

PHOTONICS WEST

The premier event for the photonics and laser industries

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The Moscone Center
San Francisco, California, USA

Conferences + Courses: 27 January–1 February 2018
Photonics West Exhibition: 30 January–1 February 2018
BIOS Expo: 27–28 January 2018

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PHOTONICS WEST 2018

THE PREMIER EVENT FOR THE
PHOTONICS AND LASER INDUSTRIES

Conferences & Courses: 27 January-1 February 2018

Photonics West Exhibition: 30 January-1 February 2018

BIOS Expo: 27-28 January 2018

The Moscone Center, San Francisco, California, USA

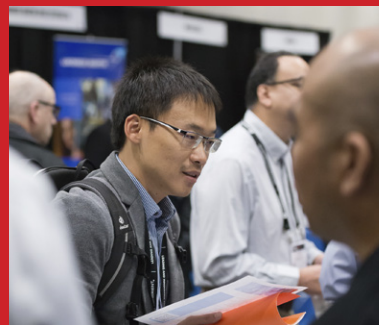


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The Moscone Center · San Francisco, California, USA

BIOS Expo: **27–28 January 2018**

Conferences + Courses: **27 January–1 February 2018**

Photonics West Exhibition: **30 January–1 February 2018**

Everything you need to know about the meeting, The Moscone Center, and San Francisco is online

- Up-to-date paper listings and session times
- Exhibiting companies and activity on the show floor
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- Information on driving and parking during exhibition days
- Schedule your week: MySchedule Tool and Conference App
 - Information about local travel options

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PROGRAM CURRENT AS OF: 1 OCTOBER 2017

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SPIE is the international society for optics and photonics, an educational not-for-profit organization founded in 1955 to advance light-based science, engineering, and technology. The Society serves nearly 264,000 constituents from 166 countries, offering conferences and their published proceedings, continuing education, books, journals, and the SPIE Digital Library in support of interdisciplinary information exchange, professional networking, and patent precedent. SPIE provided more than \$4 million in support of education and outreach programs in 2016.

For more information, visit www.SPIE.org.

Attend Photonics West to learn and network with leaders, researchers, and engineers creating new possibilities and delivering solutions.

Don't miss the world's largest photonics technologies event. Every year over 20,000 attendees come to hear the latest research and find the latest devices and systems to enable advancements in biophotonics and healthcare, new lasers for manufacturing, applications of 3D technologies, photonics-based consumer products, and more.

Conferences:

 Three conferences in one, featuring 5,200 technical presentations

BIOS pp. 40-185

Topics include biomedical optics, photonic therapeutics and diagnostics, neurophotonics, tissue engineering, translational research, tissue optics, clinical technologies and systems, biomedical spectroscopy, microscopy, imaging, nano/biophotonics.

LASE pp. 186-239

Topics include laser source engineering, nonlinear optics, laser manufacturing, laser micro-/nanoengineering, 3D fabrication, materials processing, and more.

OPTO pp. 240-361

Topics include optoelectronic materials and devices, photonic integration, displays and holography, nanotechnologies in photonics, advanced quantum and optoelectronic applications, semiconductor lasers and LEDs, MOEMS-MEMS, and optical communications.

APPLICATION TRACKS:

 Get up to speed on key technologies creating research and market opportunities.

Brain/Neuro Research, p. 363

The development of innovative technologies that will increase our understanding of brain function.

Translational Research, p. 372

Including the latest photonics technologies, tools, and techniques with high potential to impact healthcare.

3D Printing, p. 382

Highlighting papers that showcase innovative ways to apply this multidimensional/multidisciplinary technology.



Courses pp. 389-433

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BIOS EXPO
200 Companies

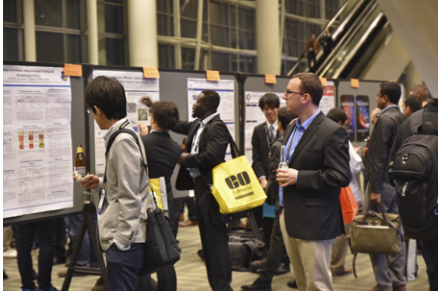


PHOTONICS WEST EXHIBITION
1,300 Companies



Plenary Presentations pp. 4-11

Don't miss these world-class speakers talking on the latest directions and most promising breakthroughs.



Technical Events pp. 12-14

Join your peers and colleagues at the poster sessions, special sessions, and other group discussions around focused technical topics.



Industry Events pp. 15-30

Keynotes, panel sessions, and workshops provide valuable information and networking opportunities for everyone—from engineers to CEOs looking for insights and opportunity.



Professional Development Workshops pp. 32-33

SPIE can help with lifelong learning and career development. Workshops and presentations will help you hone valuable job skills.



Social/Networking/Student Events pp. 34-35

Join your colleagues and make new connections at these relaxed events, including the All-Symposium Welcome Reception—an event not to be missed.



Download the SPIE Conference App



GENERAL INFORMATION pp. 434-437

Registration · Author/Presenter Information · Policies · Food and Beverage · Onsite Services · Parking and Car Rental

PROCEEDINGS pp. 439-442

SPIE POLICIES pp. 444-445



Plenary Presentations and Hot Topics

Don't miss these world-class speakers reporting on major breakthroughs and opportunities in healthcare technology.

BIOS HOT TOPICS

Saturday 27 January 2018
7:00 to 9:05 pm

7:00 to 7:10 pm

Welcome and Opening Remarks



James Fujimoto
Massachusetts Institute of
Technology (USA)
BIOS 2018 Symposium Chair



R. Rox Anderson
Wellman Ctr. for
Photomedicine, Massachusetts
General Hospital and Harvard
School of Medicine (USA)
BIOS 2018 Symposium Chair

7:10 to 7:15 pm

Presentation of the SPIE- Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

7:15 to 7:20 pm

Presentation of 2018 Britton Chance Biomedical Optics Award

Presented by SPIE President to:

Tayyaba Hasan,
Wellman Ctr. for
Photomedicine (USA)

The Britton Chance Biomedical Optics Award is presented annually in recognition of outstanding lifetime contributions to the field of biomedical optics through the development of innovative, high impact technologies. The award particularly honors pioneering contributions to optical methods and devices that have facilitated advancements in biology or medicine. The SPIE Awards Committee has made this recommendation in recognition of Dr. Hasan's impressive achievements in the field of photodynamic therapy.

7:20 to 7:40 pm

Photodynamic Therapy: the next 10 years in 10 minutes



Tayyaba Hasan
Wellman Ctr. for Photomedicine
(USA)

7:40 to 7:45 pm

Hot Topics Facilitator Remarks



Sergio Fantini
Tufts Univ. (USA)

7:45 to 7:55 pm

Taking the Photonics out of Photodynamic Therapy



Brian Wilson
Univ. of Toronto. (Canada)

7:55 to 8:05 pm

Biophotonics applications of gas in scattering media absorption spectroscopy (GASMAS)



**Katarina and
Sune Svanberg**
Lund Univ. (Sweden)
and South China
Normal Univ. (China)

8:05 to 8:15 pm

Large-scale single-cell analysis with extreme imaging



Keisuke Goda
Univ. of California/Los Angeles.
(USA) and Univ. of Tokyo
(Japan)

8:15 to 8:25 pm

Optical coherence tomography in the oral cavity



Julia Walther
Technical Univ. Dresden
(Germany)

8:25 to 8:35 pm

Optical, label-free, morpho-functional metabolic imaging



Irene Georgakoudi
Tufts Univ. (USA)

8:35 to 8:45 pm

3D multiphoton optogenetic control of neural ensemble activity



Hillel Adesnik
Univ. of California/Berkeley
(USA)

8:45 to 8:55 pm

Brainsmatics—visualizing brain-wide networks



Qingming Luo
Britton Chance Ctr. for Biomedical
Photonics, Huazhong Univ. of
Science and Technology (China)

8:55 to 9:05 pm

Latest on noninvasive, optical blood flow measurements breaking cost, portability, and scalability limits



Turgut Durduran
ICFO - Institut de Ciències
Fotòniques (Spain)

NEUROTECHNOLOGIES PLENARY SESSION

Sunday 28 January 2018 · 3:30 to 5:30 pm

This new plenary session will highlight the breadth of the exciting advances occurring in the field of neurophotonics and provide a unique forum for communication and networking for leaders and innovators in the neurophotonics community.

3:30 to 3:35 pm

Welcome and Opening Remarks



David Boas
Boston Univ. (USA)
*SPIE Brain Symposium
Chair*



Rafael Yuste
Columbia Univ.
(USA)
*SPIE Brain
Symposium Chair*

SPEAKERS:

3:35 to 3:45 pm

Neurophotonic strategies for observing and controlling neural circuits



Ed Boyden
Massachusetts Institute of
Technology (USA)

3:45 to 3:55 pm

Fast in vivo volumetric imaging of the brain



Na Ji,
Univ. of California, Berkeley
(USA)

3:55 to 4:05 pm

High-speed optical imaging of brain-wide activity



Elizabeth Hillman
Columbia Univ. (USA)

3:55 to 4:05 pm

Super-duper bioluminescent probes for next generation neuroscience



Takeharu Nagai
Osaka Univ. (Japan)

4:15 to 4:25 pm

Photoacoustic microscopy



Song Hu
Univ. of Virginia (USA)

4:25 to 4:35 pm

Photobiomodulation and the brain: a new clinical paradigm



Michael Hamblin
Wellman Ctr. for Photomedicine
(USA)

4:35 to 4:45 pm

Old tools for new uses: fNIRS to investigate transcranial brain stimulations



Hanli Liu
Univ. of Texas at Arlington (USA)

4:45 to 4:55 pm

Optical assessment of cerebral autoregulation



Sergio Fantini
Tufts Univ. (USA)

4:55 to 5:05 pm

Optics and photonics for BRAIN science: BRAIN initiative funding priorities



Edmund Talley
National Institutes of Health
(USA)

5:05 to 5:30

Discussion and Q&A

BIOS SUNDAY PLENARY SESSION

Sunday 28 January 2018
7:00 to 8:00 pm

Super-resolution post-Nobel



Stefan W. Hell
Max Planck Institute Gottingen
2014 Nobel Laureate in
Chemistry

The 2014 Nobel Prize in Chemistry was awarded jointly to W.E. Moerner, Eric Betzig and myself "for the development of super-resolved fluorescence microscopy." More than 125 years after Ernst Abbe's definition of the supposedly insurmountable diffraction resolution limit, "[our] microscopes crossed the threshold," as the Nobel poster put it. The result has been the breathtaking development of far-field optical super-resolution microscopy or, in short, 'nanoscopy' as an entire field over the past years.

A fresh look at the foundations shows that an in-depth description of the basic principles of nanoscopy spawns new powerful concepts such as MINFIELD, MINFLUX and DyMIN. Although they differ in some aspects, these concepts harness a local intensity minimum (of a doughnut or a standing wave) for determining the coordinate of the fluorophore(s) to be registered. Most strikingly, by using an intensity minimum of the excitation light to establish the fluorophore position, MINFLUX nanoscopy has obtained the ultimate (super)resolution: the size of a molecule.

BIOGRAPHY: **Stefan W. Hell** is a director at the Max Planck Institute for Biophysical Chemistry in Göttingen and at the Max Planck Institute for Medical Research in Heidelberg. He is credited with having conceived, validated and applied the first viable concept for breaking Abbe's diffraction-limited resolution barrier in a light-focusing microscope and has received several awards: most recently he shared the 2014 Kavli Prize in Nanoscience and the 2014 Nobel Prize in Chemistry.

Nature's gift: how the discovery of structural principles in a microbial protein helped illuminate the pathophysiology of psychiatry



Karl Deisseroth
Stanford Univ. (USA)

Karl Deisseroth is the D.H. Chen Professor of Bioengineering and of Psychiatry and Behavioral Sciences at Stanford University, and Investigator of the Howard Hughes Medical Institute. Over a period of twelve years, his laboratory created and developed optogenetics, CLARITY, and a broad range of supportive and enabling methods. He also has employed his technologies to discover the neural cell types and connections that cause adaptive and maladaptive behaviors, and has disseminated the technologies to thousands of laboratories around the world.

Plenary Presentations



OPTO PLENARY SESSION

Monday 29 January 2018 · 8:00 to 10:05 am

8:00 am

Welcome and Opening Remarks



Connie J. Chang-Hasnain
Univ. of California, Berkeley (USA)



Graham T. Reed
Optoelectronics Research Ctr. (United Kingdom)

8:05 am

Silicon Photonics: Bigger is Better



Andrew Rickman
Rockley Photonics Ltd. (United Kingdom)

Over the past 30 years silicon photonics has evolved into a volume technology supporting mainstream commercial applications. Though we have seen a proliferation of new approaches, the attributes required for commercial success remain the same as they were three decades ago: volume manufacturability, optical power efficiency, and high-signalling bandwidth. Comparing to the evolution of the silicon microelectronics industry several decades earlier however, in the history of silicon photonics we see one key difference: for electronic integrated circuit design, reductions in process node geometry have generally always contributed to advancing the goals of the product, leading to a conclusion that smaller is better. In contrast, for silicon photonics, reducing process geometries have introduced complexities that can inversely impact manufacturability, optical power efficiency and fiber-optic packaging. As microelectronics races to progressively smaller nodes the industry faces a question: what makes for a leading photonics platform? Perhaps bigger is better!

Andrew Rickman is the founder, CEO and Chairman of Rockley Photonics Limited based in the UK and Pasadena, CA. Rockley Photonics is a rapidly expanding company, formed to develop novel optical packet switching solutions for mega datacentre networks. Andrew was previously the founder, CEO and Chairman of Bookham Inc. (now called Oclaro Inc.). He founded Bookham in 1988 and grew the company from a start-up to a FTSE100 company. More recently, Dr. Rickman was Chairman of Kotura Inc., and was instrumental in its development and ultimately successful sale in 2013 to Mellanox Technologies, Ltd. Andrew has a mechanical engineering degree from Imperial College, London; a PhD in silicon photonics from Surrey University; an MBA from Cranfield University. He was awarded an OBE in the Queen's Millennium Honours list for services to the telecommunications industry.

8:45 am

III-Nitride Nanowire LEDs and Diode Lasers: Monolithic Light Sources on (001) Si Emitting in the 600-1300nm Range



Pallab Bhattacharya
Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)

GaN-based nanowire and nanowire heterostructure arrays epitaxially grown on (001)Si substrates have unique properties and present the potential to realize useful devices. The polarization field and density of extended defects in the nanowires are significantly smaller than those in planar heterostructures. The active light-emitting region in the nanowire heterostructures are usually InGaN disks, whose composition can be varied to tune the emission wavelength. We have demonstrated light-emitting diodes and edge-emitting diode lasers with power outputs ~10mW with emission in the 600-1300nm wavelength range. These light sources are therefore useful for a variety of applications, including silicon photonics. Detailed characterization of the epitaxial nanowire heterostructure arrays and the light sources will be described, including the characteristics of a monolithic photonic integrated circuit designed for 1.3 μ m operation.

Pallab Bhattacharya is the Charles M. Vest Distinguished University Professor and the James R. Mellor Professor of Engineering at the University of Michigan. He is recognized for his contributions to molecular beam epitaxy of compound semiconductors, quantum dot and nanowire optoelectronic devices and, in particular, lasers emitting in the visible and near-infrared and integrated photoreceivers for optical communication over the last 4 decades. He is the author of the textbook Semiconductor Optoelectronic Devices. Bhattacharya is the recipient of numerous awards including the IEEE David Sarnoff Award, the OSA Nick Holonyak, Jr. Award, the TMS John Bardeen Award, and the Heinrich Welker Medal. He is a member of the National Academy of Engineering.

9:25 am

Photonics Beyond the Diffraction Limit



Min Gu

Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

Optical data storage, optical communications and light-emitting diodes are a few examples that show that photonics has transformed massively our everyday life and global economy for a sustainable future. Nanophotonics, which studies optical science and technology at a nanoscale, has enabled the development of nano-scale optical and photonic devices that provide a green-technology platform. Abbe's law, originating from the diffraction nature of light, has set up a barrier for any efforts from the researchers to access extremely small regions in the nanometre scale. In this talk, I will show that removing the diffraction limit barrier can provide a new horizon for the development of ultrahigh-capacity optical storage devices, nano-engineered topological photonics, wide-angle optical display and micro-supercapacitors with energy density equivalent to or beyond that of Lithium ion batteries.

Min Gu is Distinguished Professor and Associate Deputy Vice-Chancellor at RMIT University and was a Laureate Fellow of the Australian Research Council. He is an elected Fellow of the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering, the AIP, OSA, SPIE, InstP, and IEEE. He was President of the International Society of Optics within Life Sciences, Vice President of the Board of the International Commission for Optics and a Director of the Board of the OSA. He was awarded the Einstein Professorship, the W. H. Steel Medal, the Ian Wark Medal, the Boas Medal and the Victoria Prize.

NANO/BIOPHOTONICS PLENARY SESSION

Tuesday 30 January 2018 · 10:30 to 11:30 am

10:30 am

Welcome and Introduction



Dan Nicolau

McGill Univ. (Canada)

10:40 am

Shaped Light for BioNanophotonics: a new chapter in imaging



Kishan Dholakia

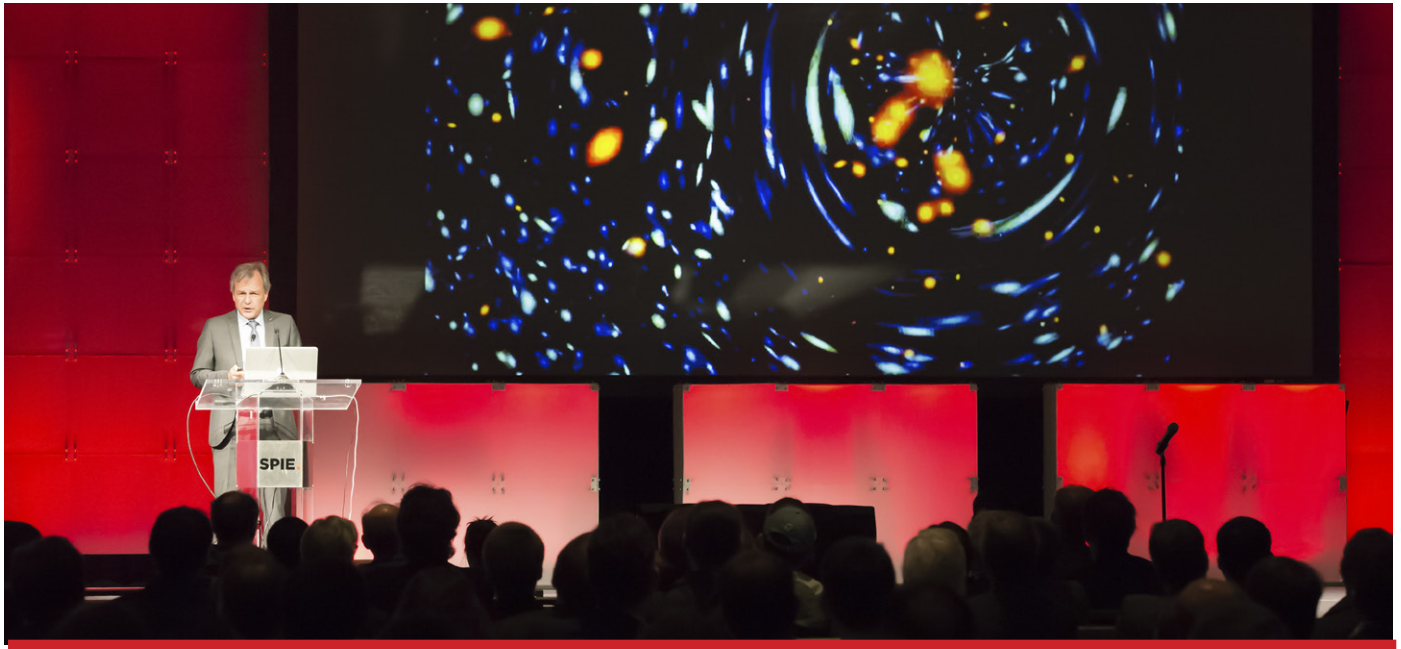
Univ. of St. Andrews (United Kingdom)

There has never been a more exciting time for biomedical imaging using light. The last decade has seen the community break through the diffraction limit as well as perform groundbreaking imaging studies for fundamental biology and healthcare in innovative ways whilst minimizing photodamage.

I will describe some of the latest advances and future opportunities using light shaped in time and space for wide field biomedical imaging. This includes the use of propagation invariant fields such as Bessel and Airy modes for obtaining wide field of view imaging with high resolution in geometries such as light sheet imaging. In addition I will describe work on complex media where we can shape light by controlling the degrees of freedom for an incident field for imaging through highly scattering tissue, at depth and developing new forms of fibre-based imaging and sensing. These methods are poised to make shaped light a powerful approach for the future of biomedical imaging.

Kishan Dholakia is a Professor of Physics in the School of Physics and Astronomy at University of St Andrews. His interests span a range of fundamental and applied photonics with a special emphasis on beam shaping of light including optical vortices and propagation invariant light fields. His group has been very active in the fields of optical manipulation and biophotonics over the last decade. He won the European Optics Prize in 2003 and is a Fellow of the Optical Society of America, SPIE, and the Royal Society of Edinburgh. He was a Royal Society Wolfson-Merit Award Holder from 2008 to 2013. He is the 2016 recipient of the R.W. Wood Prize of OSA, the 2017 recipient of the Institute of Physics Thomas Young Medal and Prize and the 2018 recipient of the SPIE Dennis Gabor Award.

Plenary Presentations



LASE PLENARY SESSION

Wednesday 31 January 2018 • 10:20 am to 12:30 pm

10:20 am

Welcome and Opening Remarks



Koji Sugioka
RIKEN (Japan)



Reinhart Poprawe
Fraunhofer-Institut für Lasertechnik (Germany)

10:25 am

Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award



Henry Helvajian
The Aerospace Corp. (USA)

10:30 to 11:10 am

Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy



Ursula Keller
ETH Zurich (Switzerland)

This talk will review our progress on gigahertz frequency combs based on modelocked semiconductor and solid-state lasers, stabilized by external silicon nitride waveguides or PCFs with an f-to-2f interferometer. Novel dual comb modelocked lasers are presented where an intracavity birefringent crystal in an ultrafast semiconductor thin disk laser is used for polarization-duplexing to obtain simultaneous emission of two modelocked beams from the same linear cavity sharing all components. Initially surprising was the observation that the cavity length adjustments to stabilize one polarization did not significantly affect the pulse repetition rate of the other, but at the end we successfully demonstrated dual comb spectroscopy without any active stabilization and with a single laser cavity.

Ursula Keller, a tenured professor of physics at ETH Zurich since 1993, leads the Ultrafast Laser Physics group, and currently also serves as a director of the Swiss NCCR MUST excellence program in ultrafast science since 2010. She received the Physics "Diplom" from ETH Zurich in 1984 and the Ph.D. in Applied Physics from Stanford University, USA in 1989. She was a Member of Technical Staff (MTS) at AT&T Bell Laboratories in New Jersey from 1989 to 1993.

She is the founding president of the ETH Women Professors Forum. She has been a co-founder and board member for Time-Bandwidth Products since 1995 and for GigaTera from 2000 to 2003, a venture capital funded telecom company. Her research interests are exploring and pushing the frontiers in ultrafast science and technology. Awards include the Charles Hard Townes Award of OSA 2015, the LIA Arthur L. Schawlow Award 2013, the ERC advanced grant in 2012, EPS Senior Prize in 2011.

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11:10 to 11:50 am

Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency



Hidetoshi Katori

The Univ. of Tokyo (Japan) and RIKEN (Japan)

The “magic frequency” protocol has made it possible to design a new type of atomic clock based on engineered perturbations. Such “optical lattice clock” allows extremely precise and speedy timekeeping, which targets a fractional uncertainty of 10⁻¹⁸. Recent progress of optical lattice

clocks is overviewed. Possible impacts and future applications of optical clocks are discussed, such as testing the fundamental laws of physics, relativistic geodesy that relies on the relativistic time dilation, and possible redefinition of the second.

Hidetoshi Katori was born in Tokyo, Japan. He is a professor, department of applied physics, The University of Tokyo, and a chief scientist, Quantum Metrology Laboratory, RIKEN. He proposed an “optical lattice clock” in 2001. He received The Medal with Purple Ribbon in 2014, and Japan Academy Award in 2015.

11:50 am to 12:30 pm

Advanced Industrial Laser Systems and Applications



Berthold Schmidt

TRUMPF Photonics Inc (USA)

Industrial laser systems continue to evolve in terms of power levels, brightness and mode of operation. While CW laser systems drive to more efficient, compact and robust light engines, ultra-short pulse (USP) solid state lasers gain increasing interest from industry due to their higher average power levels, increasing pulse energies and more flexible repetition rates, they can achieve. TRUMPF’s laser systems portfolio starting in 1985 mirrors this general development and is therefore an interesting subject to reflect the path of industrial laser systems from early CO₂ lasers to the latest generation of diode pumped USP disk lasers with up to 400W average power at 343nm. Today, our advanced laser families enable novel applications such as EUV light generation, laser lift-off and surface annealing.

Berthold Schmidt is CTO of the business unit TRUMPF Laser Technology and CEO of TRUMPF Photonics Inc., the production center for III-V high power diode lasers and subsystems. Earlier he was Head of Corporate Research establishing the TRUMPF Venture GmbH to promote disruptive technologies in early startup companies. Previously, he was CEO of Intense Ltd. in Scotland, UK and active in various management roles at Bookham, Switzerland. Berthold Schmidt received his PhD from the Technical University in Munich. He graduated from the University in Wuerzburg, Germany and holds a MSc from SUNY Albany. Since 2005 Berthold Schmidt supports the Swiss Commission for Technology and Innovation (CTI) in the field of micro and nano technologies.

Technical Events



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ATTENDEES



Join your peers and colleagues at the poster sessions, Special sessions, and group discussions around focused technical topics.

Translational Research Lunchtime Forum

Sunday 28 January 2018 · 12:30 to 2:00 pm

Join your colleagues in a discussion of outcomes-based studies that can change the lives of patients. Select participants from the Translational Research virtual symposium will have the opportunity to present their methodology and findings. These speakers will demonstrate the use of optical/light-based techniques that are innovative and clever and can change the outcome for patients in a positive and life-giving way.

Translational Research Symposium Chairs:



Bruce J. Tromberg
Beckman Laser Institute and Medical Ctr.,
Univ. of California, Irvine (USA)



Gabriela Apiou
Wellman Center for Photomedicine, Massachusetts
General Hospital Research Institute, Harvard Medical
School (USA)

NIH Special Session: NIBIB and NCI Funding Opportunities

Sunday 28 January 2018 · 1:30 to 2:30 pm



Behrouz Shabestari, Program Director
Optical Imaging and Spectroscopy, and Photoacoustic
Imaging, National Institute of Biomedical Imaging and
Bioengineering (NIBIB), National Institutes of Health
(USA)



Robert J. Nordstrom, Branch Chief
Image Guided Interventions, Cancer Imaging Program,
National Cancer Institute (NCI), National Institutes of
Health (USA)

1:30 to 1:50 pm

Scientific programs and funding opportunities at the National Institute of Biomedical Imaging and Bioengineering (NIBIB) and the National Cancer Institute (NCI)

SPEAKERS:

Behrouz Shabestari, NIBIB, National Institutes of Health (USA),
Robert J. Nordstrom, NCI, National Institutes of Health (USA)

The NIBIB mission is to improve health by leading the development and accelerating the application of biomedical technologies. The Institute is committed to integrating the physical and engineering sciences with the life sciences to advance basic research and medical care. The NCI coordinates the National Cancer Program, which conducts and supports research, training, health information dissemination, and other programs with respect to the cause, diagnosis, prevention, and treatment of cancer, rehabilitation from cancer, and the continuing care of cancer patients and the families of cancer patients. This presentation will provide an overview of the scientific programs and funding opportunities supported by NIBIB and NCI, highlighting those that are of particular importance to the field of optical imaging and spectroscopy.

1:50 to 2:20 pm

Preparing successful and competitive NIH grant applications

Speaker: **Behrouz Shabestari**, NIBIB, National Institutes of Health (USA)

The goal of this presentation is to provide junior faculty and researchers an introduction to preparing and writing a grant proposal for the National Institutes of Health (NIH), specifically related to the field of biomedical imaging and bioengineering. Topics covered include elements of a good grant proposal, NIH funding mechanisms, understanding the NIH format and review criteria, writing tips for compelling applications, and the Dos and Don'ts of successful grant-writing. The NIBIB Trailblazer Award for New and Early Stage Investigators and the new R21 Exploratory/Developmental Research Grant will be discussed.

2:20 to 2:30 pm

Final Questions and Discussion

FDA Policies and Procedures: What Academic Investigators and Small Business Should Know

Monday 29 January 2018 · 3:30 to 5:30 pm

CHAIRS:



Warren Grundfest
 Univ. of California, Los Angeles (USA)



Ramesh Raghavachari
 U.S. Food and Drug Administration (USA)

Come hear speakers from industry and regulatory agencies share their perspectives and advice on incorporating regulatory requirements into product development and how to achieve successful regulatory strategies. In addition, small business owners will gain valuable business perspectives concerning 3rd party review and regulatory approval for medical devices.



Poster Sessions

BIOS POSTER SESSIONS

Sunday 28 January 2018 5:30 to 7:30 pm

Monday 29 January 2018 5:30 to 7:30 pm

Tuesday 30 January 2018 6:00 to 8:00 pm

LASE POSTER SESSION

Tuesday 30 January 2018 6:00 to 8:00 pm

OPTO POSTER SESSION

Wednesday 31 January 2018 6:00 to 8:00 pm

Conference attendees are invited to attend the Photonics West poster sessions. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Journal of Biomedical Optics and Neurophotonics 3-Minute Poster Presentations

Monday 29 January 2018 · 4:30 to 5:30 pm

Students who have been selected to present a poster in one of the BiOS poster sessions will be presenting 3-minute rapid-fire overviews of their poster research. Presentations will be judged on content and presentation effectiveness by representatives from the Editorial Boards of the *Journal of Biomedical Optics* and *Neurophotonics*.

The top three presentations will receive cash prizes. Awards will be announced during the Monday night poster session. These awards are sponsored by the *Journal of Biomedical Optics* and *Neurophotonics*.

Technical Events

Holography

Tuesday 30 January 2018 · 7:30 to 9:00 pm

Session Chairs: **Hans I. Bjelkhagen**, Glyndŵr Univ. (United Kingdom) and Hansholo Consulting Ltd. (United Kingdom); **V. Michael Bove**, MIT Media Lab. (USA)

The Holography Technical Group is involved with the whole record of research, engineering, recording materials, and applications of holography. The main fields of interest are display holograms, commercial and artistic, holographic optical elements (HOEs), holographic interferometry and holographic non-destructive testing (HNDT), computer-generated holography (CGH), electro and digital holography, holographic microscopy, and holographic data storage (HDS).

This meeting will focus on recent developments and directions, in particular, in regard to new materials, color display holography, digital holography, CGHs and HOEs.

IBOS: International Biomedical Optics Society

Tuesday 30 January 2018 · 7:30 to 9:00 pm

Session Chairs: **Jennifer Barton**, The Univ. of Arizona (USA), **Wolfgang Drexler**, Medical Univ. Vienna (Austria)

Biomedical optics is a major growth area in modern medicine. The International Biomedical Optics Society is a nonprofit interdisciplinary group that provides a unique channel for communications among physicians and clinicians employing optics in medicine and the scientists and engineers who provide foundations for advancements in this field. The BIOS symposium, where IBOS meets, is the premier annual international forum for discussions and announcements of technical/clinical and educational/pedagogical developments in the use of lasers, optical fibers, spectroscopic diagnostic techniques, and related areas of optical medicine.

All registered conference participants are encouraged to attend this evening session. Attendees are required to wear their conference badges.

The 2018 program will include the following presentation:



Eva M. Sevick, The Brown Foundation Institute of Molecular Medicine, Texas Medical Ctr. (USA)

Fluorescence lymphatic imaging: visualizing new therapeutic strategies for cancer and autoimmune disorders?

A tutorial on the lymphatic vasculature and the “immune synapse” as discovered through non-invasive fluorescence imaging in humans.

Laser Communications

Tuesday 30 January 2018 · 7:30 to 9:00 pm

Chairs: **Hamid Hemmati**, Facebook Inc. (USA) and **Don Boroson**, MIT Lincoln Lab. (USA)

This technical event on Laser Communications will hold its informal annual meeting in conjunction with the Free-Space Laser Communication and Atmospheric Propagation conference. All professionals involved in theory and applications of free-space laser communications, remote sensing and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Attendees are invited to bring suggestions for discussion topics.

Late-Breaking Results and Innovation Awards in Quantum Sensing and Nano Electronics and Photonics

Tuesday 30 January 2018 · 7:30 to 9:00 pm

Session Chair: **Manijeh Razeghi**, Northwestern Univ. (USA)

SPIE announces the Innovation Award in Quantum Sensing and Nano Electronics and Photonics at SPIE Photonics West OPTO 2018. These awards will recognize the outstanding scientific contribution of students and early career professionals who present the most notable recent discoveries with broad impact in the areas of quantum sensing and nano electronics and photonics. These discoveries should be innovative in that they represent a new paradigm or way of thinking which will have a broad impact in their respective field. Participants will be required to give a 15-minute presentation in this Tuesday evening session chaired by Prof. Manijeh Razeghi. The winner(s) will be announced at the end of the session. Winner(s) will be awarded a commemorative plaque as well as a cash prize.

To submit your work for consideration/participation in this awards session, contact Prof. Manijeh Razeghi at razeghi@eecs.northwestern.edu with a two-page abstract (containing working title, author(s)/affiliation(s), description, and references) by **Friday 1 December 2017**.

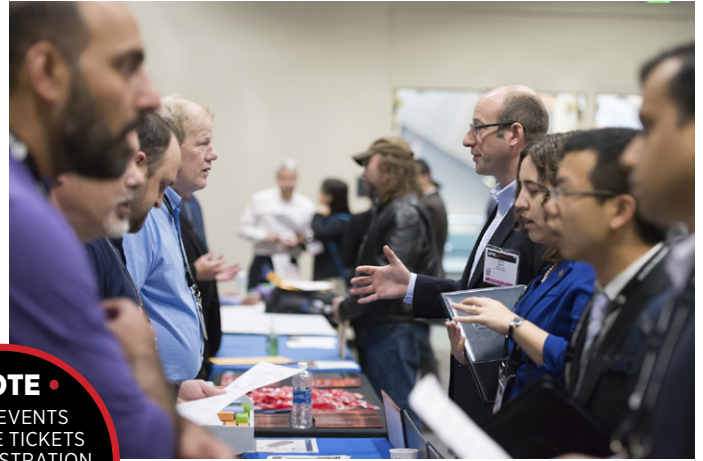
The Nature of Light: What Are Photons?

Tuesday 30 January 2018 · 7:30 to 9:00 pm

Session Chair: **Narasimha S. Prasad**, NASA Langley Research Ctr. (USA)

The purpose of this workshop is to stimulate the generation of new inquiring questions by our optical engineers and to become more effective innovators exploiting the new subtle understanding behind Non-Interaction of Waves (NIW). The key idea is to pay closer attention to visualize the invisible interaction processes that go on between light and matter in our instruments that finally give rise to the data we record. The NIW-property was explicitly underscored by Huygens as the postulate that waves advance through perpetual generation of non-interacting secondary wavelets. We have been failing to recognize that the NIW-concept is already built into the Huygens-Fresnel diffraction integral, the bedrock foundation for classical optical phenomena. This workshop will show that explicit application of NIW opens up a wide platform for better understanding almost all optical phenomena, along with potential for many innovations.

In this forum, the speaker, Chandra Roychoudhuri, who applied this method of thinking and rediscovered the forgotten NIW-property and found that it applies to all kinds of propagating waves, will first establish the generic NIW property with videos of waves on water surface and on long spring, propagating through each other without losing their individual characteristics. This will be followed by a number of optical interferometer experiments demonstrating that light wave amplitudes, by themselves, cannot re-organize their energy distributions (generate fringes) without some classical and/or quantum mechanical energy transfer process facilitated by appropriate material dipoles. Then the NIW-property will be used to articulate many inquiring questions that give rise to deeper understandings for a selected set of optical phenomena.



NOTE
SOME EVENTS REQUIRE TICKETS AND REGISTRATION. SEE INDIVIDUAL EVENTS FOR DETAILS.



Attend these free sessions to learn about growth opportunities, gain insight and inspiration about big markets, hear new business ideas, and meet industry leaders focused on commercial applications.

Startup Challenge Pitch Clinic

Monday 29 January 2018 · 9:00 am to 12:00 pm

Semi-Finalists for the Startup Challenge are invited to a morning of training on entrepreneurship and pitches.

AR, VR, MR One-Day Industry Conference and Headset Demonstrations

Monday 29 January 2018 · 10:00 am to 5:00 pm

RSVP required: innovation@spie.org

Enterprise Virtual and Augmented Reality: Paving the Road to the Ultimate Consumer Mixed Reality Experience.

“VR / AR is dead, long live MR!” Well, maybe not yet, but soon. Virtual Reality (VR), born as a tool for gaming, enables people to immerse into a synthetically created environment. Augmented Reality (AR), which enjoyed some commercial success in its early smart phone incarnation thanks to the Pokémon Go, augments the natural world with virtual objects. Addressing key hardware challenges, especially optical, such as in visual / wearable comfort and immersion are key to consumer mass adoption.

Mixed Reality (MR) can be described as a seamless experience ranging from VR to AR—and perhaps the only future concept for any “enhanced reality” mainstream technology for both enterprise and consumer.

This daylong industry conference consists of 12 invited talks on the current optical technology challenges and successes. The day ends will a panel discussion on these challenges as well as predictions for the future.

SPEAKERS:



Bernard Kress

Partner Optical Architect at Microsoft / Hololens

Bernard Kress has made over the past two decades significant scientific contributions as an engineer, researcher, associate professor, consultant, instructor, and author. He has been instrumental in developing numerous optical sub-systems for consumer electronics and industrial products, generating IP, teaching and transferring technological solutions to industry. Application sectors include laser materials processing, optical anti-counterfeiting, biotech sensors, optical telecom devices, optical data storage, optical computing, optical motion sensors, digital image projection, digital displays systems, computational imaging and display, depth map and gesture sensors, and HMD/HUD displays (as in smart glasses, AR/MR and VR). Bernard has joined Google [X] Labs. in 2011 as the Principal Optical Architect on the Google Glass project, and is since 2015 the Partner Optical Architect at Microsoft Corp. in the Hololens project.

AV, VR, MR Industry conference continued next page ➔

Industry Events



Leo Baldwin
Amazon, Functional Photonics

Leo is a physicist, futurist, and inventor with a career in applied research and product development. His design work has spanned nuclear reactor cores, submarines, fire-control, aircraft landing, laser micro-machining, nano-structures, solar energy and consumer electronics. Leo's commercial work has resulted in 56 US patents and can be found in glass plants and silicon fabs, on iPads and iPhones, and in the Fire Phone and Fire tablets. Leo is currently Principal Engineer at Amazon where he is developing technology for Corporate Projects.

Startup Challenge Networking Lunch

Monday 29 January 2018 · 12:00 pm to 1:30 pm

Startup Challenge Pitch Clinic attendees network with judges and mentors. This event is open to Startup Challenge participants only.

Photonics Cluster Reception

Monday 29 January 2018 · 5:00 pm to 6:30 pm

RSVP required. If you would like to attend, please email innovation@spie.org

All leaders from regional optics and photonics clusters are invited to join this SPIE-hosted reception. Connect with your peers while enjoying drinks and appetizers, compare notes, and hear an update from your peers abroad on efforts to raise awareness of photonics in their homeland, as well as a brief report on the SPIE Photonics Market Analysis project. Dress is business attire.



Women Executives Meet-Up

Monday 29 January 2018 · 6:00 to 7:00 pm

RSVP required. If you would like to attend, please email innovation@spie.org

Please join this inaugural event for women executives (industry or academia) to meet up, talk shop, network, and enjoy a glass of wine. This is an event for women in the optics, photonics, and applications community. This event follows the SPIE Women in Optics presentation and reception.

How Global Investment is Bringing Quantum Technologies to the Marketplace

Tuesday 30 January 2018 · 8:30 to 9:45 am

Quantum Technologies promises significant advances in secure communication, sensing and computation. It has gained momentum in the last few years, attracting significant investment, not only from various governments but also from industry. Photonics is not only a key enabler of quantum technology but it will also progressed further because of tighter demands.

This session provides a snapshot of the investments being made in different countries: the amount of money being made available for different areas. There are differences in emphasis and approach. Some of our speakers have been closely involved in their national programs. We will round this up with examples of significant commercial development that some companies are undertaking. The session will close with a panel discussion about the variation in approach in funding of quantum technology globally and the key development needs, with focus on photonics to make this all work.

MODERATOR:



Anke Lohmann

Anchored In Ltd, Consultant in Photonics and Quantum Technologies

Anke Lohmann is an independent consultant in photonics and quantum technologies. She developed the UK's Quantum Technologies Special Interest Group, a national initiative funded by the UK government as part its Quantum Technologies programme. She was previously responsible for the UK's national photonics platform until 2017. Anke is highly engaged with the UK photonics community, industry, and end-users to evaluate opportunities for this emerging sector. Anke has a MEng, Electrical Engineering from Technische Universität Dresden and PhD, MEMS, from the Imperial College London.

PANELISTS INCLUDE:



Mark Farries

Gooch & Housego (UK), Technology Advisor

Dr Mark Farries received a BSc degree in Electronic Engineering and Physics from Loughborough University in 1980 and a PhD in fibre optics from London University in 1986. He is an expert in photonics and has published over 90 papers or conference publications and been awarded 24 patents. His career encompasses over 30 years in opto-electronics with Standard Telecommunications Laboratories, Schlumberger, GEC Marconi, JDS Uniphase as Director of New Products and Evanescos as Technical Director. Currently he is Technology Development Advisor for Gooch & Housego Ltd, which is a World leading manufacturer of photonic components. He is also a visiting professor at Nottingham University.



Rishiraj Pravahan

AT&T Foundry, Principal Data Scientist

Rishiraj Pravahan is Principal Data Scientist at AT&T Foundry as well as Co-founder of INQNET Co-founder of INQNET (Intelligent Quantum Networks and Technologies) a collaboration between AT&T and Caltech within the AT&T Foundry. INQNET is aimed at research and development towards accelerating progress in the fields of quantum networks, quantum technologies, quantum machine learning and artificial intelligence. The goal of the INQNET program is to engage industry, academia and government to build the next generation quantum internet.



Robert Rölver

Bosch (Germany)
Scouting Quantum- and Nanotechnologies

Recent Developments Affecting IP Protection and Trade Compliance with China: Key Things to Know

Tuesday 30 January 2018 · 8:30 am to 10:00 am

Infringements of intellectual property rights are a widespread and ever-increasing phenomenon worldwide. International trade in counterfeit products represents up to 2.5% of world trade, or as much as €338 billion (EUIPO study, a-tv, 9.21.2017).

This session will look at how U.S. export regulations are effecting trade with China and how it is applicable to the photonics and sensors industry.

Topics include:

- IP agreements and challenges: establishing IP safeguards in the PRC business environment
- Trade logistics in China: leveraging enterprise zones, joint ventures and other business entity structures
- Managing export controlled technology in China: protective agreements and Technology Control Plans
- New PRC export regulations: impact of exporting products, technology and software from the PRC
- Recent CFIUS developments affecting trade with China

SPEAKERS:



Kerry Scarlott
BakerHostetler

Kerry Scarlott counsels organizations of all sizes engaging in activities domestically and abroad regarding international trade matters. He has particularly deep experience counseling technology-based clients on effectively and efficiently navigating the Export Administration Regulations (EAR); the International Traffic in Arms Regulations (ITAR); the Foreign Corrupt Practices Act (FCPA); special sanction programs administered by various U.S. government agencies, including the Treasury Department's Office of Foreign Assets Control (OFAC) and the National Industrial Security Program Operating Manual (NISPOM); and national security regulations.



Don Fischer
Fischer Associates

Mr. Fischer's corporate export control practice focuses on inventory and process risk assessments, development of comprehensive compliance procedures, and targeted compliance within Consent Decrees and Directed Audits and framework. Technical solutions address classification, licensing, exemptions, deemed exports, commodity jurisdictions, managing control documentation, technology control programs, leveraging IT solutions for data identification and segregation under ITAR, sourcing models, shipping and receiving, acquisition due diligence, end use verification, re-export, and off-shore compliance with U.S. regulations.

Open Session of the Sensors and Instrumentation Technical Advisory Committee

Tuesday 30 January 2018 · 9:30 am to 11:00 am

The Sensors and Instrumentation Technical Advisory Committee (SITAC) advises the Office of the Assistant Secretary for Export Administration within the Department of Commerce on technical questions that affect the level of export controls applicable to sensors and instrumentation equipment and technology.

MODERATOR:



Chris Costanzo

Deputy Director of the Sensors and Aviation Division, Bureau of Industry and Security, Department of Commerce

If you are interested in joining for one or more of these meetings, contact SPIE Government Affairs Director Jennifer Douris at jenniferd@spie.org to be added to the distribution list for meetings and activities.

BACKGROUND

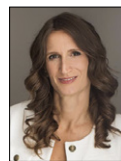
Technical Advisory Committees (TACs) advise the Department of Commerce on the technical parameters for export controls applicable to dual-use commodities and technology and on the administration of those controls. The TACs are composed of representatives from industry and Government representing diverse points of view on the concerns of the exporting community. Industry representatives are selected from firms producing a broad range of goods, technologies, and software presently controlled for national security, foreign policy, nonproliferation, and short supply reasons or that are proposed for such controls, balanced to the extent possible among large and small firms.

TAC members are appointed by the Secretary of Commerce and serve terms of not more than four consecutive years. Members of the public who are not members of the TAC are welcome to attend the open session of this committee meeting. A closed session will immediately follow the open session.

Marketing Tips for Small Companies: How to Bring Customers to You

Tuesday 30 January 2018 · 10:15 am to 12:00 pm

INSTRUCTOR:



Michele Nichols
Launch Team Inc.

Looking to improve the ROI on your marketing and sales? Compare notes with your peers in this open discussion. Speaker Michele Nichols will share successes and lessons learned across many of the optics and photonics companies she works with, and will facilitate this roundtable session.

This session will include a marketing roundtable discussion, "how to bring customers to you" ideas, practical tips for companies from start-up to second stage growth, etc.

Industry Events



Free Headshots

Tuesday 30 January 2018 · 10:00 am to 5:00 pm

Get your FREE Professional Headshot taken during Photonics West

Whether you are looking to update your SPIE profile, social media pics, or a framed picture on your desk, take advantage of this FREE service offered by SPIE. Dress professionally and even come back each day to get multiple styles of pictures.

These are free for every attendee, exhibitor, instructor, student, or exhibition visitor.

Sponsored by **SPIE. CAREER CENTER**

SPIE Job Fair

Tuesday 30 January 2018 · 10:00 am to 5:00 pm

Top Employers are Coming Together to Interview and Hire Candidates at Photonics West 2018

Whether you are looking for employees or looking for a job, this is your chance to connect with the best. Meet over 30 recruiters on the exhibit floor including KLA Tencor, Coherent, Newport, General Atomics, Lumentum and more.

Photonics Fast Pitch Lunch

Tuesday 30 January 2018 · 11:30 am to 1:30 pm

The Photonics Fast Pitch event brings entrepreneurs together with people interested in technology business investment. With 2 minutes to pitch, entrepreneurs will introduce their company, business plan, and current market traction in a rapid fire format. The goal is to build a basis for introductions and network-building in the area of photonics technology entrepreneurship. Join angel investors, VCs, analysts, M&A specialists, and big company scouts at this industry event.

Teams interested in pitching should apply at: <http://bit.ly/PFastPitch> by 11 December 2017. Teams will be invited based on readiness for accelerated growth. The session concludes with time for 1:1 questions and networking with potential investors and mentors. Space at the lunch is limited. To attend as a non-pitch presenter, please RSVP by completing the following form: <https://goo.gl/j2PgSo>.

THE PHOTONICS FAST PITCH LUNCH
IS CO-SPONSORED BY:



The Solid-State Lighting Revolution: The Next Stage of Market Development

Tuesday 30 January 2018 · 1:30 pm to 3:00 pm

The lighting market is undergoing a transformation of a magnitude not seen since the invention of the incandescent lamp. LED technology embodied in lamps (bulbs) and luminaires (fixtures) has now captured over 50% of the \$80 billion worldwide lighting market and the near-complete penetration of this market with LED sources is in sight. Energy efficiency has been the main driver for this transformation, but other factors, such as light quality and controllability, have now becoming equally, if not more, important in moving the market forward.

This panel of lighting experts will provide examples of the innovative applications that go well beyond the simple replacement of conventional sources with more efficient LEDs. Attendees will gain insights into the technology innovations that are providing new benefits and capabilities that were never achievable with conventional light sources.

MODERATOR:



Robert V. Steele

Consultant in Solid-State Lighting

Robert V. Steele is an independent consultant in solid-state lighting. He retired in March 2010 as the Director of the LED Practice at Strategies Unlimited, where he had been responsible for all of the company's activities in the area of LED market research and consulting since 1994. Dr. Steele was a founder of the Strategies in Light conference in 2000 and chaired it from 2000 to 2011. He also chaired Strategies in Light conferences in Japan and China. From 2012 to 2015 he was the chair of Strategies in Light Europe. Currently he is a co-chair of Strategies in Light in the US. Since 2010 he has consulted with LED lighting startup QuarkStar. He has written regularly for industry publications on LED markets and applications, and has given invited presentations at major conferences around the world. Dr. Steele has a B.S. in chemistry from MIT and a Ph.D. in physical chemistry from the University of California, Berkeley.

PANELISTS:



Aaron M. Smith

Finelite, Director of Technology

Aaron Smith is the Director of Technology at Finelite Inc. and in this role supports the development of energy efficient, high quality, and sustainable lighting products. This includes managing new technology integration, new product development, and R&D efforts. He completed his Master of Science in Lighting at Rensselaer Polytechnic Institute's Lighting Research Center (LRC), in Troy NY, and continued on at the LRC as a Senior Lighting Researcher until 2012. He is co-author of several lighting papers with topics that include daylighting metrics, light and health, energy efficiency, and transportation lighting. He has also received several honors including the Illuminating Engineering Society (IES) Award of Merit, IES Future Leader in Lighting, National Association of Home Builders Best Integration of Technology Silver Achievement Award, and the distinguished Leon Gaster Award (Best Paper of the Year) from the Society of Light and Lighting for the paper, "Conceptual design metrics for daylighting," published in Lighting Research & Technology. He is most proud of being part of the Finelite team, sharing awards with teammates that include utility patents and industry recognition for lighting product design, and supporting initiatives to bring better lighting to market through efforts like DOE research.



Clifton Stanley Lemon
IESNA, Founder and CEO

Clifton is the founder and CEO of Clifton Lemon Associates, which provides education, strategy, product development, and marketing consulting and advisory services to manufacturing, technology, design, and funding organizations.

He was formerly Marketing Communications Manager for Soraa and Director of Business Development at Integral Group. He is the President of the Illuminating Engineering Society, San Francisco Section, and is on the Advisory Boards of Strategies in Light/The LED Show, Lightspace CA, and LightShow West. Clifton has extensive experience with education, brand management, marketing communications, customer research, sales support, training, and project management for tech startups, multinationals, non-profits, and government agencies in the architecture, engineering, manufacturing, media, education, and publishing sectors. He has deep knowledge of sustainability, MEP, lighting, and LED technology, is well connected to the Bay Area, national, and international AEC and lighting and AEC communities, and is passionate about lighting, sustainable building, and behavioral issues in the built environment. He is an active writer and speaker, with extensive experience in event production and curriculum for professional development.



Steve Paolini
Telelumen, President

Steve joined Hewlett Packard, Optoelectronics Division in 1981. While at HP he held a variety of engineering and management positions in California, Japan, and Malaysia. In 2000 he joined Philips Lumileds as a founding member.

In 2007 he founded Telelumen, where he is currently the President. He was also the CTO at Lunera Lighting and the CTO of NEXT Lighting. He speaks frequently on a variety of topics related to solid state lighting and holds 20 issued patents. Steve has his BSEE from Penn State University.

Q&A and networking to follow.

Next Generation Fiber Technology: Perspective and Roadmap

Tuesday 30 January 2018 · 1:30 pm to 2:30 pm

We will bring world-leading experts together to discuss the challenges in different applications and markets with the goal to derive a roadmap for the next developments required in fiber technology. The results will be published in a white paper summarizing our efforts and containing a derived fiber technology roadmap for the next 10 years.

SPEAKER:



Kevin Fuchsel
Fraunhofer Institute for Applied Optics and Precision Engineering IOF
Head of Department Strategy & Marketing

Graphene-CMOS Integration for Broadband Imaging and Integrated Photonics

Tuesday 30 January 2018 · 3:00 to 3:45 pm

Graphene-CMOS integration for broadband imaging and integrated photonics—A Graphene Flagship perspective on taking graphene from the Lab to the Market

Integrated circuits based on CMOS (complementary metal-oxide semiconductors) are at the heart of the technological revolution of the past 40 years, as these have enabled compact and low cost micro-electronic circuits and imaging systems. However, the diversification of this platform into applications other than microcircuits and visible light cameras has been impeded by the difficulty to combine other semiconductors than silicon with CMOS.

We show several applications of graphene-CMOS integration. This includes the first monolithic integration of an electronic CMOS integrated circuit with graphene, operating as a broadband photodetector. We demonstrate a high-resolution image sensor and operate it as a digital camera. The graphene was sensitized with colloidal quantum dots that make it sensitive to UV, visible and infrared light (300 – 2000 nm). Moreover, we discuss the progress on integrated photonics and wafer-scale integration within the EU Graphene Flagship program.

SPEAKER:



Frank Koppens
The Institute of Photonic Sciences (ICFO)



Startup Challenge Semi-Finals

Tuesday 30 January 2018 · 2:00 pm to 4:00 pm

Startup Challenge semi-finalists pitch their business to a panel of expert judges and compete to move on to the Startup Challenge finals. Get connected to early-stage technology companies in the following areas:

Track 1: Biophotonics and Point of Care

Track 2: Imaging, Displays, Lasers, and Semiconductors

Track 3: Sensors, Wearables, IoT

Silicon Photonics and Photonic Integrated Circuits: 2018 Industry Perspective

Tuesday 30 January 2018 · 3:30 to 4:45 pm

Demand for smaller and cheaper optical interconnections inside networks and computers will create a new market of miniaturized, low-cost photonic components that can leverage the scale of CMOS manufacturing. Learn what industry leaders have developed at the frontier of the silicon photonics market.

MODERATOR:



Peter Hallett
SPIE, Director of Marketing and Industry Relations

PANELISTS:



Philippe Absil
IMEC, 3D and Optical Technologies Department Director



Peter De Dobbelaere
Luxtera, VP of Engineering



Douglas Gill
IBM T. J. Watson Research Center, Research Staff



Ashok Krishnamoorthy
Oracle, Architect and Chief Technologist, Photonics

Concurrent Opto-Mechanical Engineering: Where Do You Start? A Session for Engineering Managers

Tuesday 30 January 2018 · 4:00 to 5:00 pm

Attendees will learn how software is rapidly changing the way optical design teams are organizing themselves, significantly lowering total cost, accelerating time to market, and changing the competitive landscape.

Attendees will learn what they can do to assess their current capabilities, as well as how to initiate the changes needed to modernize their work flows.

Intended Audience: Optical and mechanical engineering managers, Directors and VPs.

INSTRUCTOR:



Mark Nicholson
Zemax

SPONSORED BY: **Zemax**



Export Control Working Group: Cameras

Wednesday 31 January 2018 · 8:30 am to 9:30 am

SPIE, in conjunction with the Department of Commerce Sensors and Instrumentation Technical Advisory Committee (SITAC), has established working groups composed of industry and university representatives to assist in identifying and developing proposals related to improving the export control system in the areas of Detector & Cameras, Lasers, and Lenses and Optics.

Discussion Topic: Detectors and Cameras

- Uncooled
- Cooled
- SWIR
- Cryocoolers
- ROICs
- Image Intensifiers

MODERATOR:



Jennifer Douris O'Bryan
SPIE Government Affairs Director

If you are interested in joining for one or more of these meetings, contact SPIE Government Affairs Director Jennifer Douris at jenniferd@spie.org to be added to the distribution list for meetings and activities.

STARTUP
challenge

SPIE.



PITCH YOUR IDEA

TO INDUSTRY PROFESSIONALS AND COMPETE TO

WIN

\$85,000

CASH & PRIZES

WWW.SPIE.ORG/STARTUP

SUBMISSIONS DUE 13 NOVEMBER 2017

The **SPIE Startup Challenge** is a competitive event that takes place on Wednesday 31 January during Photonics West 2018. We invite new entrepreneurs to pitch their light-based technology business plan

to a team of corporate development experts and venture capitalists. With over **\$85,000** in cash, prizes, promotion, and more, this is your chance to be seen, learn, and win!

OPEN TO ALL PRE-REVENUE ENTREPRENEURS

Takes place at
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FIND OUT MORE ABOUT THIS LIVELY AND INTERACTIVE PITCH COMPETITION. WWW.SPIE.ORG/STARTUP

Industry Events



From Startup Creation to Acquisition: How to Be Successful at Each Stage

Wednesday 31 January 2018 · 8:30 am to 9:45 am

Come hear experts discuss how best to develop your ideas, company, and strategies.

MODERATOR:



Laura Smoliar

Berkeley Catalyst Fund, Founding Partner and Managing Director

Laura has spent nearly two decades in Silicon Valley's technology sector. She co-founded Global Innovation Foundry, LLC in 2014 to connect innovation, market opportunity, and investors between the U.S. and Asia. Her own startup experience building strategic partnerships and raising funds from Asia inform her approach to solving complex problems across different cultures and economies, harnessing the best assets of large corporations and small companies. She has extended this into the development of a hybrid investment model (containing non-profit and for-profit components), working closely with the University of California, Berkeley, to create the Berkeley Catalyst Fund. Laura is a Columbia College graduate and a member of the Columbia Technology Ventures Executive Advisor Network. She also holds a Ph.D. in physical chemistry from the University of California, Berkeley.

SPEAKERS:

From science to startup launch: how to get your idea developed into a company



Patrick Scaglia

Blue Bear Ventures, Managing General Partner

Patrick Scaglia, co-founder of the CITRIS Foundry and Managing Director of Blue Bear Ventures he serves on the CITRIS Advisory Board and is a consultant and technology advisor to startup ventures. Patrick was a Hewlett Packard Executive for 12 years, seven of those as CTO, and most recently as VP and CTO of HP Cloud Services and Applications. Patrick serves on several Advisory Boards including the UC Berkeley College of Engineering and the Center for Information Technology Research in the Interest of Society (CITRIS). He has also served on the Georgia Tech College of Computing and the National Science Foundation Directorate for Computer Information Science and Engineering. Patrick graduated from the University Louis Pasteur in Strasbourg, France, where he received bachelor's, master's degrees and Diplome d'Etudes Approfondies (DEA) in Physics. He also graduated from the Ecole Nationale Supérieure de Physique in Strasbourg with a master's degree in engineering.

How to find the money and utilize accelerators and incubators



Sujatha Ramanujan

Luminate, Managing Director

Sujatha Ramanujan is serial entrepreneur and seasoned executive with 25 years of experience in Clinical Devices and in Consumer Electronics. Sujatha has started, built and grown three startup businesses. Sujatha has held scientific, technical leadership, and laboratory head positions in Chrysler Corporation, GE, Kodak, Carestream, and Intrinsic Materials. She holds 28 issued US patents. As a corporate investor for Kodak, then later working with regional investment councils, she provides guidance to start-ups, and M&A strategies. Dr. Ramanujan holds a PhD in Electrical Engineering from the University of Michigan and is a Board Member of the National Women's Hall of Fame.

Plans for your business, planning growth, planning an exit strategy



Magnus Bengtsson

Coherent, Vice President Strategic Marketing

Q & A to follow.

3D printing and Industry 4.0: An industry perspective

Wednesday 31 January 2018 · 8:30 am to 10:00 am

The 3D printing/additive manufacturing landscape has changed drastically since the first 3D printer was created in 1984. Originally used mostly for modelling and prototyping, 3D printing is now making its way into mainstream manufacturing. Widespread adoption however, has been slowed or limited by such factors as material options, slow print speeds, equipment cost, and lack of standardization.

At the same time advances in computing, robotics, automation, and the advent of the internet of things have aligned to further disrupt the manufacturing sector. To remain profitable and stay competitive, companies will have to embrace the digitization of manufacturing - Industry 4.0 - which, in addition to these disruptive technologies, will potentially upend traditional supply chain management and production planning as well as require engineers and designers to change their mindset from subtractive to additive.

Attend this panel discussion and find out how industry leaders are addressing the challenges of this exciting marketplace. panel discussion about these hurdles and how they might be overcome.

MODERATOR:



Stephen G. Anderson

SPIE, Director, Industry Development,

PANELISTS:



Jason Jones

Hybrid Manufacturing Technologies, Co-founder and CEO
Dr. Jason B. Jones is a pioneer in the combined use of Additive Manufacturing (AM) and CNC machining. He is the co-founder and CEO of Hybrid Manufacturing Technologies, a 3D printing start-up which equips CNC machines with AM

and laser processing capabilities. Dr. Jones has a PhD in 3D printing from the University of Warwick and has led millions of dollars of AM research and authored numerous publications and patents during the last decade. He has investigated 3D printing/ digital fabrication techniques for multi-material functional parts and hybrid processing of metals. Dr. Jones serves as a Task Group Chair for ASTM where he has led the development of several AM standards (including SO/ASTM 52921). He also serves as the chair of SME's community advisors for Additive Manufacturing (the largest professional 3D printing community world-wide). For five years prior to his research appointments, he worked as technical manager in the CNC and 3D printing industry in London.



Peter Leibinger
TRUMPF GmbH, CTO,
Vice Chairman of the Managing Board

Dr. Peter Leibinger is Vice Chairman of the Managing Board of TRUMPF GmbH + Co. KG and Chief Technology Officer. He is responsible for research and development, sales and service, as well as the development and expansion of new business units such as additive manufacturing. Among other roles, he has also served as Head of the Laser Technology and Electronics Division, where he was responsible for group-wide research and development and for new business fields. He studied mechanical engineering at the RWTH University in Aachen, Germany, and has worked as a development engineer at Ingersoll Milling Machine Company, before becoming Chairman and CEO of TRUMPF, Inc. in Farmington, CT.



Martin Schaefer
Siemens AG Corporate Technology

Photodetectors, Raman Spectroscopy, and SiPMs versus PMTs: One-Day Workshop

Wednesday 31 January 2018 · 8:30 am to 5:30 pm

Hamamatsu is holding a free one-day workshop that covers three topics. Come for each session or come for the entire day.

DAILY SCHEDULE:

PART I: 8:30 to 10:00 am

Photodetectors: Theory, Practice, Applications, and Selection

Photodetectors are essential components in a vast array of modern scientific and commercial instruments and devices; technological progress will make them even more ubiquitous. Understanding their opto-electronic properties, regimes of operation, circuit requirements, and noise characteristics is essential to a practitioner to make a proper photodetector selection for a given application.

The purpose of this presentation is to provide guidance in this process by discussing the above considerations for the four most common point photodetectors: photomultiplier tube, photodiode, avalanche photodiode, and silicon photomultiplier.

PART II: 1:00 to 2:45 pm

Raman Spectroscopy: Theory and Practice

Information about the system under investigation may be contained in the spectrum of light received from it. Spectroscopy is an umbrella term referring to a multitude of measurement techniques that can be employed to access the information.

This presentation mentions several major dispersive and non-dispersive spectroscopic techniques such as, for example, fluorescence, Fourier

transform, laser-induced breakdown, time-resolved, and discusses in greater detail three forms of Raman spectroscopy: normal, resonant, and surface enhanced. The discussion of Raman spectroscopy includes the theory behind the technique, the hardware components of a working setup, and the most common applications.

PART III: 3:00 to 5:00 pm

Single-photon detection: SiPMs versus PMTs

Since early 1990's, a silicon photomultiplier has become a viable alternative to a photomultiplier tube in selecting a photodetector for applications where the light signal may consist of few hundred photons per second.

This presentation reviews the physics of operation of both devices, describes their key opto-electric characteristics, compares their performance, and reports the latest advancements in the design of silicon photomultipliers. It ends with a discussion of several applications for which the choice between using either silicon photomultipliers or photomultiplier tubes may be very subtle.

INSTRUCTOR:



Slawomir Piatek
Hamamatsu

SPONSORED BY: **HAMAMATSU**
PHOTON IS OUR BUSINESS

Laser Optics and Polarizers, from Pulsed Lasers to White Laser Light, and IR Detectors: One-Day Workshop

Wednesday 31 January 2018 · 8:30 am to 5:00 pm

The team from Laser Components is holding a free one-day workshop that covers three topics. Come for each session or come for the entire day.

PART I: 8:30 to 10:00 am

How to Specify High-Power Laser Optics and Polarizers

Specifying the correct optical component may determine the success of an application. This session focuses on high-power laser optics and polarizers, their functional principles, essential properties, and corresponding effects depending on the application.

8:30 to 9:00 am

High-Power Laser Optics

- Advantages and disadvantages of different coating technologies
- Tradeoffs of laser optics specifications
- Laser Induced Damage Threshold (LIDT) / Absorption for UV wavelengths
- Surface flatness of laser optics after coating

9:00 to 10:00 am

Theory of polarization, polarizer types, and utilization

- Explain the matter of polarization and list different types of polarizers
- Characterize polarizers by their specifications
- Describe the polarizers mode of operation in various applications
- Define key parameters for a polarizer in an intended application

INSTRUCTORS:



Barbara Herdt
Laser Components



André Volke
CODIXX

Industry Events

PART II: 11:00 am to 1:30 pm

From Distance Measurement in LiDAR to Next-Gen White Light, Each Using Different Technologies: How to Set the Optimal Device Performance

In laser scanning applications like LiDAR, many electro-optical systems using a time-of-flight concept require temporally fast optical pulses to achieve the distance resolution and detectors that can amplify very weak signals coming from the targets. The first workshop will focus on the Pulsed Laser Diodes (PLDs) part and provide an overview of challenges faced when switching high peak current fast switch hybrid laser diode circuits. The workshop on the detector part will zoom in on Silicon Avalanche Photodiodes (APDs) in terms of structure, internal gain mechanism, and noise and speed of operation.

To close this session, we will provide an overview of a next generation white laser light module, which features safe high efficiency fiber delivery of light from a blue laser diode to a remote phosphor module that produces high luminance, incoherent, broad spectrum white light.

11:00 to 11:30 am

Driving FET-based Pulsed Laser Hybrid Circuits

Understanding of the various elements of field-effect transistors (FET) driver design for optimized device performance.

11:30 am to 12:00 pm

Silicon APD Array Structure and Operation

APD arrays requirements for special photosensitive area sizes, contours, gain variations and gaps between elements and their effects on performance.

1:00 to 1:30 pm

Features of the world's first, high luminance, white laser module

Thanks to its high luminance output, the white laser module enables novel lighting effects, including miniature luminaires with long range highly collimated beam output, compact ultra-short throw high angle illumination, and glare-free pattern generation with sharp light gradients.

INSTRUCTORS:



Dragan Grubisic
Laser Components
Detector Group



Ran Zhu
Laser Components
Canada



Julian Carey
Soraalaser

PART III: 1:30 to 5:00 pm

IR Detectors: What Are the Best New IR Technologies for Your Company

Choosing the right infrared detector can often be quite daunting as there are many to choose from, each with their own modes of operation, ideal performance conditions, variations, and limitations. This session will provide an overview of the different types of IR detectors available on the market today & cover their usage in industrial gas sensing applications, spectroscopy, radiation thermography and non-destructive inspection processes. This will include the following technologies:

- InGaAs, Extended InGaAs, and InAs Photodiodes
- PbS & PbSe (Lead Salt) Photoconductors
- Pyroelectric Detectors

1:00 to 2:00 pm

Selecting an IR detector for Gas Sensing Applications

- An understanding of the main advantages and disadvantages of common IR detector technologies covering operation, ideal conditions, available versions, and limitations of each technology
- How to specify a detector for your project
- Typical gas sensing setups for each technology
- How to get the best out of your detector
- Upcoming sensor technologies and “exotic” materials

2:00 to 2:30

High speed InGaAs Arrays for SD-OCT and Machine Vision

Understanding the specifications of 512, 1024 and 2048-pixel InGaAs Line-arrays with up to 400 KHz line rates, surpassing the speed requirements of medical (3D SD-OCT) and machine vision applications, consuming limited power while exhibiting stellar noise performance

2:30 to 3:00 pm

Use of Extended InGaAs Linear Arrays

To develop an understanding of the capability of 1.7 μ m, 2.2 μ m, and 2.6 μ m cut-off wavelength linear InGaAs arrays and the factors that influence sensitivity

4:00 to 4:30 pm

Recent improvements in PbS/PbSe detector technology

- How PbS/PbSe detectors are constructed
- The internal structure of PbS/PbSe
- What material mechanisms affect device performance
- Old vs. new: how modern manufacturing techniques affected overall detector performance

4:30 to 5:00 pm

Differential Pyroelectric Detectors

Understanding the operation of pyroelectric detectors in the true differential mode, which provides doubling of signal and an increase in D^* by a factor of around $\sqrt{2}$.

INSTRUCTORS:



Elliott Martyn Chick
Laser Components
GmbH



Lowell Snyder
Laser Components
Detector Group



Patrick Merken
Xenics

SPONSORED BY



Export Control Working Group: Lasers

Wednesday 31 January 2018 · 10:00 am to 11:00 am

SPIE, in conjunction with the Department of Commerce Sensors and Instrumentation Technical Advisory Committee (SITAC), is forming working groups comprised of industry and research university representatives that will assist in identifying and developing proposals related to improving the export control system in the areas of Detector & Cameras, Lasers and Lenses & Optics.

Discussion Topic: Lasers

- * Fiber
- * Diode
- * High Powered

MODERATOR:



Jennifer Douris O'Bryan
SPIE Government Affairs Director

If you are interested in joining for one or more of these meetings, contact SPIE Government Affairs Director Jennifer Douris at jenniferd@spie.org to be added to the distribution list for meetings and activities.



Free Headshots

Wednesday 31 January 2018 · 10:00 am to 5:00 pm

Get your FREE Professional Headshot taken during Photonics West

Whether you are looking to update your SPIE profile, social media pics, or a framed picture on your desk, take advantage of this FREE service offered by SPIE. Dress professionally and even come back each day to get multiple styles of pictures.

These are free for every attendee, exhibitor, instructor, student, or exhibition visitor.

Sponsored by **SPIE. CAREER CENTER**

SPIE Job Fair

Wednesday 31 January 2018 · 10:00 am to 5:00 pm

Top Employers are Coming Together to Interview and Hire Candidates at Photonics West 2018

Whether you are looking for employees or looking for a job, this is your chance to connect with the best. Meet over 30 recruiters on the exhibit floor including KLA Tencor, Coherent, Newport, General Atomics, Lummentum and more.

Nikon Optical Materials and Optics: at the Heart of 100 Years of History

Wednesday 31 January 2018 · 11:00 am to 12:00 pm

Take a historical look back at 100 years of development in optical materials and optics for use in some of the world most demanding consumer and industrial products. From our first microscope introduced in 1925 to the Nikon 1 in 1948, moving forward through to the digital age with semiconductor, FPD lithography systems, digital imaging, microscopes and industrial metrology.

This technical talk will focus on how Nikon's optical materials and optics have evolved to support and advance Nikon's portfolio of high-end products.

SPEAKER:



Naoyasu Uehara
Nikon

Naoyasu Uehara is the Sales and Marketing Support Specialist for Nikon Glass Business Unit US office based in Belmont, California. Since entering Nikon Corporation as a Researcher in April 2006, he has worked as a senior researcher, marketing and sales for material, optics and advanced modules. He has a Master's degree in Applied Science for Electronics and Materials from Kyushu University in March 2006, to go with a previously acquired a Bachelor's degree in Chemistry, Biology, and Marine Science at the University of the Ryukyus in March 2004.

SPONSORED BY:



Export Control Working Group: Lenses and Optics

Wednesday 31 January 2018 · 11:30 am to 12:30 pm

SPIE, in conjunction with the Department of Commerce Sensors and Instrumentation Technical Advisory Committee (SITAC), has established working groups comprised of industry and research university representatives to assist in identifying and developing proposals related to improving the export control system in the areas of Detector & Cameras, Lasers and Lenses & Optics.

Discussion Topic: Lenses and Optics

MODERATOR:



Jennifer Douris O'Bryan
SPIE Government Affairs Director

If you are interested in joining for one or more of these meetings, contact SPIE Government Affairs Director Jennifer Douris at jenniferd@spie.org to be added to the distribution list for meetings and activities.



Industry Events

Concurrent Design for Optical and Mechanical Engineers with Zemax Virtual Prototyping

Wednesday 31 January 2018 · 1:00 to 5:00 pm

Virtual prototyping helps optical and mechanical engineers design, communicate, and collaborate on building their optical product right the first time by flagging potential problems early in the product development process. Virtual prototyping from Zemax links the preferred software design tools used by the optical engineer with the preferred design tools used by the mechanical engineer. By using the same virtual prototype for design and simulations, optical and mechanical engineers can create a complete model of a product and validate the effectiveness of the design.

Learn how virtual prototyping from Zemax is improving the engineering design process for both optical and mechanical engineers with OpticStudio and LensMechanix. This course will provide awareness and understanding of the software tools available from Zemax that streamline engineering design workflow.

In this workshop, we will demonstrate how to:

- optimize, analyze, and tolerance a sequential system in OpticStudio
- optimize a sequential design for conversion to non-sequential mode
- load a sequential design into SOLIDWORKS using LensMechanix
- package, analyze, and validate your complete optomechanical design
- open a completed LensMechanix design in OpticStudio
- optimize a complete optomechanical design

INSTRUCTORS:



Thomas Pickering
Zemax



Isis Peguero
Zemax

SPONSORED BY: 

Executive Panel: How High-Growth Industries are Embracing the Innovation Ecosystem

Wednesday 31 January 2018 · 1:30 to 2:30 pm

To stay relevant and competitive in this rapidly changing world, corporations must find new ways to foster innovation in key enabling technologies and to enhance their product portfolios. How they maintain a pipeline of talent, technology, and new products will be key to their survival.

Join industry leaders from high-tech industries and learn how they engage the innovation ecosystem in a variety of ways, from company-sponsored incubators and corporate venture investment activities to sponsorship of university-related incubators and accelerators. Hear expert discussion about the changing nature of technology transfer in a world where students want to become entrepreneurs. And find out how aspects of the innovation ecosystem touch optics and photonics. Don't miss this opportunity to listen to and ask questions of high-tech executives who can help you better understand today's changing innovation ecosystem.

MODERATOR:



Laura Smoliar
Berkeley Catalyst Fund, Founding Partner and Managing Director

Laura has spent nearly two decades in Silicon Valley's technology sector. She co-founded Global Innovation Foundry, LLC in 2014 to connect innovation, market opportunity, and investors between the U.S. and Asia. Her own startup experience building strategic partnerships and raising funds from Asia inform her approach to solving complex problems across different cultures and economies, harnessing the best assets of large corporations and small companies. She has extended this into the development of a hybrid investment model (containing non-profit and for-profit components), working closely with the University of California, Berkeley, to create the Berkeley Catalyst Fund. Laura is a Columbia College graduate and a member of the Columbia Technology Ventures Executive Advisor Network. She also holds a Ph.D. in physical chemistry from the University of California, Berkeley.

PANELISTS:



Yuriko Kaida

Asahi Glass Chemical (AGC), General Manager, Business Development Americas

Dr. Yuriko Kaida is the head of Asahi Glass Chemical's U.S. office, where she leads a team focused on new technologies in photonics, optics, materials, and coatings. She began her career at AGC in Japan 24 years ago, where she developed several optical materials and elements, liquid crystal polymers for wave plates, wire grid films, and transparent glass screens. She moved into a management role in 2010, and she ran both the R&D Center and the Business Development Office in the years before moving to the U.S. Dr. Kaida holds a Ph.D. in Chemistry from Nagoya University.



Uwe Higgen

BMW i Ventures, Managing Partner

Uwe Higgen joined BMW i Ventures in September 2017 as Managing Partner. He leads a group making investments in autonomous driving, digital car, automotive cloud, artificial Intelligence, and on-demand mobility. Prior to this, Higgen was Head of the BMW Group Technology Office where he accelerated automotive innovation through the development and design of new technologies in autonomous driving, UX-design, interaction technologies, batteries and integration of digital products and services. Before coming to the U.S, Higgen served in various roles within BMW's R&D in Munich and began his career at BMW in 2001. He holds a master's degree in Computer Science from The University of Oldenburg.



Mostafa Ronaghi

llumina, CTO and SVP

Mostafa Ronaghi, Ph.D., joined Illumina in August 2008. As Senior Vice President and Chief Technology Officer, he is responsible for leading internal research and technology development (RTD) and is co-founder of Illumina Accelerator, the world's first business accelerator focused solely on creating an innovation ecosystem for the genomics industry. Ronaghi is an experienced entrepreneur and was involved in founding several start-ups in life sciences companies. Most recently, he led the formation internally at Illumina of GRAIL Bio, a new company formed to enable cancer screening from a simple blood test. In 2007, Ronaghi co-founded Avantome, a privately held sequencing company (acquired by Illumina in 2008). Before this, he co-founded NextBio, a search engine for life science data (acquired by Illumina in 2013). Ronaghi earned his Ph.D. from the Royal Institute of Technology in Sweden.



Katharine Schmidtke

Facebook, Strategic Sourcing Optical Technology

Dr. Katharine Schmidtke is responsible for Optical Technology Strategy at Facebook. She obtained a Ph.D. in non-linear optics from Southampton University in the UK and completed post-doctoral research at Stanford University. She has over 20 years' experience in the Opto-Electronics industry including positions at Finisar, JDSU (now Lumentum), and New Focus.

Basics of Laser Material Processing

Wednesday 31 January 2018 · 1:30 to 3:00 pm

Learn the basics of lasers and laser applications in this interesting and valuable workshop. This session is especially valuable to non-laser engineers and project managers who need to know what to expect from their laser systems.

- Discuss what happens when a laser beam hits a material
- Review process threshold and process window
- Discussions of how you can optimize a process, including examples of marking and ablation / engraving or cutting
- Discussion around some common things that can go wrong
- Additional examples of successful laser applications

INSTRUCTOR:



Jean-Philippe Lavoie
Coherent

How to Speak “High Power Diode Laser”

Wednesday 31 January 2018 · 3:00 to 4:30 pm

When working in the laser industry, every sector and technology has their own language and lingo. Whether you're new to an industry or interacting with vendors and customers in that space, you might feel like you could use a crash course. How to Speak “High Power Diode Laser” is exactly that, a crash course in what you need to know to be effective in your interactions and communication with vendors, customers, and your colleagues in the High Power Diode Laser industry.

In this session, we'll cover basic operation of diode lasers, but staying light on the physics and heading straight to the application. We'll go through the different structures of the semiconductor and why they are so important, before reviewing some different types of heat-sinks, the trade-offs, and a few examples of final packaging. Finally, we'll talk about what to specify and what is critical to share so you get the best solution. Vendors in the industry, their product offerings, and pricing is not discussed.

SPEAKER:



Joseph Braker
Coherent | DILAS

SPIE Startup Challenge

Wednesday 31 January 2018 · 3:30 to 6:00 pm

The main event—the SPIE Startup Challenge Finals.

With over \$85,000 in cash, prizes, and promotion at stake, this is an event not to be missed.

See and hear pitches for the “best of the best” new photonics businesses. This pitch competition is a lively, interactive event showcasing the power of entrepreneurs to move photonics technology to the global marketplace. The top two entrepreneurs from each semi-final track will have just five minutes each to pitch their businesses to a team of expert judges.

The top pitch presenter will go home with \$10,000 in cash from JENOPTIK and \$5,000 of equipment from Edmund Optics. Join fellow business development, investment, and product managers to scout new talent and see what the future of entrepreneurship in photonics looks like.

The event will conclude with a networking reception from 5-6:00pm where you can meet the presenters and fellow attendees involved in photonics entrepreneurship. See the Startup Challenge webpage for more details on presenters, logistics, prizes, and sponsors: <http://spie.org/startup>

FOUNDING PARTNER:



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SUPPORTING SPONSORS:



Industry Events

PRISM Awards Ceremony and Banquet

Wednesday 31 January 2018 · 6:00 to 10:00 pm
Tickets are limited—email: innovation@spie.org

The Prism Awards is celebrating 10 years of recognizing new product innovation in a rigorous international competition.

This gala has become the largest gathering of CEOs and VIPs in the photonics industry. The evening begins with a reception, followed by an elegant dinner and award ceremony. Dress is business and formal attire.

PRESENTERS INCLUDE:



Akira Hiruma
Hamamatsu, CEO,
President and Representative Director



Ray O. Johnson
Bessemer Venture Partners, Executive in Residence
and former Sr. VP and CTO of Lockheed Martin



Peter Leibinger
TRUMPF GmbH, CTO,
Vice Chairman of the Managing Board

PRESENTED BY: **SPIE.**

MEDIA SPONSOR: 

Market Update: Size of the Optics and Photonics Market along with Enabled Markets

Thursday 1 February 2018 · 9:15 to 9:45 am

KEYNOTE SPEAKER:



Stephen G. Anderson
Director, Industry Development, SPIE

In a unique analysis of the global optics and photonics industry, Stephen G. Anderson presents an updated comparative profile of the industry that highlights the importance of photonics to the world economy. The profile is based on a continuing SPIE review of industry trends and also includes a first-look at key end-use market segments. Don't miss this valuable presentation after the Exhibitor Breakfast. Free and open to all attendees.

Lighting the Path Towards Autonomous Mobility

Thursday 1 February 2018 · 11:00 am to 12:00 pm

Autonomous mobility is the disruptive technology of our era, and at its core are optical sensing challenges. Getting better data required to operate safely is the key to a driverless future, and this all hinges on new kind of LiDAR built for self-driving scenarios.

Join SPIE Fellow and Co-Founder of Luminar Jason Eichenholz in a talk on the requirements for self-driving vehicles and a vision for a major breakthrough in LiDAR.

SPEAKER:



Jason Eichenholz
Luminar, Co-Founder

Startup Alley: Commercialization and Prototype Showcase

Thursday 1 February 2018 · 11:00 am to 12:30 pm

Meet with the entrepreneurs featured in the Startup Challenge as they deliver their pitches and take questions about their new photonics businesses. See the prototypes and talk with the entrepreneurs to explore potential partnerships, investment, or sales.



10TH
ANNUAL



PRISM20 AWARDS18

FINALISTS AND WINNERS

DRIVING TODAY'S TECHNOLOGY TRENDS

The Prism Awards honor the best new photonic products on the market. Applications are judged by a panel of leading industry experts, venture capitalists, luminaries and visionaries.

Winners are announced at a gala event held during SPIE Photonics West 2018.

Come see the future on Wednesday 31 January.

LEARN MORE prismawards.org

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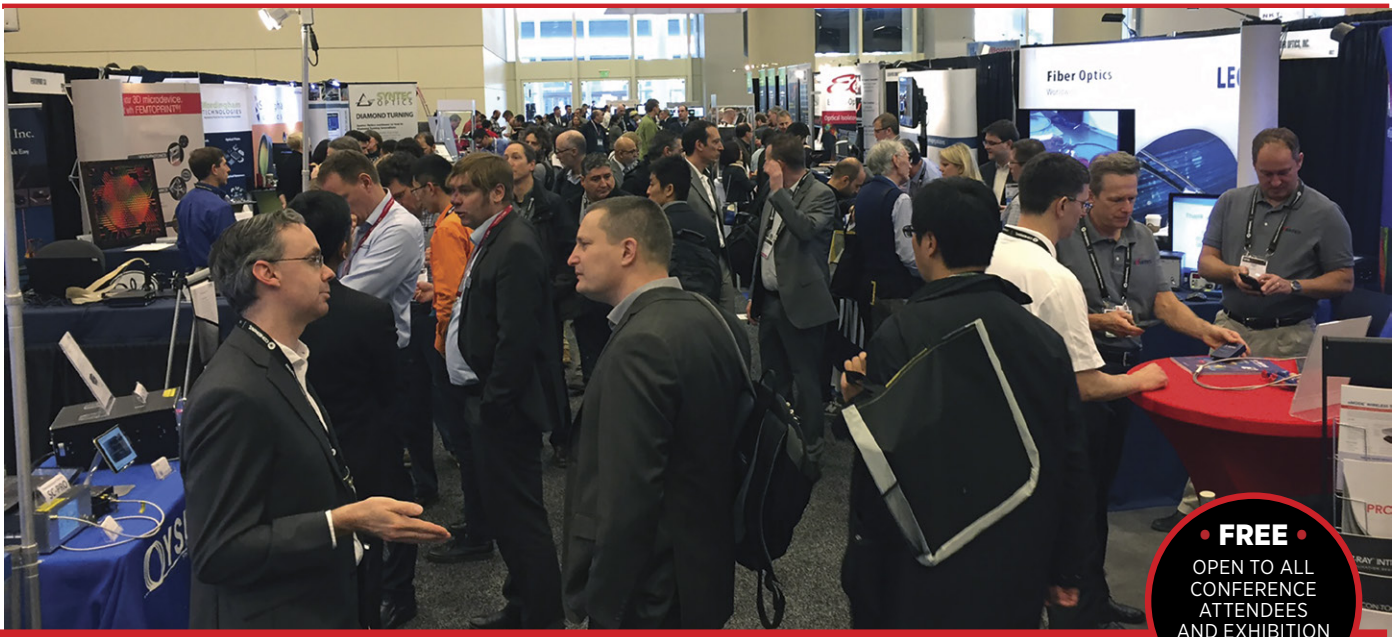
FREE ADMISSION · EXHIBITION HALL/C

Tuesday & Wednesday · 10 am to 5 pm

Gain visibility with hiring companies
Network with employers and industry peers
Post your CV/Resume online

www.spiecareercenter.org

SPIE. CAREER
CENTER



Two World-Class Exhibitions

More top-quality suppliers come to Photonics West than any other exhibition. Cost-effectively meet many suppliers and discover new possibilities.



Saturday-Sunday

BIOS EXPO

200 Companies

Saturday 28 January 10:00 am to 5:00 pm

Sunday 29 January 10:00 am to 5:00 pm

BIOS Expo, the world's largest biomedical optics and biophotonics exhibition, starts the Photonics West week. Find the latest technologies from more than 200 companies supplying biomedical research and healthcare solutions.

FEATURED TECHNOLOGIES

- Biomedical optics components
- Instrumentation
- Lasers used in research, diagnostics, and therapeutics
- Molecular imaging
- Nano/biophotonics
- Biosensors
- Spectroscopic imaging
- Microscopy



Tuesday-Thursday

PHOTONICS WEST EXHIBITION

1,300 Companies

Tuesday 30 January 10:00 am to 5:00 pm

Wednesday 31 January 10:00 am to 5:00 pm

Thursday 1 February 10:00 am to 4:00 pm

Photonics West exhibition is the premier photonics and laser event. Find the latest components, devices, and systems for your research or business needs.

FEATURED TECHNOLOGIES

- Lasers, laser accessories, laser systems
- LEDs and other light sources
- Cameras and CCD components
- Fiber optic components, equipment, systems
- Optical components
- Communications technology
- Optical detectors
- High speed imaging and sensing
- Optical materials and substrates
- IR sources and detectors
- Electronic imaging components
- Optical coatings
- Lenses and filters
- Positions and mounts
- Metrology tools

IT'S BIG · IT'S GLOBAL · IT'S WHERE BUSINESS GETS DONE

Professional Development



• **NOTE** •
FREE TO ALL
TECHNICAL
ATTENDEES.



Spend some time focusing on your career development while you're at Photonics West. Workshops and presentations will help you hone valuable job skills.

Charting a Course in the Photonics Industry

Sunday 28 January 2018 · 2:00 to 4:00 pm

Shape yourself for a future in photonics

This panel discussion will help you explore potential career pathways in the world of photonics. Get solid advice on how you can translate your knowledge, abilities, and interests into meaningful work. Whether you end up in academia, industry, or start your own company, getting a clear picture of the options from experienced leaders will help you better manage your career trajectory.

Essential Skills for a Career in Industry

Monday 29 January 2018 · 1:30 to 5:30 pm

WS1240 · Course Level: Introductory · Course Length: Half-day (3.5 hours) Continuing Education Units (CEU): 0.35 Only available upon request.

Working in industry is very different than academia. An advanced degree in science and engineering gives you many technical skills that are valuable in the private sector, but there are a lot of important aspects of working in a company that aren't taught in school. This course gives you the industry primer you need.

The course will start with an overview of the five most important ways that working in industry is different than the academic research environment

STEM graduate students are trained in. Next, we will cover five habits that scientists and engineers who are successful in industry learn quickly. We will also cover some basics of company finance, how projects are managed in industry, and some tricks for keeping your projects on schedule.

LEARNING OUTCOMES: After completing this course, attendees will be able to:

- describe five ways that technical work in industry is different than academic research
- list the five habits that scientists and engineers who are successful in industry learn quickly
- explain a corporate financial statement and point out where engineering/R&D fits into the profit model
- describe why making decisions quickly is so important in industry, and explain a new technique for making a decision when the 'right' answer is not clear
- list the key elements of a typical industry development project, and describe tactics for keeping it on schedule

INTENDED AUDIENCE: This course is intended for graduate students in science and engineering programs who are looking to pursue careers in industry. Scientists and engineers who are already working in industry and want to accelerate their career progress will also find this course very helpful.

Instructor: **David M. Giltner** is the author of the book *Turning Science into Things People Need*, and is an internationally recognized speaker and mentor for early career scientists and engineers seeking careers in industry. He has spent the last 20 years commercializing photonics technologies

in a variety of roles for several companies including JDS Uniphase and Ball Aerospace. Through his time in the private sector, David learned how to function well in both highly technical and business circles, and has often functioned as an interpreter to help these two worlds communicate more productively. David has a BS and PhD in physics and holds six patents in the fields of laser spectroscopy and optical communications.

NOTE: This course is free to technical attendees. No advance registration required.

Resumes to Interviews: Strategies for a Successful Job Search

Monday 29 January 2018 · 3:30 to 5:30 pm

WS1059 · Course Level: Introductory · Course Length: Two hours
Continuing Education Units (CEU): 0.35 Only available upon request.

This course reviews effective strategies and techniques for a successful job search such as: compiling resumes, writing cover letters, and interviewing tips. The primary goal of the course is to provide creative and proven techniques for new college graduates and professionals to plan and conduct their job search and secure a job. Creative and comprehensive job search techniques will be discussed as well as actual resume and interviewing examples and tips. Anyone who is getting ready to enter the work force who wants to answer questions such as, “when and how do I start my job search?,” “what kind of cover letter and resume gets noticed?” or “how do I sell myself in an interview?” will benefit from taking this course.

LEARNING OUTCOMES: This course will enable you to:

- start and create your job search plan
- create an online networking presence
- build and write effective cover letters and resumes that get noticed
- avoid common resume and cover letter mistakes
- interview with confidence

INTENDED AUDIENCE: Graduate students, new graduates, and early-career professionals who wish to learn more about creating a job search plan, writing an effective cover letter and resume that gets you noticed, and techniques for successful interviews.

INSTRUCTOR: **Heather Welch** has been in human resources and corporate recruiting for more than 20 years. She has extensive experience with both in-house corporate environments as well as outside agency environments. Heather is currently the Sr. Recruiter for Daylight Solutions in San Diego, and also a member of SHRM, IEEE, and SWE.

NOTE: This course is free to technical attendees. No advance registration required. This workshop presents introductory information and is intended primarily for university students and others with little professional experience.

The Craft of Scientific Presentations: A Workshop on Technical Presentations

Tuesday 30 January 2018 · 8:30 am to 12:30 pm

WS667 · Course Level: Introductory · Course Length: Half-day (3.5 hours)
Continuing Education Units (CEU): 0.35 Only available upon request.

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

LEARNING OUTCOMES: After completing this course, attendees will be able to:

- account for the audience, purpose, and occasion in a presentation
- logically structure the introduction, middle, and ending of a scientific presentation
- create a memorable and persuasive set of presentation slides
- deliver a presentation with more confidence

INTENDED AUDIENCE: This material is intended for anyone who needs to present scientific research. Those who either have not yet presented or have made several presentations will find this course valuable.

INSTRUCTOR: **Christine Haas** brings over ten years of experience working at the intersection of communication and science. She's held positions as the director of marketing for Drexel's College of Engineering and director of operations for the dean of engineering at Worcester Polytechnic Institute. Now, as principal of Christine Haas Consulting, LLC and director of the Engineering Ambassadors Network, she continues to work with scientists and engineers across industry, government, and higher education to deliver training on presentations and technical writing. Christine received her MBA in marketing from Drexel University and her BA in English from Dickinson College.

NOTE: This course is free to technical attendees. No advance registration required.

The Craft of Scientific Writing: A Workshop on Technical Writing

Tuesday 30 January 2018 · 1:30 to 5:30 pm

WS668 · Course Level: Introductory · Course Length: Half-day (3.5 hours)
Continuing Education Units (CEU): 0.35 Only available upon request.

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

LEARNING OUTCOMES: This course will enable you to:

- account for the audience, purpose, and occasion in a scientific paper
- logically structure the introduction, middle, and ending of a scientific paper
- make your language clear, energetic, and fluid
- avoid the most common mechanical errors in scientific writing

INTENDED AUDIENCE: This material is intended for anyone who needs to write about scientific research. Those who either have not yet written a paper or have written several papers will find this course valuable.

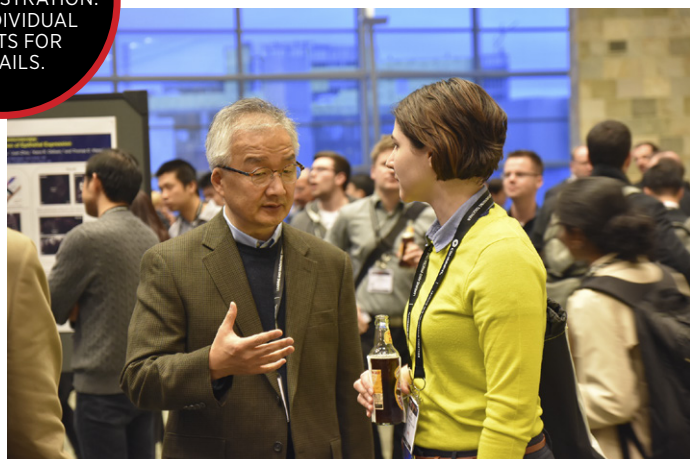
INSTRUCTORS: **CHRISTINE HAAS** brings over ten years of experience working at the intersection of communication and science. She's held positions as the director of marketing for Drexel's College of Engineering and director of operations for the dean of engineering at Worcester Polytechnic Institute. Now, as principal of Christine Haas Consulting, LLC and director of the Engineering Ambassadors Network, she continues to work with scientists and engineers across industry, government, and higher education to deliver training on presentations and technical writing. Christine received her MBA in marketing from Drexel University and her BA in English from Dickinson College.

NOTE: This course is free to technical attendees. No advance registration required.

Social/Networking/Student Events



NOTE
SOME EVENTS
REQUIRE TICKETS
AND REGISTRATION.
SEE INDIVIDUAL
EVENTS FOR
DETAILS.



Join your colleagues at these relaxed events, including the All-Symposium Welcome Reception — an event not to be missed!

Student Chapter Leadership Workshop

Friday 26 January 2018 · 9:00 am to 5:00 pm

Open to SPIE Student Chapter Members

Join SPIE student chapter leaders from around the world at this all-day Leadership Workshop. The workshop will start with breakfast, followed by a morning session on chapter benefits, and solving chapter challenges. After lunch, there will be a professional development session. Topic and speaker TBA.

All SPIE Student Chapter Members are welcome but must register by Friday, 19 January to attend. Email students@spie.org to register, or for more information. Please provide your SPIE Member ID number and current SPIE Student Chapter in your registration email.

Student Chapter Meeting

Sunday 28 January 2018 · 6:00 to 9:00 pm

Open to SPIE Student Chapter Members

Get the latest news on the Student Chapter program direct from SPIE Student Services. Join us for dinner, professional development, and networking with chapter members from around the world.

All SPIE Student Chapter Members are welcome but must register by Friday, 19 January to attend. Email students@spie.org to register, or for more information. Please provide your SPIE Member ID number and current SPIE Student Chapter in your registration email.

SPIE Fellow Member Luncheon

Monday 29 January 2018 · 12:00 to 1:30 pm

All Fellow Members of SPIE are invited to join your colleagues for an SPIE hosted lunch. The new SPIE Fellows attending Photonics West will be introduced and recognized. Please join us for this informal gathering and a chance to interact with other Fellows. Fellow Members planning to attend are asked to RSVP to Brent Johnson brentj@spie.org.

FELLOWS LUNCHEON PRESENTER:



Prof. W. E. Moerner
2014 Nobel Laureate: Chemistry
Stanford University (USA)

Women in Optics/Diversity + Inclusion Program and Reception

Monday 29 January 2018 · 5:00 to 7:00 pm

Come join us for a thought-provoking presentation that will challenge and inspire.

Join this collaborative event beginning with a presentation addressing issues related to women and ending with a workshop devoted to prioritization of issues identified by the SPIE Presidential ad-hoc Committee on Diversity + Inclusion. Refreshments will be served.

Social/Networking/Student Events

Photonics West Welcome Reception

Monday 29 January 2018 · 7:00 to 8:30 pm

PHOTONICS ARCADE

Enjoy delicious San Francisco-inspired cuisine and arcade-inspired cocktails while enjoying a game of Pinball or Pac-Man. All paid conference attendees are welcome. Please wear your conference badge.

SPIE Senior Member Breakfast

Tuesday 30 January 2018 · 8:00 to 9:00 am

All SPIE Senior Members are invited to join your colleagues for this SPIE-hosted buffet breakfast. Please join us for this informal gathering and a chance to interact with other Senior Members. Please plan to wear your yellow Senior Member ribbon for entry into this event. A special invitation is also made for members of the SPIE Board of Directors to attend this breakfast. Senior Members planning to attend are asked to RSVP to Brent Johnson (brentj@spie.org).

Lunch with the Experts - A Student Networking Event

Tuesday 30 January 2018 · 12:30 to 1:30 pm

Open to Student Conference Attendees

Enjoy a casual meal with colleagues at this engaging networking opportunity. This event features experts willing to share their experience and wisdom on career paths in optics and photonics and an award presentation for SPIE scholarships and MKS Instruments travel grant winners. Seating is limited and will be granted on a first-come, first-served basis.

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Speed Networking Social

Tuesday 30 January 2018 · 4:30 to 6:00 pm

Open to All Attendees

Join us for the next generation of networking. Add a new contact to your network every three minutes while enjoying appetizers at an off-site venue. Bring plenty of business cards, practice your pitch, and prepare to expand your network.

THIRSTYBEAR BREWING CO.

The Moscone Center is at 747 Howard St; ThirstyBear is located one block away at 661 Howard St.

SPIE After-Dinner Member Reception

Tuesday 30 January 2018 · 8:00 to 9:30 pm

For SPIE Members Only

CITYSCAPE LOUNGE

Hilton San Francisco Union Square · 333 O'Farrell Street

SPIE Members are invited to the Cityscape lounge atop the Hilton San Francisco Union Square. Take in the views of the city while enjoying cocktails, dessert, coffee and a special ice cream treat. Please note: this reception is limited to SPIE Members only. Membership cards or invitations will be requested at the entrance. If you join SPIE on-site, please bring your registration receipt. Dress is casual or business attire.

Student Social

Wednesday 31 January 2018 · 8:00 to 10:00 pm

Student Conference Attendees Only

Relax and hang out with new friends and peers while enjoying the atmosphere of a great off-site venue. No ties required but please bring your student conference badge.

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From the Moscone Center: Head Southwest on Howard St toward 4th St; Turn right on 4th St; Jillian's is on the right.



Fight Bias, Embrace Diversity

SPIE seeks to cultivate a culture of openness and inclusivity. Help us eradicate bias and make the world of optics and photonics a shining example of all minds coming together to innovate regardless of gender, race, nationality, culture, educational background, politics, sexuality, body-type and age, for the betterment of life.

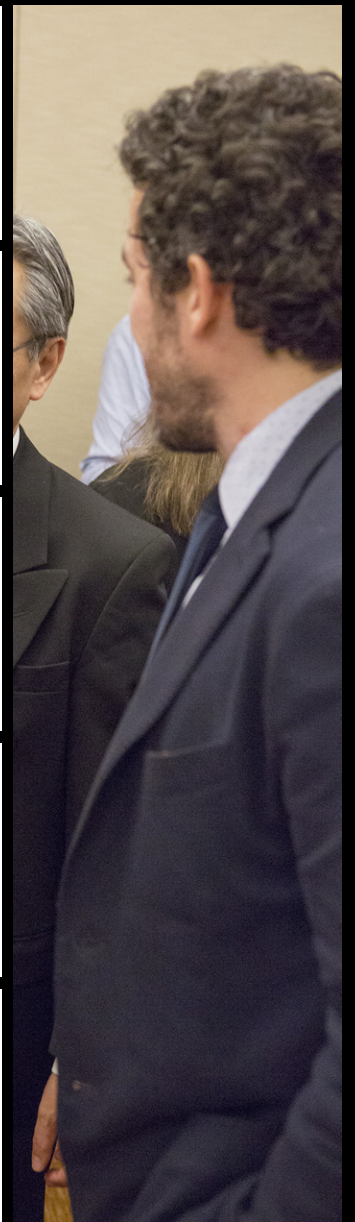
Educate yourself on the issues faced by a diverse workforce, challenge your own assumptions, and tap into the rich pool of talent, perspectives, and ideas offered by people different from you.

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INCLUSION

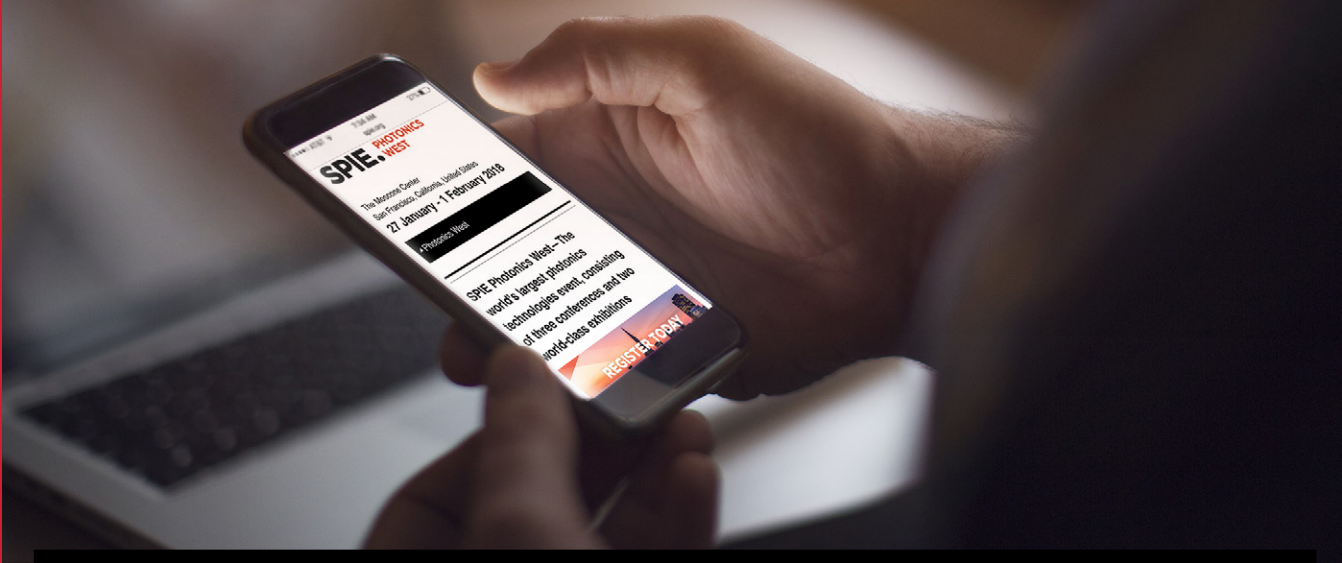
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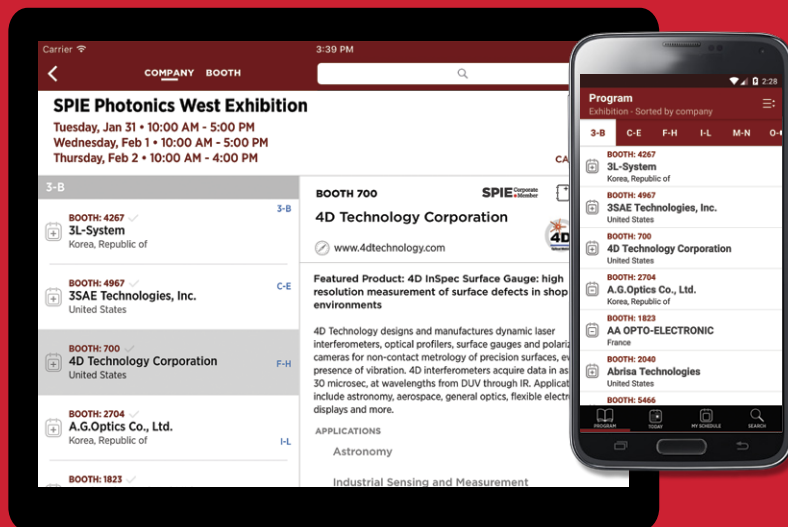
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Pavan Chandra Konda presented "Scheimpflug multi-aperture Fourier ptychography: coherent computational microscope with gigapixels/s data acquisition rates using 3D printed components" at SPIE Photonics West 2017. Authored by Pavan Chandra Konda; Jonathan M. Taylor; Andrew R. Harvey; doi: 10.1117/12.2251884; CID 100760R.

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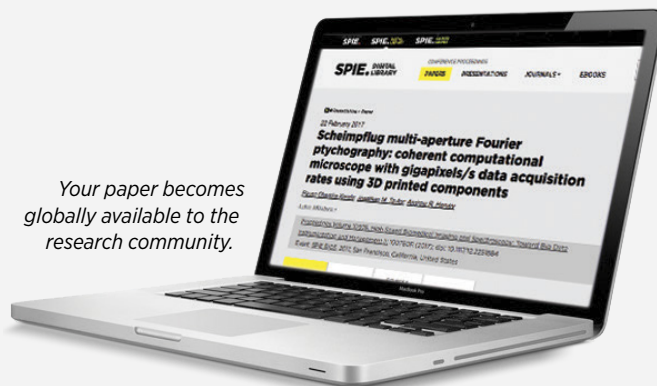
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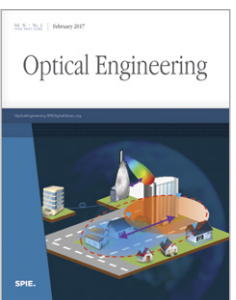
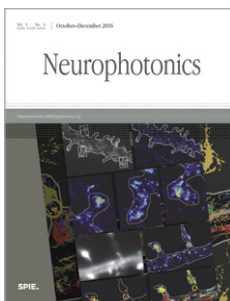
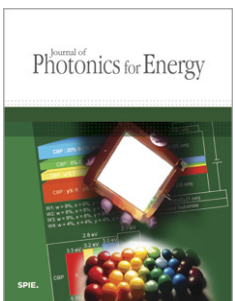
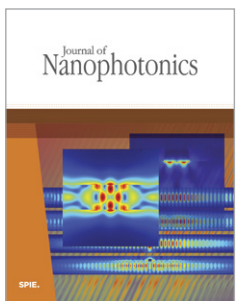
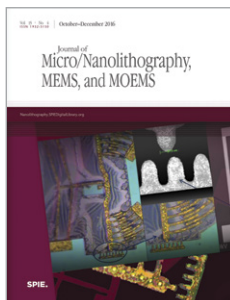
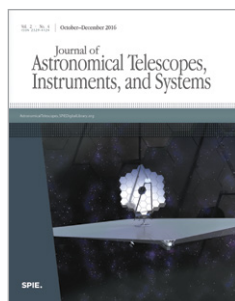
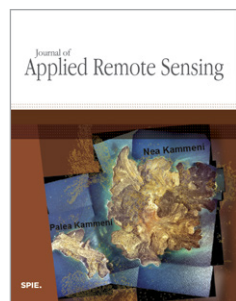
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	BIOS Sunday Plenary Session 7:00 to 8:00 pm, p.7				

Photonic Therapeutics and Diagnostics

Program Chairs: **Rafael Yuste**, Columbia Univ. (USA); **David Boas**, Boston Univ. (USA)

10480 **Clinical and Translational Neurophotonics 2018** (Madsen, Yang), p.87

10481 **Neural Imaging and Sensing 2018** (Luo, Ding), p.89

10482 **Optogenetics and Optical Manipulation 2018** (Mohanty, Thakor, Jansen), p.93

Clinical Technologies and Systems

Program Chairs: **Tuan Vo Dinh**, Fitzpatrick Institute for Photonics, Duke Univ. (USA); **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

10483 **Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII** (Izatt, Fujimoto, Tuchin), p.95

10484 **Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI** (Vo-Dinh, Mahadevan-Jansen, Grundfest), p.101

10485 **Optics and Biophotonics in Low-Resource Settings IV** (Levitz, Ozcan, Erickson), p.104

10489 **Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis** (Alfano, Demos), p.115

10486 **Design and Quality for Biomedical Technologies XI** (Raghavachari, Liang, Pfefer), p.107

10487 **Multimodal Biomedical Imaging XIII** (Azar, Intes), p.110

10488 **Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII** (Gannot), p.112

10490 **Biomedical Vibrational Spectroscopy 2018: Advances in Research and Industry** (Mahadevan-Jansen, Petrich), p.118

10491 **Microfluidics, BioMEMS, and Medical Microsystems XVI** (Gray, Becker), p.120

BIOS DAILY EVENT SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
BIOS EXPO 10:00 am to 5:00 pm			PHOTONICS WEST EXHIBITION 10:00 am to 5:00 pm		
BIOS Hot Topics 7:00 to 9:05 pm, p.6	Translational Research Lunchtime Forum 12:30 to 2:00 pm, p.12		Nano/Biophotonics Plenary Session 10:30 to 11:30 am, p.9	10:00 am to 5:00 pm	10:00 am to 4:00 pm
	NIH SPECIAL SESSION: NIBIB and NCI Funding Opportunities 1:30 to 2:30 pm, p.12	FDA Policies and Procedures: What Academic Investigators and Small Business Should Know 3:30 to 5:30 pm, p.13	BIOS (LASE) Poster Session 6:00 to 8:00 pm, p.13		
	Neurotechnologies Plenary Session 3:30 to 5:30 pm, p.7	JBO + Neurophotonics 3-Minute Poster Presentations 4:30 to 5:30 pm, p.13	IBOS: International Biomedical Optics Society , 7:30 to 9:00 pm, p.14		
	BIOS Poster Session 5:30 to 7:00 pm, p.13	BIOS Poster Session 5:30 to 7:30 pm, p.13			
	BIOS Sunday Plenary Session 7:00 to 8:00 pm, p.7				

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering		Program Chair: Steven L. Jacques , Oregon Health & Science Univ. (USA)
10496 Optical Elastography and Tissue Biomechanics V (Larin, Sampson), p.141	10492 Optical Interactions with Tissue and Cells XXIX (Jansen, Beier), p.123	
10493 Dynamics and Fluctuations in Biomedical Photonics XV (Tuchin, Larin, Leahy, Wang), p.125		
10494 Photons Plus Ultrasound: Imaging and Sensing 2018 (Oraevsky, Wang), p.129		
	10495 Biophotonics and Immune Responses XIII (Chen), p.139	

Biomedical Spectroscopy, Microscopy, and Imaging		Program Chairs: Ammasi Periasamy , Univ. of Virginia (USA); Daniel L. Farkas , Univ. of Southern California (USA) and SMI (USA)
	10497 Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XVI (Farkas, Nicolau, Leif, Leary, Tárnok), p.144	
	10498 Multiphoton Microscopy in the Biomedical Sciences XVIII (Periasamy, So, König, Xie), p.148	
10500 Single Molecule Spectroscopy and Superresolution Imaging XI (Enderlein, Gregor, Gryczynski, Erdmann, Koberling), p.156	10499 Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV (Brown, Cogswell, Wilson), p.153	
	10501 Optical Diagnostics and Sensing XVIII: Toward Point-of-Care Diagnostics (Coté), p.159	
10502 Adaptive Optics and Wavefront Control for Biological Systems IV (Bifano, Kubby, Gigan), p.162		
	10503 Quantitative Phase Imaging IV (Popescu, Park), p.165	
10504 Biophysics, Biology and Biophotonics III: the Crossroads (Wax, Backman), p.169	10505 High-Speed Biomedical Imaging and Spectroscopy III: Toward Big Data Instrumentation and Management (Tsia, Goda, Ozeki, Jalali, Lam, Wong), p.171	
	10494 Photons Plus Ultrasound: Imaging and Sensing 2018 (Oraevsky, Wang), p.129	

BIOS DAILY EVENT SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
BIOS EXPO 10:00 am to 5:00 pm			PHOTONICS WEST EXHIBITION 10:00 am to 5:00 pm 10:00 am to 5:00 pm 10:00 am to 4:00 pm		
BIOS Hot Topics 7:00 to 9:05 pm, p.6	Translational Research Lunchtime Forum 12:30 to 2:00 pm, p.12		Nano/Biophotonics Plenary Session 10:30 to 11:30 am, p.9		
	NIH SPECIAL SESSION: NIBIB and NCI Funding Opportunities 1:30 to 2:30 pm, p.12	FDA Policies and Procedures: What Academic Investigators and Small Business Should Know 3:30 to 5:30 pm, p.13	BIOS (LASE) Poster Session 6:00 to 8:00 pm, p.13		
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	BIOS Poster Session 5:30 to 7:00 pm, p.13	BIOS Poster Session 5:30 to 7:30 pm, p.13			
	BIOS Sunday Plenary Session 7:00 to 8:00 pm, p.7				



Nano/Biophotonics

Program Chairs: **Paras Prasad**, SUNY/Buffalo (USA); **Dan V. Nicolau**, McGill Univ. (Canada)

10507 Colloidal Nanoparticles for Biomedical Applications XIII (Parak, Osinski, Liang), p.177	10506 Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XV (Cartwright, Nicolau, Fixler), p.174
	10508 Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications X (Achilefu, Raghavachari), p.180
	10509 Plasmonics in Biology and Medicine XV (Vo-Dinh, Lakowicz, Ho, Ray), p.182
10510 Frontiers in Biological Detection: From Nanosensors to Systems (Danielli, Miller, Weiss), p.184	

SPIE-FRANZ HILLENKAMP POSTDOCTORAL FELLOWSHIP
in Problem-Driven Biophotonics and Biomedical Optics

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BIOS 2018 BEST PAPER AWARDS

BEST STUDENT PAPER AWARD

Diseases in the Breast and Reproductive System (Conf. 10472)

A cash prize will be awarded to the 1st, 2nd, and 3rd prize best student papers. Presentations and manuscripts will be judged based on scientific merit, impact, and clarity. Candidates for the award need to be the presenting author, a full-time student, must have conducted the majority of the research presented in the paper, and must submit their manuscript by the deadline (January 2018). To be considered, submit your abstract online, select "Yes" when asked if you are a full-time student, and select yourself as the speaker.

AWARD SPONSOR:



PASCAL ROL AWARD 2018

Ophthalmic Technologies (Conf. 10474)

Outstanding extended abstracts submitted to the Ophthalmic Technologies conference will be nominated for the Pascal Rol Award for Best Paper in Ophthalmic Technologies. The award and prize will be presented after the last scientific session of the conference to recognize the best paper and presentation. The 2017 recipient of the Pascal Rol Award was Furu Zhang, Indiana Univ. (USA) (see www.pascalrolfoundation.org).

AWARD SPONSOR:



BEST STUDENT PAPER AWARD

Microfluidics, BioMEMS, and Medical Microsystems (Conf. 10491)

We are pleased to announce that a cash prize will be awarded to the best student paper in this conference. Qualifying papers and presentations will be evaluated by the awards committee and the winner will be notified at the end of or after the meeting.

AWARD SPONSOR:



SENO MEDICAL BEST PAPER AWARDS

Photons Plus Ultrasound: Imaging and Sensing 2018 (Conf. 10494)

Seno Medical Instruments of San Antonio, Texas, will sponsor the "Best Paper Award" at this conference (Certificate of recognition to all coauthors and \$3,000). To qualify for the Award, authors must submit a two-page summary of their best results three weeks before the conference, present their papers at the conference (oral or poster) and publish a full manuscript in the SPIE Proceedings. Finalists will be announced in the Introduction to the conference proceedings volume. Awards will be presented at the closing ceremony in the conference the following year.

AWARD SPONSOR:



STUDENT POSTER SESSION COMPETITION

Multiphoton Microscopy in the Biomedical Sciences XVIII (Conf. 10498)

Undergraduate students, graduate students and postdoctoral fellows are welcome to participate in the poster session competition of the conference on Multiphoton Microscopy in the Biomedical Sciences. There is a cash award for the winner(s). The winner(s) will be informed in person or by email and must receive the award in person in the conference hall. Participants should follow the rules and regulations of SPIE for submission of their abstract and manuscript. Participants should also register their names for the competition with the Conference Chairs during the first day of the conference. Investigator Award -or- the Student Poster Session Competition Award. Submitted proceeding manuscripts are allowed for resubmission to the *Journal of Biomedical Optics* (please visit <http://spie.org/x85029.xml> for details).

Prize donated by the Conference Sponsors.



PICOQUANT YOUNG INVESTIGATOR AWARD

Single Molecule Spectroscopy and Superresolution Imaging XI (Conf. 10500)

Young scientists (age 30 or below and not yet full faculty members) are encouraged to participate in this best paper competition, which offers a \$1000 USD cash award. Participants must be both the primary author and presenter of an accepted abstract to be eligible. Please select "PicoQuant Young Investigator Award" as the last Topic in the abstract submission wizard in order to be considered. This award is sponsored by PicoQuant GmbH Berlin and presented Sunday afternoon.

AWARD SPONSOR:



BIO 2018 BEST PAPER AWARDS

BEST STUDENT PAPER AWARDS

Optical Diagnostics and Sensing XVIII: Toward Point-of-Care Diagnostics (Conf. 10501)

The Conference Chair and Program Committee would like to encourage innovative work to further the field of optical diagnostics and sensing by recognizing student pioneers with a Best Student Paper Award. Winners will be notified by email. In order to be considered for a Best Student Paper Award:

- Student must be the presenting author at the conference and must make their presentation as scheduled.
- Student must be the leading author of the manuscript and the manuscript must be submitted to the Proceedings of SPIE. The award decision is based on manuscript submission.
- Please select 'Cobolt Best Student Paper Award' as the last Topic in the abstract submission wizard in order to be considered.

EVALUATION CRITERIA

A panel of experts will evaluate all papers submitted for consideration for both quality and content. Attention will be given to 1) the innovation, clarity, and style of both the presentation at the conference and the manuscript submitted for publication, and 2) the importance of the work to the field.

Please contact the Program Coordinator, Stephanie Kaiser, at stephaniek@spie.org with any questions. Thank you for your interest!

AWARD SPONSOR:



BEST PAPER AWARDS

High-Speed Biomedical Imaging and Spectroscopy III: Toward Big Data Instrumentation and Management (Conf. 10505)

We are pleased to announce that Hamamatsu, PiPhotonics and Hitachi High-Tech will sponsor six Best Paper Awards for this Conference, with a total cash prize of \$3000: two Hamamatsu Best Paper Awards (\$500 each) two PiPhotonics Best Paper Awards (\$500 each) and two Hitachi High-Tech Best Paper Awards (\$500 each). Participants must be both the primary author and presenter of an accepted abstract to be eligible. Qualifying papers and presentations will be evaluated by the awards committee. The winners will be notified at the end of, or after, the meeting.

AWARD SPONSORS:



PRIZMATIX YOUNG INVESTIGATOR AWARDS

Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XV (Conf. 10506)

Two \$500 USD "Young Investigator Awards" sponsored by Prizmatix Ltd. will be awarded for notable contributions by young scientists presenting their work in this conference.

AWARD SPONSOR:



OCEAN OPTICS YOUNG INVESTIGATOR AWARD

Colloidal Nanocrystals for Biomedical Applications XIII (Conf. 10507)

The Ocean Optics Young Investigator Awards will be given for the best contributed papers presented by a leading author who is either a graduate student or has graduated within less than five years of the paper submission date. Two prizes will be awarded. The First Prize will consist of a \$1,000 cash prize for the Young Investigator and \$2,000 Ocean Optics equipment credit for the laboratory where the work was performed. The Second Prize will consist of a \$500 cash prize for the Young Investigator and \$1,000 Ocean Optics equipment credit for the laboratory where the work was performed. The equipment credit must be used in the same calendar year that the award is received. To be eligible, manuscripts of self-nominating authors must be received by the due date. Nominations should be sent to osinski@chtm.unm.edu and should include a brief CV of the leading author.

AWARD SPONSOR:



JOURNAL OF BIOMEDICAL OPTICS AND NEUROPHOTONICS 3-MINUTE POSTER AWARD

Students who have been selected to present a poster in one of the B^{OS} poster sessions may elect to present a 3-minute rapid-fire overview of their poster research to an interested audience of B^{OS} attendees, including a panel of judges from the Editorial Boards of the *Journal of Biomedical Optics* and *Neurophotonics*. This activity will take place on Monday afternoon, prior to the evening poster session. Presentations will be judged on content and presentation effectiveness, and the top three presentations will receive cash prizes. Awards will be announced during the Monday night poster session. To be eligible to present a 3-minute poster, the majority of the research covered by the poster must have been performed by a full-time student. The presenter should be the same student. Poster presenters who identify as students on the abstract submission will be contacted with more details about participation in the 3-Minute Poster session. These awards are sponsored by the *Journal of Biomedical Optics* and *Neurophotonics*.

CONFERENCE 10467

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10467

Photonics in Dermatology and Plastic Surgery 2018

Conference Chairs: **Bernard Choi**, Beckman Laser Institute and Medical Clinic (USA); **Haishan Zeng**, The BC Cancer Agency Research Ctr. (Canada)

Program Committee: **Anthony J. Durkin**, Beckman Laser Institute and Medical Clinic (USA); **Conor L. Evans**, Wellman Ctr. for Photomedicine (USA); **Kristen M. Kelly M.D.**, Univ. of California, Irvine School of Medicine (USA); **Milind Rajadhyaksha**, Memorial Sloan-Kettering Cancer Ctr. (USA); **Jessica C. Ramella-Roman**, Florida International Univ. (USA); **Lise Lyngsnes Randeberg**, Norwegian Univ. of Science and Technology (Norway); **InSeok Seo**, Johnson & Johnson Consumer Products (USA); **Ruikang K. Wang**, Univ. of Washington (USA)

SATURDAY 27 JANUARY

SESSION 1..... SAT 8:40 AM TO 10:20 AM

Optical Coherence Tomography I

Session Chair: **Conor L. Evans**,
Wellman Ctr. for Photomedicine (USA)

Imaging skin with full field optical coherence tomography: from subsurface fingerprints to blood flow, Egidijus Aukorius, Albert Claude Boccara, Institut Langevin (France)..... [10467-1]

Optical coherence tomography as a minimally invasive androgenic alopecia diagnostic platform, Emon E. Heidari, Junxiao Yu, Nica Sabouni, Zhongping Chen, Natasha A. Mesinkovska M.D., Beckman Laser Institute and Medical Clinic (USA)..... [10467-2]

Advantages of long-range swept-source optical coherence tomography based angiography for wide-field dermatology, Jingjiang Xu, Shaozhen Song, Shaojie Men, Ruikang K. Wang, Univ. of Washington (USA) ... [10467-3]

In-vivo detection of the skin dermo-epidermal junction by ultrahigh resolution optical coherence tomography, Niels M. Israelsen, Technical Univ. of Denmark (Denmark); Michael Maria, NKT Photonics Inc. (Denmark) and Univ. of Kent (United Kingdom); Mette Mogensen M.D., Sophie Bojesen M.D., Bispebjerg Hospital (Denmark); Mikkel Jensen, Technical Univ. of Denmark (Denmark); Merete Haedersdal M.D., Bispebjerg Hospital (Denmark); Adrian Podoleanu, Univ. of Kent (United Kingdom); Ole Bang, Technical Univ. of Denmark (Denmark) and NKT Photonics (Denmark) [10467-4]

Using optical coherence tomography (OCT) to monitor changes in cutaneous vasculature following external stimuli, Andrew Wang, Newport High School (USA); Anthony J. Deegan, Shaojie Men, Univ. of Washington (USA)..... [10467-5]

SESSION 2..... SAT 10:50 AM TO 12:10 PM

Optical Coherence Tomography II

Session Chair: **Ruikang K. Wang**, Univ. of Washington (USA)

Optimized segmentation and characterization of capillary networks using OCT, Malte Casper, Massachusetts General Hospital (USA); Hinnerk Schulz-Hildebrandt, Univ. zu Lübeck (Germany); Michael Evers, Massachusetts General Hospital (USA); Reginald Birngruber, Univ. zu Lübeck (Germany); Dieter Manstein M.D., Massachusetts General Hospital (USA); Gereon Hüttmann, Univ. zu Lübeck (Germany)..... [10467-6]

Optical coherence tomography angiography for imaging skin blood perfusion under healthy and diseased conditions, Yuandong Li, Anthony J. Deegan, Shaozhen Song, Univ. of Washington (USA); Stephanie Lee, Fred Hutchinson Cancer Research Ctr. (USA); Ruikang K. Wang, Univ. of Washington (USA)..... [10467-7]

Quantitative classification of OCT skin images with deep learning, Sanzhar Askaruly, Yujin Ahn, Ulsan National Institute of Science and Technology (Korea, Republic of); Jiho Bak, Kyungpook National Univ. (Korea, Republic of); Andrey Vavilin, Ulsan National Institute of Science and Technology (Korea, Republic of); Gil-Jin Jang, Kyungpook National Univ. (Korea, Republic of); Pilun Kim, Oz-tec Co., Ltd. (Korea, Republic of); Haekwang Lee, AmorePacific Corp. (Korea, Republic of); Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of)..... [10467-8]

Investigating skin damage induced by UV light with optical coherence tomography, Wen-Ju Chen, Wei-Chuan Chen, Cheng-Yu Lee, Chang Gung Univ. (Taiwan); Chih-Hsun Yang M.D., Chang Gung Memorial Hospital (Taiwan); Meng-Tsan Tsai, Chang Gung Univ. (Taiwan) [10467-9]

Lunch/Exhibition Break Sat 12:10 pm to 1:40 pm

SESSION 3..... SAT 1:40 PM TO 3:00 PM

Structured Light Imaging

Session Chairs: **Bernard Choi**, Beckman Laser Institute and Medical Clinic (USA); **Haishan Zeng**, BC Cancer Research Ctr. (Canada)

The use of 3D scanners for skin prick allergy testing: a feasibility study, Rudolf M. Verdaasdonk, Janne Ploeger, Mark den Blanken, Niels Liberton, Thomas Rustemeyer M.D., Jan Wolff M.D., Vrije Univ. Medical Ctr. (Netherlands)..... [10467-23]

Comparing the predictive capability of Spatial Frequency Domain Imaging (SFDI) and Laser Speckle Imaging (LSI) to the gold standard of clinical assessment in a graded model of burn severity, Adrien Ponticorvo, Rebecca A. Rowland, Melissa L. Baldado, Beckman Laser Institute and Medical Clinic (USA); David M. Burmeister, Robert J. Christy, U.S. Army Institute of Surgical Research (USA); Nicole Bernal M.D., UC Irvine Regional Burn Ctr. (USA); Bernard Choi, Anthony J. Durkin, Beckman Laser Institute and Medical Clinic (USA) and Univ. of California, Irvine (USA)..... [10467-25]

Spatial frequency domain imaging using a snap-shot filter mosaic camera with multi-wavelength sensitive pixels, Tomas Strömberg, Linköping Univ. (Sweden); Rolf B. Saager, Gordon T. Kennedy, Beckman Laser Institute and Medical Clinic (USA); Ingemar Fredriksson, Linköping Univ. (Sweden) and Perimed AB (Sweden); Göran Salerud, Linköping Univ. (Sweden); Anthony J. Durkin, Beckman Laser Institute and Medical Clinic (USA) and Univ. of California (USA); Marcus Larsson, Linköping Univ. (Sweden)..... [10467-28]

Spatial frequency domain imaging tracks healing following split-thickness skin grafts of burn wounds, Gordon T. Kennedy, Beckman Laser Institute and Medical Clinic (USA); Randolph Stone II, Andrew C. Kowalczewski, U.S. Army Institute of Surgical Research (USA); Jeffrey H. Chen, Rebecca A. Rowland, Melissa L. Baldado, Adrien Ponticorvo, Beckman Laser Institute and Medical Clinic (USA); Anthony J. Durkin, Beckman Laser Institute and Medical Clinic (USA) and Univ. of California, Irvine (USA)..... [10467-30]

SESSION 4..... SAT 3:30 PM TO 4:30 PM

Skin Cancer I

Session Chair: **Kristen M. Kelly**,
Beckman Laser Institute and Medical Clinic (USA)

Skin cancer margin analysis with morphologic and metabolic micro-tomography, Eugénie Dalimier, Emilie Benoit a la Guillaume, LLTech SAS (France); John Durkin, Drexel Univ. College of Medicine (USA); Sarah Hendriks, Thérèse Awada, GHR Mulhouse Sud-Alsace (France); Diana Mandache, Vannary Meas-Yedid, Institut Pasteur (France); Clement Apelian, Albert Claude Boccara, LLTech SAS (France) and Institut Langevin (France)..... [10467-10]

Blood flow quantification of biopsied skin lesions using a laser speckle imaging dermatoscope, Cody E. Dunn, Beckman Laser Institute and Medical Clinic (USA); Sean M. White, Manuel Valdebran, Kristen M. Kelly, Bernard Choi, Univ. of California, Irvine (USA) [10467-11]

A quantitative analysis for skin cancer diagnosis, Kiwoon Kwon, Dongguk Univ. (Korea, Republic of)..... [10467-12]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5..... SUN 8:20 AM TO 10:20 AM

Microscopy

Session Chair: **Milind Rajadhyaksha**, Memorial Sloan-Kettering Cancer Ctr. (USA)

In vivo multiphoton microscopy imaging of melasma, Griffin R. Lentsch, Mihaela Balu, Joshua N. Williams, Beckman Laser Institute and Medical Clinic (USA); Shaohoon Lee, Yonsei Univ. (Korea, Republic of); Ronald M. Harris M.D., Univ. of California, Irvine (USA); Anand Ganesan, Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA); Nirmala Nair, Unilever R&D Bangalore (India); Uma Santhanam, Unilever Research & Development (USA); Manoj Misra, Unilever HPC USA (USA) [10467-13]

Feature characterization of scarring and non-scarring types of alopecia by multiphoton microscopy, Inga Saknite, Beckman Laser Institute and Medical Clinic (USA) and Institute of Atomic Physics and Spectroscopy, Univ. of Latvia (Latvia); Manuel Valdebran M.D., Jessica Lin, Univ. of California, Irvine (USA); Griffin R. Lentsch, Joshua N. Williams, Mihaela Balu, Bruce J. Tromberg, Natasha A. Mesinkovska M.D., Beckman Laser Institute and Medical Clinic (USA) [10467-14]

Fluorescence lifetime imaging microscopy (FLIM) for visualization of targeted drug delivery and local distribution in skin of a single daily dose of topical minocycline gel: an update on translational research from preclinical to clinical, Sinyoung Jeong, Wellman Ctr. for Photomedicine, Massachusetts General Hospital, Harvard Medical School (USA); Maiko Hermsmeier, BioPharmX, Inc. (USA); Sam Osseiran, Harvard-MIT Health Sciences and Technology (USA); Akira Yamamoto, Xin Chen, Usha Nagavarapu, BioPharmX, Inc. (USA); Conor L. Evans, Wellman Ctr. for Photomedicine (USA); Kin F. Chan, AnnaMarie Daniels, BioPharmX, Inc. (USA) [10467-15]

Fluorescent imaging of Mohs surgical margins using multiphoton microscopy, Michael G. Giacomelli, Tadayuki Yoshitake, Lucas C. Cahill, Massachusetts Institute of Technology (USA); Beverly E. Faulkner-Jones, Daihung V. Do, Beth Israel Deaconess Medical Ctr. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) [10467-16]

State-of-the-art clinical multimodal multi photon / CARS / FLIM tomography of human skin, Karsten König, JenLab GmbH (Germany) [10467-17]

Multispectral detection of cutaneous lesions using spectroscopy and microscopy approaches, Ekaterina G. Borisova, Tsanislava I. Genova, Institute of Electronics, Bulgarian Academy of Sciences (Bulgaria); Petranka P. Troyanova M.D., Elmira P. Pavlova M.D., Ivan Terziev M.D., Univ. Hospital "Tsaritsa Yoanna-ISUL" (Bulgaria); Oxana V. Semyachkina-Glushkovskaya, Maria V. Lomova, Elina A. Genina, Valery V. Tuchin, Saratov State Univ. (Russian Federation); George A. Stanciu, Univ. Politehnica of Bucharest (Romania); Denis E. Tranca, Univ. Politehnica of Bucharest (Romania) and Ctr. for Microscopy-Microanalysis and Information Processing (Romania); Latchezar A. Avramov, Institute of Electronics, Bulgarian Academy of Sciences (Bulgaria) [10467-18]

SESSION 6..... SUN 10:50 AM TO 12:10 PM

Wound Healing

Session Chair: **Anthony J. Durkin**, Beckman Laser Institute and Medical Clinic (USA)

Dynamics of controllably induced bruises assessed by diffuse reflectance spectroscopy and pulsed photothermal radiometry, Ana Marin, Univ. of Ljubljana (Slovenia); Matija Milanic, Univ. of Ljubljana (Slovenia); Jožef Stefan Institute (Slovenia); Nina Verdel, Luka Vidovic, Jožef Stefan Institute (Slovenia); Boris Majaron, Jožef Stefan Institute (Slovenia), Univ. of Ljubljana (Slovenia) [10467-19]

Wide-field superficial blood flow imaging using a portable handheld laser speckle imaging device, Ben Lertsakdadet, Cody E. Dunn, Bernard Choi, Univ. of California, Irvine (USA) [10467-20]

Fluorescence visualization of wound closure in partial and full-thickness wound models, Ying Wang, Antonio Ortega-Martinez, William A. Farinelli, Richard R. Anderson M.D., Walfre Franco, Massachusetts General Hospital (USA) [10467-21]

Optical evaluation of wound healing using infrared imaging, Babak Shadgan M.D., Ali Farokhi, Aziz Ghahary, The Univ. of British Columbia (Canada) and International Collaboration on Repair Discoveries (Canada) [10467-22]

SESSION 7..... SUN 1:40 PM TO 2:20 PM

Skin Hydration

Session Chair: **InSeok Seo**, Johnson & Johnson Consumer Products (USA)

Improved sensitivity of short-wave infrared spectroscopic method for depth resolved quantitative profiling of stratum corneum in the low hydration regime, Anna A. Ezerskaia, Philips Research (Netherlands); Silvania F. Pereira, H. Paul Urbach, Technische Univ. Delft (Netherlands); Babu Varghese, Philips Research (Netherlands) [10467-23]

Evaluation of skin moisturizer effects using terahertz time domain imaging, Mariana Alfaro, Luis Humberto Martinez-Meza, Univ. Autonoma de Aguascalientes (Mexico); Carolina Rojas-Landeros, Enrique Castro-Camus, Centro de Investigaciones en Óptica, A.C. (Mexico) [10467-24]

SESSION 8..... SUN 2:20 PM TO 3:20 PM

Skin Cancer II

Session Chair: **Lise L. Randeberg**, Norwegian Univ. of Science and Technology (Norway)

Label free assessment of ultra-violet radiation induced damages in skin cells, Surya P. Singh, Sungsam Kang, Jeon Woong Kang, Peter T. C. So, Ramachandra R. Dasari, Zahid Yaqoob, Massachusetts Institute of Technology (USA); Ishan Barman, Johns Hopkins Univ. (USA) [10467-27]

Preclinical studies of dual-photosensitizer PDT combined with optical clearing for treatment of cutaneous melanoma, Layla Pires, Instituto de Física de São Carlos (Brazil); Ana Gabriela Sálvio M.D., Hospital Amaral Carvalho (Brazil); Vanderlei S. Bagnato, Instituto de Física de São Carlos (Brazil); Brian C. Wilson, Princess Margaret Cancer Ctr., Univ. of Toronto (Canada); Cristina Kurachi, Instituto de Física de São Carlos (Brazil) [10467-29]

In vivo characterizations of optical properties of human skin responses to visible light by diffuse reflectance spectroscopy, Indermeet Kohli, Tasneem F. Mohammad M.D., Cynthia L. Nicholson M.D., Henry Ford Health System (USA); Nikiforos Kollias, Independent (USA); Henry W. Lim M.D., Iltefat Hamzavi M.D., Henry Ford Health System (USA) [10467-31]

CONFERENCE 10467

SESSION 9..... SUN 3:50 PM TO 4:50 PM

Polarization

Session Chair: **Jessica C. Ramella-Roman**,
Florida International Univ. (USA)

Polarization enhanced reflectance imaging for pre-operative delineation of nonmelanoma skin cancers (NMSCs), Xin Feng, Peter Jermain, Univ. of Massachusetts Lowell (USA); Victor A. Neel, Massachusetts General Hospital (USA); Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA) . . [10467-32]

Stokes polarimetry probe for skin lesion evaluation - preliminary results, Daniel C. Louie, Lioudmila Tchvialeva, Sunil Kalia, The Univ. of British Columbia (Canada); Harvey Lui, The Univ. of British Columbia (Canada) and BC Cancer Agency (Canada); Tim K. Lee, The Univ. of British Columbia (Canada) and BC Cancer Agency (Canada) [10467-33]

Quantitatively characterizing microstructural variations of skin tissues during ultraviolet radiation damaging process based on Mueller matrix polarimetry, Wei Sheng, Honghui He, Dong Yang, Hui Ma, Graduate School at Shenzhen, Tsinghua Univ. (China) [10467-34]

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Characterization of facial solar lentigo using optical coherence tomographic gngiography, Yusuke Hara, Shiseido Global Innovation Ctr. (Japan) and Osaka City Univ. (Japan); Toyonobu Yamashita, Kumiko Kikuchi, Takako Shibata, Masato Ninomiya, Chika Katagiri, Kentaro Kajiya, Shiseido Global Innovation Ctr. (Japan); Hajime Iizuka M.D., Research Institute of Psoriasis, Kojinkai Association of Medical Corp. (Japan); Daisuke Furukawa, Souichi Saeki, Osaka City Univ. (Japan) [10467-35]

Fast determination of the spatially distributed photon fluence for light dose evaluation of PDT, Kuanxin Zhao, Weiting Chen, Tongxin Li, Panpan Yan, Tianjin Univ. (China); Zhuanping Qin, Tianjin Univ. of Technology and Education (China); Huijuan Zhao, Tianjin Univ. (China) [10467-36]

Development of high definition OCT system for clinical therapy of skin diseases, Daeyul Baek, Young-Seok Seo, Junghyun Kim, WONTECH Co., Ltd. (Korea, Republic of) [10467-37]

Label-free, multi-contrast optical coherence tomography for study of skin melanoma mice in vivo, Pei-Yu Lai, Ting-Han Lin, National Yang-Ming Univ. (Taiwan); Ya-Shuan Chou, Chung-Hsing Chang, China Medical Univ. (Taiwan); Wen-Chuan Kuo, National Yang-Ming Univ. (Taiwan) [10467-38]

Refractive index measurement in optical coherence tomography skin images, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Zahra Turani, Emad Fatemizadeh, Sharif Univ. of Technology (Iran, Islamic Republic of); Anne Clayton, Steven Daveluy, Darius Mehregan, Wayne State Univ. (USA) [10467-39]

The use of optical coherence tomography to evaluate the efficiency of skin care products, Mohammad R.N. Avanaki, Sarosh Irani, Wayne State Univ. (USA); Zahra Turani, Emad Fatemizadeh, Sharif Univ. of Technology (USA); Steven Daveluy, Wayne State Univ. School of Medicine (USA); Darius Mehregan, Juri Gelovani, Wayne State Univ. (USA) [10467-40]

Comprehensive investigation of an optical properties extraction algorithm on OCT images of numerical and experimental phantoms, Mohammad R.N. Avanaki, Wayne State Univ. (USA); Zahra Turani, Emad Fatemizadeh, Sharif Univ. of Technology (Iran, Islamic Republic of); Dilara Turk, Preethi Sriranga, Wei Chen, Juri Gelovani, Wayne State Univ. (USA); Peter Andersen, Technical Univ. of Denmark (Denmark) [10467-41]

Eigenspace-based minimum variance adaptive beamformer combined with delay multiply and sum: experimental study, Moein Mozaffarzadeh, Ali Mahloojifar, Tarbiat Modares Univ. (Iran, Islamic Republic of); Mohammad R.N. Avanaki, Wayne State Univ. (USA); Mahdi Orooji, Tarbiat Modares Univ. (Iran, Islamic Republic of) [10467-42]

The study of interstitial lipolysis using fiber coupled diode laser, Gu-In Jung, Sung-Min Kwon, Seong-Seon Shin, Byeong Kwon Kim, Institute of Advanced Convergence Technology (Korea, Republic of); Kyoung Hwan Koo, COMMAX (Korea, Republic of) [10467-43]

BIOS SUNDAY PLENARY SESSION..... SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10468

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10468

Therapeutics and Diagnostics in Urology 2018

Conference Chairs: **Hyun Wook Kang**, Pukyong National Univ. (Korea, Republic of); **Kin Foong Chan**, BioPharmX, Inc. (USA)

Program Committee: **Geoffrey N. Box M.D.**, The Ohio State Univ. (USA); **Nathaniel M. Fried**, The Univ. of North Carolina at Charlotte (USA); **Joseph C. Liao**, Stanford Univ. (USA); **Daqing Piao**, Oklahoma State Univ. (USA); **Babak Shadgan M.D.**, The Univ. of British Columbia (Canada); **Ronald Sroka**, Laser-Forschungslabor (Germany); **Joel M. Teichman M.D.**, St. Paul's Hospital (Canada); **Matthias Trottmann**, Univ. München (Germany); **Rudolf M. Verdaasdonk**, Vrije Univ. Medical Ctr. (Netherlands); **Jian J. Zhang**, Boston Scientific Corp. (USA)

SATURDAY 27 JANUARY

SESSION 1 SAT 10:30 AM TO 11:50 AM

Laser Treatment I

Session Chair: **Hyun Wook Kang**,
Pukyong National Univ. (Korea, Republic of)

Laser-assisted decontamination of biofilm in flexible cystoscope, Van Nam Tran, Chakradhar Dasagrandhi, Van Gia Truong, Young Mog Kim, Hyun Wook Kang, Pukyong National Univ. (Korea, Republic of) [10468-1]

Thermo-biometrical investigations of laser-induced phase transitions of prostatic mitochondrial membranes, Jürgen Beuthan, Charité Universitätsmedizin Berlin (Germany); Hansjörg Albrecht, Laser- und Medizin-Technologie GmbH, Berlin (Germany); Olaf Minet, Urszula Zabarylo, Charité Universitätsmedizin Berlin (Germany) [10468-2]

Multi-wavelength numerical simulation with Python of laser ablation during benign prostate hyperplasia treatment, Jonathan M. Rutherford, Metasebya Solomon, Jian J. Zhang, Thomas Hasenberg, Jason R. Xuan, Boston Scientific Corp. (USA) [10468-3]

Dual-wavelength-assisted photocoagulation for laser treatment, Jieun Hwang, Pukyong National Univ. (Korea, Republic of); Hyejin Kim, Van Gia Truong, Pukyong National Univ. (Korea, Republic of); Jason R. Xuan, Thomas Hasenberg, Boston Scientific Corp. (USA); Hyun Wook Kang, Pukyong National Univ. (Korea, Republic of) [10468-4]

Lunch/Exhibition Break Sat 11:50 am to 1:30 pm

SESSION 2 SAT 1:30 PM TO 3:00 PM

Laser Lithotripsy I

Session Chairs: **Nathaniel M. Fried**,
The Univ. of North Carolina at Charlotte (USA);
Kin Foong Chan, BioPharmX, Inc. (USA)

A novel Holmium:YAG fiber design to transmit high power with tight-bend for laser lithotripsy, Steven Peng, Boston Scientific Corp. (USA) [10468-5]

Thulium fiber laser induced vapor bubble formation using bare, tapered, ball, hollow steel, and muzzle brake fiber optic tips, David A. Gonzalez, Thomas C. Hutchens, Luke A. Hardy, The Univ. of North Carolina at Charlotte (USA); Pierce B. Irby, Carolinas Medical Ctr. (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) [10468-6]

In-vitro investigation on fragmentation/dusting and fluorescence during Ho:YAG-Laser induced lithotripsy, Ronald Sroka, Thomas Pongratz, Laser-Forschungslabor (Germany); Frank Strittmatter, Ludwig-Maximilians-Univ. München (Germany); Maximilian Eisel, Laser-Forschungslabor (Germany); Stephan Ströbl, Laser-Forschungslabor (Germany) and Ludwig-Maximilians-Univ. München (Germany) [10468-7]

Recent advances in laser lithotripsy (Invited Paper), Thomas Hasenberg, Jian J. Zhang, Boston Scientific Corp. (USA); Metasebya Solomon, Washington Univ. in St. Louis (USA); Steven Peng, Jonathan M. Rutherford, Jason R. Xuan, Raymond W. Chia, Boston Scientific Corp. (USA) ... [10468-8]

SESSION 3 SAT 3:30 PM TO 4:50 PM

Optical Imaging

Session Chairs: **Ronald Sroka**,
Laser-Forschungslabor (Germany); **Babak Shadgan M.D.**,
International Collaboration On Repair Discoveries (Canada)

Intraoperative identification of underlying major venous and arterial vessels using freehand diffuse optical spectroscopy imaging (freeDOSi) for guiding minimally invasive surgery: an in vivo demonstration in a pig model, Daqing Piao, Oklahoma State Univ. (USA); Mohammad Ramadan M.D., The Univ. of Oklahoma Health Sciences Ctr. (USA); Aaron Park, Oklahoma School of Science and Mathematics (USA); Kenneth E. Bartels D.V.M., Oklahoma State Univ. (USA); Sanjay Patel M.D., The Univ. of Oklahoma Health Sciences Ctr. (USA) [10468-9]

Characterisation of prostate biopsy tissue using optical coherence elastography, Yuting Ling, Chunhui Li, Kanheng Zhou, Guangying Guan, Univ. of Dundee (United Kingdom); Stephen Lang, Ninewells Hospital and Medical School (United Kingdom); David McGloin, Zhihong Huang, Ghulam Nabi, Univ. of Dundee (United Kingdom) [10468-10]

Effect of capsular on surface diffuse reflectance spectroscopy of capsular solid organs, Daqing Piao, Oklahoma State Univ. (USA); Halen Borrón M.D., Alan Hawxby M.D., Harlan Wright M.D., Erin Rubin M.D., The Univ. of Oklahoma Health Sciences Ctr. (USA) [10468-11]

Automated analysis of en-face optical coherence tomography images correlated with histology findings in 20 prostatectomy specimens, Abel Swaan, Berrend B. G. Muller M.D., Leah S. Wilk, Mitra Almasian, Academisch Medisch Centrum (Netherlands); Ech Zwartkruis, Vrije Univ. Medical Ctr. (Netherlands); Daniel Martijn de Bruin, Wim Schreurs, Academisch Medisch Centrum (Netherlands); L. Rozendaal, Jakkó Niewenhuijzen, Andre Vis, R. Jeroen A. van Moorselaar M.D., Vrije Univ. Medical Ctr. (Netherlands); Dirk J. Faber, Jean J. M. C. H. de la Rosette M.D., Ton G. van Leeuwen, Academisch Medisch Centrum (Netherlands); Marcel B. van Herk, The Univ. of Manchester (United Kingdom) ... [10468-12]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

CONFERENCE 10468

SUNDAY 28 JANUARY

SESSION 4. SUN 9:00 AM TO 10:00 AM

Laser Treatment II

Session Chairs: **Ronald Sroka**, Laser-Forschungslabor (Germany);
Hyun Wook Kang, Pukyong National Univ. (Korea, Republic of)

Application of laser balloon catheter for photothermal treatment on benign ureteral stricture, Jinoh Bak, Hyun Wook Kang, Pukyong National Univ. (Korea, Republic of) [10468-13]

Monitoring irradiance during full bladder irradiation for Ru(II) photosensitizer mediated Photodynamic Therapy in NMIBC, Lothar D. Lilge, Jenny Wu, Univ. Health Network (Canada); Wayne Embree, Theralase, Inc. (Canada); Yiwen Xu, Univ. Health Network (Canada); Jeffrey Cassidy, Vaughn Betz, Univ. of Toronto (Canada); Savo Lasic, Arkady Mandel, Theralase, Inc. (Canada); Girish Kulkarni, Univ. Health Network (Canada) and Univ. of Toronto (Canada); Michael Jewett, Univ. of Toronto (Canada) [10468-14]

Comparison of a novel 450-nm laser with Ho:YAG (2100 nm), Tm fiber (1940 nm), and KTP (532 nm) lasers for soft-tissue ablation, Ilya Yaroslavsky, IPG Medical Corp. (USA); Victoria Vinnichenko, Anastasiya Kovalenko, Valeriya Arkhipova, IRE-Polus Co. (Russian Federation); Gregory Altshuler, IPG Medical Corp. (USA); Valentin P. Gapontsev, IPG Photonics Corp. (USA) [10468-15]

SESSION 5. SUN 10:30 AM TO 11:30 AM

Laser Lithotripsy II

Session Chairs: **Jian J. Zhang**, Boston Scientific Corp. (USA);
Kin Foong Chan, BioPharmX, Inc. (USA)

The effect of force on fiber burn-back during lithotripsy, Ashkan Aryaei, Raymond W. Chia, Steven Peng, Boston Scientific Corp. (USA) [10468-16]

Scanning electron microscopy of real and artificial kidney stones before and after Thulium fiber laser ablation in air and water, Luke A. Hardy, The Univ. of North Carolina at Charlotte (USA); Pierce B. Irby M.D., Carolinas Medical Ctr. (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) [10468-17]

Optimization of a novel Tm fiber laser lithotripter in terms of stone ablation efficiency and repulsion reduction, Ilya Yaroslavsky, IPG Medical Corp. (USA); Victoria Vinnichenko, IRE-Polus Co. (Russian Federation); Tyler McNeill, Anna Novoseltseva, Igor Perchuk, Alexander Vybornov, Gregory Altshuler, IPG Medical Corp. (USA); Valentin P. Gapontsev, IPG Photonics Corp. (USA) [10468-18]

SUNDAY POSTER SESSION. SUN 5:30 PM TO 7:00 PM

Poster Sunday

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Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Enhanced cytotoxic effect of dual photofrin-mediated photodynamic therapy and fucoidan for bladder cancer, Hyejin Kim, Hyun Wook Kang, Pukyong National Univ. (Korea, Republic of); Jun-O Jin, Shanghai Public Health Clinical Ctr., Fudan Univ. (China) [10468-19]

Optical clearing of vaginal tissues in cadavers, Chun-Hung Chang, Luke A. Hardy, The Univ. of North Carolina at Charlotte (USA); Michael Peters, Dina Bastawros M.D., Erinn Myers M.D., Michael J. Kennelly M.D., Carolinas Medical Ctr. (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) [10468-20]

Homogeneous light distribution of spherical fibers for photodynamic therapy on bladder tumor, Van Gia Truong, Van Nam Tran, Hyun Wook Kang, Pukyong National Univ. (Korea, Republic of) [10468-21]

Feasibility study of real-time photoacoustic image-guided dual thermal therapy, Haemin Kim, Jin Ho Chang, Sogang Univ. (Korea, Republic of) [10468-22]

Comparative evaluations of animal models for urological fibrosis, Myeongjin Kim, Hyejin Kim, Hyun Wook Kang, Pukyong National Univ. (Korea, Republic of) [10468-23]

Ablation of large UA and COM stones using a compact, air-cooled, high peak power, 1940-nm Thulium fiber laser, Luke A. Hardy, David A. Gonzalez, The Univ. of North Carolina at Charlotte (USA); Pierce B. Irby, Carolinas Medical Ctr. (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) [10468-24]

Phlorotannin-combined low-level laser therapy (LLLT) for inhibition of stromal fibrosis in prostate, Yeachan Lee, Hyun Wook Kang, Hyejin Kim, Pukyong National Univ. (Korea, Republic of) [10468-25]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details.

CONFERENCE 10469

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10469

Optical Imaging, Therapeutics, and Advanced Technology in Head and Neck Surgery and Otolaryngology 2018

Conference Chairs: **Brian J. F. Wong M.D.**, Beckman Laser Institute and Medical Clinic (USA); **Justus F. Igner M.D.**, Uniklinik RWTH Aachen (Germany); **Max J. Witjes M.D.**, Univ. Medical Ctr. Groningen (Netherlands)

Program Committee: **Phil-Sang Chung**, Dankook Univ. Hospital (Korea, Republic of); **Waseem K. Jerjes**, Univ. College London (United Kingdom); **Joseph C. Jing**, Beckman Laser Institute and Medical Clinic (USA); **Milind Rajadhyaksha**, Memorial Sloan-Kettering Cancer Ctr. (USA); **Henricus J. C. M. Sterenberg**, Erasmus MC (Netherlands)

Conference Cosponsor:



Scientific Meeting of the Head and Neck Optical Diagnostics Society (HNODS)

SATURDAY 27 JANUARY

SESSION 1 SAT 8:00 AM TO 10:00 AM

Airway Imaging and Vocal Fold Dynamics I

Session Chair: **Brian J. F. Wong**, Beckman Laser Institute and Medical Clinic (USA)

Long working distance OCT for phonomicrosurgery: preliminary observation of 3D microstructure of ex vivo specimens, Jin-Choon Lee M.D., Soo-Geun Wang M.D., Euisuk Sung M.D., Kyung Un Choi M.D., Pusan National Univ. Hospital (Korea, Republic of); Hong Ki Kim D.D.S., Koh Young Technology (Korea, Republic of); Sangyoung Kim, Minkyu Kim, Yongchul Park, Chankwon Lee, Jung Hur, Young-Joo Hong, Jeonghoon Choi, Minyoung Hwangbo, Yuri Koh, Koh Young Technology, Inc. (Korea, Republic of); Soo-Keun Kong, Pusan National Univ. Hospital (Korea, Republic of) [10469-1]

Development of attachable phonomicrosurgical OCT device, Jin-Choon Lee, Euisuk Sung, Kyung Un Choi, Pusan National Univ. Hospital (Korea, Republic of); Hong Ki Kim, Hung Wook Kim, Sangyoung Kim, Choongmin Jung, Young-Joo Hong, Jeonghun Choi, Hyunjong Kim, Sol Kim, Woolim Choi, Jiun Jeon, Minyoung Hwangbo, Duck Hoon Kang, Sukhoon Park, Minkyu Kim, Seung Tae Kim, Koh Young Technology, Inc. (Korea, Republic of); Soo-Keun Kong, Pusan National Univ. Hospital (Korea, Republic of) . [10469-2]

Evaluation of oxygen consumption and acoustics of human vocal fold by using near-infrared spectroscopy, Han-Yun Cheng, Jung-Chih Chen, Institute of Biomedical Engineering, National Chiao Tung Univ. (Taiwan); Chih-Hsien Liu, Cathay General Hospital (Taiwan); Yung-An Tsou, Zih-Jie Lin, China Medical Univ. Hospital (Taiwan); Ching-Cheng Chuang, Institute of Biomedical Engineering, National Chiao Tung Univ. (Taiwan) [10469-3]

Porcine vocal folds imaged using 5 optical coherence tomography systems: a comparison, Alisa Zhukhovitskaya, Univ. of California, Irvine (USA); Jason J. Chen, Yan Li, Andrew E. Heidari, Joseph C. Jing, Jiang Zhu, Zhongping Chen, Brian J. F. Wong, Beckman Laser Institute and Medical Clinic (USA) [10469-4]

ROI detection for glottis images captured from high-speed video-endoscopy, Jun Kubota, Randol Spaulding, Santa Clara Univ. (USA); Chi Zhu, Maebashi Institute of Technology (Japan); Yuling Yan, Santa Clara Univ. (USA) [10469-5]

Development and evaluation of an office based VCSEL-OCT system in diagnosing larynx cancer, Tirunelveli Ramalingam, OCT Medical Imaging Inc. (USA) [10469-6]

Clinical translation of μ OCT imaging for cystic fibrosis studies: an intranasal imaging approach, Hui Min Leung, Massachusetts General Hospital (USA); Susan E. Birket, The Univ. of Alabama at Birmingham School of Medicine (USA); Timothy N. Ford, Chulho Daryl Hyun, Wellman Ctr. for Photomedicine (USA); Dongyao Cui M.D., Nanyang Technological Univ. (Singapore); George M. Solomon M.D., Do-Yeon Cho M.D., The Univ. of Alabama at Birmingham (USA); Bradford A. Woodworth M.D., The Univ. of Alabama School of Medicine (USA); Steven M. Rowe M.D., The Univ. of Alabama at Birmingham (USA); Guillermo J. Tearney M.D., Massachusetts General Hospital (USA) [10469-7]

SESSION 2 SAT 10:30 AM TO 11:50 AM

Airway Imaging and Vocal Fold Dynamics II

Session Chair: **Justus F. Igner M.D.**, Uniklinik RWTH Aachen (Germany)

Optical flow estimation for laryngeal image analyses, Randol Spaulding, Yuling Yan, Santa Clara Univ. (USA) [10469-8]

Comparative study of in vivo tracheal dynamics under varying respiratory conditions using anatomic OCT and CT, Santosh Balakrishnan, Ruofei Bu, Hillel Price, Carlton Zdanski, Amy L. Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) [10469-9]

Clinical evaluation of subglottic stenosis in neonates using automatic segmentation of optical coherence tomography via dynamic programming, Konrad Kozlowski, Giriraj Sharma, Brian Wong, Jason Chen, Zhongping Chen, Joseph Jing, Beckman Laser Institute and Medical Clinic (USA); Li Qi, Nanjing University (China) [10469-10]

Computer-assisted classification of vocal fold diseases lesions on NBI images using deep convolutional neural networks, Christian Stephan Betz, Klinikum der Univ. München (Georgia); Sven Mantowski, Veronika Volgger, Maria-Elke Schuster, Jörg Lohscheller, Klinikum der Univ. München (Germany) [10469-11]

Surveying tissue topography in the oral cavity using optical coherence tomography, Andrew E. Heidari, Ellen M. Hong, Zhongping Chen, Brian J. F. Wong, Beckman Laser Institute and Medical Clinic (USA) [10469-12]

Lunch/Exhibition Break Sat 11:50 am to 1:40 pm

SESSION 3 SAT 1:40 PM TO 3:00 PM

Optically Guided Cancer Surgery I

Session Chair: **Max J. Witjes M.D.**, Univ. Medical Ctr. Groningen (Netherlands)

Clinical trial results using fluorescently labeled antibodies, Eben L. Rosenthal M.D., Nynke van den Berg, Stanford Health Care (USA); Tarn Teraphongphom, Stanford Univ. (USA); Jason Warram, The Univ. of Alabama at Birmingham (USA) [10469-14]

Epidermal growth factor receptor-targeted photodynamic therapy with the conjugates of Cetuximab and IR700DX in human Head and Neck cancer cell lines, Max J. Witjes M.D., Wei Peng M.D., Univ. Medical Ctr. Groningen (Netherlands); Riette de Bruijn, Ctr. for Optical Diagnostics and Therapy, Erasmus MC (Netherlands); Eric Farrel M.D., Dominic Robinson, Erasmus MC (Netherlands) [10469-15]

Near infrared hyperspectral imaging to evaluate tongue tumor resection margins intraoperatively, Susan G. Brouwer de Koning, M.B. Karakullukcu, L. Smit, E.J.M. Baltussen, The Netherlands Cancer Institute (Netherlands); H.J.C.M. Sterenberg, The Netherlands Cancer Institute (Netherlands) and Academisch Medisch Centrum (Netherlands); T.J.M. Ruers, The Netherlands Cancer Institute (Netherlands) and Univ. Twente (Netherlands) [10469-16]

Automated detection of oropharyngeal carcinoma using multispectral imaging: a prospective feasibility study, Shamik Mascharak, Univ. of California, Santa Cruz (USA) [10469-17]

CONFERENCE 10469

SESSION 4SAT 3:30 PM TO 6:10 PM

Optically Guided Cancer Surgery II

Session Chair: **Phil-Sang Chung**,
Dankook Univ. Hospital (Korea, Republic of)

In vivo imaging of the oral cavity by endoscopic optical coherence tomography, Julia Walther, Christian Schnabel, Nadja Ebert, Universitätsklinikum Carl Gustav Carus Dresden (Germany); Michael Baumann, TU Dresden (Germany); Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany) [10469-18]

Interooperative tumor margin delineation, Maie A. St. John, Univ. of California, Los Angeles (USA) [10469-19]

Initial experience of in vivo real-time reflectance confocal microscopy of oral squamous cell carcinoma, Jocelyn C. Migliacci, Ronald Ghossein, Gary Peterson, Kivanc Kose, Miguel Cordova, Milind Rajadhyaksha, Snehal G. Patel, Memorial Sloan-Kettering Cancer Ctr. (USA) [10469-20]

Machine learning methods for fluorescence lifetime imaging (FLIM) based automated detection of early stage oral cancer and dysplasia, Rodrigo Cuenca, Shuna Cheng, Bilal H. Malik, Kristen C. Maitland, Texas A&M Univ. (USA); Beena Ahmed, Texas A&M Univ. (Qatar); Yi-Shing Lisa L. Cheng, John M. Wright, Terry Rees, Texas A&M Health Science Ctr. (USA); Javier A. Jo, Texas A&M Univ. (USA) [10469-21]

A novel multimodal optical imaging user interface for in vivo diagnosis and biopsy guidance of oral neoplasia, Eric Yang, Rice Univ. (USA); Nadarajah Vigneswaran D.D.S., The Univ. of Texas Dental Branch at Houston (USA); Ann Gillenwater M.D., The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Rebecca R. Richards-Kortum, Rice Univ. (USA) [10469-22]

Autofluorescence lifetime imaging endoscopy for automated label-free early detection of oral epithelial cancer and dysplasia, Javier A. Jo, Shuna Cheng, Rodrigo Cuenca, Elvis Duran, Bilal H. Malik, Texas A&M Univ. (USA); Beena Ahmed, Texas A&M Univ. (Qatar); Yi-Shing Lisa Cheng, John M. Wright, Texas A&M Univ. College of Dentistry (USA); Kristen C. Maitland, Texas A&M Univ. (USA) [10469-23]

Diffuse reflectance spectroscopy to discriminate tumor from healthy tongue tissue, Susan G. Brouwer de Koning, E.J.M. Baltussen, M.B. Karakullukcu M.D., L. Smit M.D., R.L.P. van Veen, The Netherlands Cancer Institute (Netherlands); B.H.W. Hendriks, Koninklijke Philips N.V. (Netherlands); H.J.C.M. Sterenberg, The Netherlands Cancer Institute (Netherlands) and Academisch Medisch Centrum (Netherlands); T.J.M. Ruers M.D., The Netherlands Cancer Institute (Netherlands) . [10469-24]

Compact and cost-effective handheld multispectral fluorescence lifetime imaging (FLIM) system for oral mucosa in vivo imaging based on a frequency-domain implementation, Shuna Cheng, Michael Serafino, Rodrigo Cuenca, Texas A&M Univ. (USA); Beena Ahmed, Texas A&M Univ. (Qatar); Brian Applegate, Javier A. Jo, Texas A&M Univ. (USA) [10469-25]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:00 AM TO 10:00 AM

Hearing and Diseases of the Ear

Session Chairs: **Justus F. Ilgner M.D.**,
Uniklinik RWTH Aachen (Germany); **Phil-Sang Chung**,
Dankook Univ. Hospital (Korea, Republic of)

Evaluation of endoscopic optical coherence tomography regarding its applicability for imaging the human tympanic membrane, Lars Kirsten, Jonas Golde, Universitätsklinikum Carl Gustav Carus Dresden (Germany); Joseph Morgenstern, TU Dresden (Germany); Mikael Erkkilä, Universitätsklinikum Carl Gustav Carus Dresden (Germany) and Das Zentrum für Medizinische Physik und Biomedizinische Technik, Medizinische Univ Wien (Austria); Martin Schindler, Julia Walther, Max Kemper, Matthias Bornitz, Universitätsklinikum Carl Gustav Carus Dresden (Germany); Marcus Neudert, TU Dresden (Germany); Thomas Zahnert, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany) [10469-26]

Visualizing cellular markers of sensorineural hearing loss in the murine cochlea using micro-optical coherence tomography, Janani S. Iyer, Harvard Univ. (USA); Gargi Sharma, Guillermo J. Tearney M.D., Massachusetts General Hospital (USA); Konstantina M. Stankovic, Massachusetts Eye and Ear Infirmary (USA) [10469-27]

Improved automated classification of OCT data for the diagnosis of otitis media in pediatric human subjects, Guillermo L. Monroy, Paritosh Pande, Beckman Institute for Advanced Science and Technology (USA); Malcolm C. Hill M.D., Ryan G. Porter M.D., Michael A. Novak M.D., Carle Foundation Hospital (USA); Darold R. Spillman Jr., Stephen A. Boppart, Beckman Institute for Advanced Science and Technology (USA) . . . [10469-28]

Diverse visualization of guinea pig cochlea images using distinct wavelengths optical coherence tomography (OCT), Sungwook Kim, Richire E. Wijesinghe, Jaeyul Lee, Muhammad F. Shirazi, Kyungpook National Univ. (Korea, Republic of); Jeong Hun Jang, Ajou Univ. School of Medicine (Korea, Republic of); Mansik Jeon, Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of) [10469-29]

Electrical and optical co-stimulation in the deaf white cat, Z. Cao, Yingyue Xu, Xiaodong Tan, N. Suematsu, Claus-Peter Richter, Northwestern Univ. (USA) [10469-30]

Customizing a commercial spectral domain optical coherence tomography system for standard free-space and fiber optic probe intracochlear measurements., Nathan C Lin, Elika Fallah, Clark E Strimbu, Christine P Hendon, Elizabeth S Olson, Columbia University (USA) . [10469-31]

Label-free Raman spectroscopy offers accurate differential diagnosis of otitis media with effusion, Rishikesh Pandey, Univ. of Connecticut School of Medicine (USA); Jeon Woong Kang, Massachusetts Institute of Technology (USA); Ishan Barman, Johns Hopkins Univ. (USA); Tulio A. Valdez, Stanford Univ. (USA) [10469-32]

SESSION 6 SUN 10:30 AM TO 11:50 AM

NBI and Optical Biopsy I

Session Chairs: **Henricus J. C. M. Sterenberg**,
Academisch Medisch Centrum (Netherlands); **Milind Rajadhyaksha**,
Memorial Sloan-Kettering Cancer Ctr. (USA)

Optical biopsy of head and neck cancer using hyperspectral imaging and convolutional neural networks, Martin Halicek, Georgia Institute of Technology (USA) and Medical College of Georgia (USA); James V. Little, Xu Wang, Mihir Patel, Christopher C. Griffith, Mark W. El-Deiry, Amy Y. Chen, Emory Univ. School of Medicine (USA); Baowei Fei, Emory Univ. (USA) [10469-33]

Narrow band imaging in laryngeal cancer: is it worthwhile?, Boudewijn Plaat, Manon Zwakenberg, Univ. Medical Ctr. Groningen (Netherlands) [10469-34]

Towards an image-guided intervention platform for benign and malignant laryngeal lesions, Fouzi Benboujja, Sarah Bowe M.D., Harvard Medical School (USA); Caroline Boudoux, Ecole Polytechnique de Montréal (Canada); Christopher J. Hartnick M.D., Harvard Medical School (USA) [10469-35]

Narrow band imaging guided resection of oral cavity cancer decreases local recurrence and increases disease-free survival, Camile Farah, Oral Health Ctr. of Western Australia (Australia) [10469-36]

Lunch/Exhibition Break Sun 11:50 am to 1:20 pm

SESSION 7 SUN 1:20 PM TO 3:00 PM

NBI and Optical Biopsy II

Session Chairs: **Henricus J. C. M. Sterenborg**,
Academisch Medisch Centrum (Netherlands); **Milind Rajadhyaksha**,
Memorial Sloan-Kettering Cancer Ctr. (USA)

Tumor margin assessment in Mohs surgery for non-melanoma skin cancer using optical coherence microscopy: a preliminary ex-vivo study, Hoon-Soo Kim M.D., Dong-Young Roh M.D., Hyun-Chang Ko M.D., Byung-Soo Kim M.D., Moon-Bum Kim M.D., Pusan National Univ. Hospital (Korea, Republic of); Hong Ki Kim, Minkyu Kim, Young-Joo Hong, Jeonghun Choi, Minyoung Hwangbo, Seung Tae Kim, Yuri Koh, Koh Young Technology, Inc. (Korea, Republic of); Soo-Keun Kong, Pusan National Univ. (Korea, Republic of). [10469-37]

Diffuse Reflectance Spectroscopy (DRS) of radiation-induced re-oxygenation in sensitive and resistant head and neck tumor xenografts, Sina Dadgar, Narasimhan Rajaram, Joel Troncoso Rodriguez, Univ. of Arkansas (USA). [10469-38]

In vivo metabolic imaging of early stage oral cancer and dysplasia based on autofluorescence lifetime endoscopy, Elvis Duran, Dae Yon Hwang, Shuna Cheng, Rodrigo Cuenca, Bilal H. Malik, Kristen C. Maitland, Texas A&M Univ. (USA); John M. Wright D.D.S., Yi-Shing Lisa Cheng D.D.S., Texas A&M Univ. College of Dentistry (USA); Beena Ahmed, Texas A&M Univ. (Qatar); Javier A. Jo, Texas A&M Univ. (USA). [10469-39]

Optimizing dynamic optical contrast imaging: signal characterization in the head and neck animal model, Karam W. Badran, UCLA David Geffen School of Medicine (USA); Harrison Cheng, Shijun Sung, Univ. of California, Los Angeles (USA); Peter Pellionisz, David Geffen School of Medicine at UCLA (USA); Zachary Taylor, Warren S. Grundfest, Univ. of California, Los Angeles (USA); Maie A. St. John, David Geffen School of Medicine at UCLA (USA). [10469-40]

Molecular imaging of PARP in oral cancer, Thomas Reiner, Memorial Sloan-Kettering Cancer Ctr. (USA) [10469-41]

Near infrared autofluorescence image guided parathyroid gland navigation in thyroidectomy, Kang-Dae Lee M.D., Kosin Univ. Gospel Hospital (Korea, Republic of) [10469-42]

SESSION 8 SUN 3:30 PM TO 6:05 PM

Novel Therapeutics, PDT, and Robotics

Session Chair: **Max J. Witjes M.D.**,
Univ. Medical Ctr. Groningen (Netherlands)

Optically guided robotic surgery, Xavier Intes, Rensselaer Polytechnic Institute (USA); Brett Miles, Mount Sinai School of Medicine (USA); Sylvain Gioux, Univ. de Strasbourg (France) [10469-43]

Novel platform for optically guided head and neck robotic surgery, Brett Miles, Icahn School of Medicine at Mount Sinai (USA); Xavier Intes, Rensselaer Polytechnic Institute (USA); Sylvain Gioux, ICube (France) [10469-44]

Transoral robotic surgery with augmented fluorescence lifetime imaging for oral cancer evaluation, Jennifer Phipps, Jakob Unger, Joao Lagarto, Univ. of California, Davis (USA); Regina Gandour-Edwards, Michael G. Moore, Arnaud Bewley, D. Gregory Farwell, UC Davis Health System (USA); Laura Marcu, Univ. of California, Davis (USA). [10469-45]

Advancements in light dosimetry in interstitial photodynamic therapy for locally advanced head and neck cancer (Invited Paper), Gal Shafirstein, David A. Bellnier, Emily Oakley, Sasheen Hamilton, Michael Habitzruther, Lawrence Tworek, Alan Hutson, Joseph Sperryak, Steven Turowski, Hassan Arshad M.D., Barbara W. Henderson, Roswell Park Cancer Institute (USA). [10469-46]

The feasibility of vessel sealing device using 1470-nm diode laser, Seung-Kuk Baek M.D., Korea Univ. College of Medicine (Korea, Republic of); Jungho Moon, Wonshik Choi, Korea Univ. (Korea, Republic of); Byoungjae Kim, Korea Univ. College of Medicine (Korea, Republic of); Jung Joo Lee, Heejin Kim, LivsMed Inc. (Korea, Republic of); Ohhyung Kwon, Jaisoon Kim, Myongji Univ. (Korea, Republic of); Doh Young Lee, Tae Hoon Kim M.D., Korea Univ. College of Medicine (Korea, Republic of). [10469-47]

Targeted photodynamic therapy in vitro and in vivo using Cetuximab-IR700DX, Wei Peng, Univ. Medical Ctr. Groningen (Netherlands); Henriëtte S. de Bruijn, Eric Farrell, Erasmus MC (Netherlands); Gooitzen M. van Dam, Max J. Witjes M.D., Univ. Medical Ctr. Groningen (Netherlands); Dominic J. Robinson, Erasmus MC (Netherlands). [10469-48]

Impact of pneumatic compression therapy on lymphatics in head and neck lymphedema using near-infrared fluorescence imaging, John C. Rasmussen, The Univ. of Texas Health Science Ctr. at Houston (USA). [10469-50]

Antibacterial studies of ZnO nanoparticle coatings on nanocrystalline YSZ irradiated with femtosecond laser light, Crysthal Alvarez, Univ. of California, Riverside (USA); Valeria Garcia, Instituto Tecnológico y de Estudios Superiores de Occidente (Mexico); Natanael Cuando-Espitia, Univ. of California, Riverside (USA); Guillermo Aguilar, Univ. of California (USA). [10469-52]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10470

Saturday–Monday 27–29 January 2018 • Proceedings of SPIE Vol. 10470

Endoscopic Microscopy XIII

Conference Chairs: **Guillermo J. Tearney M.D.**, Wellman Ctr. for Photomedicine (USA); **Thomas D. Wang**, Univ. of Michigan (USA); **Melissa J. Suter**, Massachusetts General Hospital (USA)

Program Committee: **Matthew Brenner M.D.**, Univ. of California, Irvine (USA); **David L. Dickensheets**, Montana State Univ. (USA); **Arthur F. Gmitro**, The Univ. of Arizona (USA); **Ralf Kiesslich M.D.**, Johannes Gutenberg Univ. Mainz (Germany); **Francois Lacombe**, Mauna Kea Technologies (France); **Stephen Lam M.D.**, The BC Cancer Agency Research Ctr. (Canada); **Hiroshi Mashimo**, VA Boston Healthcare System (USA); **Kenzi Murakami**, Olympus Corp. (Japan); **Norman S. Nishioka M.D.**, Massachusetts General Hospital (USA); **Wibool Piyawattanametha**, King Mongkut's Institute of Technology Ladkrabang (Thailand); **Mark J. Schnitzer**, Stanford Univ. School of Medicine (USA); **Peter T. C. So**, Massachusetts Institute of Technology (USA)

SATURDAY 27 JANUARY

SESSION 1..... SAT 8:00 AM TO 10:00 AM

Cilia, Airway, and Alveolar Structure and Function

Session Chair: **Melissa J. Suter**,
Massachusetts General Hospital (USA)

Intranasal μ OCT imaging catheter and console for the clinical study of cystic fibrosis, Hui Min Leung, Massachusetts General Hospital (USA); Susan E. Birket, The Univ. of Alabama at Birmingham School of Medicine (USA); Timothy N. Ford, Chulho Daryl Hyun, Dongyao Cui, Massachusetts General Hospital (USA); George M. Solomon M.D., The Univ. of Alabama at Birmingham (USA); Bradford A. Woodworth M.D., Massachusetts General Hospital (USA); Do-Yeon Cho M.D., Steven M. Rowe M.D., The Univ. of Alabama at Birmingham (USA); Guillermo J. Tearney M.D., Massachusetts General Hospital (USA) [10470-1]

Balloon stabilization for micro-OCT nasal imaging, Chulho Daryl Hyun, Hui Min Leung, Timothy N. Ford, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Susan E. Birket, The Univ. of Alabama at Birmingham School of Medicine (USA); George M. Solomon, Steven M. Rowe M.D., The Univ. of Alabama at Birmingham (USA); Guillermo J. Tearney M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10470-2]

Rapid measurement of solid concentration in dense mucus using diffraction-sensitive OCT, Richard L. Blackmon, Elon Univ. (USA); Silvia M. Kreda, The Univ. of North Carolina at Chapel Hill (USA); Brian S. Chapman, North Carolina State Univ. (USA); Patrick R. Sears, Lawrence E. Ostrowski, David B. Hill, The Univ. of North Carolina at Chapel Hill (USA); Joseph B. Tracy, North Carolina State Univ. (USA); Amy L. Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) . [10470-3]

Optical coherence tomography and autofluorescence microscopy of respiratory ciliated epithelia, Daniel A. Gil, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA); Joe T. Sharick, Vanderbilt Univ. (USA); Ute A. Gamm, Michael A. Choma M.D., Yale Univ. (USA); Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA) [10470-4]

Optical coherence tomography (OCT) imaging of dynamic airway behavior in an asthma model, Margit V. Szabari, Matthew B. Applegate, David C. Adams, Vanessa J. Kelly, Lida P. Hariri M.D., Chunmin Chee, Khay Tan, Robert S. Harris, Tilo Winkler, Melissa J. Suter, Massachusetts General Hospital (USA) [10470-5]

Multimodal imaging of lung tissue dynamics in mechanically ventilated rats with optical coherence tomography and intravital microscopy, Christian Schnabel, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany) [10470-6]

SESSION 2..... SAT 10:30 AM TO 12:30 PM

Clinical Applications in Pulmonary Medicine

Session Chair: **Matthew Brenner M.D.**,
Univ. of California, Irvine (USA)

Linking airway microstructure and mucus content to lung function changes in mild asthma using OCT, David C. Adams, Alyssa J. Miller, Matthew B. Applegate, Josalyn L. Cho, Jasmin A. Holz, Margit V. Szabari, Lida P. Hariri M.D., Hamid Pahlevaninezhad, Andrew D. Luster, Benjamin D. Medoff, Melissa J. Suter, Massachusetts General Hospital (USA) [10470-7]

Assessment of airway smooth muscle layers in human airways with single-measurement, polarization-sensitive OCT, Karol Karnowski, Qingyun Li, Optical+Biomedical Engineering Lab., The Univ. of Western Australia (Australia); Peter B. Noble, School of Human Sciences, The Univ. of Western Australia (Australia); Martin Villiger, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Alan James, West Australian Sleep Disorders Research Institute (Australia); David D. Sampson, Optical+Biomedical Engineering Lab., The Univ. of Western Australia (Australia) [10470-8]

OCT for lung transplantation monitoring: quantification of chronic lung allograft dysfunction (CLAD) biomarkers, Geoffrey Hohert, Anthony Lee M.D., Sylvia Lam, Pierre M. Lane, Calum MacAulay, Stephen Lam M.D., BC Cancer Research Ctr. (Canada); Roland Nador M.D., Robert Levy, John English, Vancouver General Hospital (Canada) . . . [10470-9]

Assessing airway smooth muscle contractility with fully resolved optic axis data in PS-OCT, David C. Adams, Melissa J. Suter, Massachusetts General Hospital (USA) [10470-10]

Lung biopsy assessment with dynamic cell optical imaging, Emilie Benoit a la Guillaume, LLTech SAS (France); Clement Apelian, LLTech SAS (France) and Institut Langevin, Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (France); Eugénie Dalimier, LLTech SAS (France); Albert Claude Boccara, LLTech SAS (France) and Institut Langevin, Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (France); Audrey Mansuet-Lupo M.D., Assistance Publique Hopitaux de Paris, Hôpitaux Univ. Paris Ctr. (France); Guillaume Chassagnon M.D., Marie-Pierre Revel M.D., Hôpitaux Univ. Paris Ctr. (France) [10470-11]

Development and clinical test of a miniature catheter for in vivo Raman Spectroscopy measurement of the periphery lung, Hanna C. McGregor, Michael A. Short, BC Cancer Research Ctr. (Canada); Stephen Lam M.D., BC Cancer Research Ctr. (Canada) and The Univ. of British Columbia (Canada); Tawimas Shaipanich M.D., Eve-Léa Beaudoin M.D., Haishan Zeng, BC Cancer Research Ctr. (Canada) [10470-12]

Lunch/Exhibition Break Sat 12:30 pm to 2:00 pm

SESSION 3.....SAT 2:00 PM TO 3:20 PM

Lung Injury, Monitoring and Treatment

Session Chair: **Robert A. McLaughlin**,
The Univ. of Adelaide (Australia)

Automated 3D reconstruction and evaluation of methyl isocyanate-induced airway injury in a rat model using a miniature optical coherence endoscopy probe, Yusi Miao, Univ. of California, Irvine (USA) and Beckman Laser Institute and Medical Clinic (USA); Joseph C. Jing, Beckman Laser Institute and Medical Clinic (USA) and Univ. of California, Irvine (USA); Vineet Desai, Beckman Laser Institute and Medical Clinic (USA); Yueqiao Qu, Univ. of California, Irvine (USA) and Beckman Laser Institute and Medical Clinic (USA); Jacqueline Rioux, Rhonda Garlick, Livia A. Veress, Univ. of Colorado Denver (USA); Sari B. Mahon, Matthew Brenner M.D., Beckman Laser Institute and Medical Clinic (USA); Carl W. White, Univ. of Colorado Denver (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) and Univ. of California, Irvine (USA) [10470-13]

In vivo detection of biofilms in the endotracheal tubes of intubated critical care patients using catheter-based optical coherence tomography, Roshan Dsouza, Darold R. Spillman Jr., Ronit Barkalifa, Guillermo L. Monroy, Eric J. Chaney, Univ. of Illinois at Urbana-Champaign (USA); Karen C. White, Carle Foundation Hospital (USA); Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign (USA) [10470-14]

A study of the effects of supine position and fluid intake on normal airway geometry using anatomical optical coherence tomography, Anthony Phan, Karol Karnowski, Qingyun Li, Peter Fejes, Optical+Biomedical Engineering Lab., The Univ. of Western Australia (Australia); Bryden Quirk, Institute for Photonics and Advanced Sensing, The Univ. of Adelaide (Australia); Robert A. McLaughlin, The Univ. of Adelaide (Australia); Fiona M. Wood, Burns Service of Western Australia (Australia) and Burns Injury Research Unit, The Univ. of Western Australia (Australia); David D. Sampson, Optical+Biomedical Engineering Lab., The Univ. of Western Australia (Australia) and Ctr. for Microscopy, Characterisation & Analysis, The Univ. of Western Australia (Australia) [10470-15]

PDI using nebulized indocyanine green for pneumonia treatment, Mariana Carreira Geralde, Giulia Kassab, Natalia M. Inada, Cristina Kurachi, Vanderlei S. Bagnato, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil) [10470-16]

SESSION 4.....SAT 3:50 PM TO 5:10 PM

Endoscopic OCT

Session Chair: **Jennifer K. Barton**, The Univ. of Arizona (USA)

Feasibility of FFOCT endomicroscope for cartilage evaluation, Emilie Benoit a la Guillaume, LLTech SAS (France); Cecilia Hughes, INSERM (France) and CHU Grenoble (France); Daria Andreoli, Institut Langevin (France); Aurelien Jaffard, GMCAO, TIMC-IMAG, Univ. Grenoble Alpes, CNRS, INSERM (France); Albert Claude Boccara, Institut Langevin (France); Regis Pailhe M.D., CIC-IT Grenoble, INSERM, CHU de Grenoble (France); Sandrine Voros, GMCAO TIMC-IMAG, Univ. Grenoble Alpes, CNRS, INSERM (France); Alexandre Moreau-Gaudry M.D., INSERM (France) and CHU Grenoble (France) [10470-17]

Endoscopic optical coherence tomography for depth-resolved imaging of the human oral cavity in vivo, Julia Walther, Christian Schnabel, Florian Tetschke, Tobias Rosenauer, Nadja Ebert, Universitätsklinikum Carl Gustav Carus Dresden (Germany); Michael Baumann, Deutsches Krebsforschungszentrum (Germany); Christian Hannig, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany) [10470-18]

Monitoring temperature induced phase changes in subcutaneous fatty tissue using a dynamic needle probe for optical coherence tomography, Naja Meyer-Schell, Massachusetts General Hospital (USA); Hinnerk Schulz-Hildebrandt, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Michael Evers, Malte Casper, Massachusetts General Hospital (USA); Gereon M. Hüttmann, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Dieter Manstein M.D., Massachusetts General Hospital (USA) [10470-19]

Micro optical coherence tomography probe for high resolution imaging of the inner ear, Gargi Sharma, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Janani Iyer, Kanwarpal Singh, Guillermo J. Tearney, Harvard Medical School (USA) [10470-20]

BIOS SATURDAY HOT TOPICS SESSION7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5.....SUN 8:30 AM TO 10:30 AM

Optical Imaging Probe Designs

Session Chair: **Guillermo J. Tearney M.D.**, Massachusetts General Hospital (USA)

Full optical model of micro-endoscope with optical coherence microscopy, multiphoton microscopy and visible capabilities, David Vega, College of Optical Sciences, The Univ. of Arizona (USA); Kelli Kiekens, Nikolas C. Syson, The Univ. of Arizona (USA); Tressa Baker, Catalina Foothills High School (USA); Jennifer K. Barton, The Univ. of Arizona (USA) . . [10470-21]

3D printed optics for use in miniaturised optical coherence tomography needle probes, Jiawen Li, The Univ. of Adelaide (Australia); Peter Fejes, Optical+Biomedical Engineering Lab., The Univ. of Western Australia (Australia); Dirk Lorenser, Cylite Pty Ltd. (Australia); Bryden Quirk, Institute for Photonics and Advanced Sensing, The Univ. of Adelaide (Australia); David D. Sampson, Optical+Biomedical Engineering Lab., The Univ. of Western Australia (Australia); Robert A. McLaughlin, The Univ. of Adelaide (Australia) [10470-22]

High-resolution multimodal flexible coherent Raman endoscope, Alberto Lombardini, Vasyli Mytskaniuk, Siddharth Sivankutty, Institut Fresnel (France); Esben R. Andresen, Univ. Lille 1 (France); Jérôme Wenger, Institut Fresnel (France); Marc Fabert, Univ. de Limoges (France); Nicolas Y. Joly, Max-Planck-Institut für die Physik des Lichts (Germany); Frédéric Louradour, Univ. de Limoges (France); Alexandre Kudlinski, Univ. Lille 1 (France); Hervé Rigneault, Institut Fresnel (France) [10470-23]

Long working distance fiber ball lenses for anatomic optical coherence tomography, Santosh Balakrishnan, Ruofei Bu, Amy L. Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) [10470-24]

Interchangeable side-viewing endoscopic probes for optical coherence tomography, Manuel Jorge M. Marques, Adrian Bradu, Michael R. Hughes, Univ. of Kent (United Kingdom); Guang-Zhong Yang, Imperial College London (United Kingdom); Adrian Podoleanu, Univ. of Kent (United Kingdom) [10470-25]

nirSFE: an ultrathin, flexible, near-infrared endoscope, Yaxuan Zhou, Matthew Carson, Catherine Olivo, Eric J. Seibel, Univ. of Washington (USA) [10470-26]

CONFERENCE 10470

SESSION 6.....SUN 11:00 AM TO 12:20 PM

Spectral Encoding and CLE

Session Chair: **Dvir Yelin**,
Technion-Israel Institute of Technology (Israel)

Forward-viewing spectrally encoded endoscopy with angled detection optics, Adel Zeidan, Dukho Do, DongKyun Kang, Harvard Medical School (USA) and Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Mitsuhiro Ikuta, Canon U.S.A., Inc. (USA) and Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Guillermo J. Tearney M.D., Harvard Medical School (USA) and Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10470-27]

Imaging acoustic vibrations in an ear model using spectrally encoded interferometry, Dvir Yelin, Technion-Israel Institute of Technology (Israel) [10470-28]

Small SEMC endoscopic capsule for imaging human esophagus in vivo, DongKyun Kang, Dukho Do, Catriona N. Grant, Sarah L. Giddings, Mireille Rosenberg, Paul E. Hesterberg, Qian Yuan, John J. Garber, Aubrey J. Katz M.D., Guillermo J. Tearney M.D., Massachusetts General Hospital (USA) [10470-29]

A dual-wavelength line-scan confocal endomicroscopy system for rapid molecular imaging, Khushi Vyas, Imperial College London (United Kingdom); Michael R. Hughes, Univ. of Kent (United Kingdom); Guang-Zhong Yang, Imperial College London (United Kingdom) [10470-30]

Lunch/Exhibition Break Sun 12:20 pm to 1:30 pm

SESSION 7..... SUN 1:30 PM TO 3:30 PM

Gastrointestinal Endoscopic OCT

Session Chair: **Michalina J. Gora**,
Massachusetts General Hospital (USA)

OCT based motor capsules for Barrett's esophagus screening, Rohith Reddy, Harvard Medical School (USA) and Massachusetts General Hospital (USA); Chia-Pin Liang, Harvard Medical School (USA); Timothy N. Ford, Massachusetts General Hospital (USA); Jing Dong, Harvard Medical School (USA); Matthew Beatty, Massachusetts General Hospital (USA); Kanwarpal Singh, Barry Vuong, Harvard Medical School (USA); Emilie Beaulieu-Ouellet, Grace Baldwin, Catriona N. Grant, Mireille Rosenberg, Massachusetts General Hospital (USA); Michalina J. Gora, Guillermo J. Tearney M.D., Harvard Medical School (USA) [10470-31]

Optical coherence tomography-guided laser marking with tethered capsule endomicroscopy, Chia-Pin Liang, Jing Dong, Timothy N. Ford, Rohith Reddy, Seyed Hamid Hosseiny Darbazi, Hamid Farrokhi, Matthew Beatty, Kanwarpal Singh, Barry Vuong, Emilie Beaulieu-Ouellet, Catriona N. Grant, Sarah L. Giddings, Mireille Rosenberg, Harvard Medical School (USA); Norman S. Nishioka M.D., Massachusetts General Hospital (USA); Guillermo J. Tearney M.D., Harvard Medical School (USA) .. [10470-32]

Variable stiffness and articulating tethered capsule endomicroscopy device, Chulho Daryl Hyun, Joseph A. Gardecki, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Timothy N. Ford, Wellman Ctr. for Photomedicine (USA); Michael B. Wallace M.D., Mayo Clinic (USA); Guillermo J. Tearney M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10470-33]

Trans-nasal OCT imaging of the small intestine, David O. Otuya, Yogesh Verma, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Jing Dong, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Hamid Farrokhi, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Sarah L. Giddings, Nitasha G. M. Bhat, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Omair Shakil, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Catriona N. Grant, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Guillermo J. Tearney M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10470-34]

Air-enabled tethered capsule endomicroscopy device for improved visualization of intestinal villi, Yogesh Verma, David O. Otuya, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Emilie Beaulieu-Ouellet, Wellman Ctr. for Photomedicine (USA); Jing Dong, Hamid Farrokhi, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Sarah L. Giddings, Nitasha G. M. Bhat, Wellman Ctr. for Photomedicine (USA); Omair Shakil, Irene Lerman, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Catriona N. Grant, Wellman Ctr. for Photomedicine (USA); Guillermo J. Tearney M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10470-35]

Micro-optical coherence tomography for the diagnosis of eosinophilic esophagitis: a pilot study conducted on biopsy specimens, Nicolae Iftimia, Guillermo J. Tearney M.D., Joseph Gardecki, Marine Lachenal, Massachusetts General Hospital (USA) [10470-36]

BIOS SUNDAY PLENARY SESSION.....SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

MONDAY 29 JANUARY

SESSION 8.....MON 8:20 AM TO 10:00 AM

New Endoscopic Technologies and Advances I

Session Chair: **Thomas D. Wang M.D.**, Univ. of Michigan (USA)

A compressed sensing approach for resolution improvement in fiber-bundle based endomicroscopy, John Paul Dumas, Muhammad A. Lodhi, Waheed U. Bajwa, Mark C. Pierce, Rutgers, The State Univ. of New Jersey (USA) [10470-37]

High resolution lensless digital Fourier transform holography with a fiber bundle for endoscopy, Lara M. Wurster, Medizinische Univ. Wien (Austria); Laurin Ginner, Rainer A. Leitgeb, Medizinische Univ. Wien (Austria) and Christian Doppler Lab. for Innovative Optical Imaging and its Translation to Medicine (Austria); Abhishek Kumar, Medizinische Univ. Wien (Austria) [10470-38]

Application and analysis of wave front coding technology on Zoom system, Xiaohu Guo, China North Vehicle Research Institute (China); Lingqin Kong, Beijing Institute Technology (China) [10470-39]

Lens-less wide-field microendoscopy using a coded-aperture, Jaewook Shin, Mark A. Foster, Johns Hopkins Univ. (USA) [10470-40]

Wide-field phase imaging for the endoscopic detection of dysplasia and early-stage esophageal cancer, Catherine R. M. Fitzpatrick, George S. D. Gordon, Travis W. Sawyer, Timothy D. Wilkinson, Sarah E. Bohndiek, Univ. of Cambridge (United Kingdom) [10470-41]

SESSION 9..... MON 10:30 AM TO 12:30 PM

New Endoscopic Technologies and Advances II

Session Chair: **Arthur F. Gmitro**, The Univ. of Arizona (USA)

Dual-channel (green and red) fluorescence microendoscope with subcellular resolution, Camila de Paula D'Almeida, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil); Thereza Fortunato, Lilian T. Moriyama, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil); Sebastião Pratavieira, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil) [10470-42]

Suppression of saturation artifacts in endoscopic OCT imaging, Xinyu Li, Jun Zhang, Shanshan Liang, Sun Yat-Sen Univ. (China) [10470-43]

Quantitative assessment of duodenal villi imaged by tethered capsule OCT endomicroscopy, Seyed Hamid Hosseiny Darbazi, Jing Dong, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Timothy N. Ford, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Guillermo J. Tearney M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10470-44]

Implantable lithographically defined photonic microprobe, Mohammad Amin Tadayon, Ina Pavlova, Kelly M. Martyniuk, Aseema Mohanty, Samantha P. Roberts, Felipe Barbosa, Christine A. Denny, Michal Lipson, Columbia Univ. (USA) [10470-45]

Observation of rat's colon polyps in real time by mini-endoscopy and Raman spectroscopy, Bibin B. Andriana, Hidetoshi Sato, Akinori Taketani, Kwansai Gakuin Univ. (Japan) [10470-46]

Multiphoton handheld GRIN endoscopic probe for 3D optical biopsy, Ang Li, Gunnsteinn Hall, Wenxuan Liang, Honghua Guan, Xingde Li, Johns Hopkins Univ. (USA) [10470-47]

CONFERENCE 10471

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10471

Diagnostic and Therapeutic Applications of Light in Cardiology 2018

Conference Chairs: **Guillermo J. Tearney M.D.**, Wellman Ctr. for Photomedicine (USA); **Kenton W. Gregory M.D.**, Oregon Medical Laser Ctr. (USA); **Laura Marcu**, Univ. of California, Davis (USA)

Program Committee: **Christine P. Hendon**, Columbia Univ. (USA); **Gijs van Soest**, Erasmus MC (Netherlands); **Stanislav Y. Emelianov**, The Univ. of Texas at Austin (USA)

SATURDAY 27 JANUARY

SESSION 1 SAT 8:00 AM TO 10:00 AM

FLIM

Session Chairs: **Laura Marcu**, Univ. of California, Davis (USA);
Laura Marcu, Univ. of California, Davis (USA)

Design and validation of the ball lens-based intravascular catheter for fluorescence lifetime imaging microscopy of atherosclerosis, Xi Chen, Wihan Kim, Michael J. Serafino, Zheng Tan, Texas A&M Univ. (USA); Brian L. Walton M.D., L. Maximilian Buja M.D., The Texas Heart Institute (USA); Jessie Adame M.D., Autopsy and Pathology Services, P.A. (USA); Javier A. Jo, Brian E. Applegate, Texas A&M Univ. (USA) [10471-1]

Study of bovine pericardium biochemical and biomechanical properties during collagenase degradation using fluorescence lifetime imaging, Cai Li, Jeny Shklover, Univ. of California, Davis (USA); Mojtaba Parvizi, Mayo Clinic (USA); Benjamin E. Sherlock, Alba Alfonso Garcia, Univ. of California, Davis (USA); Leigh G. Griffiths, Mayo Clinic (USA); Laura Marcu, Univ. of California, Davis (USA) [10471-2]

Freeform broad-band focusing micro optics: application to catheter based fluorescence lifetime imaging of coronary arteries, Julien Bec, Benjamin E. Sherlock, Univ. of California, Davis (USA) [10471-3]

Automatic detection of macrophages/foam cells in coronary atherosclerotic plaques based on fluorescence lifetime imaging (FLIM), Jose D. Rico-Jimenez, Univ. of Illinois at Urbana-Champaign (USA) and Texas A&M Univ. (USA); Michael J. Serafino, Xi Chen, Sebina Shrestha, Wihan Kim, Texas A&M Univ. (USA); Brian L. Walton, The Texas Heart Institute (USA); Brian E. Applegate, Javier A. Jo, Texas A&M Univ. (USA) [10471-4]

Tracking recellularization processes in vascular tissues with fiber-based autofluorescence lifetime imaging, Alba Alfonso Garcia, Jeny Shklover, Benjamin E. Sherlock, James Mcmasters, Alyssa Panitch, Univ. of California, Davis (USA); Leigh G. Griffiths, Mayo Clinic (USA); Laura Marcu, Univ. of California, Davis (USA) [10471-5]

Fluorescence lifetime intravascular ultrasound (FLIM-IVUS): new histomorphological insights for improved artery characterization, Jennifer Phipps, Julien Bec, Univ. of California, Davis (USA); Deborah Vela, L. Maximilian Buja M.D., The Texas Heart Institute (USA); Jeffrey A. Southard, Univ. of California Davis Health System (USA); Kenneth B. Margulies M.D., Hospital of the Univ. of Pennsylvania (USA); Laura Marcu, Univ. of California, Davis (USA) [10471-6]

SESSION 2 SAT 10:30 AM TO 11:50 AM

OCT

Session Chair: **Guillermo J. Tearney M.D.**,
Massachusetts General Hospital (USA)

4D optical coherence tomography for imaging aortic valve dynamics ex vivo, Christian Schnabel, Anett Jannasch, Saskia Faak, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden, TU Dresden (Germany) [10471-7]

Automated identification of macrophages/foam cells clusters in coronary atherosclerotic plaques based on intravascular optical coherence tomography (IV-OCT), Jose D. Rico-Jimenez, Univ. of Illinois at Urbana-Champaign (USA) and Texas A&M Univ. (USA); Daniel U. Campos-Delgado, Univ. Autónoma de San Luis Potosí (Mexico); Javier A. Jo, Texas A&M Univ. (USA) [10471-8]

Plaque lipid content changes in percutaneous coronary intervention by optical coherence tomography, Kamran Majeed M.D., Royal Perth Hospital (Australia); Eline M. J. Hartman M.D., Erasmus MC (Netherlands); Richard Alcock, Royal Perth Hospital (Australia); Jurgen M. R. Ligthart, Karen T. Witberg, Erasmus MC (Netherlands); Jon Spiro M.D., Royal Perth Hospital (Australia); Graham Hillis M.D., Royal Perth Hospital (Australia) and The Univ. of Western Australia (Australia); Trevor Mori M.D., The Univ. of Western Australia (Australia); Gijs van Soest, Erasmus MC (Netherlands); Carl J. Schultz M.D., Royal Perth Hospital (Australia) [10471-9]

Cellular-resolution, extended depth of focus optical coherence tomography catheter toward in vivo cardiovascular imaging, Biwei Yin, Zhonglie Piao, Chulho Daryl Hyun, Kensuke Nishimiya, Joseph A. Gardecki, Guillermo J. Tearney M.D., Harvard Medical School (USA) [10471-10]

Lunch/Exhibition Break Sat 11:50 am to 1:20 pm

SESSION 3 SAT 1:20 PM TO 3:00 PM

Multimodality Imaging

Session Chair: **Hongki Yoo**, Hanyang Univ. (Korea, Republic of)

Toward high-efficiency, high-speed dual-modality intravascular OCT molecular imaging, Zhonglie Piao, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Matthew Beatty, Kensuke Nishimiya, Biwei Yin, Kanwarpal Singh, Seyed Hamid Hosseiny Darbazi, Chulho Daryl Hyun, Sarah L. Giddings, Timothy N. Ford, Joseph A. Gardecki, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Daisuke Yamada, Kohei Watanabe, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Healthcare Optics Research Lab., Canon U.S.A., Inc. (USA) and Harvard Medical School (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA) [10471-11]

Dual-modality intravascular imaging system based on time-gated near-infrared fluorescence detection and optical coherence tomography, Yuankang Lu, Maxime Abran, Ecole Polytechnique de Montréal (Canada); Guy Cloutier, Ctr. Hospitalier de l'Univ. de Montréal (Canada) and Univ. of Montreal (Canada); Frédéric Lesage, Ecole Polytechnique de Montréal (Canada) and Institut de Cardiologie de Montréal (Canada) [10471-12]

Intravascular structural and biochemical imaging in vivo to detect atherosclerotic plaque, Min Woo Lee, Hanyang Univ. (Korea, Republic of); Woo Jae Kang, KAIST (Korea, Republic of); Joon Woo Song, Korea Univ. (Korea, Republic of); Hyeon Soo Nam, Hanyang Univ. (Korea, Republic of); Sunwon Kim M.D., Jin Won Kim, Korea Univ. (Korea, Republic of); Wang-Yuhl Oh, KAIST (Korea, Republic of); Hongki Yoo, Hanyang Univ. (Korea, Republic of) [10471-13]

Observation of blood vessel response to the strut condition of Bioresorbable Vascular Scaffold using high-speed single cardiac cycle OCT and OCT/NIRF dual modal systems, Hyun-Sang Park, KAIST (Korea, Republic of); Sunwon Kim M.D., Korea Univ. (Korea, Republic of); Hyeon Soo Nam, Hanyang Univ. (Korea, Republic of); Min-Tae Kim, KAIST (Korea, Republic of); Joon Woo Song, Korea Univ. (Korea, Republic of); Min Woo Lee, Hanyang Univ. (Korea, Republic of); Tae Shik Kim, KAIST (Korea, Republic of); Woohyeun Kim M.D., Dong Joo Oh M.D., Korea Univ. (Korea, Republic of); Kyeongsoon Park, Chung-Ang Univ. (Korea, Republic of); Hongki Yoo, Hanyang Univ. (Korea, Republic of); Jin Won Kim M.D., Korea Univ. (Korea, Republic of); Wang-Yuhl Oh, KAIST (Korea, Republic of) [10471-14]

CONFERENCE 10471

Quantitative intravascular OCT near-infrared fluorescence molecular imaging, Zhonglie Piao, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Lang Wang, Cardiovascular Research Ctr., Massachusetts General Hospital, Harvard Medical School (USA); Kanwarpal Singh, Wellman Ctr. for Photomedicine, Massachusetts General Hospital, Harvard Medical School (USA); Stephan Kellnberger, Cardiovascular Research Ctr., Massachusetts General Hospital, Harvard Medical School (USA); Eric A. Osborn, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Giovanni Ughi, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Joseph A. Gardecki, Wellman Ctr. for Photomedicine, Massachusetts General Hospital, Harvard Medical School (USA); Adam Mauskamp, Cardiovascular Research Ctr., Massachusetts General Hospital, Harvard Medical School (USA); Farouc A. Jaffer, MGH Cardiovascular Research Ctr. (USA) and Harvard Medical School (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine, Massachusetts General Hospital, Harvard Medical School (USA) . . . [10471-15]

SESSION 4SAT 3:30 PM TO 4:30 PM

Photoacoustics and Spectroscopy

Session Chair: **Gijs van Soest**, Erasmus MC (Netherlands)

Lipid profiling of carotid atherosclerotic plaque with imaging mass spectrometry (MALDI-IMS), Mirjam Visscher, Astrid M. Moerman, Peter C. Burgers, Heleen M. M. van Beusekom, Theo M. Luijck, Ton F. W. van der Steen, Frank G. H. Gijssen, Kim van der Heiden, Gijs van Soest, Erasmus MC (Netherlands) [10471-16]

Non-invasive dynamic visualisation of the carotid artery bifurcation in vivo with a three-dimensional optoacoustic hand-held scanner, Ivana Ivankovic, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10471-17]

Volumetric imaging of whole isolated beating heart with four-dimensional optoacoustic tomography, Hasiao-Chun Amy Lin, Xosé Luis Deán-Ben, Helmholtz Zentrum München GmbH (Germany); Igor R. Efimov, The George Washington Univ. (USA); Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) [10471-18]

BIOS SATURDAY HOT TOPICS SESSION7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:00 AM TO 10:00 AM

Myocardial Imaging

Session Chair: **Christine P. Hendon**, Columbia Univ. (USA)

Functional endomyocardial imaging by single-channel high resolution cross-polarization OCT, Xinwen Yao, Yu Gan, Yuye Ling, Columbia Univ. (USA); Charles C. Marboe, Columbia Univ. Medical Ctr. (USA); Christine P. Hendon, Columbia Univ. (USA) [10471-19]

Whole heart cytoarchitecture at micron-scale resolution, Erica Lazzeri, Irene Costantini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Cecilia Ferrantini, Univ. degli Studi di Firenze (Italy); Samantha Cannazzaro, Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Claudia Crocini, Univ. of Colorado (USA); Raffaele Coppini, Leonardo Bocchi, Elisabetta Cerbai, Corrado Poggesi, Univ. degli Studi di Firenze (Italy); Francesco S. Pavone, Leonardo Sacconi, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) [10471-20]

Serial OCT reveals age-dependent cardiac fiber orientation change, Alexandre Castonguay, Joel Lefebvre, Frédéric Lesage, Ecole Polytechnique de Montréal (Canada) [10471-21]

Optical mapping models of human atria including heterogeneous tissue types as informed by optical coherence tomography, Theresa H. Lye, Columbia Univ. (USA); Kevin P. Vincent, Andrew D. McCulloch, Univ. of California, San Diego (USA); Christine P. Hendon, Columbia Univ. (USA) [10471-22]

In vivo imaging of mouse heart in myocardial infarction and myocardial reperfusion injury using multifunctional optical coherence tomography, Inho Shin, KAIST (Korea, Republic of); Sun-Joo Jang M.D., KAIST (Korea, Republic of) and Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Hyun-Sang Park, Gyoung Hwan Kim, JongYoon Ju, Paul Shin, Inwon Park M.D., KAIST (Korea, Republic of); Chang-Hwan Yoon M.D., Seoul National Univ. Bundang Hospital (Korea, Republic of); Pilhan Kim, Wang-Yuhl Oh, KAIST (Korea, Republic of) [10471-23]

Integrated intra-cardiac catheter for polarization sensitive optical coherence tomography-guided radiofrequency ablation, Xiaowei Zhao, Colin Blumenthal, Case Western Reserve Univ. (USA); Kilinc U. Orhan, Case Western Reserve Univ. School of Medicine (USA); Deniz Dosluoglu, Michael W. Jenkins, Christopher Snyder, Mauricio Arruda, Andrew M. Rollins, Case Western Reserve Univ. (USA) [10471-24]

SESSION 6 SUN 10:30 AM TO 11:50 AM

Therapy

Session Chair: **Kenton W. Gregory M.D.**, Oregon Medical Laser Ctr. (USA)

Impact of radiofrequency ablation geometry on electrical conduction, Rhiana N. Rivas, Theresa H. Lye, Christine P. Hendon, Columbia Univ. (USA) [10471-25]

Dependence of perpendicular pressure to luminal surface on heating drug delivery performance using a laser-mediated thermal balloon with porcine carotid artery walls ex vivo, Misaki Kobayashi, Kao Sugauma, Keio Univ. (Japan); Natsumi Shimazaki, Keio Leading-edge Lab. of Science and Technology, Keio Univ. (Japan); Emiyu Ogawa, Keio Univ. (Japan); Tsunenori Arai, Keio Univ. (Japan) [10471-26]

Photoactivatable theranostic agent targeting scavenger receptor for imaging and stabilization of high-risk plaque, Joon Woo Song, Korea Univ. Medical Ctr. (Korea, Republic of); Min Woo Lee, Hanyang Univ. (Korea, Republic of); Jah Yeon Choi, Hyun Jung Kim, Korea Univ. Medical Ctr. (Korea, Republic of); Wang-Yuhl Oh, KAIST (Korea, Republic of); Hongki Yoo, Hanyang Univ. (Korea, Republic of); Kyeongsun Park, Chung-Ang Univ. (Korea, Republic of); Jin Won Kim, Korea Univ Medical Ctr. (Korea, Republic of) [10471-27]

Tissue differentiation and lesion depth assessment through endoscope for cardiac ablation therapy, Soo Young Park, Rajinder P. Singh-Moon, Christine P. Hendon, Columbia Univ. (USA) [10471-28]

Lunch/Exhibition Break Sun 11:50 am to 1:20 pm

SESSION 7 SUN 1:20 PM TO 3:00 PM

New Techniques and Models

Session Chair: **Andrew M. Rollins**,
Case Western Reserve Univ. (USA)

Advanced biomimetic platform for cardiovascular studies, Marina Brito, Pieter A. De Beule, Hugo Cortez, Marco Martins, Paulo P. Freitas, INL - International Iberian Nanotechnology Lab. (Portugal); Patricia Jardim M.D., Instituto Nacional de Medicina Legal e Ciências Forenses, I.P. (Portugal); Victor Jimenez, SERGAS (Spain) [10471-29]

All-optical side-viewing intravascular ultrasound imaging probe, Richard J. Colchester, Sacha Noimark, Edward Z. Zhang, Univ. College London (United Kingdom); Malcolm C. Finlay, St Bartholomew's Hospital, Barts Health NHS Trust (United Kingdom); Callum Little, The Royal Free Hospital, NHS Foundation Trust (United Kingdom); Chris D. Loder, The Royal Free Hospital (United Kingdom); Roby D. Rahkit, The Royal Free Hospital, NHS Foundation Trust (United Kingdom); Ivan P. Parkin, Paul C. Beard, Ioannis Papanikolaou, Adrien E. Desjardins, Univ. College London (United Kingdom) [10471-30]

Multi-chamber, multivariate model for online evaluation of lesion depth in cardiac tissue using optical spectroscopy, Rajinder P. Singh-Moon, Columbia Univ. (USA); Vivek Iyer M.D., Columbia Univ. Medical Ctr. (USA); Christine P. Hendon, Columbia Univ. (USA) [10471-31]

Contrast enhancement of microscopic birefringent crystals using polarization sensitive micro-optical coherence tomography, Gargi Sharma, Wellman Ctr. for Photomedicine (USA); Kanwarpal Singh, Kensuke Nishimiya, Joseph A. Gardecki, Guillermo J. Tearney, Harvard Medical School (USA) [10471-32]

Second harmonic imaging of baboon cardiac aortic leaflets trained with a portable bioreactor, Mariacarla Gonzalez, Ilyas Saytashev, Brittany Gonzalez, Alejandro Pineró, Manuel Perez, Sharan Ramaswamy, Jessica C. Ramella-Roman, Florida International Univ. (USA) [10471-33]

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Noninvasive detection of lipid-rich coronary atherosclerotic plaques using fluorescence lifetime imaging (FLIM): a comparison between time-domain (TD) and frequency-domain FD FLIM implementations, Michael J. Serafino, Texas A&M Univ. (USA); Brian L. Walton M.D., Ctr. For Advanced Heart Failure, Memorial Hermann (USA) and The Univ. of Texas Health Science Ctr. at Houston (USA); L. Maximilian Buja M.D., The Univ. of Texas Health Science Ctr. at Houston (USA); Jessie Adame M.D., Autopsy and Pathology Services, P.A. (USA); Brian E. Applegate, Javier A. Jo, Texas A&M Univ. (USA) [10471-34]

Multimodal in vivo blood flow sensing combining particle image velocimetry with optical tweezers-based blood steering, Robert Meissner, Westfälische Wilhelms-Universität Münster (Germany); Wade W. Sugden, Arndt F. Siekmann, Max-Planck-Institut für molekulare Biomedizin (Germany); Cornelia Denz V, Westfälische Wilhelms-Universität Münster (Germany) . . . [10471-35]

Catheter design optimization for practical intravascular photoacoustic imaging (IVPA) of vulnerable plaques, Sophinese Iskander-Rizk, Min Wu, Geert Springeling, Frits Mastik, Robert Beurskens, Antonius F. W. van der Steen, Gijs van Soest, Erasmus MC (Netherlands) [10471-36]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details



**SPIE-FRANZ HILLENKAMP
POSTDOCTORAL FELLOWSHIP**
in Problem-Driven Biophotonics and Biomedical Optics

An annual award of **\$75,000** to translate new biomedical optics and biophotonics technologies to clinical practice for improving human health.

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CONFERENCE 10472

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10472

Diseases in the Breast and Reproductive System IV

Conference Chairs: **Melissa C. Skala**, Univ. of Wisconsin-Madison (USA); **Paul J. Campagnola**, Univ. of Wisconsin-Madison (USA)

Program Committee: **Ji-Xin Cheng**, Purdue Univ. (USA); **Darren M. Roblyer**, Boston Univ. (USA); **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA); **Andrew M. Rollins**, Case Western Reserve Univ. (USA); **Bruce J. Tromberg**, Beckman Laser Institute and Medical Clinic (USA); **Kevin W. Eliceiri**, Univ. of Wisconsin-Madison (USA)

Conference Cosponsors:



SATURDAY 27 JANUARY

SESSION 1 SAT 8:30 AM TO 10:30 AM

Gynecology

Session Chair: **Paul J. Campagnola**, Univ. of Wisconsin-Madison (USA)

Multimodal molecular and cellular imaging of breast cancer (*Invited Paper*), Kristine Glunde, Johns Hopkins Univ. (USA) [10472-32]

Imaging opportunities in the gynecologic cancers (*Invited Paper*), Molly A. Brewer, Univ. of Connecticut Health Ctr. (USA) [10472-31]

Evaluation of segmentation algorithms for optical coherence tomography images of ovarian tissue, Travis W. Sawyer, College of Optical Sciences, The Univ. of Arizona (USA); David M. Sawyer, Tucson Medical Ctr. (USA); Photini F. S. Rice, Jennifer W. Koevary, The Univ. of Arizona (USA); Jennifer K. Barton, College of Optical Sciences, The Univ. of Arizona (USA) [10472-1]

Comparison of collagen orientation and distribution in-vivo between non-pregnant and pregnant human cervix using Mueller Matrix polarimetry, Joseph Chue-Sang, Mariacarla Gonzalez, Nola A. Holness, Ilyas Saytashev, Florida International Univ. (USA); Amir Gandjbakhche, Victor V. Chernomordik, National Institute of Child Health and Human Development (USA); Jessica C. Ramella-Roman, Florida International Univ. (USA) . [10472-2]

In vivo mapping of the cervical epithelium using multiplexed low-coherence interferometry, Kengyeh K. Chu, Derek Ho, Michael Crose, Chenfei Hu, Michael DeSoto, Jennifer J. Peters, Duke Univ. (USA); Amy P. Murtha, Duke Univ. Medical Ctr. (USA); Daryl L. Wieland, Michael Zinaman, Jacobi Medical Ctr., NYC Health + Hospitals (USA); Adam Wax, Duke Univ. (USA) [10472-3]

SESSION 2 SAT 11:00 AM TO 12:10 PM

Margin Assessment and Prostate

Session Chair: **Kevin W. Eliceiri**, Univ. of Wisconsin-Madison (USA)

Real-time assessment of breast cancer surgical specimens using multiphoton microscopy (*Invited Paper*), Michael G. Giacomelli, Tadayuki Yoshitake, Lucas C. Cahill, Massachusetts Institute of Technology (USA); Liza M. Quintana, Hilde Vardeh, James L. Connolly, Beth Israel Deaconess Medical Ctr. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) [10472-4]

Long-term longitudinal monitoring of chemotherapy response using Spatial Frequency Domain Imaging using an improved two-layer Monte Carlo based inverse model, Syeda Tabassum, Vivian E. Pera, Boston Univ. (USA); Gage J. Greening, Timothy J. Muldoon, Univ. of Arkansas (USA); Darren M. Roblyer, Boston Univ. (USA) [10472-5]

Quantifying prostate cancer morphology in 3D using light sheet microscopy and persistent homology, Peter J. Lawson, Bihe Hu, Tulane Univ. (USA); Brittany T. Fasy, Montana State Univ. (USA); Carola Wenk, J. Quincy Brown, Tulane Univ. (USA) [10472-6]

Lunch/Exhibition Break Sat 12:10 pm to 1:40 pm

SESSION 3 SAT 1:40 PM TO 3:20 PM

Breast Cancer

Session Chair: **Darren M. Roblyer**, Boston Univ. (USA)

Microfluidic models and optical imaging to monitor microenvironmental stimuli for breast cancer invasion, Jose Ayuso, Karina Lugo-Cintron, Suehelay Acevedo, Univ. of Wisconsin-Madison (USA); Amani Gillette, Morgridge Institute for Research (USA); Patrick N. Ingram, Univ. of Wisconsin-Madison (USA); Tiffany M. Heaster, Morgridge Institute for Research (USA); Kari B. Wisinski, Sean P. Palecek, David J. Beebe, Univ. of Wisconsin-Madison (USA); Melissa C. Skala, Morgridge Institute for Research (USA) [10472-7]

Label-free optical characterization of the tumor microenvironment in breast cancer, Sixian You, Haohua Tu, Yi Sun, Eric J. Chaney, Marina Marjanovic, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign (USA) [10472-8]

Elucidating the evolution of the pre-metastatic niche: Fresh insights into the soil and seed hypothesis of cancer metastasis with Raman spectroscopy, Santosh K. Paidi, Johns Hopkins Univ. (USA); Kristine Glunde, The Johns Hopkins Univ. School of Medicine (USA); Ishan Barman, Johns Hopkins Univ. (USA) [10472-9]

Morphological and metabolic micro-tomography for breast cancer detection, Emilie Benoit a la Guillaume, LLTech SAS (France); Clement Apelian, LLTech SAS (France) and Institut Langevin (France); Muriel Abbaci, Institut Gustave Roussy (France); Eugénie Dalimier, LLTech SAS (France); Claude Boccara, LLTech SAS (France) and Institut Langevin (France); Aïcha Ben Lakhdar M.D., Gustave Roussy (France); Marie-Christine Mathieu M.D., Institut Gustave Roussy (France); Odile Casiraghi M.D., Corinne Laplace-Builhé, Gustave Roussy (France) [10472-10]

Intravital imaging of tumor bioenergetics in metastatic and non-metastatic breast cancer, Raisa B. Rasul, Mason G. Harper, Narasimhan Rajaram, Univ. of Arkansas (USA) [10472-11]

SESSION 4 SAT 3:50 PM TO 5:30 PM

Breast Cancer Surgery and Margins

Session Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

Hyperspectral imaging for detection of breast cancer in resection margins using spectral-spatial classification, Esther Kho, Lisanne L. de Boer, Koen K. Van de Vijver M.D., The Netherlands Cancer Institute (Netherlands); Henricus J. C. M. Sterenborg, The Netherlands Cancer Institute (Netherlands) and Academisch Medisch Centrum (Netherlands); Theo J. M. Ruers M.D., The Netherlands Cancer Institute (Netherlands) and MIRA Institute, Univ. Twente (Netherlands) [10472-12]

Enhanced visualization of tumor margins through fusion of optical coherence tomography and micro-elastography images, Ken Foo, Lixin Chin, Kelsey M. Kennedy, Wes M. Allen, Qi Fang, Harry Perkins Institute of Medical Research (Australia) and The Univ. of Western Australia (Australia); Bruce Latham, PathWest Lab. Medicine WA (Australia); Christobel M. Saunders, The Univ. of Western Australia (Australia) and Fiona Stanley Hospital (Australia) and Royal Perth Hospital (Australia); Brendan F. Kennedy, Harry Perkins Institute of Medical Research (Australia) and The Univ. of Western Australia (Australia) [10472-13]

Real-time visualization of tumor margins in breast specimen using fluorescence lifetime, Jakob Unger, Christoph Hebisch, Jennifer Phipps, Richard Bold M.D., Morgan Darrow M.D., Laura Marcu, Univ. of California, Davis (USA) [10472-14]

Combining Raman spectroscopy and imaging for early tracking of prognostic factors and therapy failure in breast cancer, Giju Thomas, Fuyao Chen, Wilson R. Adams, Anita Mahadevan-Jansen, Vanderbilt Univ. (USA) [10472-15]

Towards real-time Diffuse Reflectance Spectroscopy (DRS) for tissue characterization of breast tissue during breast conserving surgery, Lisanne L. de Boer, The Netherlands Cancer Institute (Netherlands); Torre M. Bydlon, Philips Research (Netherlands); Marie-Jeanne T. F. D. Vrancken Peeters, Frederieke van Duijnhoven, Claudette E. Loo, The Netherlands Cancer Institute (Netherlands); Benno H. W. Hendriks, Philips Research (Netherlands) and Technische Univ. Delft (Netherlands); Henricus J. C. M. Sterenberg, The Netherlands Cancer Institute (Netherlands) and Academisch Medisch Centrum (Netherlands) [10472-16]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:10 AM TO 10:10 AM

Developmental Biology and Pediatrics

Session Chair: **Andrew M. Rollins**, Case Western Reserve Univ. (USA)

High-throughput zebrafish screening using optical coherence tomography, Ariel J. Lee, Korea Advanced Institute of Science and Technology (Korea, Republic of); Hyeongeun Kim, Jung kweon Bae, Ulsan National Institute of Science and Technology (Korea, Republic of); Yoonsung Lee, Institute for Basic Science (Korea, Republic of); Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of) . . [10472-17]

Using a wearable near-infrared spectroscopy device in children with Tourette syndrome, Pou-Leng Cheong, National Chiao Tung Univ. (Taiwan) and National Taiwan Univ. Hospital, Hsin-Chu Branch (Taiwan); Ting-Ying Li, National Chiao Tung Univ. (Taiwan); Chia-Wei Sun, Institute of Electro-Optical Engineering, National Chiao Tung Univ. (Taiwan) [10472-18]

Compression optical coherence elastography for micro-scale embryonic tissues, Brecken J. Blackburn, Shi Gu, Michael W. Jenkins, Andrew M. Rollins, Case Western Reserve Univ. (USA) [10472-19]

Using optical coherence tomography to detect disturbances in coronary microvascular in a model of fetal alcohol syndrome, Meredith C. G. Broberg, Univ. Hospitals Rainbow Babies & Children's Hospital (USA); Yehe Liu, Andrew M. Rollins, Michiko Watanabe, Michael W. Jenkins, Case Western Reserve Univ. (USA) [10472-20]

A potential non-invasive approach to evaluating blastocyst quality using biodynamic imaging, Zhe Li, Natalie Ehmke, Zoltan Machaty, David Nolte, Purdue Univ. (USA) [10472-21]

A simple optical clearing method for investigating molecular distribution in intact embryonic tissues, Yehe Liu, Michael W. Jenkins, Michiko Watanabe, Andrew M. Rollins, Case Western Reserve Univ. (USA) . . [10472-22]

SESSION 6 SUN 10:40 AM TO 12:00 PM

Cardiac Developmental Biology

Session Chair: **Michael W. Jenkins**, Case Western Reserve Univ. (USA)

Three-dimensional mapping of conduction velocity in early embryonic hearts, Shan Ling, Matthew McPheeters, Shi Gu, Michiko Watanabe, Michael W. Jenkins, Andrew M. Rollins, Case Western Reserve Univ. (USA) [10472-23]

Semi-automated measurement of absolute blood velocity and shear stress in developing embryonic hearts using a MHz FDML swept laser source, Sahar Elahi, Shi Gu, Andrew M. Rollins, Michael W. Jenkins, Case Western Reserve Univ. (USA) [10472-24]

Monitoring murine embryonic heart development in 5D with optical coherence tomography, Justin Rippey, Raksha Raghunathan, Achuth Nair, Chen Wu, Kirill V. Larin, Univ. of Houston (USA) [10472-25]

Live dynamic analysis of mouse embryonic cardiogenesis with functional optical coherence tomography, Andrew L. Lopez III, Shang Wang, Irina V. Larina, Baylor College of Medicine (USA) [10472-26]

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PW/PosterGuidelines>.

A non-surgical and translational technology for HPV-related lesions and precancerous disease, Natalia M. Inada, Hilde H. Buzzá, Cynthia A. de Castro, Instituto de Física de São Carlos (Brazil); Wellington Lombardi M.D., UNIARA (Brazil); Renata A. Belotto M.D., UNINOVE (Brazil); Cristina Kurachi D.D.S., Vanderlei S. Bagnato, Instituto de Física de São Carlos (Brazil) [10472-27]

Redox imaging of fixed tissue slides to identify biomarkers for breast cancer diagnosis/prognosis: feasibility study, He N. Xu, Julia Tchou M.D., Yusheng Li, Min Feng, Paul Zhang M.D., William Quinn, Joe A. Baur, Lin Z. Li, The Univ. of Pennsylvania Health System (USA) [10472-28]

Optical imaging of metabolic adaptability in metastatic and non-metastatic breast cancer., Lisa Rebello, Narasimhan Rajaram, Univ. of Arkansas (USA) [10472-29]

The evaluation of breast cancer chemotherapy based on multiphoton microscopy, Shulian Wu, Fujian Normal Univ. (China); Yudian Huang, Fujian Medical Univ. (China); Hui Li, Fujian Normal Univ. (China) . . . [10472-30]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10473

Sunday 28 January 2018 • Proceedings of SPIE Vol. 10473

Lasers in Dentistry XXIV

Conference Chairs: **Peter Rechmann**, Univ. of California, San Francisco (USA); **Daniel Fried**, Univ. of California, San Francisco (USA)

Program Committee: **Gregory B. Altshuler**, Palomar Medical Technologies, Inc. (USA); **Tatjana Dostálová M.D.**, Charles Univ. in Prague (Czech Republic); **Thomas Ertl**, Univ. Stuttgart (Germany); **David M. Harris**, Bio-Medical Consultants, Inc. (USA); **Jörg Meister**, Universitätsklinikum Bonn (Germany); **Eric J. Seibel**, Univ. of Washington (USA)

SUNDAY 28 JANUARY

SESSION 1 SUN 8:30 AM TO 10:10 AM

Caries Lesion Detection

Session Chair: **Peter Rechmann**, Univ. of California, San Francisco (USA)

Effect of bioglass on artificially induced enamel lesion around orthodontic brackets: OCT study, Turki A. Bakhsh, Mohammed Al-batati, King Abdulaziz Univ. (Saudi Arabia); Saud Bakhsh, Ministry of Health, Kingdom of Saudi Arabia (Saudi Arabia); Mona Mukhtar, Mohammed Al-Najjar, King Abdulaziz Univ. (Saudi Arabia); Abdulsalam A. Bakhsh, King Faisal Univ. (Saudi Arabia); Ahmad S. Bakry, King Abdulaziz Univ. (Saudi Arabia) [10473-1]

Photothermal coherence tomography for 3D visualization of dental caries, Marjan Razani, York Univ. (Canada); koneswaran sivagurunathan, Pantea Tavakolian, Sohrab Roointanb, University of Toronto (Canada); Elnaz Baradaran Shokouhia, York Univ. (Canada); Andreas Mandelis, University of Toronto (Canada); Nima Tabatabaei, York Univ. (Canada) [10473-2]

Deep learning classifier with optical coherence tomography images for early dental caries detection, Nima Karimian, Univ. of Connecticut (USA); Hassan S. Salehi, Univ. of Hartford (USA); Mina Mahdian D.D.S., Stony Brook Medicine (USA); Hisham Alnajjar, Univ. of Hartford (USA); Aditya Tadinada, Univ. of Connecticut Health Ctr. (USA) [10473-3]

Multispectral near-infrared reflectance and transillumination imaging of occlusal carious lesions: variations in lesion contrast with lesion depth, Jacob C. Simon, Cynthia L. Darling, Univ. of California, San Francisco (USA); Daniel Fried, Univ. of California San Francisco (USA) [10473-4]

Laser speckle imaging for lesion detection on tooth, João H. Damazio, João V. P. Silva, Ravana A. Sfalcin, Luciano G. Gavinho, Sidnei A. Araujo, Marcelo M. Pinto, Sílvia R. G. Oliven, Renato A. Prates, Sandra K Bussadori, Alessandro M. Deana, UNINOVE (Brazil) [10473-5]

SESSION 2 SUN 10:40 AM TO 12:00 PM

Imaging of Hard, Soft Tissue and Microbial Plaque

Session Chair: **Daniel Fried**, Univ. of California, San Francisco (USA)

In vivo polarization sensitive optical coherence tomography for imaging oral hard and soft tissues, Julia Walther, Jonas Golde, Lars Kirsten, Florian Tetschke, Franz Hempel, Tobias Rosenauer, Christian Hannig, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany) [10473-6]

Near-infrared dental imaging using scanning fiber endoscope, Yaxuan Zhou, Univ. of Washington (USA); Robert C. Lee, Alireza Sadr, Univ. of Washington School of Dentistry (USA); Eric J. Seibel, Univ. of Washington (USA) [10473-7]

Photoacoustic imaging of teeth for dentine imaging and enamel characterization, Vijitha Periyasamy, Nanyang Technological Univ. (Singapore); Mani Rangaraj, M.S. Ramiah Univ. (India); Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10473-8]

Optical measurement of acidification of human dental plaque in vitro, Jasmine Y. Graham, Leonard Nelson, Eric Seibel, University of Washington (USA) [10473-9]

Lunch/Exhibition Break Sun 12:00 pm to 2:00 pm

SESSION 3 SUN 2:00 PM TO 3:20 PM

Caries Prevention, Remineralization, Ablation and Ceramics

Session Chair: **Peter Rechmann**, Univ. of California, San Francisco (USA)

CO2-9.3 μ m short-pulsed laser caries prevention: effects of a newly developed laser irradiation pattern, Peter Rechmann, Beate Rechmann, Charles Q. Le, Univ. of California, San Francisco (USA) [10473-10]

Temperature variations in sintering ovens for metal ceramic dental prostheses: non-destructive assessment using OCT, Cosmin Sinescu M.D., Univ. of Medicine and Pharmacy Victor Babes Timisoara (Romania); Adrian Bradu, Univ. of Kent (United Kingdom); Virgil-Florin Duma, Aurel Vlaicu Univ. of Arad (Romania); Florin I. Topala, Meda Lavinia Negrutiu M.D., Univ. of Medicine and Pharmacy Victor Babes Timisoara (Romania); Adrian G. H. Podoleanu, Univ. of Kent (United Kingdom) [10473-11]

Changes in the lesion dehydration rate with thickness of the surface layer formed during remineralization on enamel and dentin surfaces, Nai-Yuan N. Chang, Jamison Jew, Daniel Fried, Univ. of California, San Francisco (USA) [10473-12]

Selective ablation of carious lesions using an integrated multispectral near-IR imaging system

and a novel 9.4- μ m CO2 laser, Kenneth H. Chan, Univ. of California, San Francisco (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA); Daniel Fried, Univ. of California, San Francisco (USA) [10473-13]

SESSION 4 SUN 3:50 PM TO 5:30 PM

Bone Ablation, Soft Tissue Treatment and Microangiography

Session Chair: **Daniel Fried**, Univ. of California, San Francisco (USA)

Bovine cortical bone ablation by femtosecond laser, Fahad Aljekhedab, McMaster Univ. (Canada); Wenbin Zhang, Shanghai 9th People's Hospital, Shanghai Jiao Tong Univ. School of Medicine (China); Jonathan Favero, Harold K. Haugen, Gregory R. Wohl, Qiying Fang, McMaster Univ. (Canada) [10473-14]

Three-frequency Nd:YAG laser for dental treatment, Tatjana Dostálová, Martina Kadlecová, Charles Univ. in Prague (Czech Republic); Helena Jelínková, Michal Němec, Jan Šulc, Czech Technical Univ. in Prague (Czech Republic); Karel Nejezchleb, Václav Škoda, Nickalaj Kapitch, Crytur Ltd. (Czech Republic); Martin Fibrich, Czech Technical Univ. in Prague (Czech Republic) [10473-15]

Wide-field and long-ranging-depth optical coherence tomography microangiography of human oral mucosa, Wei Wei, Woo June Choi, Shaojie Men, Shaozhen Song, Ruikang K. Wang, Univ. of Washington (USA) [10473-16]

Ex vivo evaluation of super pulse diode laser system with smart temperature feedback for contact soft-tissue surgery, Ilya Yaroslavsky, IPG Medical Corp. (USA); Dmitri Boutousov, BIOLASE Technology, Inc. (USA); Alexander Vybornov, Igor Perchuk, Val Meleshkevich, Gregory B. Altshuler, IPG Medical Corp. (USA) [10473-17]

In vivo and ex vivo characterization of a novel Er fiber laser system for fractional treatment of soft oral tissues, Ksenia V. Shatilova, NTO "IRE-Polus" (Russian Federation); Georgii A. Aloian, Moscow Institute of Physics and Technology (Russian Federation); Ilya V. Yaroslavsky, Gregory B. Altshuler, IPG Medical Corp. (USA); Valentin P. Gapontsev, IPG Photonics Corp. (USA) [10473-18]

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Wavelength comparison for laser induced breakdown spectroscopy caries detection, Marcello M. Amaral, Univ. Brasil (Brazil); Marcus P. Raele, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Patricia A. da Ana, Univ. Federal do ABC (Brazil); Silvia C. Nunez, Univ. Brasil (Brazil); Ricardo S. Navarro, Univ. de Brasilia (Brazil); Denise M. Zezell, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10473-19]

Adhesive fracture pattern of eroded and sound dentin after femtosecond laser irradiation, Cecília Falcão, Anderson S. L. Gomes, Patricia F. Cassimiro-Silva, Univ. Federal de Pernambuco (Brazil); Francisco de Assis Rego Filho, Federal Univ. of Alagoas (Brazil); Luciana S. A. de Melo, Tereza Dias, Gabriela Monteiro, Univ. Federal de Pernambuco (Brazil) [10473-20]

Monitoring periodontal disease treatment in vivo by optical coherence tomography, Luana O. Fernandes, Univ. Federal de Pernambuco (Brazil); Claudia C. B. O. Mota, Ctr. Univ. Tabosa de Almeida (Brazil) and Univ. Federal de Pernambuco (Brazil); José K. Neves, Hugo O. Oliveira, Leógenes M. Santiago, Ctr. Univ. Tabosa de Almeida (Brazil); Anderson S. L. Gomes, Univ. Federal de Pernambuco (Brazil) [10473-21]

Optical coherence tomography evaluation of the interface of laminate veneers cemented with different brands of resin cements, Tereza J. C. Dias, Univ. Federal de Pernambuco (Brazil); Cláudia C.B. O. Mota, Univ. Federal de Pernambuco (Brazil) and Ctr. Univ. Tabosa de Almeida (Brazil); Natalia S. M. Pires, Luana O. Fernandes, Luciana S. A. Melo, Patricia F. da Silva, Sergio L. Campello, Anderson S. L. Gomes, Univ. Federal de Pernambuco (Brazil) [10473-22]

Comparison of oral lesions diagnosis with and without fluorescence visualization in population screening, Luciana Simonato D.D.S., Univ. Brasil (Brazil); Ricardo S. Navarro, Univ. de Brasilia (Brazil); Alessandra Baptista D.D.S., Univ. Brasil (Brazil); Saygo Tomo M.D., Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil); Silvia C. Nunes D.D.S., Univ. Brasil (Brazil); Antonio G. J. Balbin Villaverde Sr., Univ. Anhembi Morumbi (Brazil) . [10473-23]

Evaluation of enamel mineral loss around cavities prepared by Er,Cr:YSGG laser and restored with different materials after an acid challenge, Ricardo S. Navarro D.D.S., Univ. Brasil (Brazil) and Univ. de São Paulo (Brazil); Clarissa C. Bonifácio D.D.S., Academic Ctr. for Dentistry Amsterdam (Netherlands); Fausto M. Mendes D.D.S., Adriana B. Matos D.D.S., Univ. de São Paulo (Brazil); Denise M. Zezell, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Patricia M. Freitas D.D.S., Univ. de São Paulo (Brazil); Alessandra Baptista D.D.S., Univ. de Brasília (Brazil); Silvia C. Nunez D.D.S., Univ. Brasil (Brazil); José Carlos P. Imparato D.D.S., Univ. de São Paulo (Brazil) and São Leopoldo Mandic (Brazil) [10473-24]

Temperature increasing in titanium implants using a high-intensity diode laser for peri-implantitis decontamination, Carla Faustino, Univ. Federal do ABC (Brazil); Luciano Bachmann, Univ. de São Paulo (Brazil); Patricia A. da Ana, Univ. Federal do ABC (Brazil) [10473-25]

Analysis of reflectance spectra of comercial dental resins under different illumination light sources, Renan A. Romano, Univ. de São Paulo (Brazil); Hérica A. R. Donato, Weber A. Ricci, State Univ. of São Paulo (Brazil); Sebastião Pratavieira, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil) [10473-26]

The study on debonding of ceramic brackets using a portable diode laser, Sung-Min Kwon, Seong Seon Shin, Jun-Ho Hwang, Jong Hoon Lee, Gu-In Jung, Institute of Advanced Convergence Technology, Kyungpook National Univ. (Korea, Republic of) [10473-27]

Using optical coherence tomography for investigation of tooth demineralization, Jia-Ling Ke, Institute of Electro-Optical Science and Technology, National Taiwan Normal Univ. (Taiwan); Nguyễn Hoàng Trung, Bo-Huei Huang, Chang Gung Univ. (Taiwan); Yen-Li Wang, Chang Gung Memorial Hospital (Taiwan); Ya-Ju Lee, Institute of Electro-Optical Science and Technology, National Taiwan Normal Univ. (Taiwan); Meng-Tsan Tsai, Chang Gung Univ. (Taiwan) [10473-28]

Image-guided removal of interproximal lesions with a CO₂ laser, Albert Ngo, Kenneth H. Chan, Daniel Fried, Univ. of California, San Francisco (USA) [10473-29]

Lesion contrast on stained tooth occlusal surfaces at wavelengths from 400-2200-nm, Chung Ng, Jacob C. Simon, Daniel Fried, Cynthia L. Darling, Univ. of California, San Francisco (USA) [10473-30]

Wide-field long-range optical coherence tomography structural and angiography imaging for assessment of oral tissue and bio-materials, Shaozhen Song, Jingjiang Xu, Shaojie Men, Univ. of Washington (USA); Hrebesh M. Sudhash, Lynette Zaidel, Colgate-Palmolive Co. (USA); Ruikang K Wang, Univ. of Washington (USA) [10473-31]

Multifunctional wide-field imaging by polarization-sensitive optical coherence tomography based on swept source for dentistry, Jingjiang Xu, Shaozhen Song, Lei Zhang, Univ. of Washington (USA); Hrebesh M. Subhash, Lynette Zaidel, Colgate-Palmolive Co. (USA); Ruikang K. Wang, Univ. of Washington (USA) [10473-32]

Quantitative assessment of hard and soft tissues within oral cavity based on OCT and OCT-angiography, Yuxuan Cheng, Shaozhen Song, Shaojie Men, Jingjiang Xu, Univ. of Washington (USA); Hrebesh M. Sudhash, Lynette Zaidel, Colgate-Palmolive Co. (USA); Ruikang K. Wang, Univ. of Washington (USA) [10473-33]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Göttingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10474

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10474

Ophthalmic Technologies XXVIII

Conference Chairs: **Fabrice Manns**, Univ. of Miami (USA); **Per G. Söderberg**, Uppsala Univ. (Sweden); **Arthur Ho**, Brien Holden Vision Institute (Australia)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr. (USA); **Michael Belkin**, Tel Aviv Univ. (Israel); **Kostadinka Bizheva**, Univ. of Waterloo (Canada); **David Borja**, Alcon Labs., Inc. (USA); **Ralf Brinkmann**, Univ. zu Lübeck (Germany); **Wolfgang Drexler**, Medizinische Univ. Wien (Austria); **Sina Farsiou**, Duke Univ. (USA); **Daniel X. Hammer**, U.S. Food and Drug Administration (USA); **Karen M. Joos**, Vanderbilt Univ. (USA); **Kirill V. Larin**, Univ. of Houston (USA); **Ezra Maguen**, American Eye Institute (USA); **Donald T. Miller**, Indiana Univ. (USA); **Derek Nankivil**, Johnson & Johnson Vision Care, Inc. (USA); **Daniel V. Palanker**, Stanford Univ. (USA); **Jean-Marie Parel**, Bascom Palmer Eye Institute (USA); **Roberto Pini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Ygal Rotenstreich**, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); **Luigi Rovati**, Univ. degli Studi di Modena e Reggio Emilia (Italy); **Marco Ruggeri**, Bascom Palmer Eye Institute (USA); **Georg Schuele**, OptiMedica Corp. (USA); **Jerry Sebag**, VMR Institute (USA); **Peter Soliz**, VisionQuest Biomedical, LLC (USA); **Yuankai K. Tao**, Vanderbilt Univ. (USA); **Valery V. Tuchin**, N.G. Chernyshevsky Saratov National Research State Univ. (Russian Federation), National Research Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control RAS (Russian Federation); **Robert J. Zawadzki**, Univ. of California, Davis (USA)

SATURDAY 27 JANUARY

SESSION 1 SAT 8:30 AM TO 10:00 AM

Ocular Angiography and Perfusion

Session Chairs: **Marco Ruggeri**, Bascom Palmer Eye Institute (USA); **Sina Farsiou**, Duke Univ. (USA)

Multimodality optical coherence tomography and fluorescence confocal scanning laser ophthalmoscopy in a zebrafish model of retinal vascular occlusion and remodeling. Xiaoyue Li, Kathleen Spitz, Ivan Bozic, Yuankai K. Tao, Vanderbilt Univ. (USA) [10474-1]

Visualization and quantification of choriocapillaris based on swept source OCT angiography. Qinqin Zhang, Univ. of Washington (USA); Fang Zhen, Giovanni Gregori, Bascom Palmer Eye Institute (USA); Chieh-Li Chen, Zhongdi Chu, Univ. of Washington (USA); Philip J. Rosenfeld, Bascom Palmer Eye Institute (USA); Ruikang K. Wang, Univ. of Washington (USA) ... [10474-2]

Investigation of vascular scattering patterns in retinal and choroidal OCT angiography with a contrast agent. Marcel Bernucci, Conrad W. Merkle, Vivek J. Srinivasan, Univ. of California, Davis (USA) [10474-3]

Laser Doppler perfusion imaging of human retina using off-axis holography. Leo Puyo, Mathias Fink, Institut Langevin (France); Michel Paques, Institut de la Vision (France); Michael Atlan, Institut Langevin (France) [10474-4]

Motion correction of optical coherence tomography angiography with dedicated scan based on Lissajous pattern. Shuichi Makita, Yiwei Chen, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) [10474-5]

Deep network for retinal disease classification based on limited clinical OCT angiography datasets. Yuxuan Cheng, Yingxin Cao, Qinqin Zhang, Zhongdi Chu, Ruikang K. Wang, Univ. of Washington (USA) [10474-6]

SESSION 2 SAT 10:30 AM TO 11:30 AM

Ophthalmic Imaging: Polarization

Session Chairs: **Donald T. Miller**, Indiana Univ. (USA); **Robert J. Zawadzki**, Univ. of California, Davis (USA)

Polarization-sensitive optical coherence tomography in the anterior mouse eye. Bernhard Baumann, Marco Augustin, Danielle J. Harper, Antonia Lichtenegger, Martina Muck, Pablo Eugui, Michael Pircher, Christoph K. Hitzenberger, Medizinische Univ. Wien (Austria) [10474-7]

Investigation of corneal structures with polarization-sensitive OCT using a conical scan pattern. Florian Beer, Medizinische Univ. Wien (Austria) and Technische Univ. Wien (Austria); Andreas Wartak, Bernhard Baumann, Michael Pircher, Christoph K. Hitzenberger, Medizinische Univ. Wien (Austria) [10474-8]

Macular analysis by multi-contrast segmentation of retinal pigment epithelium and choroid by Jones-matrix OCT. Shinnosuke Azuma, Shuichi Makita, Univ. of Tsukuba (Japan); Yasushi Ikuno, Osaka Univ. (Japan) and Univ. of Tsukuba (Japan); Masahiro Miura, Tokyo Medical Univ. (Japan) and Univ. of Tsukuba (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan) [10474-9]

Objective evaluation of choroidal melanin contents with polarization-sensitive optical coherence tomography. Masahiro Miura, Ibaraki Medical Ctr., Tokyo Medical Univ. (Japan); Shuichi Makita, Yoshiaki Yasuno, Univ. of Tsukuba (Japan); Yasushi Ikuno, Sato Uematsu, Osaka Univ. (Japan); Takuya Iwasaki, Hiroshi Goto, Tokyo Medical Univ. (Japan) [10474-10]

SESSION 3 SAT 11:30 AM TO 12:15 PM

Pascale Rol Lecture

Session Chair: **Per Söderberg**, Uppsala Univ. (Sweden)

Photons in treatment of ocular tumors: needs for further technology (Keynote Presentation). Arun D. Singh M.D., Cleveland Clinic (USA) [10474-11]

SESSION 4 SAT 1:45 PM TO 3:30 PM

Ophthalmic Imaging: Adaptive Optics Instrumentation

Session Chairs: **Daniel X. Hammer**, U.S. Food and Drug Administration (USA); **Derek Nankivil**, Johnson & Johnson Vision Care, Inc. (USA)

3D printed phantom of retinal photoreceptor cells for evaluating adaptive optics imaging modalities. Nikita Kedia, Zhuolin Liu, U.S. Food and Drug Administration (USA); Ryan Sochol, Univ. of Maryland, College Park (USA); Daniel X. Hammer, Anant Agrawal, U.S. Food and Drug Administration (USA) [10474-12]

Multi-detector adaptive optics scanning laser ophthalmoscope. Volker Jaedicke, Sanam Mozaffari, Francesco LaRocca, Austin Roorda, Univ. of California, Berkeley (USA) [10474-13]

Optimization of a multi-color adaptive optics scanning laser ophthalmoscope design with diffraction-limited illumination and collection for high-throughput imaging. Francesco LaRocca, Sanam Mozaffari, Volker Jaedicke, Austin Roorda, Univ. of California, Berkeley (USA) [10474-14]

Handheld adaptive optics scanning laser ophthalmoscope for in vivo imaging of adults and infants. Theodore B. DuBose, Derek Nankivil, Francesco LaRocca, James M. Polans, Brenton Keller, Duke Univ. (USA); Anthony N. Kuo M.D., Lejla Vajzovic, Cynthia A. Toth M.D., Duke Eye Ctr., Duke Univ. Health System (USA); Joseph A. Izatt, Sina Farsiou, Duke Univ. (USA) [10474-15]

Large field of view adaptive optics scanning laser ophthalmoscopy and optical coherence tomography. Marie Laslandes, Matthias Salas, Andreas Wartak, Christoph K. Hitzenberger, Michael Pircher, Medizinische Univ. Wien (Austria) [10474-16]

In vivo retinal imaging for fixational eye motion detection using a high-speed DMD-based ophthalmoscope. Kari V. Vienola, Mathivanan Damodaran, Vrije Univ. Amsterdam (Netherlands); Boy Braaf, Massachusetts General Hospital (USA); Koenraad A. Vermeer, Rotterdam Ophthalmic Institute (Netherlands); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) [10474-17]

Investigation of microscopic retina with multimodal adaptive optics, Zhuolin Liu, Anant Agrawal, Lawrence Kagemann, U.S. Food and Drug Administration (USA); Johnny Tam, National Eye Institute, National Institutes of Health (USA); Daniel X. Hammer, U.S. Food and Drug Administration (USA) [10474-18]

SESSION 5 SAT 4:00 PM TO 5:30 PM

**Ophthalmic Therapy:
Treatment, Monitoring and Feedback**

Session Chairs: **Georg Schuele**, Abbott Medical Optics (USA); **Ralf Brinkmann**, Medizinisches Laserzentrum Lübeck GmbH (Germany)

Imaging guided photo-mediated ultrasound therapy to remove choroidal blood vessels, Haonan Zhang, Tongji Univ. (China) and Univ. of Michigan (USA); Jia Li, Nanjing Medical Univ. (China) and Univ. of Michigan (USA); Zhang Wei, Chinese Academy of Medical Sciences (China) and Univ. of Michigan (USA) and Peking Union Medical College Hospital (China); Xinyi Xie, Nanjing Medical Univ. (China) and Univ. of Michigan (USA); Qian Cheng, Tongji Univ. (China); Yannis M. Paulus M.D., Univ. of Michigan (USA); Xinmai Yang, The Univ. of Kansas (USA); Xueming Wang, Tongji Univ. (China) and Univ. of Michigan (USA) [10474-19]

Optical coherence tomography distance sensor guided smart microsurgical injector for inclined injection, Jintaek Im, Cheol Song, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of) [10474-20]

Real-time corneal segmentation and 3D surgical tool tracking in anterior segment intrasurgical OCT, Brenton Keller, Mark Draelos, Gao Tang, Sina Farsi, Anthony N. Kuo M.D., Kris Hauser, Joseph A. Izatt, Duke Univ. (USA) [10474-21]

Quantifying the effects of hydration on corneal stiffness with optical coherence elastography, Manmohan Singh, Jiasong Li, Univ. of Houston (USA); Zhaolong Han, Shanghai Jiao Tong Univ. (China); Srilatha Vantipalli, Univ. of Houston (USA); Michael D. Twa, The Univ. of Alabama at Birmingham (USA); Kirill V. Larin, Univ. of Houston (USA) [10474-22]

Monitoring corneal crosslinking with phase-decorrelation OCT, Brecken J. Blackburn, Shi Gu, Case Western Reserve Univ. (USA); Matthew R. Ford, The Cleveland Clinic Foundation (USA); Michael W. Jenkins, Case Western Reserve Univ. (USA); William J. Dupps Jr., The Cleveland Clinic Foundation (USA); Andrew M. Rollins, Case Western Reserve Univ. (USA) [10474-23]

Automated selective retina treatment (SRT): an optical single pulse feedback technique, Eric Seifert, Medizinisches Laserzentrum Lübeck GmbH (Germany); Young Gun Park M.D., Young-Jung Roh M.D., Seoul St. Mary's Hospital (Korea, Republic of); Dirk Theisen-Kunde, Ralf Brinkmann, Medizinisches Laserzentrum Lübeck GmbH (Germany) [10474-24]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SESSION 6 SUN 8:00 AM TO 10:00 AM

Ophthalmic Imaging: Cellular Resolution

Session Chairs: **Yuankai K. Tao**, Vanderbilt Univ. (USA); **Daniel V. Palanker**, Stanford Univ. (USA)

In-vivo volumetric imaging of the cellular structure of healthy and pathological human cornea with high-speed UHR-OCT, Zohreh Hosseinaee, Bingyao Tan, Kirsten Carter, Denise Hileeto, Luigina Sorbara, Kostadinka Bizheva, Univ. of Waterloo (Canada) . . [10474-25]

High speed UHR-OCT for in-vivo volumetric imaging of the palisades of Vogt and the cellular structure of the limbal crypts in the healthy and pathological human corneo-scleral limbus, Kostadinka Bizheva, Bingyao Tan, Zohreh Hosseinaee, Kirsten Carter, Denise Hileeto, Luigina Sorbara, Univ. of Waterloo (Canada) [10474-26]

In vivo Imaging through the entire thickness of human cornea by full-field optical coherence tomography, Viacheslav Mazlin, Peng Xiao, Institut Langevin (France); Eugénie Dalimier, LLTech SAS (France); Katharine F. Grieve, Institut de la Vision (France) and Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France); Kristina Irsch, Institut de la Vision (France) and Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France) and The Wilmer Eye Institute, The Johns Hopkins Univ. School of Medicine (USA); José-Alain Sahel M.D., School of Medicine, Univ. of Pittsburgh (USA) and Institut de la Vision (France) and Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France); Mathias Fink, Institut Langevin (France); Albert Claude Boccara, Institut Langevin (France) and LLTech SAS (France) [10474-27]

Ultrahigh resolution imaging of cellular dynamics in explanted corneas and retinas with ocular pathologies using dynamic full-field OCT, Olivier Thouvenin, Jules Scholler, Albert Claude Boccara, Institut Langevin (France); Michel Paques, José-Alain Sahel M.D., Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France); Mathias Fink, Institut Langevin (France); Katharine F. Grieve, Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France) [10474-28]

A novel technique for phase imaging of ex-vivo retina, Dino Carpentras, Timothé Laforest, Mathieu Künzi, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Laura Kowalczyk, Francine Behar-Cohen M.D., Univ. de Lausanne (Switzerland); Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10474-29]

Retinal line field SLO using split detection and holography, Laurin Ginner, Medizinische Univ. Wien (Austria); Tilman Schmoll, Carl Zeiss Meditec, Inc. (USA); Abhishek Kumar, Matthias Salas, Lara M. Wurster, Rainer A. Leitgeb, Medizinische Univ. Wien (Austria) [10474-30]

Method to investigate temporal dynamics of ganglion and other inner retinal cells in the living human eye, Kazuhiro Kurokawa, Indiana Univ. (USA); Zhuolin Liu, U.S. Food and Drug Administration (USA); James Crowell, Furu Zhang, Donald T. Miller, Indiana Univ. (USA) [10474-31]

Measuring diurnal and light-induced changes in photoreceptor length with nanometer precision using adaptive optics optical coherence tomography, Furu Zhang, School of Optometry, Indiana Univ. (USA); Zhuolin Liu, U.S. Food and Drug Administration (USA); Kazuhiro Kurokawa, Donald T. Miller, School of Optometry, Indiana Univ. (USA) [10474-32]

SESSION 7 SUN 10:30 AM TO 11:45 AM

Functional Imaging and Enhanced Visualization

Session Chairs: **Wolfgang Drexler**, Medizinische Univ. Wien (Austria); **Karen M. Joos M.D.**, Vanderbilt Univ. Medical Ctr. (USA)

Systematic in-vivo investigation of intrinsic optical signals in the photoreceptor outer segment, Clara Pfäffle, Medizinisches Laserzentrum Lübeck GmbH (Germany); Dierck Hillmann, Thorlabs GmbH (Germany); Hendrik Spahr, Medizinisches Laserzentrum Lübeck GmbH (Germany); Bastian Kabuth, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Gereon M. Hüttmann, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany) and Airway Research Ctr. North, Deutsches Zentrum Für Lungenforschung (Germany) [10474-33]

Photoacoustic ocular imaging of retina oxygen gradients in vivo, Ali Hariri, Junxin Wang, Daniel Chao, Jesse V. Jokerst, Univ. of California, San Diego (USA) [10474-34]

Photothermal optical coherence tomography of indocyanine green in the eye, Maryse Lapierre-Landry, Vanderbilt Univ. (USA); Joseph Carroll, Medical College of Wisconsin (USA); Michael T. Nork, Univ. of Wisconsin-Madison (USA); Yuankai K. Tao, Vanderbilt Univ. (USA); Melissa C Skala, Univ. of Wisconsin-Madison (USA) and Morgridge Institute for Research (USA) [10474-35]

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Anterior chamber blood cell differentiation using spectroscopic optical coherence tomography, Ruobing Qian, Ryan P. McNabb, Anthony N. Kuo M.D., Joseph A. Izatt, Duke Univ. (USA) [10474-36]

SS-OCT with focus tunable optics for enhanced visualization of vitreous opacities, Ireneusz Grulkowski, Nicolaus Copernicus Univ. (Poland); Silvestre Manzanera, Lab. de Óptica, Univ. de Murcia (Spain); Lukasz Cwiklinski, Franciszek Sobczuk, Nicolaus Copernicus Univ. (Poland); Pablo Artal, Lab. de Óptica, Univ. de Murcia (Spain) [10474-37]
Lunch/Exhibition Break Sun 11:45 am to 1:00 pm

SESSION 8. SUN 1:00 PM TO 2:15 PM

Ophthalmic Diagnostics and Imaging: Clinical Applications

Session Chairs: **Ygal Rotenstreich**, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); **Jerry Sebag M.D.**, VMR Institute (USA)

Angular distribution of Pigment epithelium central limit-Inner limit of the retina Minimal Distance (PIMD), in the young not pathological optic nerve head imaged by OCT, Per Söderberg, Uppsala Univ. (Sweden) [10474-38]

Nonmydriatic single-shot widefield fundus camera with trans-pars planar illumination, Devrim Toslak, Benquan Wang, Minhaj Nur Alam, Xincheng Yao, Univ. of Illinois at Chicago (USA) [10474-39]

Diagnostic imaging of pediatric retinoblastoma patients with a new 1050nm handheld optical coherence tomography system: a clinical study, Oleg Nadiarnykh, Vrije Univ. Amsterdam (Netherlands); Nara McNeill, Machteld I. Bosscha, Vrije Univ. Medical Ctr. (Netherlands); Frank D. Verbraak, Academisch Medisch Centrum, Univ. van Amsterdam (Netherlands); Annette C. Moll, Vrije Univ. Medical Ctr. (Netherlands); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) [10474-40]

Imaging of pediatric pathology in the intensive care nursery using a custom handheld, ultra-compact, swept-source OCT probe, Christian Viehland, Francesco LaRocca, Du Tran-Viet, Moseph Jackson-Atogi, Caelan Eckard, Brenton Keller, Cynthia A. Toth M.D., Joseph A. Izatt, Duke Univ. (USA) [10474-41]

Widefield whole eye SSOC measurement of retinal curvature for papilledema screening, Ryan P. McNabb, M. Tariq Bhatti, Maysantoine El Dairi, Duke Univ. School of Medicine (USA); Joseph A. Izatt, Duke Univ. (USA); Anthony N. Kuo M.D., Duke Univ. School of Medicine (USA) [10474-42]

SESSION 9. SUN 2:15 PM TO 3:30 PM

Visual Optics and Refractive Error

Session Chairs: **Arthur Ho**, Brien Holden Vision Institute (Australia); **Ezra Maguen M.D.**, American Eye Institute (USA)

Evaluation of Posterior Porcine Sclera Elasticity in situ as a function of IOP, Achuth Nair, Chen Wu, Manmohan Singh, Chih Hao Liu, Raksha Raghunathan, Jennifer Nguyen, Univ. of Houston (USA); Kirill V. Larin, Univ. of Houston (USA) and Tomsk State Univ. (Russian Federation) and Baylor College of Medicine (USA) [10474-43]

Objective dynamic changes in lens curvature during accommodation using optical coherence tomography images, Siobhan Williams, Univ. of Miami (USA) and Bascom Palmer Eye Institute, Univ. of Miami School of Medicine (USA); Giovanni Gregori, Bascom Palmer Eye Institute (USA); Marco Ruggeri, Bascom Palmer Eye Institute (USA) and Univ. of Miami (USA); Yu-Cherng Chang, Univ. of Miami Miller School of Medicine (USA) and Univ. of Miami (USA) and Bascom Palmer Eye Institute, Univ. of Miami Miller School of Medicine (USA); Florence A. Cabot, Bascom Palmer Eye Institute (USA); Arthur Ho, Brien Holden Vision Institute (Australia) and The Univ. of New South Wales (Australia) and Univ. of Miami Miller School of Medicine (USA); Sonia H. Yoo, Bascom Palmer Eye Institute (USA); Jean-Marie A. Parel, Bascom Palmer Eye Institute (USA) and Univ. of Miami (USA) and Brien Holden Vision Institute (Australia); Fabrice Manns, Univ. of Miami (USA) and Bascom Palmer Eye Institute, Univ. of Miami School of Medicine (USA) [10474-44]

Adaptive optics visual simulator for eyes with large refractive errors, Nikolai Suchkov, Voptica S.L. (Spain) and Lab. de Óptica Univ. de Murcia (Spain); Enrique J. Fernández, Pablo Artal, Lab. de Óptica, Univ. de Murcia (Spain) [10474-45]

Measurement and design of refractive corrections using ultrafast laser-induced intra-tissue refractive index shaping in live cats, Daniel R. Brooks, Kaitlin T. Wozniak, Wayne H. Knox, Jonathan D. Ellis, Krystal R. Huxlin, Univ. of Rochester (USA) [10474-46]

A novel eye tracking-based strabismus angle measurement device, Oren Yehezkel, NovaSight (Israel); Abraham Spierer, The Goldschleger Eye Research Institute, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); Dan Oz, Ran Yam, NovaSight (Israel); Michael Belkin M.D., The Goldschleger Eye Research Institute, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel) [10474-47]

SESSION 10. SUN 4:00 PM TO 5:00 PM

Ophthalmic Multimodal Imaging

Session Chairs: **Luigi Rovati**, Univ. degli Studi di Modena e Reggio Emilia (Italy); **David Borja**, Alcon Labs., Inc. (USA)

Imaging early neovascularization in the vldlr-/- mouse using multi-functional optical coherence tomography, Marco Augustin, Matthias Wechdorn, Ulrike Pfeiffenberger, Medizinische Univ. Wien (Austria); Tanja Himmel, Martin Glösmann, Veterinaermedizinische Univ. Wien (Austria); Stanislava Fialová, René M. Werkmeister, Christoph K. Hitzenberger, Bernhard Baumann, Medizinische Univ. Wien (Austria) [10474-48]

Retinal and choroidal imaging in vivo using integrated photoacoustic microscopy and optical coherence tomography, Chao Tian, Wei Zhang, Van Phuc Nguyen, Ziyi Huang, Xueding Wang, Yannis M. Paulus M.D., Univ. of Michigan (USA) [10474-49]

Multimodal imaging for monitoring delivery of therapeutics into the extravascular spaces of the choroid, Ygal Rotenstreich, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel) and Sackler School of Medicine, Tel Aviv Univ. (Israel); Adi Tzameret, Sackler School of Medicine, Tel Aviv Univ. (Israel); Sapir E. Kalish, Ettel Bubis, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); Michael Belkin M.D., Sackler School of Medicine, Tel Aviv Univ. (Israel); Iris Moroz, Ifat Sher-Rosenthal, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel) [10474-50]

Multimodality optical coherence tomography and fluorescence confocal scanning laser ophthalmoscopy for image-guided feedback of intraocular injections in mouse models, Oscar R. Benavides, Benjamin D. Terrones, Kelsey C. Leeburg, Sankarathi B. Mehanathan, Edward M. Levine, Yuankai K. Tao, Vanderbilt Univ. (USA) [10474-51]

PASCAL ROL AWARD SUN 5:00 PM TO 5:15 PM

Pascal Rol Award

Session Chair: **Arthur Ho**, Brien Holden Vision Institute (Australia)

DISCUSSION SUN 5:15 PM TO 5:30 PM

Discussion

Session Chairs: **Fabrice Manns**, Univ. of Miami (USA); **Arthur Ho**, Brien Holden Vision Institute (Australia); **Per Söderberg**, Uppsala Univ. (Sweden)

SUNDAY POSTER SESSION. SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Spectral auto-fluorescence imaging of the retina for drusen detection, James Foubister, Optos plc (United Kingdom) and Univ. of Glasgow (United Kingdom); Alistair Gorman, Optos plc (United Kingdom); Andy R. Harvey, Univ. of Glasgow (United Kingdom) [10474-52]

New illuminations approaches with single-use micro LEDs endoilluminators for the pars plana vitrectomy, Philipp Simon Kölbl, Univ. Ulm (Germany); Frank Koch, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany); Christian Lingenfelder, Pharmpur GmbH (Germany); Martin Hessling, Hochschule Ulm (Germany) [10474-53]

Feasibility study of Raman spectroscopy for investigating the mouse retina in vivo, Suman K. Manna, Pengfei Zhang, Ratheesh K. Maleppat, Edward N. Pugh Jr., Marcos A. S. de Oliveira, Che-Wei Chang, James W. Chan, Robert J. Zawadzki, Univ. of California, Davis (USA) [10474-54]

Quantitative analysis of microvasculature and structural changes in uveitis using spectral domain and swept source optical coherence tomography, Jasmine Vu, Univ. of Washington (USA) [10474-55]

- Quantitative visual just noticeable differences**, Derek Nankivil, Minghan Chen, C. Benjamin Wooley, Johnson & Johnson Vision Care, Inc. (USA) [10474-56]
- On the development of a novel chromatic RGB laser technology for in vivo visual perimetry**, Luis Alberto V. Carvalho, Mei-Chun Lo, Farhad Akhavan, LightMed USA (USA) [10474-57]
- In vivo imaging of the outer retina and pigment epithelial melanin with visible light optical coherence tomography**, Aaron Kho, Shau Poh Chong, Robert J. Zawadzki, Vivek J. Srinivasan, Univ. of California, Davis (USA) [10474-58]
- Solar exposure of sunglasses: aging test display**, Leonardo M. Mariano Gomes, Mauro Masili, Guilherme Andriotti Momesso, Felipe Marques da Silva, Liliane Ventura, Univ. de São Paulo (Brazil) [10474-59]
- Development of low cost UV index datalogger and comparison between UV index sensors**, Leonardo M. Mariano Gomes, Liliane Ventura, Univ. de São Paulo (Brazil) [10474-60]
- Age-dependence of the attenuation coefficients of the sclera and ciliary muscle measured in vivo with OCT**, Yu-Cherng Chang, Gabrielle M. Mesquita, Univ. of Miami Miller School of Medicine (USA); Florence A. Cabot, Univ. of Miami Miller School of Medicine (USA) and Bascom Palmer Eye Institute, Univ. of Miami School of Medicine (USA); Marco Ruggeri, Univ. of Miami Miller School of Medicine (USA); Sonia H. Yoo, Univ. of Miami Miller School of Medicine (USA) and Bascom Palmer Eye Institute, Univ. of Miami School of Medicine (USA); Arthur Ho, Univ. of Miami Miller School of Medicine (USA) and Brien Holden Vision Institute (Australia); Jean-Marie A. Parel, Univ. of Miami Miller School of Medicine (USA) and Bascom Palmer Eye Institute, Univ. of Miami School of Medicine (USA); Fabrice Manns, Univ. of Miami Miller School of Medicine (USA) and Univ. of Miami (USA) [10474-61]
- In vivo neuronal retinal imaging at cellular level**, Timothé Laforest, Mathieu Künzi, Dino Carpentras, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Laura Kowalczyk, Francine Behar-Cohen M.D., Univ. de Lausanne (Switzerland); Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10474-62]
- Developing an ultrafast multispectral fundus imaging system**, Changhui Li, Da Zou, Yue Yu, Wenzhao Li, Peking Univ. (China) [10474-63]
- Handheld OCT angiography**, Gangjun Liu, Casey Eye Institute, Oregon Health & Science Univ. (USA) [10474-64]
- A holographic waveguide based eye tracker**, Changgeng Liu, Univ. of Illinois at Chicago (USA); Juan Liu, Beijing Institute of Technology (China); Lei Liu, The Univ. of Alabama at Birmingham (USA); Xincheng Yao, Univ. of Illinois at Chicago (USA) [10474-65]
- Analysis of phase difference distributions in Doppler optical coherence tomography for improved flow quantification**, Maximilian G. O. Gräfe, Vrije Univ. Amsterdam (Netherlands) [10474-66]
- Quantitative evaluation of retinal degeneration in royal college of surgeons rats by contrast enhanced ultrahigh resolution optical coherence tomography**, Wen-Chuan Kuo, Jia-Pu Syu, Min-Jyun Su, National Yang-Ming Univ. (Taiwan); Po-Wei Chen, Chang-Chih Ke, Shih-Hwa Chiou, Institute of Pharmacology, National Taiwan Univ. (Taiwan) [10474-67]
- Multiphoton tomography of cross-linked human corneas**, Ana Batista, Univ. des Saarlandes (Germany) and JenLab GmbH (Germany); Hans Georg Breunig, JenLab GmbH (Germany); Tobias Hager, Berthold Seitz, Univ. des Saarlandes (Germany); Karsten König, JenLab GmbH (Germany) and Univ. des Saarlandes (Germany) [10474-68]
- Realistic modeling of individual eyes using a generic model**, Shani Rosen, Shy Shoham, Technion-Israel Institute of Technology (Israel) [10474-69]
- Quantifying changes in lens biomechanical properties due to cataract with optical coherence elastography**, Hongqiu Zhang, Chen Wu, Manmohan Singh, Kirill V. Larin, Univ. of Houston (USA) [10474-70]
- A new concept of imaging system: telescope windows**, Cyril Bourgenot, Durham Univ. (United Kingdom); Euan N. Cowie, Univ. of Glasgow (United Kingdom); Laura Young, David Robertson, Gordon D. Love, Durham Univ. (United Kingdom); Johannes Courtial, Univ. of Glasgow (United Kingdom); John Girkin, Durham Univ. (United Kingdom) [10474-71]
- In-vivo volumetric imaging of the vasculature of the healthy and pathological human limbus with high speed ultra-high resolution spectral domain OCT**, Bingyao Tan, Zohreh Hosseinaee, Kirsten Carter, Denise Hilleto, Luigina Sorbara, Kostadinka Bizheva, Univ. of Waterloo (Canada) [10474-72]
- 3D reconstruction of vitreous floaters using optical coherence tomography**, Buyun Zhang, Rachel Qu, Tiancheng Huo, Jiang Zhu, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) [10474-73]
- Anterior segment vascular imaging of a rat eye burn model using high speed swept source optical coherence tomography following corneal injury**, Cerine Lal, Hrebesh M. Subhash, Sweta Rani, Sergey A. Alexandrov, Thomas Ritter, Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) [10474-74]
- Measurement accuracy of a stressed contact lens during its relaxation period**, David C. Compertore, Philipp V. Ignatovich, Lumetrics, Inc. (USA) [10474-75]
- Dry eye diagnosis through active optical interferometric nitrocellulose thin film: application to MMP9, S100a6 and CST4 biomarkers**, Maria-Fe Laguna Heras, Beatriz Santamaria, Univ. Politécnic de Madrid (Spain); David Lopez-Romero, BIOD, Univ. Politécnic de Madrid (Spain); Ana López-Hernandez, Univ. Politécnic de Madrid (Spain); Francisco Javier Sanza, BIOD, Univ. Politécnic de Madrid (Spain); Álvaro Lavin, Rafael Casquel, Univ. Politécnic de Madrid (Spain); María Victoria Maigler, BIOD, Univ. Politécnic de Madrid (Spain) [10474-76]
- A comparison study between spectral-domain and swept-source OCT angiograms based on CNV measurement**, Qinqin Zhang, Univ. of Washington (USA); Andrew R. Miller, Fang Zheng, Giovanni Gregori, Bascom Palmer Eye Institute (USA); Chieh-Li Chen, Zhongdi Chu, Univ. of Washington (USA); Philip J. Rosenfeld, Bascom Palmer Eye Institute (USA); Ruikang K. Wang, Univ. of Washington (USA) [10474-77]
- Automated classification and quantitative analysis of arterial and venous vessels in fundus images**, Minhaj Nur Alam, Taeyoon Son, Devrim Toslak, Jennifer I. Lim, Xincheng Yao, Univ. of Illinois at Chicago (USA) [10474-78]
- Combined adaptive optics with optical coherence tomography and scanning laser ophthalmoscopy for in vivo mouse retina imaging**, Pengfei Zhang, Univ. of California, Davis (USA); Daniel J. Wahl, Simon Fraser Univ. (Canada); Jacopo Mocchi, Univ. degli Studi di Verona (Italy); Yifan Jian, Simon Fraser Univ. (Canada); Suman K. Manna, Ratheesh K. Meleppat, Univ. of California, Davis (USA); Riccardo Muradore, Univ. degli Studi di Verona (Italy); Stefano Bonora, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Marinko V. Sarunic, Simon Fraser Univ. (Canada); Edward N. Pugh Jr., Robert J. Zawadzki, Univ. of California, Davis (USA) [10474-79]
- Why choroid vessels appear dark in clinical optical coherence tomography**, Mitchell A. Kirby, Chenxi Li, Woo June Choi, Univ. of Washington (USA); Giovanni Gregori, Philip J. Rosenfeld, Bascom Palmer Eye Institute (USA); Ruikang K. Wang, Univ. of Washington (USA) [10474-80]
- Retinal fundus imaging with a plenoptic sensor**, Brice Thurin, Sotiris Nousias, Univ. College London (United Kingdom); Pearse Keane, Moorfields Eye Hospital, National Health Service (England) (United Kingdom) and Univ. College London (United Kingdom); Sébastien Ourselin, Christos Bergeles, Univ. College London (United Kingdom) [10474-81]
- Full ocular biometry through dual-depth whole-eye optical coherence tomography**, Hyung-Jin Kim, Minji Kim, Min Gyu Hyeon, Youngwoon Choi, Beop-Min Kim, Korea Univ. (Korea, Republic of) [10474-82]
- Improving optical sectioning and contrast of high-resolution retinal images with high-speed adaptive optics loop**, Cyril Petit, Pedro Mecê, Jean-Marc Conan, ONERA (France); Michel Paques, Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France); Serge C. Meimon, ONERA (France) [10474-83]
- Investigation of the effect of directional (off-axis) illumination on the reflectivity of retina layers in mice using swept-source optical coherence tomography**, Ratheesh K. Meleppat, Pengfei Zhang, Univ. of California, Davis (USA); Daniel J. Wahl, Yifan Jian, Simon Fraser Univ. (Canada); Suman K. Manna, Univ. of California, Davis (USA); Marinko V. Sarunic, Simon Fraser Univ. (Canada); Edward N. Pugh Jr., Robert J. Zawadzki, Univ. of California, Davis (USA) [10474-84]
- Wide-field closed-loop optical stabilization in adaptive optics flood-illumination ophthalmoscopy for clinical application**, Pedro Mecê, Cyril Petit, Laurent Mugnier, ONERA (France); Michel Paques, INSERM (France); Serge C. Meimon, ONERA (France) [10474-85]
- Jones matrix optical coherence tomography based multi-contrast tissue classification of the posterior eye**, Deepa K. Kasaragod, Shuichi Makita, Univ. of Tsukuba (Japan); Yasushi Ikuno, Osaka Univ. (Japan); Masahiro Miura, Tokyo Medical Univ. (Japan) and Univ. of Tsukuba (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan) [10474-86]

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Multimodal imaging including optical coherence tomography, blue autofluorescence and multicolor fundus imaging for assessment of disease progression in retinal degeneration, Ygal Rotenstreich, Ettel Bubis, Alon Skaat, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel) and Sackler School of Medicine, Tel Aviv Univ. (Israel); Iris Moroz, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); Ofra Kalter-Leibovici, Sackler School of Medicine, Tel Aviv Univ. (Israel) and The Gertner Institute, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel); Ifat Sher-Rosenthal, The Chaim Sheba Medical Ctr., Tel Hashomer (Israel). [10474-87]

Corneal permeability for cement dust: prognosis for occupational safety, Roman Kalmykov, Saratov State Medical Univ. (Russian Federation); Daria Popova, Elina Genina, Saratov State Univ. (Russian Federation); Tatyana Kamenskikh, Saratov State Medical Univ. (Russian Federation); Valery Tuchin, Alexey Bashkatov, Saratov State Univ. (Russian Federation). [10474-88]

Laser Induced, spatially resolved, alterations of refractive power in rabbit eyes ex vivo, Chao Wang, Mikhail Fomovsky, Sinisa Vukelic, Columbia Univ. (USA) [10474-89]

Developmental approach towards high resolution optical coherence tomography for glaucoma diagnostics, Steffi Ketelhut, Jürgen Schneckeburger, Björn Kemper, Westfälische Wilhelms-Univ. Münster (Germany) [10474-90]

Accurate method for luminous transmittance and signal detection quotients measurements in sunglasses lenses, Artur D. Loureiro, Univ. de São Paulo (Brazil) [10474-91]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

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CONFERENCE 10475

Saturday 27 January 2018 • Proceedings of SPIE Vol. 10475

Visualizing and Quantifying Drug Distribution in Tissue II

Conference Chairs: **Kin Foong Chan**, BioPharmX, Inc. (USA); **Conor L. Evans**, Wellman Ctr. for Photomedicine (USA)

Program Committee: **Zane A. Arp**, GlaxoSmithKline (USA); **Melissa L. Mather**, Keele Univ. (United Kingdom); **Wei Min**, Columbia Univ. (USA); **Kurt R. Zinn**, The Univ. of Alabama at Birmingham (USA)

Conference Cosponsor: 

SATURDAY 27 JANUARY

SESSION 1 SAT 8:10 AM TO 10:00 AM

Pharmacokinetic Tomography: Absorption, Distribution, Metabolism and Excretion (ADME)

Session Chairs: **Conor L. Evans**, Wellman Ctr. for Photomedicine (USA); **Kin Foong Chan**, BioPharmX, Inc. (USA)

Visualizing and quantifying drugs: new paradigms in pharmacokinetics and pharmacodynamics, Conor L. Evans, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10475-1]

Stimulated Raman scattering imaging of ferroptosis-inhibiting ferrostatins in living cells (*Invited Paper*), Wei Min, Michael M. Gaschler, Fanghao Hu, Brent R. Stockwell, Columbia Univ. (USA) [10475-2]

Near-infrared fluorescence imaging of intratumoral antibody delivery in pancreatic cancer patients, Guolan Lu, Willemieke Tummers, Robert Ertsey, Tarn Teraphongphom, Nynke van den Berg, Steven Hong, Christina Kong, Teri Longacre, George Fisher, George Poultides, Eben Rosenthal, Stanford Univ. (USA) [10475-3]

A photochemical priming approach to overcome physiological barriers for drug delivery (*Invited Paper*), Huang-Chiao Huang, Imran Rizvi, Joyce Liu, Sriram R. Anbil, Yan Baglo, Tayyaba Hasan, Massachusetts General Hospital (USA) [10475-4]

The effect of mice strain and labeling on the interstitial vessel permeability of nanoparticles, Lin-Jie Lin, Pei-Chun Wu, Tzu-Ming Liu, Univ. of Macau (Macao, China) [10475-5]

Shortwave infrared fluorescence imaging with the clinically approved near-infrared dye indocyanine green (*Invited Paper*), Oliver T. Bruns, Mounji G. Bawendi, Jessica A. Carr, Daniel Franke, Massachusetts Institute of Technology (USA) [10475-6]

SESSION 2 SAT 10:30 AM TO 12:20 PM

Pharmacodynamics Tomography: Drug Response and Therapeutic Effects

Session Chairs: **Zane A. Arp**, GlaxoSmithKline (USA); **Wei Min**, Columbia Univ. (USA)

Next-generation in vivo optical imaging with short-wave infrared quantum dots (*Invited Paper*), Oliver T. Bruns, Daniel Franke, Jessica A. Carr, Mari Saif, Mounji G. Bawendi, Massachusetts Institute of Technology (USA) [10475-7]

Noninvasive monitoring of pharmacodynamics in the skin wound healing process using multimodal microscopy, Jose D. Rico-Jimenez, Jang Hyuk Lee, Univ. of Illinois at Urbana-Champaign (USA); Aneesh Alex, GlaxoSmithKline (USA) and Univ. of Illinois (USA); Eric J. Chaney, Ronit Barkalifa, Univ. of Illinois at Urbana-Champaign (USA); Eric Olson, David Adams, GlaxoSmithKline (USA); Marina Marjanovic, Univ. of Illinois at Urbana-Champaign (USA); Zane A. Arp, GlaxoSmithKline (USA); Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign (USA) [10475-8]

In vivo multiphoton imaging of hepatobiliary metabolism in normal and diseased mouse liver, Chih-Ju Lin, Hsuan-Shu Lee, Chen-Yuan Dong, National Taiwan Univ. (Taiwan) [10475-9]

Deep tissue imaging of target engagement in live animals, Margarida Barroso, Albany Medical College (USA); Xavier Intes, Nattawat Sinsuebphon, Rensselaer Polytechnic Institute (USA); Alena Rudkouskaya, Albany Medical College (USA) [10475-10]

Characterization of skin structure and chemical content in response to topical intervention using coherent Raman scattering imaging, Sam Osseiran, Sinyoung Jeong, Conor L. Evans, Massachusetts General Hospital (USA) [10475-11]

Lunch/Exhibition Break Sat 12:20 pm to 1:40 pm

SESSION 3 SAT 1:40 PM TO 2:40 PM

Imaging Screening Tools in Drug Development

Session Chairs: **Melissa L. Mather**, Keele Univ. (United Kingdom); **Kurt R. Zinn**, The Univ. of Alabama at Birmingham (USA)

How deep one can probe highly scattered tissues using coherent optical spectroscopies?, Vladislav V. Yakovlev, Texas A&M Univ. (USA) [10475-12]

DeepDyeDrop: an image-based approach to quantify the phenotypic response of cancer cells to therapeutics (*Invited Paper*), Marc Hafner, Caitlin E. Mills, Luca Gerosa, Mirra Chung, Mario Niepel, Peter K. Sorger, Harvard Medical School (USA) [10475-13]

Omic profiling of CDK4/6 inhibitors reveals functionally important secondary targets of abemaciclib (*Invited Paper*), Caitlin E. Mills, Marc Hafner, Kartik Subramanian, Chen Chen, Sarah Boswell, Robert Everley, Harvard Medical School (USA); Dejan Juric, Massachusetts General Hospital (USA); Peter K. Sorger, Harvard Medical School (USA) [10475-14]

SESSION 4 SAT 2:40 PM TO 5:40 PM

Advanced Methods in Drug Detection and Imaging

Session Chairs: **Conor L. Evans**, Wellman Ctr. for Photomedicine (USA); **Kin Foong Chan**, BioPharmX, Inc. (USA)

Two photon fluorescence anisotropy microscopy for quantification of drug-target engagement at the single cell level (*Invited Paper*), Claudio Vinegoni, Ralph Weissleder, Massachusetts General Hospital (USA) [10475-15]

Effects of endogenous fluorescence from ex vivo human facial skin specimens in the pharmacokinetic study of a topical minocycline gel using two-photon excitation fluorescence (2PEF) and fluorescence lifetime imaging microscopy (FLIM), Maiko Hermsmeier, BioPharmX, Inc. (USA); Sinyoung Jeong, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Akira Yamamoto, Xin Chen, Usha Nagavarapu, BioPharmX, Inc. (USA); Conor L. Evans, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Kin F. Chan, BioPharmX, Inc. (USA) [10475-16]

Phasor approach to fluorescence lifetime imaging microscopy for visualization and quantification of drug distribution of a topical minocycline gel in human facial skin (*Invited Paper*), Sinyoung Jeong, Massachusetts General Hospital (USA); Maiko Hermsmeier, BioPharmX, Inc. (USA); Sam Osseiran, Massachusetts General Hospital (USA); Akira Yamamoto, Usha Nagavarapu, Kin F. Chan, BioPharmX, Inc. (USA); Conor L. Evans, Massachusetts General Hospital (USA) [10475-17]

Ex vivo and in vivo quantitative 3D molecular cutaneous imaging in human skin using coherent Raman and 2photon microscopy (*Invited Paper*), Barbara Sarri, Rafaël Canonge, Institut Fresnel (France); Xueqin Chen, Sébastien Grégoire, Jean-Baptiste Galey, Florian Formanek, L'Oréal Recherche et Innovation (France); Hervé Rigneault, Institut Fresnel (France) [10475-18]

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Paired agent imaging enables rapid assessment of therapeutic efficacy for personalized therapy (*Invited Paper*), Emily Schultz, Allison Solanki, Lei Wang, Oregon Health & Science Univ. (USA); Kenneth M. Tichauer, Illinois Institute of Technology (USA); Summer L. Gibbs, Oregon Health & Science Univ. (USA) [10475-19]

Quantitative imaging of gemcitabine engagement and efficacy in pancreatic cancer, Lei Wang, Allison Solanki, Oregon Health & Science Univ. (USA); Kenneth M. Tichauer, Illinois Institute of Technology (USA); Summer L. Gibbs, Oregon Health & Science Univ. (USA) [10475-20]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto, (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Pulmonary delivery and distribution of nebulized photosensitizer in vivo, Giulia Kassab, Mariana C. Geralde, Natalia M. Inada, Vanderlei S. Bagnato, Instituto de Física de São Carlos (Brazil)..... [10475-21]

BIOS SUNDAY PLENARY SESSION.....SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10476

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10476

Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXVII

Conference Chairs: **David H. Kessel**, Wayne State Univ. (USA); **Tayyaba Hasan**, Massachusetts General Hospital (USA)

Program Committee: **Imran Rizvi**, Brigham and Women's Hospital (USA); **Jonathan P. Celli**, Univ. of Massachusetts Boston (USA)

SATURDAY 27 JANUARY

SESSION 1 SAT 9:00 AM TO 10:15 AM

Photodynamic Therapy I

Session Chair: **David H. Kessel**, Wayne State Univ. School of Medicine (USA)

Photodynamic therapy: the role of paraptosis, David H. Kessel, Wayne State Univ. School of Medicine (USA) [10476-1]

Broadening photodynamic therapy (PDT) applications to the metastatic setting?, Tayyaba Hasan, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10476-2]

Photodynamic therapy-based combinations to overcome molecular, cellular and stromal resistance mechanisms in ovarian and pancreatic cancer, Imran Rizvi, Shubhankar Nath, Girgis Obaid, Huang-Chiao Huang, Mans Broekgaarden, Anne-Laure Bulin, Sriram R. Anbil, Massachusetts General Hospital (USA); Utkan Demirci, Cancer Ctr., Stanford Univ. (USA); David H. Kessel, Wayne State Univ. School of Medicine (USA); Tayyaba Hasan, Massachusetts General Hospital (USA) [10476-3]

SESSION 2 SAT 10:45 AM TO 12:05 PM

Photodynamic Therapy II

Session Chair: **Imran Rizvi**, Wellman Ctr. for Photomedicine (USA)

Optically activated oxygen-loaded perfluorocarbon nanoparticles for ultrasound-guided photodynamic therapy, Sidhartha Jandhyala, Austin C. Van Namen, Geoffrey P. Luke, Dartmouth College (USA) [10476-4]

A comparison of low fluence-rate light sources for ALA-PpIX based photodynamic therapy of skin, Ethan P. M. LaRochelle, Kayla A. Marra, Karina E. Lukovits, Thayer School of Engineering at Dartmouth (USA); M. Shane Chapman, Geisel School of Medicine, Dartmouth College (USA); Edward V. Maytin M.D., Cleveland Clinic (USA); Tayyaba Hasan, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) [10476-5]

Evaluating the efficacy of continuous, low irradiance photodynamic therapy in vivo: artificial light versus natural sunlight, Kayla A. Marra, Ethan P. M. LaRochelle, Karina E. Lukovitz, Thayer School of Engineering at Dartmouth (USA); Michael S. Chapman, Dartmouth Hitchcock Medical Ctr., Dartmouth College (USA); Tayyaba Hasan, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) [10476-6]

Efficient in vitro photodynamic inactivation of Candida albicans by using repetitive light doses, Susana Alejandra Torres-Hurtado, Julián Ramírez Ramírez, Rubén Ramos-García, Julio-Cesar Ramírez-San-Juan, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Teresita Spezzia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) [10476-7]

Lunch/Exhibition Break Sat 12:05 pm to 1:20 pm

SESSION 3 SAT 1:20 PM TO 3:00 PM

Photodynamic Therapy III

Session Chair: **Sandra O. Gollnick**, Roswell Park Cancer Institute (USA)

Nanoparticle-based photodynamic therapy on non-melanoma skin cancer, Félix Fanjul-Vélez, José Luis Arce-Diego, Univ. de Cantabria (Spain) [10476-8]

Light-triggered liposomal cargo delivery platform incorporating photosensitizers and gold nanoparticles for enhanced singlet oxygen generation and increased cytotoxicity, Wei Deng, Zofia Kautzka, Sandhya Clement, Ewa Goldys, Macquarie Univ. (Australia) [10476-9]

Targeting non-small cell lung cancer by novel TLD-1433-mediated photodynamic therapy, Tomonari Kinoshita, Univ. Health Network (Canada) and Toronto General Hospital, Univ. of Toronto (Canada); Manjunatha Ankathatti Munegowda, Theralase, Inc. (Canada); Hitoshi Igai, Kosuke Fujino, Univ. Health Network (Canada); Chang Young Le Lee, Univ. Health Network (Canada) and Toronto General Hospital (Canada); Hideki Ujije, Univ. Health Network (Canada); Arkady Mandel, Theralase, Inc. (Canada); Lothar D. Lilge, Kazuhiro Yasufuku, Univ. Health Network (Canada) [10476-10]

Biodegradable nanoconstructs for targeted deep tumour therapy, Sandhya Clement, Wenjie Chen, Wei Deng, Ewa Goldys, Macquarie Univ. (Australia) [10476-11]

The NPe6 fluorescence measurements by using a fluorescence sensing system for skin photosensitivity risk assessment after photodynamic therap, Keishi Ohtani M.D., Tokyo Medical Univ. (Japan); Jitsu Usuda, Nippon Medical School (Japan); Emiyo Ogawa, Keio Univ. (Japan); Sachio Maehara, Tokyo Medical Univ. Hospital (Japan); Kentaro Imai, Tokyo Medical Univ. (Japan); Tatsuya Inoue, Nippon Medical School (Japan); Masaru Hagiwara, Masatoshi Kakihana, Naohiro Kajiwara, Tokyo Medical Univ. (Japan); Tatsuo Ohira, Tokyo Medical Univ. Hospital (Japan); Tsunenori Arai, Keio Univ. (Japan); Norihiko Ikeda M.D., Tokyo Medical Univ. (Japan) [10476-12]

SESSION 4 SAT 3:30 PM TO 4:50 PM

Photodynamic Therapy IV

Session Chair: **Theresa M. Busch**, Univ. of Pennsylvania (USA)

Clinical and preclinical studies of tumor microenvironment in PDT: expectations and observations, Theresa M. Busch, Univ. of Pennsylvania (USA) [10476-13]

Light fluence dosimetry in lung-simulating cavities, Timothy C. Zhu, Michele M. Kim, Andrea Dimofte, The Univ. of Pennsylvania Health System (USA); Mary J. Potasek, Karl Beeson, Simphotek Inc. (USA) [10476-14]

Myeloperoxidase as an immunomodulator in intraoperative photodynamic therapy, Richard W. Davis, Emma Snyder, Joann Miller, Perelman Ctr. for Advanced Medicine, Univ. of Pennsylvania (USA); Astero Klampatsa, Steven Maceyko, Steven Albelda, Univ. of Pennsylvania (USA); Keith A. Cengel M.D., Theresa M. Busch, Perelman Ctr. for Advanced Medicine, Univ. of Pennsylvania (USA) [10476-15]

Multi-parametric Imaging to predict response post surgery and photodynamic therapy in orthotopic glioblastoma models, Srivalleesha Mallidi, Megumi Ichikawa, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10476-16]

CONFERENCE 10476

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

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SUNDAY 28 JANUARY

SESSION 5 SUN 8:50 AM TO 10:30 AM

Photodynamic Therapy V

Session Chair: **Sanjay Anand**, Lerner Research Institute - Cleveland Clinic (USA)

Implementing photodynamic therapy for pancreatic cancer using endoscopic ultrasonography, Kenneth K. Wang M.D., Mayo Clinic (USA) [10476-17]

Combination approaches for achieving improved outcomes with photodynamic therapy in patients with skin cancer and precancer, Edward V. Maytin M.D., Sanjay Anand, Lerner Research Institute - Cleveland Clinic (USA); Christine B. Warren, The Cleveland Clinic (USA) [10476-18]

Intraoperative PDT for serosal malignancies: a comparison of toxicity and outcomes for different photosensitizers, Keith A. Cengel M.D., Perelman Ctr. for Advanced Medicine (USA); Theresa M. Busch, Univ. of Pennsylvania (USA); Sai Yendamuri, Roswell Park Cancer Institute (USA); Joseph S. Friedberg, The Univ. of Pennsylvania Health System (USA); Charles B. Simone II, Perelman Ctr. for Advanced Medicine (USA) [10476-19]

A quality assurance program for clinical PDT, Andrea Dimofte, Jarod C. Finlay, Yi Hong Ong, Timothy C. Zhu, The Univ. of Pennsylvania Health System (USA) [10476-20]

SESSION 6 SUN 11:00 AM TO 12:00 PM

Photodynamic Therapy VI

Session Chair: **Kenneth K. Wang M.D.**, Mayo Clinic (USA)

Development of a registry for patients treated with photodynamic therapy, Sandra Gollnick, Kristen Anton, Roswell Park Cancer Institute (USA) [10476-21]

GRAVITY: a project on glioblastoma risk attrition by vectorized thermotherapy, Khaled Metwally, Nicola Jones, Gaihan Ndjehoya, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Centrale de Marseille (France); Florian Correard, Anne-Laure Bailly, Aix-Marseille Univ. (France) and Ctr. de Recherche en Oncologie Biologique et Oncopharmacologie, INSERM (France); Marie-Anne Estève, Aix-Marseille Univ. (France) and Ctr. de Recherche en Oncologie Biologique et Oncopharmacologie, INSERM (France); Diane Braguer, Aix-Marseille Univ. (France) and Ctr. de Recherche en Oncologie Biologique et Oncopharmacologie, INSERM (France); Gleb Tselikov, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) and LP3 - Lasers, Plasmas et Procédés Photoniques (France); Anton A. Popov, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) and LP3 - Lasers, Plasmas et Procédés Photoniques (France); Ahmed Al-Kattan, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) and LP3 - Lasers, Plasmas et Procédés Photoniques (France); Andrei V. Kabashin, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) and LP3 - Lasers, Plasmas et Procédés Photoniques (France); Matthieu Gerstenmayer, Institut d'Imagerie Biomédicale (I²BM), Commissariat à l'Énergie Atomique (France) and NeuroSpin, Commissariat à l'Énergie Atomique (France) and CEA-Ctr. de SACLAY, Commissariat à l'Énergie Atomique (France); Benoit Larrat, Institut d'Imagerie Biomédicale (I²BM), Commissariat à l'Énergie Atomique (France); Damien Gasteau, Institut Fresnel (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Centrale de Marseille (France); Anabela Da Silva, Aix-Marseille Univ. (France); Serge Mensah, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) [10476-22]

In vitro and in vivo studies of 2-photon photodynamic therapy for the treatment of conjunctival melanoma, Layla Pires, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil); Shireen Khattak, Keenan Research Ctr. for Biomedical Science, St. Michael's (Canada) and Univ. of Toronto (Canada); Sebastião Pratavieira, Renan A. Romano, Vanderlei S. Bagnato, Cristina Kurachi, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil); Brian C. Wilson, Univ. of Toronto (Canada) and Princess Margaret Cancer Ctr., Univ. Health Network (Canada) [10476-23]

Lunch/Exhibition Break Sun 12:00 pm to 1:20 pm

SESSION 7 SUN 1:20 PM TO 3:00 PM

Photodynamic Therapy VII

Session Chair: **Timothy C. Zhu**, The Univ. of Pennsylvania Health System (USA)

Non-toxic approach for treatment of breast cancer and its cutaneous metastasis: Capecitabine (Xeloda) enhanced photodynamic therapy in a murine tumor model, Sanjay Anand, Anton Denisyuk, Taylor Bullock, Mukul Govande, Edward V. Maytin M.D., Cleveland Clinic (USA) [10476-24]

Development of low-cost enabling technology for image-guided photodynamic therapy treatment of oral cancer in resource-limited settings, Hui Liu, Univ. of Massachusetts Boston (USA); Amjad P. Khan, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Liam Daly, Grant Rudd, Paola Leon Alarcon, Yiran Liu, Hamid El-Hamidi, Univ. of Massachusetts Boston (USA); Imran Rizvi, Srivalleesha Mallidi, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Shakir Khan, Bilal Hussain, Abrar A. Hasan, Shahid Siddiqui, Jawaharlal Nehru Medical College, Aligarh Muslim Univ. (India); Filip Cuckov, Univ. of Massachusetts Boston (USA); Tayyaba Hasan, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Jonathan P. Celli, Univ. of Massachusetts Boston (USA) [10476-25]

Cellular pH and PI3K signaling as determinants of Protoporphyrin IX conversion and ALA PDT response, Michael Anderson, Jonathan P. Celli, Praj Acharya, Univ. of Massachusetts Boston (USA) [10476-26]

Multi-session PDT on breast cancer spheroids, Carolina de Paula Campos, Natalia Mayumi Inada, Cristina Kurachi, Univ. de São Paulo (Brazil) [10476-27]

High energy photons enhanced photodynamic therapy, Yiping Guo, Shi Sheng, Wei Zhang, Michael C. Lun, Shih-Ming Tsai, Wei-Chun Chin, Roy Hoglund, Changqing Li, Univ. of California, Merced (USA) [10476-28]

SESSION 8 SUN 3:30 PM TO 4:30 PM

Photodynamic Therapy VIII

Session Chair: **Srivalleesha Mallidi**, Wellman Ctr. for Photomedicine (USA)

Bioluminescence-activated photodynamic therapy of breast cancer cells, Seonghoon Kim, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10476-29]

Reactive oxygen species explicit dosimetry (ROSED) of a type 1 photosensitizer, Timothy C. Zhu, Michele M. Kim, The Univ. of Pennsylvania Health System (USA); Yi Hong Ong, Univ of Pennsylvania Health System (USA) [10476-30]

In vitro evaluation of photodynamic therapy using redox-responsive nanoparticles carrying PpIX, Ilaíali S. Souza Leite, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil); Juan L. Vivero-Escoto, Zachary Lyles, The Univ. of North Carolina at Charlotte (USA); Vanderlei Salvador Bagnato, Natalia Mayumi Inada, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil) [10476-31]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

MONDAY 29 JANUARY

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Poster Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Photodynamic inactivation of Staphylococcus aureus and Escherichia coli using a new Bacteriochlorin as photosensitizer, Diego Barboza, Laura C. A. Martins, Thaila Q. Corrêa, Mariana C. Geralde, Sebastião Pratavieira, Kleber T. de Oliveira, Marciana P. Uliana, Clovis W. O. de Souza, Univ. de São Paulo (Brazil) [10476-32]

Virtual-source correlation diffusion approximation for enhanced near-field modeling of scattering motion in low-albedo medium, Zhuangping Qin, Tianjin Univ. of Technology and Education (China) and Tianjin Key Lab. of Information Sensing & Intelligent Control (China); Wenjuan Ma, Tianjin Medical Univ. Cancer Institute and Hospital (China); Ping Fu, Jing Li, Ru Ding, Shuyan Ren, Tianjin Univ. of Technology and Education (China) [10476-33]

Determination of optical properties, drug concentration and tissue oxygenation in-vivo in human pleural tissue before and after Photofrin-mediated photodynamic therapy, Yi Hong Ong, Perelman Ctr. for Advanced Medicine, Univ. of Pennsylvania (USA); Jarod C. Finlay, Michele M. Kim, Perelman Ctr. for Advanced Medicine, Univ. of Pennsylvania (USA); Andrea Dimofte, Perelman Ctr. for Advanced Medicine, Univ. of Pennsylvania (USA); Keith A. Cengel M.D., Timothy C. Zhu, Perelman Ctr. for Advanced Medicine, Univ. of Pennsylvania (USA) [10476-34]

Fluorescence spectroscopy for the assessment of chlorin e6 pharmacokinetics in solid Ehrlich tumor, Lilian T. Moriyama, Univ. de São Paulo (Brazil); Clóvis Grecco, IBRAMED (Brazil); Marciana P. Uliana, Univ. Federal da Integração Latino-americana (Brazil); Cristina Kurachi, Univ. de São Paulo (Brazil) [10476-35]

HSA/PSS coated gold nanorods as thermo-triggered drug delivery vehicles for combined photothermal therapy and chemotherapy, Ting-Yu Tu, Shu-Jyuan Yang, National Taiwan Univ. (Taiwan); Chung-Hao Wang, Gene'e Tech Co. Ltd. (Taiwan); Shin-Yu Lee, Ming-Jium Shieh, National Taiwan Univ. (Taiwan) [10476-36]

Mechanism to preserve phrenic nerve function during photosensitization reaction: drug uptake and photosensitization reaction effect on electric propagation, Haruka Takahashi, Risa Hamada, Emiyo Ogawa, Tsunenori Arai, Keio Univ. (Japan) [10476-37]

3-compartment talaporfin sodium pharmacokinetic model by optimization using fluorescence measurement data from canine skin to estimate the concentration in interstitial space, Yuko Uno, Emiyo Ogawa, Keio Univ. (Japan); Eitaro Aiyoshi, The Institute of Statistical Mathematics (Japan); Tsunenori Arai, Keio Univ. (Japan) [10476-38]

Photodynamic inactivation using curcuminoids and Photogem® on caenorhabditis elegans, Yulli Albuquerque, Sebastião Pratavieira, Natalia M. Inada, Kleber T. de Oliveira, Clovis W. O. de Souza, Fernanda F. Anibal, Univ. de São Paulo (Brazil) [10476-39]

Photodynamic therapy with optical fiber in contact with the tissue - an in vivo experiment to induce deeper necrosis with a low power laser, Lilian T. Moriyama, Thereza C. Fortunato, Univ. de São Paulo (Brazil); Daniel Bonini, Santa Casa de Misericórdia de São Carlos (Brazil); Clóvis Grecco, IBRAMED (Brazil); José D. Vollet-Filho II, Cristina Kurachi, Vanderlei S. Bagnato, Univ. de São Paulo (Brazil) [10476-40]

Influence of different coupling agents on the light-phantom interface, Thereza C. Fortunato, Vanderlei S. Bagnato, Lilian T. Moriyama, Univ. de São Paulo (Brazil) [10476-41]

Improvement of light coupling to turbid phantom by the use of a hydrogel, Dilley F. da Silva, Lilian T. Moriyama, Thereza C. Fortunato, José D. Vollet-Filho II, Sebastião Pratavieira, Clóvis Grecco, Cristina Kurachi, Vanderlei S. Bagnato, Univ. de São Paulo (Brazil) [10476-42]

Spatial and temporal theoretical distribution of photosensitizer concentration using white light in PDT, Victor Guachamin, Michelle B. Requena, Renan A. Romano, Lilian T. Moriyama, Sebastião Pratavieira, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil) [10476-43]

Subcellular localization and photodynamic activity of Photodithazine (glucosamine salt of chlorin e6) in murine melanoma B16-F10: an in vitro and in vivo study, Bruno A. Ono, Layla Pires, Marcelo Nogueira, Cristina Kurachi, Sebastião Pratavieira, Univ. de São Paulo (Brazil) [10476-44]

SESSION 9 MON 8:30 AM TO 10:00 AM

Isotope Optical Imaging and Cancer

Joint Session with Conferences 10476 and 10478

Session Chair: **Sylvain Gioux**, Univ. de Strasbourg (France)

Optical imaging of radiotracers (Invited Paper), Jan Grimm, Edwin Pratt, Memorial Sloan-Kettering Cancer Ctr. (USA) [10478-35]

Radioactivity in the darkroom: the role of radioluminescence microscopy in PET radiotracer characterization and development (Invited Paper), Guillem Pratx, Stanford Univ. (USA) [10478-36]

Cherenkov luminescence imaging under ambient lighting conditions for intraoperative applications, Justin S. Klein, Aaron R. Selfridge, Gregory S. Mitchell, Martin S. Judenhoffer, Simon R. Cherry, Univ. of California, Davis (USA) [10478-37]

Flexible autoradiography for molecular imaging of tumour margins, Thomy Mertzani, Univ. College London (United Kingdom); Kunal Vyas, Maarten Grootendorst, David S. Tuch, Lightpoint Medical, Ltd. (United Kingdom); Danail Stoyanov, Simon R. Arridge, Univ. College London (United Kingdom) [10478-38]

SESSION 10 MON 10:30 AM TO 11:50 AM

Radiation Therapy Optical Imaging and Sensing

Joint Session with Conferences 10476 and 10478

Session Chair: **Brian W. Pogue**,
Thayer School of Engineering at Dartmouth (USA)

Single photon detection imaging of Cherenkov light emitted during radiation therapy, Brian W. Pogue, Ethan Philip M. LaRochelle, Petr Bruza, Jacqueline M. Andreozzi, Phillip M. Adamson, Thayer School of Engineering at Dartmouth (USA) [10478-39]

Progress toward noninvasive detection of tumor oxygenation utilizing Cherenkov excited luminescence scanned imaging, Jennifer R. Shell, Dartmouth Hitchcock Medical Ctr. (USA); Ethan Philip M. LaRochelle, Petr Bruza, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) [10478-40]

Structural Cherenkov luminescence imaging with Hadamard-patterned field illumination, Mengyu Jia, Petr Bruza, Ethan Philip M. LaRochelle, Jennifer R. Shel, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) [10478-41]

Characterization of the proton irradiation induced luminescence of materials and application in radiation oncology dosimetry, Arash Darafsheh, Washington Univ. School of Medicine in St. Louis (USA); Alireza Kassaei, Jarod C. Finlay, Univ. of Pennsylvania (USA) [10478-42]

Cherenkov imaging for Total Skin Electron Therapy (TSET), Yunhe Xie, Amit Maity, The Univ. of Pennsylvania Health System (USA); Petr Bruza, Thayer School of Engineering at Dartmouth (USA); Tianshun Miao, DoseOptics, LLC (USA); Jacqueline M. Andreozzi, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA); John Plastaras M.D., Timothy C. Zhu, The Univ. of Pennsylvania Health System (USA) . . . [10478-43]

CONFERENCE 10477

Saturday 27 January 2018 • Proceedings of SPIE Vol. 10477

Mechanisms of Photobiomodulation Therapy XIII

Conference Chairs: **Michael R. Hamblin**, Wellman Ctr. for Photomedicine (USA); **James D. Carroll**, THOR Photomedicine Ltd. (United Kingdom); **Praveen Arany**, Univ. at Buffalo (USA)

Program Committee: **Heidi Abrahamse**, Univ. of Johannesburg (South Africa); **Tomas Hode**, Immunophotonics, Inc. (USA); **Clark E. Tedford**, LumiThera (USA); **Mei X. Wu M.D.**, Harvard Medical School (USA), Wellman Ctr. for Photomedicine (USA)

Conference Cosponsor:



SATURDAY 27 JANUARY

SESSION 1.....SAT 8:15 AM TO 10:00 AM

PBM therapy in Neuroregeneration and Neurorehabilitation

Photobiomodulation for the brain: has the light dawned? (*Invited Paper*), Michael R. Hamblin, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10477-1]

Optimization of low-level light therapy's illumination parameters for spinal cord injury in a rat model, Ali S. Shuaib, Ali Bourisly, Kuwait Univ. (Kuwait) [10477-2]

Measurement of light penetration of near-infrared laser at the lumbosacral nerves in rats, Naoya Ishibashi, Hiroshi Shimoyama, Yuki Kawase, Shosaku Motohara, Takamitsu Okayama, Daisuke Niwa, Jun Koyama, Teijin Pharma Ltd. (Japan) [10477-3]

Synapto-protective effect of low-level light emitting diode (LED) therapy in an in vitro model of status epilepticus, Namgwe Hong, Hee Jung Kim, Jin-Chul Ahn, Dankook Univ. (Korea, Republic of) [10477-4]

Enabling multi-site intra spinal canal dosimetry of transcutaneous photobiomodulation therapy on cadaver dogs using a custom designed, flexible, 9-channel photo-diode probe, Daqing Piao, Lara Sypniewski D.V.M., Christian Bailey, Danielle Dugat D.V.M., Shaghayegh Aslanzadeh, Daniel Burba, Oklahoma State Univ. (USA); Luis H. De Taboada, LiteCure, LLC (USA) [10477-5]

Therapeutic effect of forearm low level light treatment on blood flow, oxygenation, and oxygen consumption, Pengbo Wang, Jiajing Sun, Linggang Meng, Ting Li, Univ. of Electronic Science and Technology of China (China) [10477-6]

Non-invasive therapy for traumatic brain injury with NPLT, Adelaide Micci, Jutatip Guptarak, Auston Grant, Margaret A. Parsley, Ian J. Bolding, Donald S. Prough M.D., Irene Y. Petrov, Yuriy Y. Petrov, Rinat O. Esenaliev, The Univ. of Texas Medical Branch (USA) [10477-7]

SESSION 2.....SAT 10:30 AM TO 11:45 AM

PBM therapy for Cosmetics and Esthetics

The systemic effects of photobiomodulation, James D. Carroll, THOR Photomedicine Ltd. (United Kingdom) [10477-8]

Effects of blue LED light on human healthy and keloid fibroblasts, Giada Magni, Francesca Rossi, Francesca Tatini, Roberto Pini, Istituto di Fisica Applicata "Nello Carrara" (Italy); Elisabetta Coppi, Irene Fusco, Anna Maria Pugliese, Univ. degli Studi di Firenze (Italy); Marco Fracalvieri M.D., A.O.U. Città della Salute e della Scienza di Torino, Ospedale San Lazzaro (Italy); Stefano G. Gasperini M.D., Medical Advisor (Italy); Cristina Tripodi, Domenico Alfieri, Lorenzo Targetti, EmoLed S.r.l. (Italy) [10477-9]

Spot fat reduction by red and near infrared LED phototherapy, Sungkyoo Lim, Eal-Whan Park M.D., Dankook Univ. (Korea, Republic of) [10477-10]

Photoaesthetic procedures using amber led and infrared laser light reducing the age spots and flaccidity (tissue and muscle) on skin, Priscila F. C. de Menezes, Rosane de Fátima Zanirato Lizarelli, Vanderlei Salvador Bagnato, Univ. de São Paulo (Brazil) [10477-11]

LED: a viable treatment for melasma on darker skin types?, Khosi Mpfana, Cape Peninsula Univ. of Technology (South Africa). [10477-12]

Lunch/Exhibition Break Sat 11:45 am to 1:00 pm

SESSION 3.....SAT 1:00 PM TO 2:30 PM

Clinical Applications for PBM Therapy

Prolonging shelf life of platelets by near infrared low-level laser, Mei X. Wu M.D., Qi Zhang, Harvard Medical School (USA) [10477-13]

Translational research in the prevention of myocardial reperfusion injury by PBM: a review of molecular mechanisms and current research results, Ann Liebert, Australasian Research Institute (Australia) . . . [10477-14]

Effect of photobiomodulation on lower urinary tract dysfunction in rat cystitis model, Yuki Kawase, Teijin Pharma Ltd. (Japan); Tomoyuki Uchiyama, Dokkyo Medical Univ. Hospital (Japan) and Chiba Univ. Graduate School of Medicine (Japan); Naoya Ishibashi, Daisuke Niwa, Jun Koyama, Teijin Pharma Ltd. (Japan) [10477-15]

Influence of phototherapies on the outcome of complete tibial fractures grafted or not with MTA: Raman spectroscopic study on rabbits, Antônio Luiz B. Pinheiro, Luiz Guilherme P. Soares, Aline C. P. da Silva, Univ. Federal da Bahia (Brazil); Nicole R. Silva Santos, Univ. Estadual da Bahia (Brazil); Anna Paula L. T. da Silva, Bruno Luiz R. C. Neves, Amanda P. Soares, Univ. Federal da Bahia (Brazil); Landulfo Silveira Jr., Univ. Anhembi Morumbi (Brazil) [10477-16]

Photo-kinesiotherapy: photobiomodulation associated with some kinesiotherapies for orofacial rehabilitation, Rosane de Fátima Zanirato Lizarelli, Mariah A. Righetti, Univ. de São Paulo (Brazil); Nelson Mauricio Jr., Neofarma (Brazil); Nelson Morini Jr., Univ. de Mogi das Cruzes (Brazil); Maisa O. Melo, Univ. de São Paulo (Brazil); Estela Sant'anna, CEFAL IBRAMED (Brazil); Patricia M. B. G. Maia Campos, Simone C. H. Regalo, Univ. de São Paulo (Brazil) [10477-17]

A Monte Carlo simulation of the dosimetry of extraorally delivered photobiomodulation therapy, Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA) and Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Wendy B. London, Christine Duncan, Dana-Farber Cancer Institute, Boston Children's Hospital (USA) and Harvard Medical School (USA); Amy F. Juliano, Massachusetts Eye and Ear Infirmary (USA) and Harvard Medical School (USA); Steve T. Sonis, Brigham and Women's Hospital (USA) and Harvard School of Dental Medicine (USA) and Biomodels, LLC (USA); Ather Adnan, Brigham and Women's Hospital (USA); Nathaniel S. Treister, Brigham and Women's Hospital (USA) and Harvard School of Dental Medicine (USA) [10477-18]

SESSION 4.....SAT 2:30 PM TO 5:30 PM

Mechanisms of PBM Therapy

Photoceuticals: a mechanistic pharmacological approach to photobiomodulation dosimetry, Praveen Arany D.D.S., Univ. at Buffalo (USA)..... [10477-19]

Wavelength dependence of intracellular nitric oxide levels in hTERT-RPE cells in vitro, Nathaniel J. Pope, National Research Council (USA); Samantha M. Powell, The Univ. of Oklahoma (USA); Jeffrey C. Wagle, Air Force Research Lab. (USA)..... [10477-20]

5-ALA photopreparation using pulsed NIR enhances skin fluorescence via temperature-independent cell signaling pathways, Daniel Barolet M.D., McGill Univ. (Canada); Augustin Barolet, RoseLab (Canada); Gregory Cormack, McGill Univ. (Canada) and RoseLab (Canada)..... [10477-21]

Novel approach to elucidate the nature of photobiomodulation therapy, Vladislav V. Yakovlev, Texas A&M Univ. (USA)..... [10477-22]

Intra-articular laser treatment plus platelet rich plasma (PRP) significantly reduces pain in many patients who had failed prior PRP treatment, Chadwick Prodromos M.D., Sue Finkle, Alexander M. Dawes, Illinois Sports Medicine and Orthopaedic Ctrs. (USA); Angelo Dizon, Advanced Physical Therapy Institute (USA)..... [10477-23]

Design and reliability analysis of a novel laser acupuncture device, Fulin Zhong, Boan Pan, Zebin Li, Ting Li, Univ. of Electronic Science and Technology of China (China)..... [10477-24]

Effects of low level light therapy and NO on light irradiation efficacy of ruthenium-phthalocyanine complexes as a function of radical species formation, Laisa Negri, Univ. de São Paulo (Brazil) and Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Tassia Martins, Univ. de São Paulo (Brazil); Roberto Santana da Silva, Univ. de São Paulo (Brazil) and Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Michael R. Hamblin, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA)..... [10477-25]

The effect of tissue thickness and skin color on penetration of therapeutic light into human cheek, Wayne J. Selting D.D.S., Consultant (USA); James D. Carroll, THOR Photomedicine Ltd. (United Kingdom)..... [10477-26]

Resonance Raman spectroscopy of isolated mitochondria provides a new model to study photobiomodulation, Michael L. Denton, Air Force Research Lab. (USA); Gary D. Noojin, Engility Corp. (USA); Cherry C. Gonzalez, Air Force Research Lab. (USA); Vladislav V. Yakovlev, Texas A&M Univ. (USA)..... [10477-27]

Transcranial red and near-infrared lasers at fluency of 8 J/cm² enhances brain mitochondrial function in aging model, Farzad Salehpour, Nahid Ahmadian, Seyed Hossein Rasta, Mehdi Farhoudi, Poursan Karimi, Saeed Sadigh-Eteghad, Tabriz Univ. of Medical Sciences (Iran, Islamic Republic of)..... [10477-28]

BIOS SATURDAY HOT TOPICS SESSION7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

LED photochemotherapy against Staphylococcus aureus: an in vitro study, Antônio Luiz B. Pinheiro, Amanda P. Soares, Susana Carla P. S. de Oliveira D.D.S., Univ. Federal da Bahia (Brazil); Juliana S. C. Monteiro, Univ. Estadual de Feira de Santana (Brazil); Gustavo M. Pires-Santos, Fernando José P. Sampaio, Luiz Guilherme P. Soares, Univ. Federal da Bahia (Brazil)..... [10477-29]

[Ru(bipy)3]2+ nanoparticle-incorporate dental light cure resin to promote photobiomodulation therapy for enhanced vital pulp tissue repair, Rodrigo C. Mosca, Sasikumar Ponnusamy, School of Dental Medicine, Univ. at Buffalo (USA); Carlos A. Zeituni, Instituto de Pesquisas Energéticas e Nucleares (Brazil) and Comissão Nacional de Energia Nuclear (Brazil); Praveen Arany D.D.S., School of Dental Medicine, Univ. at Buffalo (USA)..... [10477-30]

Effects of PBM on breast tumor-bearing mice, Camila R. Silva, Saulo Toledo, Martha Simões Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil) and Comissão Nacional de Energia Nuclear (Brazil)..... [10477-31]

Advances in laser therapy for 'human bone-repair', Mohammad Nazrul Islam, Shaheed Suhrawardy Medical College and Hospital (Bangladesh)..... [10477-32]

Staphyloxanthin photobleaching sensitizes methicillin-resistant staphylococcus aureus to reactive oxygen species attack, Pu-Ting Dong, Boston Univ. (USA); Haroon T. Mohammad, Purdue Univ. (USA); Xiaoyu Wang, Jie Hui, Boston Univ. (USA); Lijia Liang, Purdue Univ. (USA); Junjie Li, Boston Univ. (USA); Mohamed Selem, Purdue Univ. (USA); Ji-Xin Cheng, Boston Univ. (USA)..... [10477-33]

Low-level laser therapy and chitosan hydrogel on chondrocyte, Eduardo Trevisan, Brazil Univ. (Brazil); Cintia Martignago, Lia M. Neves, Federal Univ. of São Carlos (Brazil); Livia Assis, Carla Roberta Tim, Brazil Univ. (Brazil)..... [10477-34]

Safety and efficacy of Photobiomodulation therapy for weight loss, Ambereen Ahmed M.D., A&M Assorted Therapy, LLC (USA)..... [10477-35]

BIOS SUNDAY PLENARY SESSION.....SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10478

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10478

Molecular-Guided Surgery: Molecules, Devices, and Applications IV

Conference Chairs: **Brian W. Pogue**, Thayer School of Engineering at Dartmouth (USA); **Sylvain Gioux**, Univ. of Strasbourg (France)

Program Committee: **Michael Bouvet**, Univ. of California, San Diego (USA); **David J. Cuccia**, Modulated Imaging, Inc. (USA); **Michele Diana**, The Institute of Image-Guided Surgery of Strasbourg (France); **Fernando Dip**, Consultant (USA); **Summer L. Gibbs**, Oregon Health & Science Univ. (USA); **Hisataka Kobayashi**, National Cancer Institute (USA); **Frédéric Leblond**, Ecole Polytechnique de Montréal (Canada); **Jonathan T.C. Liu**, Univ. of Washington (USA); **Vasilis Ntziachristos**, Helmholtz Zentrum München GmbH (Germany); **Keith D. Paulsen**, Thayer School of Engineering at Dartmouth (USA); **Eben L. Rosenthal M.D.**, Stanford Health Care (USA); **Jonathan M. Sorger**, Intuitive Surgical, Inc. (USA); **Tomasz S. Tkaczyk**, Rice Univ. (USA); **Kenneth M. Tichauer**, Illinois Institute of Technology (USA); **Alex Vahrmeijer**, Leiden Univ. Medical Ctr. (Netherlands); **Thomas D. Wang M.D.**, Univ. of Michigan (USA); **Brian C. Wilson**, Ontario Cancer Institute (Canada); **Siavash Yazdanfar**, GE Global Research (USA)

Conference Cosponsors:



SATURDAY 27 JANUARY

SESSION 1 SAT 8:15 AM TO 10:00 AM

Advanced Detection Methods I

Session Chair: **Brian W. Pogue**,
Thayer School of Engineering at Dartmouth (USA)

Slide-free molecular pathology with in vivo dual-axis confocal and ex vivo light-sheet microscopy (*Invited Paper*), Jonathan T. C. Liu, Univ. of Washington (USA) [10478-1]

Static and dynamic full field OCT: an endogenous biomarker? (*Invited Paper*), Albert Claude Boccara, Institut Langevin (France); Clement Apelian, LLTech SAS (France) and Institut Langevin (France); Emilie Benoit a la Guillaume, Alban Mounier, Eugénie Dalimier, LLTech SAS (France) . . . [10478-2]

A clinical assay to quantify surface Hsp90 expression on breast cancer specimens intraoperatively, Brian Crouch, Jennifer Gallagher, Allison Hall, Mary Scott Soo, Duke Univ. (USA); Philip Hughes, Timothy Haystead, Duke Univ. School of Medicine (USA); Nimmi Ramanujam, Duke Univ. (USA) [10478-3]

Intraoperative determination of tumor aggressiveness by real-time label-free nonlinear imaging and characterization of tumor-associated extracellular vesicles, Yi Sun, Sixian You, Haohua Tu, Darold R. Spillman Jr., Marina Marjanovic, Eric J. Chaney, Univ. of Illinois (USA); George Z. Liu M.D., Anna Higham, Kimberly A. Craddock M.D., Carle Foundation Hospital (USA); Stephen A. Boppart, Univ. of Illinois (USA) [10478-4]

Raman spectroscopic analysis for gastric and colorectal cancer in surgical treatment toward molecular-guided surgery, Shigehiro Koga M.D., Yuji Watanabe M.D., Yusuke Oshima, Ehime Univ. (Japan) . . . [10478-5]

SESSION 2 SAT 10:30 AM TO 12:15 PM

Advanced Detection Methods II

Session Chair: **Sylvain Gioux**, Univ. de Strasbourg (France)

Polarization- and wavelength-resolved imaging with standard laparoscopes (*Invited Paper*), Daniel S. Elson, Imperial College London (United Kingdom) [10478-6]

Label-free optical spectroscopy techniques for targeted, real time and informed in situ cancer diagnosis (*Invited Paper*), Frédéric Leblond, Ecole Polytechnique de Montréal (Canada) [10478-7]

Optimization of the incident wavelength in Mueller Matrix imaging of cervical collagen, Joseph Chue-Sang, Florida International Univ. (USA) [10478-8]

Fluorescence lifetime-based contrast enhancement of Indocyanine green-labelled tumors, Anand T. Kumar, Stefan Carp, Massachusetts General Hospital (USA) [10478-9]

Fluorescence detection and enumeration of rare circulating cells in vivo, Xuefei Tan, Roshani A. Patil, Northeastern Univ. (USA); Judith M. Runnels, Charles P. Lin, Massachusetts General Hospital (USA); Mark Nieder, Northeastern Univ. (USA) [10478-10]

Lunch/Exhibition Break Sat 12:15 pm to 1:30 pm

SESSION 3.....SAT 1:30 PM TO 3:30 PM

Imaging Systems

Session Chair: **Brian W. Pogue**,
Thayer School of Engineering at Dartmouth (USA)

Real-time quantitative optical imaging for surgical guidance (*Invited Paper*), Sylvain Gioux, Univ. de Strasbourg (France) [10478-11]

Bio-inspired near infrared fluorescence sensors: from the ocean to the operating room (*Invited Paper*), Viktor Gruev, Missael Garcia, Nan Cui, Qinru Li, Univ. of Illinois (USA) [10478-12]

The design of dual channel fluorescence molecular imaging applied to surgical lesion detection and resection, Zhang Chong, Mao Yamin, He Kunshan, Chinese Academy of Sciences (China); Jiang Shixin, Beijing Jiaotong Univ. (China); Chi Chongwei, Chinese Academy of Sciences (China); Kun Wang, Institute of Automation (China); Tian Jie, Chinese Academy of Sciences (China). [10478-13]

High registration projection system for fluorescence guided surgery, Hiroto Terada, Hamamatsu Photonics K.K. (Japan). [10478-14]

Handheld dual-modality wide-field fluorescent imaging guided dual-axis confocal microscope for fluorescence molecular guidance of precise tumor resection in head and neck surgery, Zhen Qiu, Institute of Quantitative Health Science and Engineering, Michigan State Univ. (USA); Tarn Teraphongphom, Nynke S. van den Berg, Nathan O. Loewke, Guolan Lu, Robert Ertsey, Frank Schonig, Stephan Rogalla, Shai Friedland, Michael J. Mandella, Eben L. Rosenthal M.D., Stanford Univ. (USA); Christopher H. Contag, Institute of Quantitative Health Science and Engineering, Michigan State Univ. (USA) [10478-15]

Hexachromatic imager for near-infrared fluorescence image-guided surgery, Missael Garcia, Washington Univ. in St. Louis (USA) and Univ. of Illinois (USA); Viktor Gruev, Univ. of Illinois (USA); Radoslav Marinov, Washington Univ. in St. Louis (USA); Kevin Kauffman, Univ. of Michigan (USA); Tyler Davis, Univ. of Illinois (USA). [10478-16]

SESSION 4.....SAT 4:00 PM TO 5:40 PM

Contrast Agents

Session Chair: **Sylvain Gioux**, Univ. de Strasbourg (France)

Nanoprobes for optical fluorescence imaging (*Invited Paper*), Hak Soo Choi, Massachusetts General Hospital (USA) [10478-17]

Development of novel molecular probes for NIR-II fluorescence imaging (*Invited Paper*), Zhen Cheng, Stanford Univ. (USA). [10478-18]

Improved identification of cranial nerves using paired-agent imaging: topical staining protocol optimization through experimentation and simulation, Veronica C. Torres, Todd Wilson, Austėja Staneviciute, Illinois Institute of Technology (USA); Richard W. Byrne, Rush Univ. Medical Ctr. (USA); Kenneth M. Tichauer, Illinois Institute of Technology (USA) .. [10478-19]

Topical application of nerve-specific fluorophores for image-guided nerve sparing surgical procedures, Connor W. Barth, Summer L. Gibbs, Lei Wang, Oregon Health & Science Univ. (USA) [10478-20]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

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Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

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See page 6 for details.

SESSION 5.....SUN 8:15 AM TO 10:00 AM

Clinical Translation and Clinical Applications I

Session Chair: **Brian W. Pogue**,
Thayer School of Engineering at Dartmouth (USA)

Is it really molecular guided surgery (or just EPR effect)? Understanding and overcoming the effects of cancer physiology on tumor contrast (*Invited Paper*), Kenneth M. Tichauer, Illinois Institute of Technology (USA) [10478-21]

Tumor-targeted fluorescent dyes for fluorescence-guided surgery (*Invited Paper*), Philip Low, Sakkarapalayam M. Mahalingam, Lindsay E. Kelderhouse, Purdue Univ. (USA); Pravin Gagare, Mohammad Noshi, Sumith Kularatne, On Target Labs., LLC (USA) . [10478-22]

Dual probe difference specimen imaging for rapid identification of margin assessment during breast conserving surgery, Jasmin Schaefer, Oregon Health & Science Univ. (USA); Connor W. Barth, Oregon Health & Science Univ. (USA); Vince Rossi, Kimberley S. Samkoe, Scott C. Davis, Thayer School of Engineering at Dartmouth (USA); Summer L. Gibbs, Oregon Health & Science Univ. (USA) [10478-23]

Intraoperative and quantitative molecular phenotyping (IQMP) of breast cancer surgical margins: comparison of data analysis methods for topically applied nanoparticles, Xiaochun Xu, Illinois Institute of Technology (USA); Soyoung Kang, Yu Wang, Jonathan T. C. Liu, Univ. of Washington (USA); Kenneth M. Tichauer, Illinois Institute of Technology (USA) .. [10478-24]

A fluorescent humanized anti-CEA antibody specifically labels metastatic pancreatic cancer in a patient-derived orthotopic xenograft (PDOX) mouse model, Thinzar Lwin, Moores Cancer Ctr., Univ. of California, San Diego (USA); Takashi Murakami M.D., AntiCancer, Inc. (USA); Paul J. Yazaki, City of Hope (USA); Bryan Clary M.D., Moores Cancer Ctr., Univ. of California, San Diego (USA); Robert M. Hoffman, AntiCancer, Inc. (USA); Michael Bouvet M.D., Moores Cancer Ctr., Univ. of California, San Diego (USA) [10478-25]

SESSION 6.....SUN 10:30 AM TO 12:15 PM

Clinical Translation and Clinical Applications II

Session Chair: **Sylvain Gioux**, Univ. de Strasbourg (France)

Chemical digitization of a physiologic signal for tumor imaging to facilitate software assisted image guided surgery (*Invited Paper*), Baran Sumer, Univ. of Texas Southwestern Medical Ctr. (USA) [10478-26]

Impact of fluorescence imaging in thyroid surgery (*Invited Paper*), Benmiloud Fares, l'Hôpital Européen (France) [10478-27]

Instantaneous fluorogenic spray for micro tumor detection (*Invited Paper*), Ching Tung, Weill Cornell Medicine (USA) [10478-28]

Sensitivity and specificity of panitumumab-IRDye800 as an optical agent for image guided surgery in patients with head and neck cancer, Tarn Teraphongphom, Steven Hong M.D., Willemieke S. F. J. Tummers, Nynke S. van den Berg, Nicholas J. Oberhelman, Robert Ertsey, Guolan Lu, Adam J. Gomez, Brock A. Martin, Christina S. Kong M.D., Eben L. Rosenthal M.D., Stanford Univ. (USA) [10478-29]

Panitumumab-IRDye800 for fluorescence-guidance based metastatic lymph node identification in patients with head and neck cancer, Nynke S. van den Berg, Tarn Teraphongphom, Willemieke S. F. J. Tummers, Steven Hong M.D., Guolan Lu, Adam J. Gomez M.D., Brock A. Martin M.D., Robert Ertsey, Nicholas J. Oberhelman, Christina S Kong M.D., Dimitros Colevas M.D., Eben L. Rosenthal M.D., Stanford Univ. (USA) [10478-30]

Lunch/Exhibition Break Sun 12:15 pm to 1:30 pm

CONFERENCE 10478

SESSION 7..... SUN 1:30 PM TO 3:30 PM

Clinical Translation and Clinical Applications III

Session Chair: **Brian W. Pogue**,
Thayer School of Engineering at Dartmouth (USA)

The next steps in surgical imaging (*Invited Paper*), Eben L. Rosenthal, Stanford Univ. (USA). [10478-31]

Molecular fluorescence guided surgery, pathology and endoscopy: new avenues for drug exploration and treatment monitoring (*Invited Paper*), Gooitzen M. van Dam, Univ. Medical Ctr. Groningen (Netherlands) . [10478-32]

To be announced (*Invited Paper*), Alexander L. Vahrmeijer, Leiden Univ. Medical Ctr. (Netherlands) [10478-33]

IS-001: investigating a novel compound for fluorescent ureteral identification during robotic hysterectomy (*Invited Paper*), Richard Farnam M.D., Texas Urogynecology & Laser Surgery Ctr. (USA) [10478-34]

PANEL DISCUSSION. SUN 4:00 PM TO 5:30 PM

SUNDAY POSTER SESSION. SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

NADPH as a potential intrinsic probe for tumour margin estimation, Hazel Stewart, Univ. of Strathclyde (United Kingdom); Ted Hupp, The Univ. of Edinburgh (United Kingdom); David J. Birch, Univ. of Strathclyde (United Kingdom). [10478-43]

Fluorescent labeling of circulating tumor cells for diffuse in-vivo flow cytometry, Roshani A. Patil, Bryan Q. Spring, Mark Niedre, Northeastern Univ. (USA) [10478-44]

Integration of a wide-field spatial frequency domain and fluorescence lifetime imaging system, Sez-Jade Chen, Xavier Intes, Rensselaer Polytechnic Institute (USA); Sylvain Gioux, Univ. de Strasbourg (France). [10478-45]

A bio-inspired time domain near infrared fluorescence imager, Nan Cui, Washington Univ. in St. Louis (USA); Steven M. Blair, Univ. of Illinois (USA); Missael Garcia, Washington Univ. in St. Louis (USA); Viktor Gruiev, Univ. of Illinois (USA) [10478-46]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

MONDAY 29 JANUARY

SESSION 8..... MON 8:30 AM TO 10:00 AM

Isotope Optical Imaging and Cancer

Joint Session with Conferences 10476 and 10478

Session Chair: **Sylvain Gioux**, Univ. de Strasbourg (France)

Optical imaging of radiotracers (*Invited Paper*), Jan Grimm, Edwin Pratt, Memorial Sloan-Kettering Cancer Ctr. (USA) [10478-35]

Radioactivity in the darkroom: the role of radioluminescence microscopy in PET radiotracer characterization and development (*Invited Paper*), Guillem Pratx, Stanford Univ. (USA) [10478-36]

Cherenkov luminescence imaging under ambient lighting conditions for intraoperative applications, Justin S. Klein, Aaron R. Selfridge, Gregory S. Mitchell, Martin S. Judenhoffer, Simon R. Cherry, Univ. of California, Davis (USA) [10478-37]

Flexible autoradiography for molecular imaging of tumour margins, Thomy Mertzaniidou, Univ. College London (United Kingdom); Kunal Vyas, Maarten Grootendorst, David S. Tuch, Lightpoint Medical, Ltd. (United Kingdom); Danail Stoyanov, Simon R. Arridge, Univ. College London (United Kingdom). [10478-38]

SESSION 9..... MON 10:30 AM TO 11:50 AM

Radiation Therapy Optical Imaging and Sensing

Joint Session with Conferences 10476 and 10478

Session Chair: **Brian W. Pogue**,
Thayer School of Engineering at Dartmouth (USA)

Single photon detection imaging of Cherenkov light emitted during radiation therapy, Brian W. Pogue, Ethan Philip M. LaRochelle, Petr Bruza, Jacqueline M. Andreozzi, Phillip M. Adamson, Thayer School of Engineering at Dartmouth (USA) [10478-39]

Progress toward noninvasive detection of tumor oxygenation utilizing Cherenkov excited luminescence scanned imaging, Jennifer R. Shell, Dartmouth Hitchcock Medical Ctr. (USA); Ethan Philip M. LaRochelle, Petr Bruza, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) [10478-40]

Structural Cherenkov luminescence imaging with Hadamard-patterned field illumination, Mengyu Jia, Petr Bruza, Ethan Philip M. LaRochelle, Jennifer R. Shel, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) [10478-41]

Characterization of the proton irradiation induced luminescence of materials and application in radiation oncology dosimetry, Arash Darafsheh, Washington Univ. School of Medicine in St. Louis (USA); Alireza Kassaei, Jarod C. Finlay, Univ. of Pennsylvania (USA) [10478-42]

Cherenkov imaging for Total Skin Electron Therapy (TSET), Yunhe Xie, Amit Maity, The Univ. of Pennsylvania Health System (USA); Petr Bruza, Thayer School of Engineering at Dartmouth (USA); Tianshun Miao, DoseOptics, LLC (USA); Jacqueline M. Andreozzi, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA); John Plataras M.D., Timothy C. Zhu, The Univ. of Pennsylvania Health System (USA) . . . [10478-43]

CONFERENCE 10479

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10479

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases

Conference Chair: **Tianhong Dai**, Wellman Ctr. for Photomedicine (USA), Massachusetts General Hospital (USA), Harvard Medical School (USA)

Program Committee: **Akilan Palanisami**, Wellman Ctr. for Photomedicine (USA), Massachusetts General Hospital (USA), Harvard Medical School (USA); **Kristen C. Maitland**, Texas A&M Univ. (USA); **Ying Wang M.D.**, Chinese PLA General Hospital (China); **Michael R. Hamblin**, Wellman Ctr. for Photomedicine (USA); **Alessandro M. Deana**, UNINOVE (Brazil)

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MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:00 AM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases I

Session Chair: **Kristen C. Maitland**, Texas A&M Univ. (USA)

Fast and cultivation-free identification of pathogens by means of Raman spectroscopy (*Invited Paper*), Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany); Björn Lorenz, Institutes für Physikalische Chemie, Friedrich-Schiller-Univ. Jena (Germany); Christina Wichmann, Leibniz-Institut für Photonische Technologien e.V. (Germany); Sandra Kloss, Stephan Stöckel, Susann Meisel, Susanne Pahlow, Anja Silge, Thomas Bocklitz, Petra Rösch, Friedrich-Schiller-Univ. Jena (Germany) [10479-1]

High throughput Raman spectroscopy for host-pathogen interactions (*Invited Paper*), Anuradha Ramoji, Universitätsklinikum Jena (Germany); Natalie Toepfer, Universitätsklinikum Jena (Germany) and Leibniz-Institut für Photonische Technologien e.V. (Germany); Jan Rueger, Abdullah S. Mondol, Iwan W. Schie, Leibniz-Institut für Photonische Technologien e.V. (Germany); Ute Neugebauer, Universitätsklinikum Jena (Germany) and Leibniz-Institut für Photonische Technologien e.V. (Germany) and Institute of Physical Chemistry, Abbe Ctr. of Photonics (Germany); Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany) [10479-2]

Rapid bacterial identification based on surface-enhanced Raman scattering and machine learning, Chi-Sing Ho, Neal Jean, Amr Saleh, Stefano Ermon, Niaz Banaei, Jennifer A. Dionne, Stanford Univ. (USA) [10479-3]

Fast optical susceptibility testing of pathogens directly from bacterial suspensions using Raman spectroscopy, Johanna Kirchnerhoff, Marcel Dahms, Ulrich-Christian Schröder, Astrid Tannert, Mathias W. Pletz, Universitätsklinikum Jena (Germany); Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany); Ute Neugebauer, Universitätsklinikum Jena (Germany) [10479-4]

Application of Raman spectroscopy combined with multivariate analysis for diagnosis dengue fever in human blood sera, Saranjam Khan, National Institute of Lasers & Optronics (Pakistan) [10479-5]

SESSION 2 MON 10:30 AM TO 12:20 PM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases II

Session Chair: **Walfre Franco**, Wellman Ctr. for Photomedicine (USA)

Unraveling bacterial networks and their antimicrobial susceptibility on silicon microarchitectures using intrinsic phase-shift spectroscopy (*Invited Paper*), Heidi Leonard, Liran Holtzman, Yuri Haimov, Yechezkel Kashi, Technion-Israel Institute of Technology (Israel); Sarel Halachmi, Ofer Nativ, Bnai Zion Medical Ctr. (Israel); Ester Segal, Technion-Israel Institute of Technology (Israel) [10479-6]

A digital microarray for transcriptional biomarkers of antibiotic resistance utilizing plasmonic nanorods and interferometric imaging (*Invited Paper*), Derin D. Sevenler, Emma A. Briars, Boston Univ. (USA); George Daaboul, NanoView Diagnostics (USA); Fulya Ekiz Kanik, Joseph Greene, Ahmad Khalil, M. Selim Ünlü, Boston Univ. (USA) ... [10479-7]

Elastic light scattering for clinical pathogens identification: application to early screening of Staphylococcus aureus on specific medium. (*Invited Paper*), Emmanuelle Schultz, Univ. Grenoble Alpes (France) and CEA-LETI (France); Valentin Genuer, Univ. Grenoble Alpes (France) and CEA-LETI (France); Pierre R. Marcoux, Univ. Grenoble Alpes (France) and CEA-LETI (France); Olivier Gal, Chakib Belafdil, CEA LIST (France); Damien Decq, Univ. Grenoble Alpes (France) and CEA-LETI (France) and MINATEC (France); Max Maurin, CHU Grenoble (France); Sophie Morales, Univ. Grenoble Alpes (France) and CEA-LETI (France) and MINATEC (France) [10479-8]

Label-free multiphoton imaging and identification of common pathogens found in corneal infections, Shu-Han Wen, Shu-Han Wen, National Taiwan Univ. (Taiwan); Vishal Jhanji, The Chinese Univ. of Hong Kong (Hong Kong, China); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) [10479-9]

Lunch Break Mon 12:20 pm to 1:40 pm

SESSION 3 MON 1:40 PM TO 3:20 PM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases III

Session Chairs: **Zeev Zalevsky**, Bar-Ilan Univ. (Israel); **Akilan Palanisami**, Wellman Ctr. for Photomedicine (USA)

Usage of light for enhanced sensing and treating of inflammations and infections (*Invited Paper*), Eitan Weintraub, Ben Sachs, Yana Reznick, Moshe Sinvani, Rachel Lubart, Ehud Banin, Yevgeny Beiderman, Zeev Zalevsky, Bar-Ilan Univ. (Israel) [10479-10]

A principal component analysis approach for the diagnosis of cellulitis based on skin reflectance spectrometry, Antonio Ortega-Martinez, Adam Raff, Carina N. Thomas, Wellman Ctr. for Photomedicine (USA); Lauren Ko, Massachusetts General Hospital (USA); Walfre Franco, R. Rox Anderson M.D., Wellman Ctr. for Photomedicine (USA); Daniela Kroshinsky, Massachusetts General Hospital, Harvard Medical School (USA) [10479-11]

Noninvasive monitoring local variations of fever and edema on human: Potential for point-of-care inflammation assessment. Zebin Li, Xianglin Li, Ting Li, Univ. of Electronic Science and Technology of China (China) [10479-12]

Engineered bioluminescent influenza viruses shed light on defense against influenza virus infection (*Invited Paper*), Ling Chen, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences (China) [10479-13]

CONFERENCE 10479

SESSION 4 MON 3:50 PM TO 5:30 PM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases IV

Session Chair: **Utkan Demirci**, Stanford Univ. (USA)

Imaging and navigation of remote controlled nanostructured carriers for theranostics (*Invited Paper*), Marina Novoselova, Sergey V. German, Saratov State Univ. (Russian Federation); Ekaterina I. Galanzha, Univ. of Arkansas for Medical Sciences (USA); Valery V. Tuchin, Saratov State Univ. (Russian Federation) and National Research Tomsk State Univ. (Russian Federation) and Precision Mechanics and Control Institute, Russian Academy of Sciences (Russian Federation); Vladimir P. Zharov, Univ. of Arkansas for Medical Sciences (USA); Dmitry Gorin, Saratov State Univ. (Russian Federation) and Skolkovo Institute of Science and Technology (Russian Federation); Elina A. Genina, Saratov State Univ. (Russian Federation) and National Research Tomsk State Univ. (Russian Federation) [10479-14]

Micro- and nano-scale technologies for applications in medicine at the POC and bedside (*Invited Paper*), Utkan Demirci, Stanford Univ. (USA) [10479-15]

Smart wearable system for light treatment of chronic wounds, Rolando Ferrini, David Kallweit, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); Anna Klapczynski, Natalia Kuch, Anja Becker, Norbert Gretz, Ruprecht-Karls-Universität Heidelberg (Germany); Kyriacos Michaelides, SignalGeneriX Ltd. (Cyprus); Julien Steinbrunn, Marielle Bouschbacher, Lab. URGO (France); Rhys Waite, Microsemi Semiconductor Ltd. (United Kingdom); Manuel Seckel, Dion Manassis, Technische Universität Berlin (Germany) [10479-16]

Dynamic light scattering for bacteria quantification and viability determination, Lan Wang, Adam Push M.D., UV Light Care (USA) [10479-17]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Poster Monday

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Energy, wavelength or photon flux: which one influences aPDT?, Elisabete C. Dias, Aline S. Silva Sousa, Renato A. Prates, Vanessa C. P. Santos, Alessandro M. Deana, Univ. Nove de Julho (Brazil) [10479-49]

Control of burn wound infection by photodynamic therapy, Naoto Ishiwata, Tokyo Univ. of Agriculture and Technology (Japan); Yasuyuki Tsunoi, Satoko Kawachi, National Defense Medical College (Japan); Yasue Haruyama, Daizoh Saitoh, Shunichi Sato, National Defense Medical College (Japan); Izumi Nishidate, Tokyo Univ. of Agriculture and Technology (Japan) [10479-50]

Efficacy of antimicrobial 405 nm blue-light for inactivation of airborne bacteria, Laura Dougall, John G. Anderson, Igor V. Timoshkin, Scott J. MacGregor, Michelle Maclean, Univ. of Strathclyde (United Kingdom) [10479-51]

Investigation of the optical properties of hard tooth tissues for various degrees of demineralization, Alexey Selifonov, Daria K. Tuchina II, Yulia S. Skibina, Andrei Zakharevich, Saratov State Univ. (Russian Federation); Olga Shapoval, Saratov State Medical Univ. (Russian Federation); Valery V. Tuchin, Saratov State Univ. (Russian Federation) [10479-52]

Evaluation of methylene blue-mediated photodynamic inactivation in association with encapsulated nitric oxide donor in chitosan nanoparticles on Leishmania (L.) amazonensis. an in vitro study, Fernanda Viana Cabral, Univ. de São Paulo (Brazil); Jesica Ayelen Dimmer, Univ. Nacional de Córdoba (Argentina); Milena Pelegrino, Amedea Seabra, Univ. Federal do ABC (Brazil); Martha S. Ribeiro, Univ. de São Paulo (Brazil) [10479-53]

Photoinactivation of pathogens in experimentally contaminated milk, Carolina dos Anjos, Univ. de São Paulo (Brazil); Caetano Padial Sabino, Instituto de Pesquisas Energéticas e Nucleares (Brazil) and Univ. de São Paulo (Brazil) and BioLambda, LTD. (Brazil); Mauricio S. Baptista, Univ. de São Paulo (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Fábio P. Sella, Ronaldo Gomes Gargano, Bruna Stanigher Barbosa, Bruno Toledo Silva, School of Veterinary Medicine and Animal Science, Univ. de São Paulo (Brazil); Nilton Lincopan, School of Pharmaceutical Sciences, Univ. de São Paulo (Brazil); Fabio C. Pogliani, School of Veterinary Medicine and Animal Science, Univ. de São Paulo (Brazil) [10479-54]

Effectiveness of photobiomodulation therapy and aerobic exercise training on articular cartilage in an experimental model of osteoarthritis in rats, Livia Assis, Univ. de Brasília (Brazil) [10479-55]

A study on the biological effects by the photodynamic therapy on diabetic ulcers reparation in humans, Patrícia M. Carrinho-Aureliano D.D.S., Ricardo S. Navarro D.D.S., Dora K. Andreani D.D.S., Vislaine A. Morete D.D.S., Shizumi Iseri D.D.S., Alessandra Baptista D.D.S., Silvia C. Nunez D.D.S., Univ. de Brasília (Brazil); Antonio B. Villaverde D.D.S., Univ. Anhembi Morumbi (Brazil) [10479-56]

Disinfection biofilm in vitro catheter device, Lan Wang, Michael Hwang, Adam Push M.D., Asiem Bhaskar, UV Light Care (USA) [10479-57]

Petri dish zone inhibition imaging quantification analysis, Lan Wang, UV Light Care (USA); Alex Sun, UV Light Care, Inc. (USA); Adam Push M.D., Asiem Bhaskar, UV Light Care (USA) [10479-58]

TUESDAY 30 JANUARY

SESSION 5 TUE 8:00 AM TO 10:10 AM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases V

Session Chair: **Alessandro M. Deana D.D.S.**, UNINOVE (Brazil)

Antimicrobial blue light inactivation of pathogenic microbes: state of the art (*Invited Paper*), Tianhong Dai, Massachusetts General Hospital, Harvard Medical School (USA) [10479-18]

Blue light enhances the antimicrobial activity of honey against Pseudomonas aeruginosa, Viviana Orlandi, Fabrizio Bolognese, Paola Barbieri, Univ. degli Studi dell'Insubria (Italy) [10479-19]

Microbial photoinactivation by 470 nm radiation: an investigation into the underlying photobiological mechanism, Katharina Hoene, Katharina Wild, Julian Schmid, Barbara Spellerberg, Martin Hesslering, Institute of Medical Engineering and Mechatronics, Hochschule Ulm (Germany) [10479-20]

In vitro results of flexible light-emitting antimicrobial bandage designed for prevention of surgical site infections, Mitchell Greenberg, April Lovelady, Texas A&M Univ. (USA) and SABER Corp. (USA); Robert Smith, SABER Corp. (USA); Alan Glowczwski, Texas A&M Univ. (USA) and SABER Corp. (USA); Kristen C. Maitland, Texas A&M Univ. (USA) [10479-21]

Antimicrobial blue light inactivation of biofilms formed by clinical isolates of multidrug-resistant bacteria, Raquel Ferrer-Espada, Tianhong Dai, Massachusetts General Hospital (USA) [10479-22]

Antimicrobial blue light inactivation of Neisseria gonorrhoeae, Ying Wang M.D., Massachusetts General Hospital, Harvard Medical School (USA) and Chinese PLA General Hospital (China); Tianhong Dai, Raquel Ferrer-Espada, Massachusetts General Hospital, Harvard Medical School (USA) [10479-23]

SESSION 6 TUE 10:40 AM TO 12:10 PM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases VI

Session Chair: **Tianhong Dai**, Massachusetts General Hospital (USA)

Mechanism of Propionibacterium acne necrosis by initiation of reactive oxygen species (ROS) by porphyrin absorption (*Invited Paper*), Caerwyn Ash, Univ. of Wales Trinity Saint David (United Kingdom) [10479-24]

Light as a selective antibiotic: a novel approach of antibacterial photosensitization through activation of coproporphyrin III, John Logan Jenkins, Jeremy B. Ford, Dennis J. Horvath Jr., Jocelyn Simpson, Eric P. Skaar, E. Duco Jansen, Vanderbilt Univ. (USA) [10479-25]

Drug-free annihilation of methicillin-resistant staphylococcus aureus via staphyloxanthin photobleaching, Pu-Ting Dong, Boston Univ. (USA); Haroon T. Mohammad, Purdue Univ. (USA); Xiaoyu Wang, Boston Univ. (USA); Jie Hui, Purdue Univ. (USA); Lijia Liang, Jilin Univ. (China); Junjie Li, Boston Univ. (USA); Mohamed N. Seleem, Purdue Univ. (USA); Ji-Xin Cheng, Boston Univ. (USA) [10479-26]

Photodynamic activity of natural anthraquinones on fibroblasts, Jesica Ayelen Dimmer, Instituto Multidisciplinario de Biología Vegetal, Univ. Nacional de Córdoba (Argentina); Camila Ramos Silva, Instituto de Pesquisas Energéticas e Nucleares (Brazil) and Comissão Nacional de Energia Nuclear (Brazil); Susana Carolina Nunez Montoya, Jose Luis Cabrera, Instituto Multidisciplinario de Biología Vegetal, Univ. Nacional de Córdoba (Argentina); Martha S. Ribeiro, LATO (Brazil) [10479-27]

SESSION 7 TUE 1:30 PM TO 3:30 PM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases VII

Session Chair: **Long Chiang**, Univ. of Massachusetts Lowell (USA)

Potential of antimicrobial photodynamic inactivation by potassium iodide and other inorganic salts (*Invited Paper*), Michael R. Hamblin, Wellman Ctr. for Photomedicine (USA) [10479-28]

Effect and mechanisms of photodynamic therapy in treating chronic skin ulcers infected with *Pseudomonas aeruginosa* (*Invited Paper*), Xia Lei, Yang Tan, Daping Hospital & Research Institute of Surgery, Third Military Medical Univ. (China) [10479-29]

APDT mediated by methylene blue increases membrane permeability of *Escherichia coli*, Nathalia V. dos Santos, Univ. de São Paulo (Brazil); Caetano Padial Sabino, BioLambda (Brazil) and Univ. de São Paulo (Brazil) and Instituto de Pesquisas Energéticas e Nucleares (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Nilton Lincopan, Mauricio S. Baptista, Univ. de São Paulo (Brazil) [10479-30]

Photodynamic inactivation (PDI) over cariogenic biofilm using photosensitizers based on curcumin, Alessandra Nara de Souza Rastelli D.D.S., Univ. de São Paulo (Brazil); Adilson César de Abreu Bernardi, Univ. de Araraquara (Brazil); Sebastião Pratavieira, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil); Kléber Thiago de Oliveira, Univ. Federal de São Carlos (Brazil); Dongmei M. Deng, Academisch Ctr. Tandheelkunde Amsterdam (Netherlands); Vanderlei Salvador Bagnato, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil) [10479-31]

Impact of rose bengal and riboflavin photodynamic antimicrobial therapy (PDAT) on virulence factors of methicillin-resistant staphylococcus aureus (MRSA) ocular species, Heather A. Durkee, Mariela C. Aguilar, Alejandro Arboleda, Nidhi Relhan, Nicholas Nolan, Anna Martinez, Mercury Sawatari, Karam A. Alawa, Jorge Maestre-Mesa, Guillermo Amescua, Jean-Marie A. Parel, Darlene Miller, Bascom Palmer Eye Institute (USA) [10479-32]

SESSION 8 TUE 4:00 PM TO 5:30 PM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases VIII

Session Chair: **Michael R. Hamblin**, Wellman Ctr. for Photomedicine (USA)

Decacationic [70]fullereryl-light harvesting chromophore conjugates for efficient photokilling of infectious bacteria (*Invited Paper*), Min Wang, Univ. of Massachusetts Lowell (USA); Ying-Ying Huang M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Liyi Huang, Tianhong Dai, Michael R. Hamblin, Wellman Ctr. for Photomedicine (USA); Long Chiang, Univ. of Massachusetts Lowell (USA) [10479-33]

A quaternary ammonium modified coumarin derivative for antimicrobial photodynamic therapy, Zhiyuan Sun, Technical Institute of Physics and Chemistry (China) and Univ. of Chinese Academy of Sciences (China); Shaona Zhou, Ying Gu, Chinese PLA General Hospital (China); Yuxia Zhao, Technical Institute of Physics and Chemistry (China) [10479-34]

Primary cellular targets of MB-APDT in bacteria and yeast, Caetano Padial Sabino, BioLambda (Brazil) and Univ. de São Paulo (Brazil) and Instituto de Pesquisas Energéticas e Nucleares (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Mauricio S. Baptista, Nilton Lincopan, Univ. de São Paulo (Brazil) [10479-35]

Potassium iodide potentiates antimicrobial photodynamic inactivation mediated by Rose Bengal: in vitro and in vivo studies, Xiang Wen, Xiaoshen Zhang, Wellman Ctr. for Photomedicine (USA); Grzegorz Szewczyk, Jagiellonian Univ. in Krakow (Poland); Ahmed ElHussien, Ying-Ying Huang M.D., Wellman Ctr. for Photomedicine (USA); Tadeusz Sarna, Jagiellonian Univ. (USA); Michael R. Hamblin, Wellman Ctr. for Photomedicine (USA) [10479-36]

WEDNESDAY 31 JANUARY

SESSION 9 WED 8:30 AM TO 10:00 AM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases IX

Session Chair: **Silvia C. Nunez D.D.S.**, Univ. de Brasília (Brazil)

Screening novel phthalocyanines for developing photodynamic-vaccination and -insecticides (*Invited Paper*), Kwang Poo Chang, Bala K. Kolli, Chicago Medical School, Rosalind Franklin Univ. of Medicine and Science (USA); Dennis K. P. Ng, The Chinese Univ. of Hong Kong (China); Shin-Hong Shiao, National Taiwan Univ. College of Medicine (Taiwan); Laura Manna, Univ. degli Studi di Napoli Federico II (Italy); Neng-Yao Shih, National Institute of Cancer Research, National Health Research Institutes (Taiwan); Robert L. Elliott, Elliott-Elliott-Baucom Breast Cancer Research and Treatment Ctr. (USA); Guo-Liang Fu, GeneFirst Ltd. (United Kingdom) [10479-37]

Discovery of a NorA efflux pump inhibitor-methylene blue hybrid photoantimicrobial against methicillin-resistant *Staphylococcus aureus*, Michael Kelso, Ardeshir Rineh, Naveen K. Dolla, Univ. of Wollongong (Australia); Anthony R. Ball, Gliese 623B, LLC (USA); Maria Magana, Athens Medical School, Aeginition Hospital (Greece); John B. Bremner, Univ. of Wollongong (Australia); Michael R. Hamblin, Massachusetts General Hospital, Harvard Medical School (USA); George Tegos, Gliese 632B, LLC (USA) [10479-38]

A comparative analysis of aPDI effect of phenothiazinium dyes in the presence of an inorganic salt as potentiator, Sahand Ghaffari, Bogaziçi Univ. (Turkey) [10479-39]

Antimicrobial photodynamic inactivation mediated by a class of dual-action light-activated antibiotics: tetracyclines is potentiated by potassium iodide, Ya He, Sun Yat-sen Memorial Hospital, Sun Yat-sen Univ. (China); Ying-Ying Huang M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Liyan Xi, Sun Yat-sen Memorial Hospital, Sun Yat-sen Univ. (China); Michael R. Hamblin, Wellman Ctr. for Photomedicine (USA) [10479-40]

SESSION 10 WED 10:30 AM TO 11:50 AM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases X

Session Chair: **Kwang Poo Chang**, Rosalind Franklin Univ. of Medicine and Science (USA)

Biodistribution and toxicity assessment of photoactivatable antibody-conjugated, antibiotic loaded gold nanocages for the treatment of bacterial infections, Daniel G. Meeker, Univ. of Arkansas for Medical Sciences (USA); Jingyi Chen, Tengjiao Wang, Univ. of Arkansas (USA); Peter R. Panizzi, Auburn Univ. (USA); Ginell R. Post M.D., Mark S. Smeltzer, Univ. of Arkansas for Medical Sciences (USA) [10479-41]

Photodynamic therapy to destroy pneumonia associated microorganisms using external irradiation source, Rosane B. Soares, Univ. de Brasília (Brazil); Walter Miyakawa, Instituto de Estudos Avançados (Brazil); Ricardo S. Navarro D.D.S., Alessandra Baptista D.D.S., Univ. de Brasília (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Silvia C. Nunez D.D.S., Univ. de Brasília (Brazil) [10479-42]

Potential by potassium iodide TPPS4 for antimicrobial photodynamic inactivation, Liyi Huang, Michael R. Hamblin, Massachusetts General Hospital (USA) [10479-43]

Antimicrobial photodynamic therapy proved not to induce bacterial resistance, Laura M. de Freitas, Ana L. Blanco, Univ. Estadual Paulista "Julio de Mesquita Filho" (Brazil); Carla R. Fontana, Univ. Estadual Paulista "Julio de Mesquita Filho" (Brazil) [10479-44]

Lunch/Exhibition Break Wed 11:50 am to 1:20 pm

CONFERENCE 10479

SESSION 11 WED 1:20 PM TO 2:40 PM

Photonic Diagnosis and Treatment of Infections and Inflammatory Diseases XI

Healthcare acquired infection (HAIs): a deadly problem that is preventable (*Invited Paper*), Troy Cowan, Vision Based Consulting, LLC (USA) [10479-45]

Identification of barriers and research opportunities to improve the effective and efficient application of adjunct UVC surface disinfection in healthcare (*Invited Paper*), Richard Martinello, Yale Univ. (USA) . . . [10479-46]

Modeling of UV disinfection in medical device applications, Lan Wang, Adam Push M.D., UV Light Care (USA) [10479-47]

Insights into the working mechanism of water filtered infrared A (wIRA) irradiation on Chlamydia trachomatis serovar E, Nicole Borel, Jasmin Kuratli, Theresa Pesch, Hanna Marti, Christian Blenn, Univ. Zürich (Switzerland) [10479-48]

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Saturday-Sunday

BIOS EXPO

200 Companies

Saturday 27 January 10:00 am to 5:00 pm

Sunday 28 January 10:00 am to 5:00 pm

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FEATURED TECHNOLOGIES

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- Molecular imaging
- Nano/biophotonics
- Biosensors
- Spectroscopic imaging
- Microscopy

CONFERENCE 10480

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10480

Clinical and Translational Neurophotonics 2018

Conference Chairs: **Steen J. Madsen**, Univ. of Nevada, Las Vegas (USA); **Victor X. D. Yang**, Ryerson Univ. (Canada)

Program Committee: **David Abookasis**, Ariel Univ. of Samaria (Israel); **Frederic Leblond**, Ecole Polytechnique de Montréal (Canada); **Herbert Stepp**, Ludwig-Maximilians-Univ. München (Germany)

SATURDAY 27 JANUARY

SESSION 1 SAT 8:00 AM TO 10:00 AM

Operative and Post Op. Therapy

5-aminolevulinic acid-mediated photodynamic therapy can target the intractable glioma stem cells in mesenchymal type glioblastomas, Naosuke Nonoguchi, Toshihiko Kuroiwa M.D., Osaka Medical College (Japan) [10480-1]

Low level light therapy on stroke with a portable and illumination-parameter adjustable LED helmet, Pengbo Wang, Jiajing Sun, Ting Li, Univ. of Electronic Science and Technology of China (China) [10480-2]

Light and ultrasound based approaches for enhancing drug delivery to the brain, Steen J. Madsen III, Univ. of Nevada, Las Vegas (USA); Tatiana Krasieva, Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (USA); Kristian Berg, Norwegian Radium Hospital, Oslo Univ. Hospital (Norway); Rohit Kumar Nair, Henry Hirschberg M.D., Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (USA) [10480-3]

Low-invasive reconstruction of spine discs under thermo-mechanical effect of fiber laser, Emil N. Sobol, Federal Scientific Research Ctr. "Crystallography and Photonics", Russian Academy of Sciences (Russian Federation) and Arcuo Medical, Inc. (USA); Andrey V. Baskov, Igor A. Borshchenko, Medical Ctr. for Vertebrology and Orthopedics (Russian Federation) [10480-4]

Optimized path planning for soft tissue resection via laser vaporization, Weston Ross, Duke Univ. (USA); Neil Cornwell, North Carolina State Univ. (USA); Sreekar Mantena, North Carolina School of Science and Mathematics (USA); Matthew Tucker, Brian Mann, Patrick Codd M.D., Duke Univ. (USA) [10480-5]

Photodynamic therapy platform for glioblastoma and intrabronchial tumors, Lasse Orsila, Jukka-Pekka Alanko, Visa Kaivosoja, Modulight, Inc. (Finland); Toomas Uibu, Tampere Univ. Hospital (Finland) [10480-6]

SESSION 2 SAT 10:30 AM TO 11:50 AM

Optical Spectroscopy: Clinical I

Optical mapping of prefrontal activity in pathological gamblers, Zhen Yuan, Xiaohong Lin, Univ. of Macau (Macao, China) [10480-7]

Optical mapping of the brain activity in children with Down's syndrome, Zhen Yuan, Fengmei Lu, Univ. of Macau (Macao, China) [10480-8]

Comparison on driving fatigue related hemodynamics activated by acoustic and visual stimulus, Zishan Deng, Yuan Gao, Ting Li, Univ. of Electronic Science and Technology of China (China) [10480-9]

Investigation of prefrontal cerebral hemodynamics during head up tilt table task using NIRS, Zephaniah Phillips V, Seung-ho Paik, Korea Univ. (Korea, Republic of); Byung-Jo Kim, Korea Univ. Medical Ctr. (Korea, Republic of); Youngwoon Choi, Beop-Min Kim, Korea Univ. (Korea, Republic of) [10480-10]

Lunch/Exhibition Break Sat 11:50 am to 1:40 pm

SESSION 3 SAT 1:40 PM TO 3:00 PM

Optical Spectroscopy: Clinical II

Intraoperative optical monitoring of the cerebral hemodynamics and metabolism during cardiac surgery, Parisa Farzam, Harvard Medical School (USA) and Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA); Juliette J. Selb, Stefan A. Carp, Parya Farzam, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Mirela Simon, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA); Maria Angela Franceschini, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA); Jason Zhensheng Qu, Massachusetts General Hospital (USA) [10480-11]

Model choice influence on calibration of brain health monitoring using combined frequency domain near infrared spectroscopy and diffuse correlation spectroscopy, Stefan A. Carp, Parisa Farzam, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA); Juliette J. Selb, Neurophotonics Ctr., Boston Univ. (USA); Parya Farzam, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA); Jason Z. Qu, Massachusetts General Hospital (USA); Maria Angela Franceschini, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) [10480-12]

Intraoperative hyperspectral imaging of brain hemodynamics during epileptiform activity, Audrey Laurence, Ecole Polytechnique de Montréal (Canada) and Univ. of Montreal Hospital Research Ctr. (Canada); Leticia M. Angulo-Rodríguez, Frédéric Lesage, Ecole Polytechnique de Montréal (Canada); Alain Bouthillier, Dang Khoa Nguyen, Ctr. Hospitalier de l'Univ. de Montréal (Canada); Frédéric Leblond, Ecole Polytechnique de Montréal (Canada) and Ctr. Hospitalier de l'Univ. de Montréal (Canada) [10480-13]

Optical intrinsic signal imaging for brain tumor surgery, Tien-Yu Hsiao, National Chiao Tung Univ. (Taiwan); Xin-Rui Liu, The First Hospital of Jilin Univ. (China); Kai-Shih Chiu, National Chiao Tung Univ. (Taiwan); Yun-Qian Li, The First Hospital of Jilin Univ. (China); Chun-Jung Huang, National Chiao Tung Univ. (Taiwan); Shan-Ji Li, The First Hospital of Jilin Univ. (China); Ching-Po Lin, Institute of Neuroscience, National Yang-Ming Univ. (Taiwan); Chia-Wei Sun, National Chiao Tung Univ. (Taiwan) [10480-14]

SESSION 4 SAT 3:30 PM TO 5:30 PM

Fluorescence Resection and Spectroscopy

Activatable fluorescent nanoprobe for rapid and specific ex vivo identification of central nervous system lymphoma, Joseph Georges, Philadelphia College of Osteopathic Medicine (USA) and Barrow Neurological Institute (USA); Xiaowei Liu, Hao Yan, Xiaodong Qi, Biodesign Institute, Arizona State Univ. (USA); Trent Anderson, Burt Feuerstein, The Univ. of Arizona College of Medicine (USA); Peter Nakaji M.D., Barrow Neurological Institute (USA) [10480-15]

Creation of an optically tunable, solid tissue phantom for use in cancer detection, Matthew Tucker, Duke Univ. (USA); Catherine Wallace, Medical College of Georgia (USA); Sreekar Mantena, North Carolina School of Science and Mathematics (USA); Neil Cornwell, North Carolina State Univ. (USA); Weston Ross, Ren Odion, Tuan Vo-Dinh, Patrick Codd, Duke Univ. (USA) [10480-16]

Detecting brain cancer using fluorescence polarization imaging, Anna N. Yaroslavsky, Xin Feng, Univ. of Massachusetts Lowell (USA); Yulian Ramirez, Univ. of Massachusetts Medical School (USA); Yingying Huang M.D., Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Alonzo Ross, Univ. of Massachusetts Medical School (USA); Michael R. Hamblin, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) [10480-17]

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Intraoperative reflectance and fluorescence spatial frequency domain imaging to enhance guidance of glioma resection, Dennis J. Wirth, David W. Roberts M.D., Dartmouth Hitchcock Medical Ctr. (USA); Keith D. Paulsen, Thayer School of Engineering at Dartmouth (USA) [10480-18]

Neurosurgical microscopic solid laser-based light inhibits photobleaching during fluorescence-guided brain tumor removal with 5-aminolevulinic acid, Naokado Ikeda, Yoshinaga Kajimoto M.D., Naosuke Nonoguchi M.D., Shinji Kawabata M.D., Motomasa Furuse M.D., Osaka Medical College (Japan); Tetsuo Sugano, Mitsubishi Electric Engineering Co., Ltd. (Japan); Taku Sato, Kiyoshi Saito M.D., Fukushima Medical Univ. (Japan); Toshihiko Kuroiwa M.D., Osaka Medical College (Japan). [10480-19]

Development of a surgical loupe system for observing protoporphyrin IX fluorescence in malignant glioma surgery after administering 5-aminolevulinic acid, Toshihiko Kuroiwa M.D., Yoshinaga Kajimoto M.D., Motomasa Furuse M.D., Naokado Ikeda, Naosuke Nonoguchi M.D., Shinji Kawabata M.D., Osaka Medical College (Japan) [10480-20]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:00 AM TO 10:00 AM

Optical Spectroscopy: Pre-Clinical I

In vivo imaging of cerebral hemodynamics and tissue scattering in rat brain using a surgical microscope camera system, Izumi Nishidate, Takuya Kanie, Afrina Mustari, Tokyo Univ. of Agriculture and Technology (Japan); Satoko Kawauchi, Shunichi Sato, National Defense Medical College Research Institute (Japan); Manabu Sato, Yasuaki Kokubo, Yamagata Univ. (Japan). [10480-21]

Multimode interferometric diffuse correlation spectroscopy (iDCS), Wenjun Zhou, Oybek Kholiqov, Shau Poh Chong, Vivek J. Srinivasan, Univ. of California, Davis (USA) [10480-22]

Optical imaging characterizing brain response to thermal insult in injured rodent, David Abookasis, Oren Shaul, Omri Meitav, Gadi Pinchasi, Ariel Univ. (Israel) [10480-23]

Optical monitoring of acute physiological changes in a rat mild blast-induced traumatic brain injury model and its correlation with histopathological outcomes, Satoko Kawauchi, Michiyo Sakamaki, Chinami Onuma, Yukari Komuta, National Defense Medical College (Japan); Izumi Nishidate, Tokyo Univ. of Agriculture and Technology (Japan); Kenichi Kaida, Hitoshi Tsuda, Shunichi Sato, National Defense Medical College (Japan) [10480-24]

Monte Carlo look up table-based inverse algorithm to estimate cerebral optical properties in small animals using frequency-domain near infrared spectroscopy, Seung Yup Lee, Emory Univ. (USA) and Georgia Institute of Technology (USA); Corey Zheng, Georgia Institute of Technology (USA); Erin M. Buckley, Emory Univ. (USA) and Georgia Institute of Technology (USA) [10480-25]

Inverse Monte Carlo lookup table method to determine cerebral tissue properties in small animals using diffuse reflectance spectroscopy, Corey Zheng, Seung Yup Lee, Erin M. Buckley, Emory Univ. (USA) . [10480-26]

SESSION 6 SUN 10:30 AM TO 11:10 AM

Optical Spectroscopy: Pre-Clinical II

A three-wavelength multi-channel brain functional imager based on digital lock-in photon-counting technique, Xuemei Ding, Bingyuan Wang, Dongyuan Liu, Yao Zhang, Huijuan Zhao, Feng Gao, Tianjin Univ. (China) [10480-27]

Optical topography guided diffuse optical tomography for imaging brain function: a methodological study on semi-3 dimensional reconstruction, Bingyuan Wang, Jie He, Xuemei Ding, Yao Zhang, Tianjin Univ. (China); Wenjuan Ma, Tianjin Medical Univ. Cancer Institute & Hospital (China); Jiao Li, Limin Zhang, Zhongxing Zhou, Huijuan Zhao, Feng Gao, Tianjin Univ. (China) [10480-28]

PLENARY SESSION SUN 3:30 PM TO 5:30 PM

Neurotechnologies Plenary Session

Session Chairs: **David A. Boas**, Boston Univ. (USA)
Rafael Yuste, Columbia Univ. (USA)

This new plenary session will highlight the breadth of the exciting advances occurring in the field of neurophotonics and provide a unique forum for communication and networking for leaders and innovators in the neurophotonics community.

See page 7 for details

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10481

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10481

Neural Imaging and Sensing 2018

Conference Chairs: **Qingming Luo**, Huazhong Univ. of Science and Technology (China); **Jun Ding**, Stanford School of Medicine (USA)

Program Committee: **Robert R. Alfano**, The City College of New York (USA); **David A. Boas**, Massachusetts General Hospital (USA); **Shih-Chi Chen**, The Chinese Univ. of Hong Kong (Hong Kong, China); **Yu Chen**, Univ. of Maryland, College Park (USA); **Javier DeFelipe**, Univ. Politécnica de Madrid (Spain); **Hongwei Dong**, Univ. of California, Los Angeles (USA); **Congwu Du**, Stony Brook Univ. (USA); **Beop-Min Kim**, Korea Univ. (Korea, Republic of); **Byungkook Lim**, Univ. of California, San Diego (USA); **Francesco Saverio Pavone**, European Lab. for Non-linear Spectroscopy (Italy); **Darcy S. Peterka**, Columbia Univ. (USA); **Kambiz Pourrezaei**, Drexel Univ. (USA); **Claus-Peter Richter**, Northwestern Univ. (USA); **Anna W. Roe**, Vanderbilt Univ. (USA); **Shy Shoham**, Technion-Israel Institute of Technology (Israel); **Shaoqun Zeng**, Huazhong Univ. of Science and Technology (China); **Oxana V. Semyachkina-Glushkovskaya**, Saratov State Univ. (Russian Federation); **Pengcheng Li**, HUST-Suzhou Institute for Brainmatics (China)

SUNDAY 28 JANUARY

PLENARY SESSION SUN 3:30 PM TO 5:30 PM

Neurotechnologies Plenary Session

Session Chairs: **David A. Boas**, Boston Univ. (USA)
Rafael Yuste, Columbia Univ. (USA)

This new plenary session will highlight the breadth of the exciting advances occurring in the field of neurophotonics and provide a unique forum for communication and networking for leaders and innovators in the neurophotonics community.

See page 7 for details

MONDAY 29 JANUARY

SESSION 1 MON 8:20 AM TO 10:10 AM

In Vivo Mouse Brain Imaging I

Session Chair: **Qingming Luo**,
Britton Chance Ctr. for Biomedical Photonics (China)

GRIN lens based confocal system for deep brain calcium imaging (*Invited Paper*), Ling Fu, Britton Chance Ctr. for Biomedical Photonics (China); Qian Liu, Huazhong University of Sci&Tech, Wuhan National Lab for Optoelectronics G305 (China) [10481-1]

Stimulus-evoked functional and blood perfusion changes in the healthy and tumor rat somatosensory cortex imaged with UHR-OCT, Kostadinka Bizheva, Nadine Haymour, Zohreh Hosseinaee, Bingyao Tan, Benjamin MacLellan, Univ. of Waterloo (Canada); Carl J. Fisher, Princess Margaret Cancer Ctr., Univ. Health Network (Canada); Lothar D. Lilje, Univ. of Toronto (Canada) [10481-2]

Cerebral oxygenation and blood flow distributions along the capillary path in awake mice, Baoqiang Li, Ikbal Sencan, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Tatiana V. Esipova, Univ. of Pennsylvania (USA); Kivilcim Kilic, Univ. of California, San Diego (USA); Mohammad Moeini, Institute of Biomedical Engineering, Ecole Polytechnique de Montréal (Canada); Mohammad A. Yaseen, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Buyin Fu, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Sreekanth Kura, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Frédéric Lesage, Institute of Biomedical Engineering, Ecole Polytechnique de Montréal (Canada); Sergei A. Vinogradov, Univ. of Pennsylvania (USA); Anna Devor, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Univ. of California, San Diego (USA) and Harvard Medical School (USA); David A. Boas, Sava Sakadžić, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Harvard Medical School (USA) [10481-3]

Deep brain two-photon NIR fluorescence imaging for study of Alzheimer's disease, Congping Chen, Zhuoyi Liang, Biao Zhou, Nancy Ip, Jianan Y. Qu, Hong Kong Univ. of Science and Technology (China) .. [10481-4]

In vivo volumetric imaging of fast biological dynamics in deep tissue via wavefront engineering, Lingjie Kong, Tsinghua Univ. (China); Yifeng Zhou, Meng Cui, Purdue Univ. (USA) [10481-5]

SESSION 2 MON 10:40 AM TO 12:10 PM

In Vivo Mouse Brain Imaging II

Session Chair: **Ling Fu**,
Britton Chance Ctr. for Biomedical Photonics (China)

Imaging electrical activity in awake mouse brain with an improved voltage indicator and random-access two-photon microscopy (*Invited Paper*), Michael Lin, Stanford Univ. (USA) [10481-6]

Imaging of stimulus-induced hemodynamic response in the rat cortex using phase-stabilized swept-source OCT, Paul Shin, WooJhon Choi, KAIST (Korea, Republic of); JongYoon Ju, Korea Institute of Science and Technology (Korea, Republic of); Wang-Yuhl Oh, KAIST (Korea, Republic of) [10481-7]

Exploring with a reflectance fiber probe the biological mechanisms inducing light scattering and absorption changes during rat somatosensory cortex activation: relevance for the study of neurovascular and neurometabolic coupling mechanisms, Pierre P. Marquet M.D., Institut Univ. en Santé Mentale de Québec, Univ. Laval (Canada); Keven Bourgeois, Ctr. Hospitalier Univ. Vaudois (Switzerland); Jean-Michel Mugnes, Institut Univ. en Santé Mentale de Québec, Univ. Laval (Canada); Pierre J. Magistretti M.D., Christian Depeursinge, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10481-8]

Optically-transparent micro-ring resonator enables longitudinal cortical imaging by photoacoustic microscopy, Hao Li, Xian Zhang, Xiao Shu, Xiangfan Chen, Biqin Dong, Hao F. Zhang, Cheng Sun, Northwestern Univ. (USA) [10481-9]

Lunch Break Mon 12:10 pm to 1:30 pm

SESSION 3 MON 1:30 PM TO 3:20 PM

Brain-Wide Imaging I

Session Chair: **David A. Boas**, Boston Univ. (USA)

Brainmatics: bridging the brain science and brain-inspired artificial intelligence (*Invited Paper*), Qingming Luo, Suzhou Institute of Brainmatics, Huazhong Univ. of Science and Technology (China) [10481-10]

Mapping the quantitative cytoarchitecture of the whole mouse brain by light-sheet microscopy and digital brain atlasing, Ludovico Silvestri, Antonino Paolo Di Giovanna, Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Francesco Orsini, Univ. degli Studi di Firenze (Italy); Irene Costantini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Jan Bjaalie, Univ. I Oslo (Norway); Paolo Frasconi, Univ. degli Studi di Firenze (Italy); Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) [10481-11]

Imaging whole mouse brains with a dual resolution serial swept-source OCT scanner, Joël Lefebvre, Alexandre Castonguay, Frédéric Lesage, Ecole Polytechnique de Montréal (Canada) [10481-12]

Whole-brain observation in a living Drosophila brain by three-photon excitation at 1300-nm, Kuo-Jen Hsu, Shi-Wei Chu, National Taiwan Univ. (Taiwan); Tianyu Wang, Cornell Univ. (USA); Yen-Yin Lin, National Tsing Hua Univ. (Taiwan); Ann-Shyn Chiang, National Tsing Hua Univ. (Taiwan) and Academia Sinica (Taiwan) and Univ. of California, San Diego (USA); Chris Xu, Cornell Univ. (USA) [10481-13]

Line-illumination modulation for high-throughput optical-sectioning imaging, Rui Jin, Qiuyuan Zhong, Yutong Han, Xiaohua Lv, Xiaoquan Yang, Hui Gong, Jing Yuan, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China) [10481-14]

CONFERENCE 10481

SESSION 4 MON 3:50 PM TO 5:40 PM

Brain-Wide Imaging II

Session Chair: **Francesco Saverio Pavone**, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy)

Photoacoustic tomography: Deep functional imaging at high spatiotemporal resolution (*Invited Paper*), Lihong V. Wang, California Institute of Technology (USA). [10481-15]

Volumetric optoacoustic mapping of fast neuronal activity in an isolated mouse brain model expressing genetically encoded calcium indicator, Sven Gottschalk, Oleksiy Degtyaruk, Institute of Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany); Johannes Rebling, Benedict McLarney, Institute of Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Xosé Luis Deán-Ben, Institute of Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany); Shy Shoham, Technion-Israel Institute of Technology (Israel) and Neuroscience Institute, NYU Langone Medical Ctr. (USA); Daniel Razansky, Institute of Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany) [10481-16]

Optical projection tomography as a tool for mouse brain phenotyping, David Nguyen, Paul J. Marchand, Arielle L. Planchette, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Julia Nilsson, Lund Univ. Diabetes Ctr. (Sweden); Miguel Sison, Jérôme Extermann, Antonio Lopez, Marcin Sylwestrzak, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Anja Schmidt-Christensen, Dan Holmberg, Lund Univ. Diabetes Ctr. (Sweden); Dimitri Van De Ville, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10481-17]

Cryo-micro-optical sectioning tomography for label-free brainwide visualization of senile plaque, Yilin Luo, Huazhong Univ. of Science and Technology (China); Anle Wang, Mengmeng Liu, Tian Lei, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China); Xiaochuan Zhang, Zhaobing Gao, Hualiang Liang, Shanghai Institute of Materia Medica, Chinese Academy of Sciences (China); Hui Gong, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China); Jing Yuan, Huazhong Univ. of Science and Technology (China) [10481-18]

Advanced NeuroGPS-Tree achieves brain-wide reconstruction of neuronal population equal to manual reconstruction level, Tingwei Quan, Hang Zhou, Shiwei Li, Qingming Luo, Hui Gong, Anan Li, Shaoqun Zeng, Huazhong Univ. of Science and Technology (China) [10481-19]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Poster Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Investigating amyloid-beta plaques in whole brain sections of a mouse model of Alzheimer's disease with a visible light optical coherence microscope, Antonia Lichtenegger, Danielle J. Harper, Marco Augustin, Pablo Eugui, Medizinische Univ. Wien (Austria); Martina Muck, Adelheid Wöhner M.D., Klinisches Institut für Neurologie, Medizinische Univ. Wien (Austria); Christoph K. Hitzberger, Bernhard Baumann, Medizinische Univ. Wien (Austria) [10481-41]

Simultaneous OCT imaging and temperature sensing with a miniaturized fiber-optic probe, Jiawen Li, Erik P. Schartner, Bryden Quirk, Rodney W. Kirk, Stefan Musolino, Heike Ebendorff-Heidepriem, Robert A. McLaughlin, The Univ. of Adelaide (Australia) [10481-42]

A novel neurophotonics approach to study neural networks in vitro, Wardiya Afshar Saber, Federico M. Gasparoli, School of Medicine, Univ. of St. Andrews (United Kingdom); Frank J. Gunn-Moore, Univ. of St. Andrews (United Kingdom); Maciej K. Antkowiak, School of Medicine, Univ. of St. Andrews (United Kingdom) [10481-43]

Three-dimensional reconstruction of the human brain cortex by means of a SWITCH/TDE-combined clearing method, Irene Costantini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Ludovico Silvestri, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Erica Lazzeri, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Valerio Conti, Azienda Ospedaliera Univ. Anna Meyer (Italy); Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. of Florence (Italy); Leonardo Sacconi, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Renzo Guerrini, Azienda Ospedaliera Univ. Anna Meyer (Italy); Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. of Florence (Italy) [10481-44]

Change in cognitive process during dance video game play with different appendages for motor output, Kota Suzuki, Yumie Ono, Sotaro Shimada, Meiji Univ. (Japan); Atsumichi Tachibana, Dokkyo Medical Univ. (Japan); Jack Adam Noah, Yale School of Medicine (USA) [10481-45]

Analysis of prefrontal cortex function in TD patient during working memory task and olfactory task by using fNIRS measurements, WeiShan Hsiao, Yen-Ting Chen, Institute of Biomedical Engineering, National Chiao Tung Univ. (Taiwan); Wen-Chin Weng, National Taiwan Univ. Children's Hospital (Taiwan); Wang-Tso Lee, National Taiwan Univ. Children's Hospital (Taiwan); Jung-Chih Chen, Ching-Cheng Chuang, Institute of Biomedical Engineering, National Chiao Tung Univ. (Taiwan) [10481-46]

Diffusion quantification of IR-780 dye delivered using Lexiscan through the blood brain barrier, Rebecca W. Pak, Hanh N. D. Le, Heather Valentine, Johns Hopkins Univ. (USA); Daniel L. J. Thorek, The Johns Hopkins Univ. School of Medicine (USA); Arman Rahmim, Dean F. Wong, Jin U. Kang, Johns Hopkins Univ. (USA) [10481-47]

A software pipeline for high-throughput stitching and processing of teravoxel-sized 3D images of brain samples, Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. of Florence (Italy); Ludovico Silvestri, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Francesco Orsini, Univ. degli Studi di Firenze (Italy); Irene Costantini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. degli Studi di Firenze (Italy); Paolo Frascioni, Univ. degli Studi di Firenze (Italy); Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. degli Studi di Firenze (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy) [10481-49]

Voluntary exercise confers protection against age-related deficits in brain oxygenation in awake mice model of Alzheimer's disease, Xuecong Lu, Mohammad Moeini, Ecole Polytechnique de Montréal (Canada) and Institut de Cardiologie de Montréal (Canada); Baoqiang Li, Sava Sakadžić, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Frédéric Lesage, Ecole Polytechnique de Montréal (Canada) and Institut de Cardiologie de Montréal (Canada) [10481-50]

Hemodynamic monitoring in different cortical layers with a single fiber optical system, Linhui Yu, Muhammad S. Noor, Zelma H. T. Kiss, Kartikeya Murari, Univ. of Calgary (Canada) [10481-51]

Comparison of seven optical clearing methods for mouse brain, Peng Wan, Tingting Yu, Jingtian Zhu, Dan Zhu, Britton Chance Ctr. for Biomedical Photonics (China) [10481-52]

Single camera hemodynamic imaging of mouse brain with intact skull, Seung-Ho Paik, Zephaniah Phillips V, Youngwoon Choi, Beop-Min Kim, Korea Univ. (Korea, Republic of) [10481-53]

Long fiber based multi-channel NIRS system for freely moving mice, Young Kyu Kim, Seung-Ho Paik, Zephaniah Phillips V, Youngwoon Choi, Beop-Min Kim, Korea Univ. (Korea, Republic of) [10481-54]

Understanding neurovascular mechanisms during cortical spreading depression in ischemic stroke rats using novel ECoG-LSCI technology, Han-Chi Pan, Chia-Hua Tsai, Lun-De Liao, National Health Research Institutes (Taiwan) [10481-55]

Optical clearing method for skull tissue for in-vivo morphological imaging of the rat brain with UHR-OCT, Nadine Haymour, Zohreh Hosseinaee, Kostadinka Bizheva, Univ. of Waterloo (Canada) [10481-56]

Measurement of shear-induced diffusion of red blood cells using dynamic light scattering-optical coherence tomography, Jianbo Tang, Massachusetts General Hospital, Harvard Medical School (USA) and Boston Univ. (USA); Sefik Evren Erdener, Massachusetts General Hospital, Harvard Medical School (USA); Baoqiang Li, Buyin Fu, Sava Sakadžić, Stefan A. Carp, Massachusetts General Hospital, Harvard Medical School (USA); Jonghwan Lee, Brown Univ. (USA); David A. Boas, Boston Univ. (USA) and Massachusetts General Hospital, Harvard Medical School (USA) [10481-57]

Sparse super-localization reconstruction in transport-regime fluorescence molecular tomography, Golam Kibria Chowdhury, Univ. of Alberta (Canada). [10481-58]

Deep brain imaging using an ultra-thin OCT endoscopy probe, Woo June Choi, Univ. of Washington (USA); Suebei Moon, Kookmin Univ. (Korea, Republic of); Ruikang K. Wang, Univ. of Washington (USA). [10481-59]

Improved near infrared spectroscopy patch with conformal contact elastomeric substrate, Chang Hyun Park, Jong Seo Park, Keum-Shik Hong, Suck Won Hong, Pusan National Univ. (Korea, Republic of); Kyung-In Jang, Daegu Gyeonbuk Institute of Science and Technology (Korea, Republic of); Chang-Soek Kim, Pusan National Univ. (Korea, Republic of) [10481-60]

Bio-signal impact of cybersickness caused by virtual reality, Yi Tien Lin, Yu-Yi Chien, Fang-Cheng Lin, Yi-Pai Huang, National Chiao Tung Univ. (Taiwan) [10481-61]

Optimized uDISCO for improving fluorescence preservation of green fluorescent protein, Yusha Li, Tingting Yu, Jianyi Xu, Dan Zhu, Britton Chance Ctr. for Biomedical Photonics (China) [10481-62]

Automatic tissue image segmentation based on image processing and deep learning, Zhenglun Kong, Northeastern Univ. (USA); Junyi Luo, Ting Li, Univ. of Electronic Science and Technology of China (China) [10481-63]

DeepBouton: automated identification of single-neuron axonal boutons at the brain-wide scale, Shaoqun Zeng, Shenghua Cheng, Xiaojun Wang, Qingming Luo, Hui Gong, Britton Chance Ctr. for Biomedical Photonics (China). [10481-64]

Simultaneous two-layer two photon imaging with frequency multiplexing, Yiming Guo, Pei Li, Yu Wang, Shaoqun Zeng, Xiaohua Lv, Britton Chance Ctr. for Biomedical Photonics (China) [10481-65]

High-resolution imaging immunolabeled large-volume brain tissues, Xiuli Liu, Shaoqun Zeng, Ruixi Chen, Britton Chance Ctr. for Biomedical Photonics (China) [10481-66]

Whole-brain imaging using multi-view sub-voxel-resolving light-sheet microscopy, Jun Nie, Sa Liu D.D.S., Huazhong Univ. of Science and Technology (China); Yusha Li, Tingting Yu, Dan Zhu, Britton Chance Ctr. for Biomedical Photonics (China) and Wuhan National Lab. for Optoelectronics (China); Peng Fei, Huazhong Univ. of Science and Technology (China) and Britton Chance Ctr. for Biomedical Photonics (China) and Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China). [10481-67]

Three-channel whole-brain optical imaging for visualizing dual-labeled input and output of neural circuit with co-located anatomical reference, Zhangheng Ding, Xiaoyu Zhang, Qiuyuan Zhong, Ting Zheng, Pan Luo, Xiangning Li, Jing Yuan, Hui Gong, Qingming Luo, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China). [10481-68]

A lightweight camera system for intrinsic imaging of cortex in non-headfixed primates, Derek Zaraza, Oregon Health & Science Univ. (USA); Anna W. Roe, Oregon Health & Science Univ. (USA) [10481-69]

Single and multidigit activation in monkey somatosensory cortex using voltage sensitive dye imaging, Robert M. Friedman, Oregon Health & Science Univ. (USA); Anna W. Roe, Oregon Health and Science Univ. (USA). [10481-70]

TUESDAY 30 JANUARY

SESSION 5 TUE 8:10 AM TO 10:00 AM

Novel Technologies I

Session Chair: **Beop-Min Kim**,
Korea Univ. Medical Library (Korea, Republic of)

Hybrid averaging optical coherence tomography angiography and applications in brain (*Invited Paper*), Peng Li, Pei Li, Shanshan Yang, Zhihua Ding, Zhejiang Univ. (China). [10481-20]

Optical imaging of cellular membrane potential using quantum-peptide-fullerene bioconjugates, James B. Delehanty, U.S. Naval Research Lab. (USA). [10481-21]

Reconstruction and depixelation of multicore fiber bundle images by fiber bundle rotation, Carlos Rentería, Javier Suárez, Parijat Sengupta, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign (USA) and Beckman Institute for Advanced Science and Technology (USA) . . . [10481-22]

Structure illuminated two-photon microscopy for high resolution imaging deep into the brain, Yao Zheng, Wei Gong, Ke Si, Zhejiang Univ. (China). [10481-23]

Nanomedicine photoluminescence crystal-inspired brain sensing approach, Yan Fang M.D., Fudan Univ. (China) [10481-24]

SESSION 6 TUE 10:30 AM TO 12:30 PM

Novel Technologies II

Session Chair: **Jun Ding**, Stanford Univ. Medical Ctr. (USA)

High-speed, high-resolution in vivo brain imaging with wavefront shaping (*Invited Paper*), Na Ji, Univ. of California, Berkeley (USA) . . [10481-25]

Generation of extremely thin light sheets allows fast isotropic imaging of whole mouse brains by ultramicroscopy (*Invited Paper*), Hans-Ulrich Dodt, Saiedeh Saghafi, Klaus Becker, Christian Hahn, Marko Pende, Inna Sabdyusheva-Litschauer, Technische Univ. Wien (Austria) [10481-26]

Super-resolution localization microscopy with large field-of-view for mapping synaptic connectivity at multiple scales, Zhenli Huang, Bo Xin, Yujie Wang, Luchang Li, Zhaoning Zhang, Mingtao Shang, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China) [10481-27]

Simultaneous two-photon microscopy and magnetic resonance imaging at ultrahigh field of 16.4 Tesla, Meng Cui, Purdue Univ. (USA) . . . [10481-28]

UbasM: a simple, rapid, efficient balanced optical clearing method for brain imaging, Lingling Chen, Guiye Li, Yingchao Li, Shenzhen Univ. (China); Lina Liu, Ang Liu, Shenzhen Univ. (China); Shuangchen Ruan, Shenzhen Univ. (China). [10481-29]

Lunch/Exhibition Break Tue 12:30 pm to 1:40 pm

SESSION 7 TUE 1:40 PM TO 3:20 PM

Human Brain Imaging

Session Chair: **Yu Chen**, Univ. of Maryland, College Park (USA)

Interferometric near-infrared spectroscopy (iNIRS) at short source-detector separations, Oybek Kholiqov, Wenjun Zhou, Vivek J. Srinivasan, Univ. of California, Davis (USA) [10481-30]

Low-frequency oscillation amplitude elevation of prefrontal cerebral hemodynamics with driving duration during prolonged driving test, Zishan Deng, Yuan Gao, Ting Li, Univ. of Electronic Science and Technology of China (China) [10481-31]

Detection of cortical oxygen for clinical analysis and trends research of olfactory memory by using functional optical topography, Yen Ting Chen, Ching-Cheng Chuang, Jung-Chih Chen, National Chiao Tung Univ. (Taiwan). [10481-32]

Global cerebral ischemia induces spatial propagation of cerebral blood flow during cardiac arrest and after resuscitation, Christian Crouzet, Robert H. Wilson, Beckman Laser Institute and Medical Clinic (USA); Afsheen Bazrafkan, Univ. of California, Irvine School of Medicine (USA); Juan Alcocer, Univ. of California, Irvine (USA); Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA); Yama Akbari M.D., Univ. of California, Irvine School of Medicine (USA); Bernard Choi, Beckman Laser Institute and Medical Clinic (USA). [10481-33]

Spatio-temporal propagation of changes in cerebral blood flow and tissue scattering in response to cardiac arrest and resuscitation, Robert H. Wilson, Christian Crouzet, Mohammad Torabzadeh, Beckman Laser Institute and Medical Clinic (USA); Afsheen Bazrafkan, Yama Akbari M.D., Univ. of California, Irvine School of Medicine (USA); Bernard Choi, Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA). [10481-34]

CONFERENCE 10481

SESSION 8. TUE 3:50 PM TO 6:00 PM

Optical Sensing and Imaging for Brain Diseases

Session Chair: **Shy Shoham**,
Technion-Israel Institute of Technology (Israel)

Advances of deep imaging in brain within optical tissue windows
(Invited Paper), Lingyan Shi, Wei Min, Columbia Univ. (USA) [10481-35]

Long term imaging of living brain glial cancer cells, Patricia M. A. Farias, Phornano Holding GmbH (Austria) and Univ. Federal de Pernambuco (Brazil) and Centro de Tecnologias Estratégicas do Nordeste (Brazil); André Galembeck, Federal Rural Univ. of Pernambuco (Brazil) and Centro de Tecnologias Estratégicas do Nordeste (Brazil); Raquel Milani, Centro de Tecnologias Estratégicas do Nordeste (Brazil); Arnaldo Andrade, Univ. Federal de Pernambuco (Brazil); Andreas Stingl, Phornano Holding GmbH (Austria) [10481-36]

Cerebral penetrating arteriole dynamics has important implication to the exacerbated ischemic injury in type 2 diabetes, Yuandong Li, Woo June Choi, Shaozhen Song, Univ. of Washington (USA); Atsushi Kanoke, Jialing Liu, Univ. of California, San Francisco (USA); Ruikang K. Wang, Univ. of Washington (USA) [10481-37]

Optical coherence tomography angiography based biomarkers to assess the safety of peripheral nerve electrostimulation, Srikanth Vasudevan, U.S. Food and Drug Administration (USA); Ahhyun S. Nam, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Benjamin J. Vakoc, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Daniel X. Hammer, U.S. Food and Drug Administration (USA) [10481-38]

White matter atrophy in spinocerebellar ataxia type 1 mouse models revealed by serial optical coherence scanner, Chao J. Liu, Harry T. Orr, Taner Akkin, Univ. of Minnesota, Twin Cities (USA) [10481-39]

Photodynamic opening of blood-brain barrier, Oxana V. Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation); Ekaterina G. Borisova, Institute of Electronics, Bulgarian Academy of Sciences (Bulgaria); Sergei G. Sokolovski, Optoelectronics and Biomedical Photonics Group, Aston Univ. (United Kingdom); Alexander Shirokov, Institute of Biochemistry and Physiology of Plants and Microorganisms, Russian Academy of Sciences (Russian Federation); Nikita A. Navolokin, Saratov State Medical Univ. (Russian Federation); Natalia Shushunova, Alexander Khorovodov, Maria V. Ulanova, Madina M. Sagatova, Ilana Agranovich, Anastasiya Bodrova, Saratov State Univ. (Russian Federation); Edik U. Rafailov, Aston Univ. (United Kingdom) [10481-40]

CONFERENCE 10482

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10482

Optogenetics and Optical Manipulation 2018

Conference Chairs: **Samarendra K. Mohanty**, Nanoscope Technologies, LLC (USA); **Nitish V. Thakor**, Johns Hopkins Univ. (USA), National Univ. of Singapore (Singapore); **E. Duco Jansen**, Vanderbilt Univ. (USA)

Program Committee: **Antoine Adamantidis**, McGill Univ. (Canada); **George J. Augustine**, Duke–NUS Graduate Medical School (Singapore); **Klaus B. Gerwert**, Ruhr–Univ. Bochum (Germany); **Xue Han**, Boston Univ. (USA); **Elizabeth M. Hillman**, Columbia Univ. (USA); **Richard Kramer**, Univ. of California, Berkeley (USA); **Alfred L. Nuttall**, Oregon Health & Science Univ. (USA); **Anna W. Roe**, Vanderbilt Univ. (USA); **Ulrich T. Schwarz**, Technische Univ. Chemnitz (Germany); **Shy Shoham**, Technion–Israel Institute of Technology (Israel); **John P. Welsh**, Univ. of Washington (USA); **Rafael Yuste M.D.**, Columbia Univ. (USA)

SATURDAY 27 JANUARY

SESSION 1..... SAT 8:00 AM TO 10:00 AM

Control I

Session Chair: **Samarendra K. Mohanty**, Nanoscope Technologies, LLC (USA)

The development of radiogenetically-controlled signaling proteins for novel applications to optogenetics (*Invited Paper*), Morgan S. Schmidt, Patrick Dennis, Ruth Pachter, Air Force Research Lab. (USA)..... [10482-1]

Activation of functional domains in the primate cortex with infrared neural stimulation, [10482-2]

Validating the temperature rise during infrared neural inhibition with increased block width, Jeremy B. Ford, Mohit Ganguly, Megan Poorman, Vanderbilt Univ. (USA); Michael W. Jenkins, Hillel J. Chiel, Case Western Reserve Univ. (USA); E. Duco Jansen, Vanderbilt Univ. (USA)..... [10482-3]

Photoactivatable control of immune signaling cascades and optogenetic immunomodulation for tumor killing, Lian He, Texas A&M Univ. (USA)..... [10482-4]

Optogenetic probing of muscle function, active sensation, and recovery from nerve damage in the mouse whisker system, Akhil Bandi, Aman Upadhyay, Thomas J. Vajtay, S. Olga Yiantsos, Rutgers, The State Univ. of New Jersey (USA); Christian R. Lee, David J. Margolis, Rutgers, School of Arts and Sciences (USA)..... [10482-5]

Excitability of astrocyte in vitro with infrared neural stimulation, Wilson R. Adams, Manqing Wang, Vanderbilt Univ. (USA); Roberto Zamboni, Valentina Benfenati, Istituto per la Sintesi Organica e la Fotoreattività (Italy); E. Duco Jansen, Anita Mahadevan–Jansen, Vanderbilt Univ. (USA) and Vanderbilt Univ. Medical Ctr. (USA)..... [10482-6]

SESSION 2..... SAT 10:30 AM TO 11:50 AM

Control II

Session Chair: **E. Duco Jansen**, Vanderbilt Univ. (USA)

Real-time optical manipulation of the cardiac conduction pathway, Emilia Margoni, Samantha Cannazzaro, LENS - Lab. Europeo di Spettroscopie Non-Linearari (Italy); Cecilia Ferrantini, Raffaele Coppini, Univ. degli Studi di Firenze (Italy); Pin Yan, Leslie Loew, Univ. of Connecticut Health Ctr. (USA); Leonardo Bocchi, Univ. degli Studi di Firenze (Italy); Marina Campione, Univ. degli Studi di Padova (Italy); Elisabetta Cerbai, Corrado Poggiosi, Univ. degli Studi di Firenze (Italy); Gil Bub, McGill Univ. (Canada); Francoaco Pavone, Leonardo Sacconi, LENS - Lab. Europeo di Spettroscopie Non-Linearari (Italy)..... [10482-7]

Optogenetic control of Drosophila cardiac function with red-shifted opsins, Jing Men, Lehigh Univ. (USA); Airong Li, Rudolph Tanzi, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Chao Zhou, Lehigh Univ. (USA)..... [10482-8]

Towards optogenetic control of spatiotemporal cardiac dynamics, Laura Diaz–Rodriguez, Stefan Luther, Claudia Richter, Max Planck Institute for Dynamics and Self–Organization (Germany)..... [10482-9]

Infrared light alters cardiorespiratory activity in a dose and site dependent manner in the in situ arterially perfused brainstem preparation, Gjinovefa Kola M.D., Junqi Zhuo, Thomas E. Dick, Case Western Reserve Univ. (USA); Mathias Dutschmann, Howard Florey Institute (Australia); E. Duco Jansen, Vanderbilt Univ. (USA); Hillel J. Chiel, Michael W. Jenkins, Stephen J. Lewis, Case Western Reserve Univ. (USA)..... [10482-10]

Lunch/Exhibition Break Sat 11:50 am to 1:20 pm

SESSION 3..... SAT 1:20 PM TO 3:10 PM

Detection

Session Chair: **E. Duco Jansen**, Vanderbilt Univ. (USA)

In vivo brain activity imaging from socially-interacting multiple mice (*Invited Paper*), Takeharu Nagai, Osaka Univ. (Japan)..... [10482-11]

In-vivo label-free optical detection of neural activities in retina, Subrata Batabyal, Sivakumar Gajjeraman, Weldon Wright, Samarendra K. Mohanty, Nanoscope Technologies, LLC (USA)..... [10482-12]

Measuring IR-induced 3D temperature profiles using phase decorrelation OCT, Junqi Zhuo, Brecken J. Blackburn, Matthew T. McPheeters, Lars Thrane, Hillel J. Chiel, Case Western Reserve Univ. (USA); E. Duco Jansen, Vanderbilt Univ. (USA); Michael W. Jenkins, Case Western Reserve Univ. (USA)..... [10482-13]

Optical stimulation and monitoring of the visual system using bioluminescent opsin, Samarendra K. Mohanty, Subrata Batabyal, Sivakumar Gajjeraman, Nanoscope Technologies, LLC (USA); Takeharu Nagai, Osaka Univ. (Japan); Weldon Wright, Nanoscope Technologies, LLC (USA)..... [10482-14]

A compact integrated device for spatially-selective optogenetic neural stimulation based on the Utah Optrode Array, Robert Scharf, Christopher Reiche, The Univ. of Utah (USA); Niall McAlinden, Yunzhou Cheng, Enyuan Xie, Univ. of Strathclyde (United Kingdom); Rohit Sharma, Prashant Tathireddy, Loren Rieth, The Univ. of Utah (USA); Keith Mathieson, Univ. of Strathclyde (United Kingdom); Steve Blair, The Univ. of Utah (USA)..... [10482-15]

SESSION 4..... SAT 3:40 PM TO 5:20 PM

Delivery

Session Chair: **Samarendra K. Mohanty**, Nanoscope Technologies, LLC (USA)

Single source for simultaneous two-photon stimulation and imaging based on spectral-temporal modulation of supercontinuum generation, Yuan-Zhi Liu, Carlos Renteria, Sixian You, Yi Sun, Haohua Tu, Parijat Sengupta, Stephen A. Boppart, Univ. of Illinois (USA)..... [10482-16]

Modeling of cerebral blood flow in reaction to neural stimulation, Rex Chin-Hao Chen, Farid Atry, Univ. of Wisconsin–Milwaukee (USA); Jane Pisaniello, Sarah Brodnick, Aaron J. Suminski, Joseph Novello, Jared Ness, Justin C. Williams, Univ. of Wisconsin–Madison (USA); Ramin Pashaie, Univ. of Wisconsin–Milwaukee (USA)..... [10482-18]

An integrated model for optimizing laser induced thermal inhibition in nerves, Mohit Ganguly, Jeremy B. Ford, Vanderbilt Univ. (USA); Michael W. Jenkins, Hillel J. Chiel, Case Western Reserve Univ. (USA); E. Duco Jansen, Vanderbilt Univ. (USA)..... [10482-19]

Hydrogels for efficient light delivery in optogenetic applications, Sonja Johannsmeier, Niedersächsisches Zentrum für Biomedizintechnik, Implantatforschung und Entwicklung (Germany); Maria L. Torres, Leibniz Univ. Hannover (Germany); Tammo Ripken, Laser Zentrum Hannover e.V. (Germany); Alexander Heisterkamp, Leibniz Univ. Hannover (Germany); Dag Heinemann, Laser Zentrum Hannover e.V. (Germany)..... [10482-20]

Light propagation analysis in neural tissue for wireless optogenetic nanonetworks, Pedram Johari, Univ. at Buffalo (USA); Stefanus Wirdatmadja, Sasitharan Balasubramaniam, Tampere Univ. of Technology (Finland); Josep M. Jornet, Univ. at Buffalo (USA)..... [10482-21]

CONFERENCE 10482

BIOS SATURDAY HOT TOPICS SESSION7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5..... SUN 8:00 AM TO 10:30 AM

Manipulation

Session Chair: **E. Duco Jansen**, Vanderbilt Univ. (USA)

Optical tools for analyzing and controlling neural circuits (*Keynote Presentation*), Edward S. Boyden, MIT Media Lab. (USA) [10482-22]

Targeted nano-enhanced Optical delivery of opsin for dry-AMD therapy, Sivakumar Gajjaraman, Subrata Batabyal, Weldon Wright, Samarendra K. Mohanty, Nanoscope Technologies, LLC (USA) [10482-23]

An all-optical system for rapid and deep interrogation of behaviorally relevant activity patterns, Gilad Lerman, Jonathan V. Gill, Dmitry Rinberg, NYU School of Medicine (USA); Shy Shoham, Technion-Israel Institute of Technology (Israel) [10482-24]

Peripheral nerve recruitment curve using near-infrared stimulation, Marie Dautrebande, Pascal Doguet, Synergia Medical (Belgium); Simon-Pierre Gorza, Univ. Libre de Bruxelles (Belgium); Jean Delbeke, Univ. Gent (Belgium); Antoine Nonclercq, Univ. Libre de Bruxelles (Belgium) [10482-25]

Development of electro-conductive silver phosphate-based glass optrodes for in vivo optogenetics, Mathieu Desjardins, Stepan Gorgutsa, Yannick Ledemi, Gabriel Gagnon-Turcotte, Esmael Maghsoudloo, Guillaume Filion, Benoit Gosselin, Younès Messaddeq, Univ. Laval (Canada) . . [10482-26]

Targeted optogenetic investigation of in vitro human iPSC-derived neuronal networks, Felix Schmieder, TU Dresden (Germany) [10482-27]

SESSION 6.....SUN 11:00 AM TO 12:00 PM

Mechanism

Session Chair: **Samarendra K. Mohanty**, Nanoscope Technologies, LLC (USA)

The role of voltage-dependent potassium currents during thermal block in the squid giant axon, Mohit Ganguly, Vanderbilt Univ. (USA); Michael W. Jenkins, Hillel J. Chiel, Case Western Reserve Univ. (USA); E. Duco Jansen, Vanderbilt Univ. (USA) [10482-28]

The role of membrane capacitance and ion channels in the response of primary auditory neurons to infrared light, William G. A. Brown, Swinburne Univ. of Technology (Australia); Karina Needham, The Univ. of Melbourne (Australia); Alexander C. Thompson, Bionics Institute (Australia); Bryony Nayagam, The Univ. of Melbourne (Australia) and Bionics Institute (Australia); Paul R. Stoddart, Swinburne Univ. of Technology (Australia) [10482-29]

Computational algorithm for assessing inter-neuronal connectivity to optimize optogenetic stimulation and neural circuit activity, Carlos Renteria, Shreya M. Santhanam, Yuan-Zhi Liu, Denise Medina, Parijat Sengupta, Stephen A. Boppart, Univ. of Illinois (USA) and Beckman Institute for Advanced Science and Technology (USA) [10482-30]

PLENARY SESSION SUN 3:30 PM TO 5:30 PM

Neurotechnologies Plenary Session

Session Chairs: **David A. Boas**, Boston Univ. (USA)
Rafael Yuste, Columbia Univ. (USA)

This new plenary session will highlight the breadth of the exciting advances occurring in the field of neurophotonics and provide a unique forum for communication and networking for leaders and innovators in the neurophotonics community.

See page 7 for details

CONFERENCE 10483

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10483

Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII

BIOS

Conference Chairs: **Joseph A. Izatt**, Duke Univ. (USA); **James G. Fujimoto**, Massachusetts Institute of Technology (USA); **Valery V. Tuchin**, N.G. Chernyshevsky Saratov National Research State Univ. (Russian Federation), National Research Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control RAS (Russian Federation)

Program Committee: **Peter E. Andersen**, Technical Univ. of Denmark (Denmark); **Kostadinka Bizheva**, Univ. of Waterloo (Canada); **Stephen A. Boppart M.D.**, Univ. of Illinois at Urbana-Champaign (USA); **Zhongping Chen**, Beckman Laser Institute and Medical Clinic (USA); **Johannes de Boer**, Vrije Univ. Amsterdam (Netherlands); **Wolfgang Drexler**, Medizinische Univ. Wien (Austria); **Grigory V. Gelikonov**, Institute of Applied Physics (Russian Federation); **Christoph K. Hitzenberger**, Medizinische Univ. Wien (Austria); **Robert A. Huber**, Univ. zu Lübeck (Germany); **Rainer A. Leitgeb**, Medizinische Univ. Wien (Austria); **Xingde Li**, Johns Hopkins Univ. (USA); **Yingtian Pan**, Stony Brook Univ. (USA); **Adrian Gh. Podoleanu**, Univ. of Kent (United Kingdom); **Andrew M. Rollins**, Case Western Reserve Univ. (USA); **Marinko V. Sarunic**, Simon Fraser Univ. (Canada); **Guillermo J. Tearney M.D.**, Wellman Ctr. for Photomedicine (USA); **Ruikang K. Wang**, Univ. of Washington (USA); **Maciej Wojtkowski**, Nicolaus Copernicus Univ. (Poland); **Yoshiaki Yasuno**, Univ. of Tsukuba (Japan)

SUNDAY 28 JANUARY

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Technology

Speckle-modulation for unlimited speckle reduction in optical coherence tomography, Orly Liba, Stanford Univ. (USA); Matthew D. Lew, Washington Univ. in St. Louis (USA); Elliott D. SoRelle, Rebecca Dutta, Debasish Sen, Darius M. Moshfeghi, Steven Chu, Adam de la Zerda, Stanford Univ. (USA) [10483-85]

Integrated imaging engine with wideband 1060 nm laser for high resolution SS-OCT, Nate J. Kemp, Walid Atia, Brian Goldberg, Bart Johnson, Mark Kuznetsov, Noble Larson, Peter Whitney, AXSUN Technologies Inc. (USA) [10483-86]

Segmentation on optical coherence microscopy fly heart images using convolutional neural networks, Lian Duan, Xi Qin, Yuanhao He, Lehigh Univ. (USA); Xialin Sang, Hainan Univ. (China); Jinda Pan, Tianjin Univ. (China); Tao Xu, Jing Men, Lehigh Univ. (USA); Yutao Ma, Wuhan Univ. (China); Chao Zhou, Lehigh Univ. (USA) [10483-87]

Validating nanoscale sensitivity of spectroscopic OCT using FDTD, Aya Eid, Di Zhang, James Winkelmann, Northwestern Univ. (USA); Ji Yi, Boston Univ. (USA); Vadim Backman, Northwestern Univ. (USA) . . . [10483-88]

A compact off-axis full-field time-domain OCT device for homecare applications, Michael Münst, Medizinisches Laserzentrum Lübeck GmbH (Germany); Helge Sudkamp D.D.S., Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany); Peter Koch, Malte vom Endt, Eike Brockmueller, Medizinisches Laserzentrum Lübeck GmbH (Germany); Claus von der Burchard, Johann Roeder, Univ. Eye Hospital (Germany); Gereon Huettmann, Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany) [10483-89]

Implementation and demonstration of compressed sensing enabled phase-resolved swept-source optical coherence tomography, Yuye Ling, Columbia Univ. (USA); William Meiniel, Institut Pasteur (France) and Télécom ParisTech (France); Jean-Christophe Olivo-Marín, Institut Pasteur (France); Elsa D. Angelini, Télécom ParisTech (France) and Imperial College London (United Kingdom); Christine P. Hendon, Columbia Univ. (USA) [10483-90]

Extraction of group velocity dispersion (GVD) value from standard Fourier domain OCT data, Sylwia M. Kolenderska, Bastian Braeuer, Frédérique Vanholsbeeck, The Univ. of Auckland (New Zealand) . . . [10483-91]

Snapshot polarization-sensitive plug-in optical module for a Fourier-domain optical coherence tomography system, Manuel Jorge M. Marques, Univ. of Kent (United Kingdom); Sylvain Rivet, Univ. de Bretagne Occidentale (France); Adrian Bradu, Adrian Podoleanu, Univ. of Kent (United Kingdom) [10483-92]

Time efficient Gabor fused master slave optical coherence tomography, Ramona C. Cernat, Adrian Bradu, Univ. of Kent (United Kingdom); Sylvain Rivet, Univ. de Bretagne Occidentale (France); Adrian Podoleanu, Univ. of Kent (United Kingdom) [10483-93]

Intra-retinal segmentation of optical coherence tomography images using active contours with a dynamic programming initialization and an adaptive weighting strategy, Peyman Gholami, Priyanka Roy, Mohana K. Parthasarathy, Abbas Ommani, John S. Zelek, Vasudevan Lakshminarayanan, Univ. of Waterloo (Canada) [10483-94]

250kHz SD-OCT for volumetric imaging of the cellular structure of biological tissue, Bingyao Tan, Zohreh Hosseinaee, Kostadinka Bizheva, Univ. of Waterloo (Canada) [10483-95]

Non-destructive geometric and refractive index characterization of single and multi-element lenses using optical coherence tomography, Yuan Kai K. Tao, Mohamed T. El-Haddad, Vanderbilt Univ. (USA) . . . [10483-96]

Long-to-short wavelength swept source, Bart C. Johnson, Walid Atia, Mark Kuznetsov, Brian Goldberg, Nate Kemp, Peter Whitney, AXSUN Technologies Inc. (USA) [10483-97]

Wavelet tree structure based speckle noise removal for optical coherence tomography, Xin Yuan, Nokia Bell Labs (USA); Xuan Liu, New Jersey Institute of Technology (USA) [10483-98]

Wide field of view and high lateral resolution optical coherence tomography by 3d image stitching and superresolution, Kai Shen, Univ. of Miami (USA); Guomin Jiang, Univ. of Miami (USA); Sarfaraz A. Baig, Michael R. Wang, Univ. of Miami (USA) [10483-99]

Scaled nonuniform Fourier transform for image reconstruction in swept source optical coherence tomography, Karim Nagib, Univ. of Manitoba (Canada); Namal Fernando, Manitoba Hydro (Canada); Behzad Kordi, Sherif Sherif, Univ. of Manitoba (Canada) [10483-100]

Highly efficient superluminescent diodes and SLD-based combined light sources of red spectral range for applications in biomedical imaging, Ekaterina V. Andreeva, Andrey Anikeev, Stepan Il'chenko, Opton Ltd. (Russian Federation); Alexander Chamorovskiy, Superlum (Ireland); Sergei D. Yakubovich, Moscow Technological Univ. (MIREA) (Russian Federation) [10483-101]

Automated intraretinal layer segmentation of optical coherence tomography images using graph-theoretical methods, Priyanka Roy, Mohana K. Parthasarathy, John S. Zelek, Vasudevan Lakshminarayanan, Peyman Gholami, Univ. of Waterloo (Canada) [10483-102]

An analytical expression for the path length accumulation in OCT signals from diffuse media evaluated from first principles, Andrei K. Dioumaev, Thomas P. Jenkins, MetroLaser, Inc. (USA); Bauke Heeg, Lumium Inc. (Netherlands) [10483-103]

An OCT image denoising method based on fractional integral, Minghui Chen, Xianfu Qin, Jintao He, Wenyu Jia, Gang Zheng, Univ. of Shanghai for Science and Technology (China) [10483-104]

CONFERENCE 10483

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

MONDAY 29 JANUARY

SESSION 1. MON 8:30 AM TO 10:00 AM

Ophthalmic New Technology I

Session Chair: **Joseph A. Izatt**, Duke Univ. (USA)

Combined hardware and computational adaptive optics for human retinal imaging, Fredrick A. South, Univ. of Illinois (USA); Kazuhiro Kurokawa, Zhuolin Liu, Indiana Univ. (USA); Yuan-Zhi Liu, Univ. of Illinois (USA); Donald T. Miller, Indiana Univ. (USA); Stephen A. Boppart, Univ. of Illinois (USA) [10483-1]

Multi-scale sensorless adaptive optics OCT for in vivo human retinal imaging, Myeong Jin Ju, Morgan Heisler, Daniel J. Wahl, Yifan Jian, Marinko V. Sarunic, Simon Fraser Univ. (Canada) [10483-2]

Imaging the human retina using 1060 nm akinetic swept source optical coherence tomography with and without adaptive optics, Matthias Salas, Marco Augustin, Medizinische Univ. Wien (Austria); Franz Felberer, Imagine Eyes (France); Andreas Wartak, Marie Laslandes, Laurin Ginner, Michael Niederleithner, Rainer A. Leitgeb, Ursula Schmidt-Erfurth, Medizinische Univ. Wien (Austria); Xavier Levecq, Imagine Eyes (France); Wolfgang Drexler, Michael Pircher, Medizinische Univ. Wien (Austria) [10483-3]

Constant linear velocity spiral scanning with dynamic focusing for efficient 4D OCT ophthalmic imaging with isotropic lateral sampling, Oscar Carrasco-Zevallos, Duke Univ. (USA); Ryan P. McNabb, Duke Univ. School of Medicine (USA); Christian Viehland, Brenton Keller, Moseph Jackson-Atogi, Anthony N. Kuo, Joseph A. Izatt, Duke Univ. (USA) . . . [10483-4]

Multimodal ophthalmic imaging using handheld spectrally encoded coherence tomography and reflectometry (SECTR), Kelsey C. Leeburg, Mohamed T. El-Haddad, Joseph D. Malone, Benjamin D. Terrones, Yuankai K. Tao, Vanderbilt Univ. (USA) [10483-5]

In vivo high resolution FFOCT human retinal imaging, Peng Xiao, Viacheslav Mazlin, Mathias Fink, A. Claude Boccara, Institut Langevin (France) [10483-6]

SESSION 2. MON 10:30 AM TO 12:00 PM

Cardiac and Small Animal

Session Chair: **James G. Fujimoto**,
Massachusetts Institute of Technology (USA)

Long-depth-range Megahertz OCT for structural and functional cardiac imaging at up to 100 volumes/s, Michal Hamkalo, Institute of Physical Chemistry of the Polish Academy of Sciences (Poland) and Nicolaus Copernicus Univ. (Poland); Tom Pfeiffer, Univ. zu Lübeck (Germany); Jan Christoph, Max Planck Institute for Dynamics and Self-Organization (Germany); Wolfgang Draxinger, Robert A. Huber, Univ. zu Lübeck (Germany); Stefan Luther, Ulrich Parfitt, Max Planck Institute for Dynamics and Self-Organization (Germany); Maciej Wojtkowski, Polish Academy of Sciences (Poland) [10483-7]

Intravascular optical coherence tomography for characterization of atherosclerosis with a 1.7 micron swept-source laser, Yan Li, Joseph C. Jing, Emon Heidari, Jiang Zhu, Yueqiao Qu, Zhongping Chen, Univ. of California, Irvine (USA) [10483-8]

Mapping the human left atrium and pulmonary veins with optical coherence tomography, Theresa H. Lye, Christine P. Hendon, Columbia Univ. (USA) [10483-9]

Intraoperative, multimodal guidance of cardiac ablation therapy using an optical coherence tomography and optical spectroscopy (OCT-OS) integrated ablation catheter, Rajinder P. Singh-Moon, Xinwen Yao, Mohammad Zaryab, Columbia Univ. (USA); Vivek Iyer M.D., Columbia Univ. Medical Ctr. (USA); Christine P. Hendon, Columbia Univ. (USA) [10483-10]

Imaging radiofrequency ablation lesions in the left atrium: toward guidance of atrial fibrillation, Xiaowei Zhao, Colin Blumenthal, Orhan U. Kilinc, Michael W. Jenkins, Case Western Reserve Univ. (USA); Mauricio Arruda, Christopher Snyder, Univ. Hospitals of Cleveland (USA); Andrew M. Rollins, Case Western Reserve Univ. (USA) [10483-11]

Dynamic, functional, and quantitative imaging of the mouse oviduct in vivo using optical coherence tomography, Shang Wang, Riana Syed, Olga A. Grishina, Irina V. Larina, Baylor College of Medicine (USA) . [10483-12]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 3. MON 1:30 PM TO 3:30 PM

OCT Angiography

Session Chair: **Christoph K. Hitzenberger**,
Medizinische Univ. Wien (Austria)

Quantitative assessment of choriocapillaris alterations in advanced age-related macular degeneration using optical coherence tomography angiography, Eric M. Moul, Research Lab. of Electronics (USA); Carl B. Rebhun, A. Yasin Alibhai, Carlos Moreira-Neto, New England Eye Ctr. (USA); Julia Schottenhamml, Research Lab. of Electronics (USA) and Pattern Recognition Lab (Germany); ByungKun Lee, WooJhon Choi, Research Lab. of Electronics (USA); Lennart A. Husvogt, Research Lab. of Electronics (USA); Andreas Maier, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Caroline R. Baumal, Andre J. Witkin, Jay S. Duker, Nadia K. Waheed, New England Eye Ctr. (USA); James G. Fujimoto, Research Lab. of Electronics (USA) [10483-13]

In vivo functional microangiography with sensitivity down to the capillary level by dual band dual scan inverse spectroscopic optical coherence tomography (D2-ISOCT), Rongrong Liu, James A. Winkelmann, Graham Spicer, Aya Eid, Yunxiao Zhu, T. Quyen Nguyen, Guillermo A. Ameer, Northwestern Univ. (USA); Ji Yi, Boston Univ. (USA); Vadim Backman, Northwestern Univ. (USA) [10483-14]

Adaptable switching schemes for investigations of retinal blood flow using sequential multi-channel OCT, Andreas Wartak, Florian Beer, Bernhard Baumann, Michael Pircher, Christoph K Hitzenberger, Medizinische Univ. Wien (Austria) [10483-15]

Optical coherence tomography angiography based capillary velocimetry, Yuandong Li, Qinqin Zhang, Shaozhen Song, Wei Wei, Ruikang K. Wang, Univ. of Washington (USA) [10483-16]

Complex differential variance angiography with noise-bias correction for optical coherence tomography of the retina, Boy Braaf, Wellman Ctr. for Photomedicine (USA); Sabine Donner, Heidelberg Engineering GmbH (Germany); Ahhyun S. Nam, Brett E. Bouma, Benjamin J. Vakoc, Wellman Ctr. for Photomedicine (USA) [10483-17]

The impact of phase noise on the OCT angiography algorithms based on amplitude, phase and complex information, Jingjiang Xu, Shaozhen Song, Yuandong Li, Ruikang K. Wang, Univ. of Washington (USA) [10483-18]

MHz-rate OCTA imaging of the human choriocapillaris and choroid is improved compared to slower systems despite inherently reduced sensitivity, Justin V. Migacz, UC Davis Medical Ctr. (USA); Iwona M. Gorczyńska, Nicolaus Copernicus Univ. (Poland); Mehdi Azimipour, Ravi S. Jonnal, UC Davis Medical Ctr. (USA); Robert J. Zawadzki, Univ. of California, Davis (USA); John S. Werner, UC Davis Medical Ctr. (USA) [10483-19]

Video rate live 4D-MHz-OCT flow sensing, Wolfgang Draxinger, Tom Pfeiffer, Jan-Phillip Kolb, Robert A. Huber, Univ. zu Lübeck (Germany) [10483-20]

SESSION 4. MON 4:00 PM TO 6:00 PM

GI/Endoscopic/Catheter

Session Chair: **Guillermo J. Tearney M.D.**,
Massachusetts General Hospital (USA)

Balloon catheter-based therapy monitoring for epithelial lesions using complex differential variance in optical coherence tomography, Néstor Uribe-Patarroyo, William C. Y. Lo, Katharina V. Hoebel, Kathy Beaudette, Martin Villiger, Benjamin J. Vakoc, Wellman Ctr. for Photomedicine (USA) [10483-21]

Feasibility of ultrahigh speed en face OCT tethered capsule for volumetric mapping of Barrett's Esophagus in non-sedated patients, Kaicheng Liang, Osman O. Ahsen, Hsiang-Chieh Lee, Massachusetts Institute of Technology (USA); Annalee Murphy, VA Boston Healthcare System (USA); Zhao Wang, Massachusetts Institute of Technology (USA); Benjamin M. Potsaid, Massachusetts Institute of Technology (USA) and Thorlabs, Inc. (USA); Marisa Figueiredo, VA Boston Healthcare System (USA); Vijaysekhar Jayaraman, Praevium Research, Inc. (USA); Qin Huang, Hiroshi Mashimo, VA Boston Healthcare System (USA) and Harvard Medical School (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) . . [10483-22]

In vivo imaging of the upper gastrointestinal tract using extended depth of focus tethered capsule optical coherence tomography endomicroscopy, Barry Vuong, Biwei Yin, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Massachusetts General Hospital (USA); Emilie Beaulieu-Ouellet, Wellman Ctr. for Photomedicine (USA) and Massachusetts General Hospital (USA); Jing Dong, David O. Otuya, Yogesh Verma, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Massachusetts General Hospital (USA); Matthew Beatty, Timothy N. Ford, Wellman Ctr. for Photomedicine (USA) and Massachusetts General Hospital (USA); Kanwarpal Singh, Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Massachusetts General Hospital (USA) [10483-23]

Ultrahigh-resolution anastigmatic OCT capsule at 800 nm with laser marking, Dawei Li, Johns Hopkins Univ. (USA) [10483-24]

Micromotor catheters for dual-beam manually-actuated distortion-corrected imaging, Anthony Lee M.D., Madeline Harlow, Geoffrey Hohert, Calum MacAulay, Pierre M. Lane, BC Cancer Research Ctr. (Canada) [10483-25]

Automated detection of esophageal dysplasia in in vivo optical coherence tomography images of the human esophagus, Michalis Kassinosopoulos, Univ. of Cyprus (Cyprus); Jing Dong, Guillermo J. Tearney, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Costas Pitris, Univ. of Cyprus (Cyprus) [10483-26]

High-speed volumetric fiber scanning probe for optical coherence tomography, Hinnerk Schulz-Hildebrandt, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany) and German Ctr. for Lung Research (Germany); Sabrina Lohmann, Tom Pfeiffer, Univ. zu Lübeck (Germany); Tim Eixmann, Medizinisches Laserzentrum Lübeck GmbH (Germany); Martin Ahrens, Fachhochschule Lübeck (Germany); Josua Rehra, Medizinisches Laserzentrum Lübeck GmbH (Germany); Wolfgang Draxinger, Univ. zu Lübeck (Germany); Robert A. Huber, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany); Gereon M. Hüttmann, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany) and German Ctr. for Lung Research (Germany) [10483-27]

ultrahigh-resolution diffractive OCT catheter for label-free in vivo pathology of small airways, Wu Yuan, Hyeon-Cheol Park, Robert Brown, Wayne A. Mitzner, Lonny B. Yarmus, Jeffrey Thiboutot, Xingde Li, Johns Hopkins Univ. (USA) [10483-28]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Poster Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Functional and Applications

Capillary red blood cell velocimetry by phase-resolved optical coherence tomography, Jianbo Tang, Massachusetts General Hospital (USA) and Boston Univ. (USA) and Harvard Medical School (USA); Sefik Evren Erdener, Harvard Medical School (USA) and Boston Univ. (USA) and Massachusetts General Hospital (USA); Buyin Fu, Harvard Medical School (USA) and Massachusetts General Hospital (USA); David A. Boas, Boston Univ. (USA) [10483-105]

OCT needle probe for intraocular distance measurements and blood vessel detection during robotic assisted eye surgery, Tim Eixmann, Medizinisches Laserzentrum Lübeck GmbH (Germany); Hinnerk Schulz-Hildebrandt, Univ. zu Lübeck (Germany); Martin Ahrens, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Mouloud Oura, Gianni Borghesan, Emmanuel Vander Poorten, KU Leuven (Belgium); Gernot Kronreif, Austrian Ctr. for Medical Innovation and Technology (Austria); Maarten Beelen, PRECEYES B.V. (Netherlands); Gereon M. Hüttmann, Univ. zu Lübeck (Germany) [10483-106]

Detection of brain tumor margins using optical coherence tomography, Ronald Miguel Juarez Chambi, Texas A&M Univ. (USA); Carmen Kut, The Johns Hopkins Univ. School of Medicine (USA); Jesus Rico-Jimenez, Texas A&M Univ. (USA); Daniel U. Campos-Delgado, Univ. Autónoma de San Luis Potosí (USA); Alfredo Quinones-Hinojosa, Mayo Clinic (USA); Xingde Li, Johns Hopkins Univ. (USA); Javier A. Jo, Texas A&M Univ. (USA) [10483-107]

Dynamical optical coherence tomography of lacrimal passage using extrinsic contrast agent, Reiko Yoshimura, Donghak Choi, Kitasato Univ. (Japan); Masahiro Fujimoto M.D., Akihito Uji M.D., Kyoto Univ. (Japan); Fumiko Hiwatashi, Systems Engineering Inc. (Japan); Koji Ohbayashi, Advanced Imaging Co. Ltd. (Japan) and Systems Engineering Inc. (Japan) [10483-108]

Fast three-dimensional registration on OCT angiography for speckle reduction and visualization, Yuxuan Cheng, Shaozhen Song, Shaojie Men, Wei Wei, Univ. of Washington (USA) [10483-109]

Analysis of phase difference distributions in Doppler optical coherence tomography for improved flow quantification, Maximilian G. O. Gräfe, Vrije Univ. Amsterdam (Netherlands); Maude Gondre, Univ. de Genève (Switzerland) and Vrije Univ. Amsterdam (Netherlands) [10483-110]

Assessing normalized reflectance index as a retinal imaging feature in optical coherence tomography, Michael R. Gardner, Henry G. Rylander III, Thomas E. Milner, The Univ. of Texas at Austin (USA) [10483-111]

Measurement of endothelial function in vivo on mice by optical coherence tomography, Weiye Song, Jingyan Han, Ji Yi, Boston Univ. (USA) [10483-112]

Quantification of bilirubin concentrations by visible light spectroscopic optical coherence tomography, Colin Veenstra, Wilma Petersen, Lot Jeurink, Ivo M. Vellekoop, Nienke Bosschaart, Univ. Twente (Netherlands) [10483-113]

Non-invasive preclinical anterior chamber imaging of murine eyes using optical coherence tomography and angiography, Jens Horstmann, Uta Gehlsen, Univ. zu Köln (Germany); Felix Bock, Deniz Hos, Claus Cursiefen, Univ. zu Köln (Germany) and Ctr. for Molecular Medicine Cologne (CMMC) (Germany); Philipp Steven, Univ. zu Köln (Germany) [10483-114]

Comparison of phase-resolved Doppler optical coherence tomography and optical coherence tomography angiography for measuring retinal blood vessels size, Zohreh Hosseinaee, Bingyao Tan, Kostadinka Bizheva, Univ. of Waterloo (Canada) [10483-115]

Quantifying ciliary motion of nasal mucosa in rabbits in vivo using optical coherence tomography, Jason J. Chen, Univ. of California, Irvine (USA) and Beckman Laser Institute and Medical Clinic (USA); Alisa Zhukhovitskaya, Univ. of California, Irvine (USA); Jeffrey T. Gu, Univ. of California, Irvine School of Medicine (USA); Andrew E. Heidari, Joseph C. Jing, Univ. of California, Irvine (USA); Zhongping Chen, Brian J. F. Wong, Univ. of California, Irvine (USA) and Beckman Laser Institute and Medical Clinic (USA) [10483-116]

3-D visualization of the ovarian tissue scattering coefficient with swept-source optical coherence tomography, Yifeng Zeng, Bin Rao, Sreyankar Nandy, Quing Zhu, Washington Univ. in St. Louis (USA) [10483-117]

Investigation in clinical potential of polarization sensitive optical coherence tomography in laryngeal tumor model study, Xin Zhou, The Univ. of British Columbia (Canada); Chulho Oak, The Univ. of British Columbia (Canada) and Kosin Univ. College of Medicine (Korea, Republic of); Yeh-Chan Ahn, Pukyong National Univ. (Korea, Republic of); Sungwon Kim, Kosin Univ. College of Medicine (Korea, Republic of); Shuo Tang, The Univ. of British Columbia (Canada) [10483-118]

Requirements for automated evaluation of AMD in home-care OCT, Claus von der Burchard, Jan Tode, Christoph Ehlken, Univ. Eye Hospital (Germany); Helge M. Sudkamp, Peter Koch, Timo Kepp, Gereon M. Hüttmann, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Johann Roeder, Univ. Eye Hospital (Germany) [10483-119]

Brain tissue analysis using texture features based on optical coherence tomography images, Marcel Lenz, Ruhr-Univ. Bochum (Germany); Robin Krug, Univ. Knappschaftskrankenhaus Bochum GmbH (Germany); Christopher Dillmann, Technische Fachhochschule Georg Agricola zu Bochum (Germany); Nils C. Gerhardt, Ruhr-Univ. Bochum (Germany); Hubert Welp, Technische Fachhochschule Georg Agricola zu Bochum (Germany); Kirsten Schmieder, Univ. Knappschaftskrankenhaus Bochum GmbH (Germany); Martin R. Hofmann, Ruhr-Univ. Bochum (Germany) ... [10483-120]

Handheld widefield OCT and OCTA, Gangjun Liu, Casey Eye Institute, Oregon Health & Science Univ. (USA) [10483-121]

Non-invasive nanoparticle enhanced OCT imaging for differentiation of malignant melanoma from benign nevi, Audrey Fotouhi, Wayne State Univ. School of Medicine (USA); Mohammad R. N. Avanaki, Wayne State Univ. (USA); Darius Mehregan, Wayne State Univ. School of Medicine (USA); Juri Gelovani, Wayne State Univ. (USA); Nerissa Viola-Villegas, Wei Chen, Wayne State Univ. School of Medicine (USA) [10483-122]

CONFERENCE 10483

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:30 AM TO 10:00 AM

Novel Microscopy

Session Chair: **Rainer Andreas Leitgeb**,
Medizinische Univ. Wien (Austria)

Three-dimensional traction force optical coherence microscopy, Jeffrey A. Mulligan, Cornell Univ. (USA); Xinzeng Feng, The Univ. of Texas at Austin (USA); Steven G. Adie, Cornell Univ. (USA) [10483-29]

Realistic representation of scatterer microstructure in full-wave simulation of OCT image formation, Pawel Ossowski, Nicolaus Copernicus Univ. (Poland); Andrea Curatolo, The Univ. of Western Australia (Australia); Maciej Wojtkowski, Nicolaus Copernicus Univ. (Poland) and Polish Academy of Sciences (Poland); David D. Sampson, The Univ. of Western Australia (Australia); Peter R. T. Munro, Univ. College London (United Kingdom) [10483-30]

High-resolution spectral domain optical coherence microscopy in 1700-nm spectral band, Masahito Yamanaka, Naoki Hayakawa, Hiroyuki Kawagoe, Nagoya Univ. (Japan); Shuichi Makita, Yoshiaki Yasuno, Univ. of Tsukuba (Japan); Norihiko Nishizawa, Nagoya Univ. (Japan) [10483-31]

Ex vivo imaging of conjunctival lymphatics using optical coherence tomography lymphangiography, Peijun Gong, Paula Yu, Karol Karnowski, Dong An, Dao-Yi Yu, David Sampson, The Univ. of Western Australia (Australia) [10483-32]

First in-human intranasal uOCT imaging, Hui Min Leung, Massachusetts General Hospital (USA); Susan E. Birket, The Univ. of Alabama at Birmingham School of Medicine (USA); Timothy N. Ford, Chulho Daryl Hyun, Dongyao Cui, Massachusetts General Hospital (USA); George M. Solomon M.D., Bradford Woodworth, Do-Yeon Cho, Steven M. Rowe M.D., The Univ. of Alabama at Birmingham School of Medicine (USA) [10483-33]

Optogenetic control of Drosophila cardiac function by integrating red-light stimulation and optical coherence microscopy (OCM) imaging, Jing Men, Lehigh Univ. (USA); Aironng Li, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Rudolph E. Tanzi, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Chao Zhou, Lehigh Univ. (USA) [10483-34]

SESSION 6..... TUE 10:30 AM TO 12:00 PM

OCT New Technology I

Session Chair: **Ruikang K. Wang**, Univ. of Washington (USA)

Optical coherence refraction tomography for isotropically resolved cross-sectional imaging, Kevin C. Zhou, Ruobing Qian, Sina Farsiu, Joseph A. Izatt, Duke Univ. (USA) [10483-35]

A 16 MHz frequency-comb stretched-pulse mode-locked (SPML) laser using a continuously chirped fiber

Bragg grating for subsampled OCT, Norman Lippok, Meena Siddiqui, Benjamin J. Vakoc, Reza Khazaeinezhad, Wellman Ctr. for Photomedicine (USA) [10483-36]

Flexible and cost-effective wide-field optical coherence tomography based on dual-beam multiplexing and numerical subsampling, Shaozhen Song, Jingjiang Xu, Nhan Minh Le, Ruikang K. Wang, Univ. of Washington (USA) [10483-37]

Stepless spectral zooming during live 3D-OCT with MHz-OCT, Tom Pfeiffer, Robert A. Huber, Wolfgang Draxinger, Univ. zu Lübeck (Germany) [10483-38]

9.4 MHz A-line rate OCT platform at 1300 nm using stretched-pulse mode-locked (SPML) laser, Tae Shik Kim, Paul Shin, Jongyoon Ju, KAIST (Korea, Republic of); Benjamin J. Vakoc, Wellman Ctr. for Photomedicine (USA); Wang-Yuhl Oh, KAIST (Korea, Republic of) [10483-39]

Chip-based space-division multiplexing optical coherence tomography for wide field imaging, Mudabbir Badar, Yongyang Huang, Lehigh Univ. (USA); Arthur Nitkowski, Aaron Weinroth, Tornado Spectral Systems (Canada); Nelson Tansu, Chao Zhou, Lehigh Univ. (USA) [10483-40]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 7..... TUE 1:30 PM TO 3:30 PM

Ophthalmic New Technology II

Session Chair: **Marinko V. Sarunic**, Simon Fraser Univ. (Canada)

Resolution and throughput optimized intraoperative spectrally encoded coherence tomography and reflectometry (iSECTR) for multimodal imaging during ophthalmic microsurgery, Joseph D. Malone, Mohamed T. El-Haddad, Kelsey C. Leeburg, Benjamin D. Terrones, Yuankai K. Tao, Vanderbilt Univ. (USA) [10483-41]

Signal processing for full-field swept-source OCT to obtain intrinsic optical signals, Dierck Hillmann, Thorlabs GmbH (Germany); Clara Pfäffle, Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany); Gereon M. Hüttmann, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany) and Airway Research Ctr. North (ARCN), Member of the German Center for Lung Research (DZL) (Germany) [10483-42]

Real-time feedback control system of retinal laser coagulation by using phase-resolved OCT measurement on tissue denaturation, Shuichi Makita, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) [10483-43]

Temperature monitoring by speckle variance optical coherence tomography combined with ophthalmic laser system, Soohyun Lee, Johns Hopkins Univ. (USA); Changho Lee, Chonnam National Univ. Medical School (Korea, Republic of) and Hwasun Hospital (Korea, Republic of); Gyeong Woo Cheon, GE Global Research (USA); Jongmin Kim, Gihoon Kim, Dongki Cho, Lutronic Corp. (Korea, Republic of); Jin U. Kang, Johns Hopkins Univ. (USA) [10483-44]

Ultra-high speed OCT allows measurement of intraocular pressure, corneal geometry, and corneal stiffness using a single instrument, Manmohan Singh, Univ. of Houston (USA); Zhaolong Han, Shanghai Jiao Tong Univ. (China); Achuth Nair, Alexander Schill, Univ. of Houston (USA); Michael D. Twa, School of Optometry, The Univ. of Alabama at Birmingham (USA) and The Univ. of Alabama at Birmingham (USA); Kirill V. Larin, Univ. of Houston (USA) and Tomsk State Univ. (Russian Federation) and Baylor College of Medicine (USA) [10483-45]

Numerically refocused retinal imaging with off-axis full-field time-domain OCT, Helge M. Sudkamp D.D.S., Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany); Peter Koch, Michael Müntz, Malte Vom Endt, Medizinisches Laserzentrum Lübeck GmbH (Germany); Hendrik Spahr, Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany); Dierck Hillmann, Thorlabs GmbH (Germany); Hinnerk Schulz-Hildebrandt, Reginald Birngruber M.D., Univ. zu Lübeck (Germany); Gereon Hüttmann, Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany) [10483-46]

Deep neural network based segmentation of retinal optical coherence tomography images, Morgan Heisler, Donghuan Lu, Sieun Lee, Simon Fraser Univ. (Canada); Pavle Prentasac, Univ. of Zagreb (Croatia); Zaid Mammo, Gavin Docherty, Forson Chan, The Univ. of British Columbia (Canada); Yifan Jian, Myeong Jin Ju, Simon Fraser Univ. (Canada); Andrew Merkur, The Univ. of British Columbia (Canada); Chandrakumar Balaratnasingam, The Univ. of British Columbia (Canada) and Lions Eye Institute (Australia) and Vitreous Retina Macula Consultants of New York (USA); Eduardo V. Navajas, The Univ. of British Columbia (Canada); Sven Loncaric, Univ. of Zagreb (Croatia); Mirza Faisal Beg, Marinko V. Sarunic, Simon Fraser Univ. (Canada) [10483-47]

Volumetric non-local-means based speckle reduction for optical coherence tomography, Carlos Cuartas-Vélez, René Restrepo, Univ. EAFIT (Colombia); Brett E. Bouma, Wellman Ctr. for Photomedicine (USA) and Institute for Medical Engineering and Science, Massachusetts Institute of Technology (USA); Néstor Uribe-Patarroyo, Wellman Ctr. for Photomedicine (USA) [10483-48]

SESSION 8.....TUE 4:00 PM TO 6:00 PM

OCT New Technology II

Session Chair: **Yoshiaki Yasuno**, Univ. of Tsukuba (Japan)

Characterization of an Intra-Cavity Buffered Bi-Directional Sweeping Fully Self-Controlled 1.6 MHz FDML Laser, Wolfgang Wieser, Thomas Klein, Markus Petermann, Optores GmbH (Germany); Tom Pfeiffer, Robert A. Huber, Univ. zu Lübeck (Germany)[10483-49]

Measuring 3D temperature profiles using phase-decorrelation OCT, Junqi Zhuo, Brecken J. Blackburn, Matthew T. McPheeters, Lars Thrane, Hillel J. Chiel, Shi Gu, Andrew M. Rollins, Case Western Reserve Univ. (USA); E. Duco Jansen, Vanderbilt Univ. (USA); Michael W. Jenkins, Case Western Reserve Univ. (USA)[10483-50]

A new method for ultra-compact shot-noise limited OCT, Hooman Mohseni, Northwestern Univ. (USA); Vala Fathipour, Univ. of California, Berkeley (USA)[10483-51]

Depth of focus extension in optical coherence tomography via multiple aperture synthesis, En Bo, Linbo Liu, Nanyang Technological Univ. (Singapore)[10483-52]

Matrix approach of the optical coherence tomography, Alexandre Aubry, Amaury Badon, Albert Claude Boccara, Mathias Fink, Institut Langevin (France)[10483-53]

Angular/longitudinal doppler sensitive optical coherence tomography using vortex beams, Eun Song Kim, Nitesh Katta, Daniel M. Santos, Thomas E. Milner, The Univ. of Texas at Austin (USA)[10483-54]

Spectral domain, common path OCT in a handheld PIC based system, Arne Leinse, Lennart Wevers, Denys Marchenko, Ronald Dekker, René G. Heideman, Lionix International (Netherlands)[10483-55]

OCT amplitude (speckle) statistics of discrete random media, Dirk J. Faber, Mitra Almasian, Ton G. van Leeuwen, Academisch Medisch Centrum (Netherlands)[10483-56]

WEDNESDAY 31 JANUARY

SESSION 9.....WED 8:30 AM TO 10:00 AM

Elastography

Session Chair: **Andrew M. Rollins**, Case Western Reserve Univ. (USA)

Investigating the relationship between phase-decorrelation OCT and compression OCE measurements, Brecken J. Blackburn, Shi Gu, Case Western Reserve Univ. (USA); Koroush Shoele, Florida State Univ. (USA); Michael W. Jenkins, Andrew M. Rollins, Case Western Reserve Univ. (USA)[10483-57]

Interferometric detection of 3D micro-motion using synthetic sub-apertures in full-field swept-source optical coherence tomography, Hendrik Spahr, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany); Dierck Hillmann, Thorlabs GmbH (Germany); Clara Pfäffle, Gereon M. Hüttmann, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany)[10483-58]

Nanobomb optical coherence elastography, Chih Hao Liu, Alexander Schill, Susobhan Das, Dmitry Nevozhay, Manmohan Singh, Jennifer Nguyen, Megan Goh, Achuth Nair, Univ. of Houston (USA); Konstantin V. Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Kirill V. Larin, Univ. of Houston (USA)[10483-59]

Quantified elasticity mapping of retinal tissue using confocal shear wave acoustic radiation force optical coherence elastography, Youmin He, Yueqiao Qu, Jiang Zhu, Beckman Laser Institute and Medical Clinic (USA); Yi Zhang, The Univ. of Southern California (USA); Arya Saïdi, Southern California College of Optometry (USA); Teng Ma, Qifa Zhou, The Univ. of Southern California (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA)[10483-60]

A comparison of wide-field OCT, micro-strain and micro-elasticity imaging of human breast, Wes M. Allen, Kelsey M. Kennedy, Qi Fang, Lixin Chin, Andrea Curatolo, Lucinda Watts, Renate Zilkens, Harry Perkins Institute of Medical Research (Australia); Synn Lynn Chin, Benjamin F. Dessauvage, Bruce Latham, Christobel M. Saunders, Fiona Stanley Hospital (Australia); Brendan F. Kennedy, Harry Perkins Institute of Medical Research (Australia)[10483-61]

Measurement of sub-nanometer oscillations induced by photonic radiation pressure for volumetric active microrheology of hydrogels, Nichaluk Leartprapun, Rishyashring R. Iyer, Steven G. Adie, Cornell Univ. (USA)[10483-62]

SESSION 10.....WED 10:30 AM TO 12:00 PM

Polarization

Session Chair: **Johannes F. de Boer**, Vrije Univ. Amsterdam (Netherlands)

Definitive depolarization contrast for optical frequency domain imaging, Norman Lippok, Martin Villiger, Wellman Ctr. for Photomedicine (USA); Alexandre Albanese, Massachusetts Institute of Technology (USA); Eelco Meijer, Massachusetts General Hospital (USA); Kwanghun Chung, Massachusetts Institute of Technology (USA); Timothy Padera, Massachusetts General Hospital (USA); Sangeeta Bhatia, Massachusetts Institute of Technology (USA)[10483-63]

A sequential approach towards polarization sensitive optical coherence tomography, Jonas Golde, Universitätsklinikum Carl Gustav Carus Dresden (Germany); Lars Kirsten, Edmund Koch, TU Dresden (Germany) . . . [10483-64]

A technique for fully resolving the optic axis in PS-OCT and its use in assessing airway smooth muscle function, David C. Adams, Melissa J. Suter, Massachusetts General Hospital (USA)[10483-65]

Reconstruction of depth-resolved relative optic axis orientation with passive delay polarization-multiplexed PS-OCT, Qingyun Li, Karol Karnowski, The Univ. of Western Australia (Australia); Martin Villiger, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Massachusetts General Hospital (USA); Peter Noble, School of Human Sciences, The Univ. of Western Australia (Australia); Alan James, Sir Charles Gairdner Hospital (Australia); David Sampson, Ctr. for Microscopy, Characterisation & Analysis, The Univ. of Western Australia (Australia)[10483-66]

Ultra-high-resolution polarization sensitive optical coherence tomography with local birefringence measurement modality, Qiaozhou Xiong, Xinyu Liu, Nanshuo Wang, Si Chen, Cilwyn Shalitha Braganza, Shufen Chen, Linbo Liu, Nanyang Technological Univ. (Singapore)[10483-67]

Polarization sensitive optical coherence tomography for in vivo imaging of the oral cavity with enhanced contrast, Julia Walther, Jonas Golde, Lars Kirsten, Florian Tetschke, Franz Hempel, Tobias Rosenauer, Christian Hannig, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany)[10483-68]

Lunch/Exhibition Break Wed 12:00 pm to 1:30 pm

SESSION 11.....WED 1:30 PM TO 3:30 PM

Visible Light OCT

Session Chair: **Zhongping Chen**, Beckman Laser Institute and Medical Clinic (USA)

Visible light optical coherence microscopy imaging of the mouse cortex with femtoliter volume resolution, Conrad W. Merkle, Shau Poh Chong, Aaron M. Kho, Univ. of California, Davis (USA); Alfredo Dubra, Stanford Univ. (USA); Vivek J. Srinivasan, Univ. of California, Davis (USA)[10483-69]

Extended-focus visible optical coherence microscopy for label-free subcellular tomography, Paul J. Marchand, Arno Bouwens, David Nguyen, Miguel Sison, Séverine Coquoz, Daniel Szlag, Jérôme Extermann, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland)[10483-70]

Retinal oximetry in humans using visible-light optical coherence tomography, Hao F. Zhang, Siyu Chen, Xiao Shu, Peter L. Nesper, Northwestern Univ. (USA); Wenzhong Liu, Opticent Health (USA); Amani A. Fawzi, Northwestern Univ. (USA)[10483-71]

White light polarization sensitive optical coherence tomography for high resolution mouse retinal imaging, Danielle J. Harper, Marco Augustin, Antonia Lichtenegger, Pablo Eugui, Christoph K. Hitztenberger, Bernhard Baumann, Medizinische Univ. Wien (Austria)[10483-72]

In vivo imaging using a visible inverse spectroscopic optical coherence tomography probe, James A. Winkelmann, Aya Eid, The-Quyen Nguyen, Thang Bui, Northwestern Univ. (USA); Ji Yi, Boston Univ. (USA); Vadim Backman, Northwestern Univ. (USA)[10483-73]

Visible light wavefront sensorless adaptive optics optical coherence tomography (Vis-SAO-OCT), Christine Huang, Daniel J. Wahl, Myeong Jin Ju, Yifan Jian, Marinko V. Sarunic, Simon Fraser Univ. (Canada) . . . [10483-74]

Visible light OCT-based quantitative imaging of lipofuscin in the retinal pigment epithelium using a standard reference target, Zahra Nafar, Shuliang Jiao, Florida International Univ. (USA)[10483-75]

Achromatized visible light OCT for ultrahigh resolution retinal imaging, Tingwei Zhang, Shau Poh Chong, Marcel Bernucci, Vivek J. Srinivasan, Univ. of California, Davis (USA)[10483-76]

CONFERENCE 10483

SESSION 12..... WED 4:00 PM TO 6:00 PM

Novel Contrast

Session Chair: **Valery V. Tuchin**,
Saratov State Univ. (Russian Federation)

Few-mode fiber OCT for angular scattering contrast in tissue.

Pablo Eugui, Antonia Lichtenegger, Marco Augustin, Danielle J. Harper, Andreas Wartak, Martina Muck, Adelheid Wöhrer, Christoph K. Hitztenberger, Bernhard Baumann, Medizinische Univ. Wien (Austria)[10483-77]

Investigating ethanol-induced microvascular abnormalities using scatter labeled imaging of microvasculature in excised tissue (SLIME).

Yehe Liu, Meredith C. G. C. G. Broberg, Andrew M. Rollins, Michiko Watanabe, Michael W. Jenkins, Case Western Reserve Univ. (USA). [10483-78]

Optical coherence tomography of lymphatic vessel endothelial

hyaluronan receptors in vivo. Peng Si, Debasish Sen, Rebecca Dutta, Siavash Yousefi, Roopa Dalal, Yonatan Winetraub, Orly Liba, Adam de la Zerda, Stanford Univ. School of Medicine (USA) [10483-79]

Design and validation of a scanning system for angle-resolved low-

coherence interferometry. Zachary A. Steelman, Derek Ho, Kengyeh K. Chu, Adam Wax, Duke Univ. (USA) [10483-80]

Combined targeted fluorescence molecular imaging and optical

coherence tomography for cancer diagnostics. Fabio Feroldi, Mariska Verlaan, Helene Knaus, Carla F. M. Molthoff, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) [10483-81]

Detection of ultrastructural modification in a synthetic pre-metastatic

niche with inverse spectroscopic optical coherence tomography (ISOCT). Graham Spicer, Northwestern Univ. (USA); Grace G. Bushnell, Univ. of Michigan (USA); Aya Eid, James A. Winkelmann, Rongrong Liu, Northwestern Univ. (USA); Ji Yi, Boston Univ. (USA); Samira M. Azarin, Univ. of Minnesota, Twin Cities (USA); Lonnie D. Shea, Univ. of Michigan (USA); Vadim Backman, Northwestern Univ. (USA) [10483-82]

Necrotic region detection of three-dimensional tumor spheroids using

optical coherence tomography. Yongyang Huang, Shunqiang Wang, Qiongyu Guo, Lehigh Univ. (USA); Sarah Kessel, Nexcelom Bioscience LLC (USA); Ian Rubino, Wentao Shi, Yaling Liu, Lehigh Univ. (USA); Peter Y. Li, Jean Qiu, Nexcelom Bioscience LLC (USA); Chao Zhou, Lehigh Univ. (USA) [10483-83]

An accurate estimation of the attenuation coefficient from beam-shape

corrected OCT scans of a single layer phantom. Babak Ghafaryasl, Koenraad A. Vermeer, Rotterdam Ophthalmic Institute (Netherlands); Tom W. Callewaert, Technische Univ. Delft (Netherlands); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands); Lucas J. van Vliet, Technische Univ. Delft (Netherlands) [10483-84]

CONFERENCE 10484

Sunday-Tuesday 28-30 January 2018 • Proceedings of SPIE Vol. 10484

Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI

Conference Chairs: **Tuan Vo-Dinh**, Fitzpatrick Institute For Photonics, Duke Univ. (USA); **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA); **Warren S. Grundfest M.D.**, Univ. of California, Los Angeles (USA)

SUNDAY 28 JANUARY

SESSION 1.....SUN 9:10 AM TO 10:10 AM

Diagnostic Technologies for Cancer Detection

Session Chair: **Tuan Vo-Dinh**, Duke Univ. (USA)

Paired-agent fluorescent imaging to detect micrometastases in breast sentinel lymph node biopsy, Chengyue Li, Xiaochun Xu, Yusairah Basheer, Kenneth M. Tichauer, Illinois Institute of Technology (USA) [10484-1]

Quantitative subsurface fluorescence imaging enabled by spatial frequency domain imaging for enhanced glioma resection, Mira Sibai, Princess Margaret Cancer Ctr., Univ. Health Network (Canada); Dennis J. Wirth, Dartmouth Hitchcock Medical Ctr. (USA); Frédéric Leblond, Ecole Polytechnique de Montréal (Canada); David W. Roberts M.D., Dartmouth Hitchcock Medical Ctr. (USA); Keith D. Paulsen, Thayer School of Engineering at Dartmouth (USA); Brian C. Wilson, Univ. Health Network (Canada) [10484-2]

Surface enhanced spatially offset Raman spectroscopy (SESORS) for deep brain cancer detection, Ren Odion, Pietro Strobbia, Tuan Vo-Dinh, Duke Univ. (USA) [10484-3]

SESSION 2.....SUN 10:40 AM TO 12:00 PM

Advanced Photonic Technologies for Clinical Applications

Session Chair: **Tuan Vo-Dinh**, Duke Univ. (USA)

Enhanced differentiation of invasive breast ductal carcinoma via polarization-sensitive interferometric synthetic aperture microscopy, Jianfeng Wang, Yang Xu, Eric Chaney, Marina Marjanovic, Darold R. Spillman Jr., Stephen A. Boppart, Univ. of Illinois (USA) [10484-4]

Feasibility of structured illumination fluorescence microscopy of liver biopsies for transplant evaluation, David B. Tulman, Mei Wang, Kate Elfer, Samuel Luethy, Carly Askinas, Daniel Mena, Andrew Sholl, Tulane Univ. (USA); Ari Cohen, Ochsner Health System (USA); Jonathon Q. Brown, Tulane Univ. (USA); Gretchen Galliano M.D., Ochsner Hospital System (USA) [10484-5]

Spatial frequency domain imaging: frequency selection, Swapnesh Panigrahi, Sylvain Gioux, ICube (France) [10484-6]

Synergistic immuno photothermal nanotherapy (SYMPHONY) to treat unresectable and metastatic cancers and produce cancer vaccine effect, Tuan Vo-Dinh, Brant Inman, Duke Univ. (USA); Paolo F. Maccarini, Duke Univ. Medical Ctr. (USA); Gregory M. Palmer, Duke Univ. School of Medicine (USA); Yang Liu, Duke Univ. (USA) [10484-7]

SESSION 3.....SUN 1:30 PM TO 3:10 PM

Robotics and Light Biopsies for Surgical Applications

Session Chair: **Mary-Ann Mycek**, Univ. of Michigan (USA)

Intra-operative guidance using combined photoacoustic and pulsed fluorescence imaging for robotic-assisted surgery: preliminary in vivo experiment using murine prostate model, Jeeun Kang, Hanh N. D. Le, Karakuş Serkan, Arthur Burnett M.D., Jin U. Kang, Emad M. Boctor, Johns Hopkins Univ. (USA) [10484-8]

Raman spectroscopy towards intraoperative assessment of surgical margins in robotic assisted radical prostatectomy, Michael Pinto, Ecole Polytechnique de Montréal (Canada); Kelly Aubertin, CRCHUM (Canada); Joannie Desroches, Ecole Polytechnique de Montréal (Canada); Vincent Q. Trinh, Andrée-Anne Grosset, Fred Saad, Kevin Zorn, CRCHUM (Canada); Frédéric Leblond, Ecole Polytechnique de Montréal (Canada); Dominique Trudel, CRCHUM (Canada); Frédéric Lesage, Ecole Polytechnique de Montréal (Canada) [10484-9]

An endoscopic 3D structured illumination imaging system for robotic anastomosis surgery, Hanh N. D. Le, Johns Hopkins Univ. (USA); Hieu Nguyen, Zhaoyang Wang, The Catholic Univ. of America (USA); Justin Opfermann, Children's National Health System (USA); Simon Leonard, Johns Hopkins Univ. (USA); Axel Krieger, Univ. of Maryland, College Park (USA); Jin U. Kang, Johns Hopkins Univ. (USA) [10484-10]

The epidural needle guidance with an intelligent and automatic identification system for epidural anesthesia, Meng-Chun Kao, Wen-Chuan Kuo, National Yang-Ming Univ. (Taiwan); Chien-Kun Ting, Mei-Yung Tsou, Taipei Veterans General Hospital (Taiwan) [10484-11]

Integrated Raman biopsy probe for high yield targeted brain cancer biopsies, Joannie Desroches, Ecole Polytechnique de Montréal (Canada); Michael Jermyn, Dartmouth College (USA); Eric Marple, Kirk Urmey, EmVision, LLC (USA); Gilles Soulez, Ctr. Hospitalier de l'Univ. de Montréal (Canada); Marie-Christine Guiot, Montreal Neurological Institute and Hospital (Canada); Brian C. Wilson, Univ. Health Network (Canada); Kevin Petrecca, Montreal Neurological Institute and Hospital (Canada); Frédéric Leblond, Ecole Polytechnique de Montréal (Canada) [10484-12]

SESSION 4.....SUN 3:40 PM TO 5:00 PM

Luminescence Methods for Clinical Applications

Session Chair: **Laura Marcu**, Univ. of California, Davis (USA)

An oxygen-sensing phosphorescent liquid bandage for post-operative flap monitoring, Haley L. Marks, Emmanuel Roussakis, Nicholas H. Nowell, Massachusetts General Hospital (USA); Alexandra Bucknor, Beth Israel Deaconess Medical Ctr., Harvard Medical School (USA); Parisa Kamali M.D., Radboud Univ. Nijmegen (Netherlands); Samuel J. Lin M.D., Beth Israel Deaconess Medical Ctr., Harvard Medical School (USA); Conor L. Evans, Massachusetts General Hospital (USA) [10484-13]

Assessment of post-implantation integration of engineered tissues using fluorescence lifetime spectroscopy, Sakib Elahi, Seung Yup Lee, William R. Lloyd, Leng-Chun Chen, Shiuhyang Kuo, Ying Zhou, Hyungjin M. Kim, Robert Kennedy, Cynthia Marcelo, Stephen Feinberg, Mary-Ann Mycek, Univ. of Michigan (USA) [10484-14]

Multichannel solid state photodetection system for low-cost fluorescence lifetime spectroscopy, Diego Yankelevich, Julien Bec, Jonathan D. Wapman, Laura Marcu, Univ. of California, Davis (USA) [10484-15]

Micro-hole array fluorescent sensor based on AC- Dielectrophoresis (DEP) for simultaneous analysis of nano-molecules, Hye Jin Kim, Korea Univ. (Korea, Republic of); Kyo Seon Hwang, Kyung Hee Univ. (Korea, Republic of); Eunji Lee, Jinsik Kim, Dongguk Univ. (Korea, Republic of); Jung Ho Park, Korea Univ. (Korea, Republic of) [10484-16]

CONFERENCE 10484

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Wide-field high spatial frequency domain imaging of tissue microstructure, Weihao Lin, Bixin Zeng, Zili Cao, Danfeng Zhu, Wenzhou Medical Univ. (China); Min Xu, Fairfield Univ. (USA) and Univ. of Illinois (China).....[10484-40]

The precancerous lesions detection in mice model using polarization-sensitive optical coherence tomography, Hong-Yi Lee, National Yang-Ming Univ. (Taiwan); Ping-Hsien Chen, Taipei Veterans General Hospital (Taiwan); Kuo-Wei Chang, Wen-Chuan Kuo, National Yang-Ming Univ. (Taiwan).....[10484-41]

Which experimental model can sensitively indicate brain death by Functional near-infrared spectroscopy?, Boan Pan, Univ. of Electronic Science and Technology of China (China); Xiaobo Huang, Sichuan Provincial People's Hospital (China) and Univ. of Electronic Science and Technology of China (China); Xuemei Tang, Sichuan Provincial People's Hospital (China) and Univ. of Electronic Science and Technology of China (China); Sen Lu, Sichuan Provincial People's Hospital (China); Ting Li, Univ. of Electronic Science and Technology of China (China).....[10484-42]

Near infrared assessment of the brain in cardiac arrest patients, Thu Nga Nguyen, Vladislav Toronov, Ryerson Univ. (Canada); Steve Lin, St. Michael's Hospital (Canada); Ermias Woldemichael, Ryerson Univ. (Canada); Paul Dorian D.D.S., Gregory Hare, Akshay Bagai, Wen Wu, Karina Goncharenko, St. Michael's Hospital (Canada).....[10484-43]

3D registration method for assessing the gastrointestinal motility using spectral reflectance estimation, Kazuki Nobe, Kayo Yoshimoto, Osaka City Univ. (Japan); Kenji Yamada, Osaka Univ. (Japan); Hideya Takahashi, Osaka City Univ. (Japan).....[10484-44]

Quantifying metabolic redox ratio in cancer with compact point-detection fluorescence spectroscopy, Ren Odion, Quan Liu, Tuan Vo-Dinh, Duke Univ. (USA).....[10484-45]

Integrating 4-d light-sheet imaging with interactive virtual reality to recapitulate developmental cardiac mechanics and physiology, Yichen Ding, Univ. of California, Los Angeles (USA); Arash Abiri, Univ. of California, Irvine (USA); Parinaz Abiri, Juhyun Lee, Chih-Chiang Chang, Kyung In Baek, Rene Packard, Tzung Hsiai, Univ. of California, Los Angeles (USA).....[10484-46]

Imaging of ablation margin of ligamentum flavum by Ho-YAG laser using polarization-sensitive optical coherence tomography, Kwan Seob Park, Jun Geun Shin, Advanced Photonics Research Institute (Korea, Republic of); Young-Seok Seo, WONTECH Co., Ltd. (Korea, Republic of); Chun Kee Chung, College of Medicine, Seoul National Univ. (Korea, Republic of).....[10484-47]

Fourier ptychography based blood smear imaging, Kalpesh B. Mehta, Harsh Chajjar, Siemens Healthcare Pvt. Ltd. (India).....[10484-48]

BIOS SUNDAY PLENARY SESSION..... SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details.

MONDAY 29 JANUARY

SESSION 5..... MON 9:10 AM TO 10:10 AM

Surgical Guidance Technologies

Session Chair: **Warren S. Grundfest**,
Univ. of California, Los Angeles (USA)

Feasibility of using spatial frequency domain imaging to aid in fluorescence guided resection, Dennis J. Wirth, Dartmouth Hitchcock Medical Ctr. (USA); Mira Sibai, Princess Margaret Cancer Ctr., Univ. Health Network (Canada); David W. Roberts M.D., Dartmouth Hitchcock Medical Ctr. (USA); Keith D. Paulsen, Thayer School of Engineering at Dartmouth (USA).....[10484-17]

Intraoperative imaging device for real-time identification of critical structures during surgery, Shona D. Stewart, Heather Gomer, Aaron Smith, ChemImage Corp. (USA); James C. Post, Allegheny General Hospital, West Penn Allegheny Health System (USA); Patrick Treado, ChemImage Corp. (USA); Jeffrey Cohen, Allegheny General Hospital, West Penn Allegheny Health System (USA).....[10484-18]

Evaluating surgical treatment of peripheral artery disease (PAD) with a portable near-infrared spectroscopic system, Christopher J. Fong, Jennifer W. Hoi, Hyun K. Kim, Youngwan W. Kim, Danielle R. Bajakian, Andreas Hielscher, Columbia Univ. (USA).....[10484-19]

SESSION 6..... MON 10:40 AM TO 12:00 PM

Acoustics and Ultrasound Technologies

Session Chair: **Warren S. Grundfest**,
Univ. of California, Los Angeles (USA)

A fiber optoacoustic guide-wire with augmented reality towards precision breast conserving surgery, Lu Lan, Boston Univ. (USA); Rui Li, Vibronix, Inc. (USA); Kaiming Liu, Tsinghua Univ. (China); Jieying Mai, Purdue Univ. (USA); Jennifer A. Medley, Samilia Obeng-Gyasi, Indiana Univ. School of Medicine (USA); Linda K. Han, Parkview Cancer Institute (USA); Pu Wang, Vibronix, Inc. (USA); Ji-Xin Cheng, Boston Univ. (USA); Yan Xia, Vibronix, Inc. (USA).....[10484-20]

Optimizing signal output: Identifying the effects of viscoelasticity on vibroacoustic response by altering beam frequency, Nikan K. Namiri, Ashkan Maccabi, Univ. of California, Los Angeles (USA); Neha Bajwa, Ctr. for Advanced Surgical and Interventional Technology (USA); Karam W. Badran, Zachary Taylor, Maie St. John, Warren S. Grundfest, George Saddik, Univ. of California, Los Angeles (USA).....[10484-21]

Structural and functional assessment of intense therapeutic ultrasound effects on partial Achilles tendon transection, Jennifer K. Barton, Photini Faith Rice, Caitlin C. Howard, Jen W. Koevary, The Univ. of Arizona (USA); Forest L. Danford, Univ. of Arizona (USA); David A. Gonzales, The Univ. of Arizona (USA); Jonathan P. Vande Geest, Univ. of Pittsburgh (USA); Leonard D. Latt, John A. Szivek, The Univ. of Arizona (USA); Michael Slayton, Guided Therapy Systems, Inc. (USA).....[10484-22]

Comparison of acoustic waves generated by micro and nanosecond laser for smart laser surgery system, Herve K. Nguendon Kenhagho, Georg Rauter, Univ. Basel (Switzerland); Raphael Guzman, Univ. Hospital Basel (Switzerland); Philippe C. Cattin, Azhar Zam, Univ. Basel (Switzerland).....[10484-23]

Lunch Break..... Mon 12:00 pm to 1:30 pm

SESSION 7 MON 1:30 PM TO 3:10 PM

Clinical Applications of Coherence Techniques (OCT)

Session Chair: **Jennifer K. Barton**, The Univ. of Arizona (USA)

Motion-compensated optical coherence tomography using envelope-based surface detection and Kalman-based prediction, Kristina Irsch, The Johns Hopkins Univ. School of Medicine (USA) and UPMC Sorbonne Univ. (France); Soohyun Lee, Sanjukta N. Bose, Jin U. Kang, Johns Hopkins Univ. (USA)[10484-24]

Polarization-sensitive optical coherence tomography with single spectrometer and optical delay line, Kwan Seob Park, Jun Geun Shin, Advanced Photonics Research Institute (Korea, Republic of); Byeong Ha Lee, Gwangju Institute of Science and Technology (Korea, Republic of); Tae Joong Eom, Advanced Photonics Research Institute (Korea, Republic of)[10484-25]

Monitoring treatment efficacy for rheumatoid arthritis using frequency-domain diffuse optical tomography: a case study, Christopher J. Fong, Hyun K. Kim, Jong Hwan Lee, Jennifer W. Hoi, Michael Rasiej, Laura Geraldino-Pardilla, Joan M. Bathon, Andreas Hielscher, Columbia Univ. (USA)[10484-26]

SS-OCT system for human retina imaging based on active mode locking wavelength-swept fiber laser, Hwi Don Lee, Gwangju Institute of Science and Technology (Korea, Republic of); Gyeong Hun Kim, Pusan National Univ. (Korea, Republic of); Yong Joon Joo, Gwangju Institute of Science and Technology (Korea, Republic of); Chang-Seok Kim, Pusan National Univ. (Korea, Republic of); Tae Joong Eom, Gwangju Institute of Science and Technology (Korea, Republic of)[10484-27]

Microscope-mounted intraoperative optical coherence tomography with actively tunable focus and optical path length, Ju Ha Kim, Chosun Univ. (Korea, Republic of); Yong Joon Joo, Gwangju Institute of Science and Technology (Korea, Republic of); Su Min Han, Huvitz Co., Ltd. (Korea, Republic of); Eun-Seo Choi, Chosun Univ. (Korea, Republic of); Tae Joong Eom, Gwangju Institute of Science and Technology (Korea, Republic of)[10484-28]

SESSION 8 MON 3:40 PM TO 5:00 PM

NIR/Vis Spectroscopic Techniques for Clinical Applications

Session Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

Vena cava filters and thrombolytic therapeutic monitoring based on functional near-infrared spectroscopy for deep vein thrombosis, Boan Pan, Fulin Zhong, Pengbo Wang, Ting Li, Univ. of Electronic Science and Technology of China (China)[10484-29]

Evaluation of muscle oxygen consumption by using near-infrared spectroscopy in Duchenne Muscular Dystrophy, Te-Hsuan Chen, National Chiao Tung Univ. (Taiwan); Wen-Chin Weng, National Taiwan Univ. Children's Hospital (Taiwan); Chia-Wei Lin, National Taiwan Univ. Hospital (Taiwan); Jung-Chih Chen, Ching-Cheng Chuang, National Chiao Tung Univ. (Taiwan) .. [10484-30]

Design and performance test of nirs-based spine cord lesion detector, Nanxi Li, Univ. of Electronic Science and Technology of China (China); Yu Su, Ting Li, Univ. of Electronic Science and Technology of China (China)[10484-31]

Measuring temperature induced phase change kinetics in subcutaneous adipose tissues using near infrared spectroscopy, magnetic resonance spectroscopy and optical coherence tomography, Amir Y. Sajjadi, Massachusetts General Hospital (USA)[10484-32]

TUESDAY 30 JANUARY

SESSION 9 TUE 9:10 AM TO 10:10 AM

Diffuse Reflectance Techniques for Clinical Applications

Session Chair: **Quan Liu**, Nanyang Technological Univ. (Singapore)

In vivo diffuse reflectance spectroscopy of hollow structures and solid organs in the abdominal cavity in a pig model using a laparoscopy-adaptable applicator probe for evaluating the potential of intraoperative tissue classification, Daqing Piao, Oklahoma State Univ. (USA); Mohammad Ramadan M.D., Ion Maloney M.D., Sanjay Patel M.D., The Univ. of Oklahoma Health Sciences Ctr. (USA)[10484-33]

Simultaneous, noninvasive, in vivo, continuous monitoring of hematocrit, vascular volume, hemoglobin oxygen saturation, pulse rate and breathing rate in humans and other animal models using a single light source, Joseph Chaiken, Paul Dent, Sai Han Tun, Seth Fillioe, Bin Deng, Syracuse Univ. (USA); Josh Satalin, Gary Nieman, Kailyn Wilcox, Quinn Searles, Sri Narsipur, Charles M. Peterson, SUNY Upstate Medical Univ. (USA); Jerry Goodisman, Syracuse Univ. (USA)[10484-34]

CMOS-based contact imaging system for spatially resolved diffuse reflectance spectroscopy, Nils Petitdidier, Anne Koenig, Rémi Gerbelot, Henri Grateau, CEA-LETI (France); Sylvain Gioux, Univ. de Strasbourg (France); Sophie Morales, CEA-LETI (France)[10484-35]

SESSION 10 TUE 10:40 AM TO 12:00 PM

Imaging: Theory and Simulations

Session Chair: **Quan Liu**, Nanyang Technological Univ. (Singapore)

Polarized light histology of tissue and differential Mueller matrix formalism, Tatiana Novikova, Ecole Polytechnique (France); Thomas Sang Hyuk Yoo, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Saclay (France); Tzaniislava Genova-Hristova, Institute of Electronics, Russian Academy of Sciences (Bulgaria); Hee Ryung Lee, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Saclay (France); Ekaterina Borisova, Institute of Electronics, Russian Academy of Sciences (Bulgaria); Ivan Terziev, Univ. Hospital "Tsaritsa Yoanna-ISUL" (Bulgaria); Enric Garcia-Caurel, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Saclay (France) . . .[10484-36]

Selection of optimal multispectral imaging system parameters for small joint arthritis detection, Rok Dolenc, Matija Milanic, Jošt Stergar, Univ. of Ljubljana (Slovenia)[10484-37]

Monte Carlo simulation of near-infrared light propagation in realistic adult head models with hair follicles, Boan Pan, Fulin Zhong, Ting Li, Univ. of Electronic Science and Technology of China (China)[10484-38]

The study on fast localization method of anomaly block in brain based on differential optical density, Huiquan Wang, Lina Ren, Hui Wang, Xing Feng, Haofeng Qi, Jinhai Wang, Tianjin Polytechnic Univ. (China) . . .[10484-39]

CONFERENCE 10485

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10485

Optics and Biophotonics in Low-Resource Settings IV

Conference Chairs: **David Levitz**, MobileODT (Israel); **Aydogan Ozcan**, Univ. of California, Los Angeles (USA); **David Erickson**, Cornell Univ. (USA)

Program Committee: **Gerard L. Coté**, Texas A&M Univ. (USA); **Wolfgang Drexler**, Medizinische Univ. Wien (Austria); **Matthew D. Keller**, Intellectual Ventures Lab. (USA); **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA); **Chetan A. Patil**, Temple Univ. (USA); **Nirmala Ramanujam**, Duke Univ. (USA); **Avi Rasooly**, National Institutes of Health (USA); **Eric A. Swanson**, OCT News (USA); **Sebastian Wachsmann-Hogiu**, McGill Univ. (Canada); **Ian M. White**, Univ. of Maryland, College Park (USA)

SATURDAY 27 JANUARY

SESSION 1 SAT 8:40 AM TO 10:00 AM

Smartphone Based Optical Instruments

Session Chair: **Gerard L. Coté**, Texas A&M Univ. (USA)

Smartphone-based assessment of blood alteration severity, Xianglin Li, Jaxin Xue, Wei Li, Ting Li, Univ. of Electronic Science and Technology of China (China) [10485-1]

A dual-mode mobile phone microscope using the onboard camera flash, Antony Orth, Emma R. Wilson, Ctr. of Excellence for Nanoscale BioPhotonics, RMIT Univ. (Australia); Jeremy Thompson, Ctr. of Excellence for Nanoscale BioPhotonics, The Univ. of Adelaide (Australia); Brant C. Gibson, Ctr. of Excellence for Nanoscale BioPhotonics, RMIT Univ. (Australia) [10485-2]

Smartphone confocal microscopy of human skin in vivo, Esther E. Freeman, Massachusetts General Hospital (USA); Aggrey Semeere, Priscilla Namaganda, Infectious Diseases Institute (Uganda); Jeffrey Martin, Univ. of California, San Francisco (USA); Salvador González, Hospital Univ. Ramón y Cajal (Spain); Gary Peterson, Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA); Richard R. Anderson, Guillermo J. Tearney, Massachusetts General Hospital (USA); DongKyun Kang, Massachusetts General Hospital (USA) and The Univ. of Arizona (USA) [10485-3]

Mobile phone based transcutaneous bilirubinometry, Brandon Harrison, Alexander P. Dumont, Temple Univ. (USA); Hendrik Weitkamp, Vanderbilt Univ. (USA); Chetan A. Patil, Temple Univ. (USA) [10485-4]

SESSION 2 SAT 10:30 AM TO 12:20 PM

Machine Learning in Imaging, Sensing and Diagnostics

Session Chair: **Matthew D. Keller**, Intellectual Ventures Lab. (USA)

Precision versus program: setting priorities for visual screening and cervical cancer prevention in low-resource settings (*Invited Paper*), Paul D. Blumenthal M.D., Stanford Univ. (USA) [10485-5]

Characterization of cervigram image sharpness using multiple self-referenced measurements and random forest classifiers, Mayoore Jaiswal, Matt Horning, Liming Hu, Intellectual Ventures Lab. (USA); Yau Ben-Or, MobileODT Ltd. (Israel); Cary Champlin, Intellectual Ventures Lab. (USA); David Levitz, MobileODT Ltd. (Israel) [10485-6]

Image processing and machine learning techniques to automate diagnosis of Lugol's iodine cervigrams for a low-cost, point-of-care, digital colposcope, Mercy N. Asiedu, Anish Simhal, Usamah Chaudhary, Duke Univ. (USA); John W. Schmitt, Duke Univ. Medical Ctr. (USA); Guillermo Sapiro, Nimmi Ramanujam, Duke Univ. (USA) [10485-7]

Machine learning enabled flexible and low-cost plasmonic sensors for point-of-care sensing, Zachary Ballard, Daniel Shir, Shyama Sathianathan, Sarah Bazargan, Aashish Bhardwaj, Aydogan Ozcan, Univ. of California, Los Angeles (USA) [10485-8]

Automatic and accurate segmentation of cerebral tissues in fMRI dataset with combination of image processing and deep learning, Zhenglun Kong, Northeastern Univ. (USA); Junyi Luo, Ting Li, Univ. of Electronic Science and Technology of China (China) [10485-9]

Lunch/Exhibition Break Sat 12:20 pm to 1:30 pm

SESSION 3 SAT 1:30 PM TO 3:30 PM

Low-Cost and Mobile Spectral Imaging and Sensing

Session Chair: **David Levitz**, MobileODT Ltd. (Israel)

Spectroscopic applications for low resource environments (*Keynote Presentation*), Katarina Svanberg M.D., Lund Univ. (Sweden) and South China Normal Univ. (China); Sune Svanberg, Lund Univ. (Sweden) and South China Normal Univ. (China) [10485-10]

Hyperspectral imaging with near-infrared-enabled mobile phones for tissue oximetry, Jonathan Lin, Pejman Ghassemi, U.S. Food and Drug Administration (USA); Yu Chen, Univ. of Maryland, College Park (USA); Joshua Pfefer, U.S. Food and Drug Administration (USA) [10485-11]

Scattering and absorption measurements of cervical tissues measures using low cost multi-spectral imaging, Amir Bernat, Kfir Bar-Am, MobileODT Ltd. (Israel); Leigh Cataldo, Scripps Clinic Medical Group (USA); Frank J. Bolton, MobileODT Ltd. (Israel); Bruce Kahn M.D., Scripps Clinic Medical Group (USA); David Levitz, MobileODT Ltd. (Israel) [10485-12]

Ultra-portable, spectrometer based nucleic acid quantification system for point-of-care applications, Varun Koppa, David Erickson, Cornell Univ. (USA) [10485-13]

Detecting adulterants in milk with lower cost mid-infrared and Raman spectroscopy, Changwon Lee, Wenbo Wang, Benjamin Wilson, Matthew D. Keller, Intellectual Ventures Lab. (USA) [10485-14]

SESSION 4 SAT 4:00 PM TO 5:20 PM

Low-Cost and Compact OCT Instrumentation

Session Chair: **Eric A. Swanson**, Acacia Communications Inc. (USA)

Towards OCT on a chip, Elisabet Rank, Medizinische Univ. Wien (Austria); Stefan Nevlacsil, Paul Müllner, Rainer Hainberger, AIT Austrian Institute of Technology GmbH (Austria); Marcus Duell, Exalos AG (Switzerland); Matthias Voelker, Nanko Verwaal, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany); Gerald Meinhardt, Martin Sagmeister, Jochen Kraft, ams AG (Austria); Padraic Morrissey, Seán Collins, Matthieu Duperron, Peter O'Brien, Tyndall National Institute (Ireland); Stefan Richter, Michael Kempe, Carl Zeiss AG (Germany); Wolfgang Drexler, Medizinische Univ. Wien (Austria) [10485-15]

Briefcase sized low-cost, portable spectral domain low-coherence interferometry system for primary care applications, Roshan Dsouza, Jungeun Won, Guillermo L. Monroy, Darold R. Spillman Jr., Stephen A. Boppart, Univ. of Illinois (USA) [10485-16]

Q-switched based supercontinuum source towards low-cost ultra-high resolution optical coherence tomography, Michael Maria, Univ. of Kent (United Kingdom); Ivan Bravo, Technical Univ. of Denmark (Denmark); Thomas Feuchter, Lasse Leick, Peter Moselund, Mark Denninger, NKT Photonics A/S (Denmark); Adrian Podoleanu, Univ. of Kent (United Kingdom); Ole Bang, Technical Univ. of Denmark (Denmark) [10485-17]

Simultaneous en-face imaging of multiple layers of a partial fingerprint with multiple reference optical coherence tomography, Kai Neuhaus, National Univ. of Ireland, Galway (Ireland); Paul M. McNamara, Compact Imaging, Inc. (USA) and National Univ. of Ireland, Galway (Ireland); Seán O'Gorman, Sergey Alexandrov, National Univ. of Ireland, Galway (Ireland); Josh Hogan, Carol Wilson, Compact Imaging, Inc. (USA); Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) [10485-18]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:20 AM TO 10:00 AM

Fluorescence-Based Imaging and Sensing Methods

Session Chair: **David Erickson**, Cornell Univ. (USA)

Design and development of a simple low-cost UV fluorescence multi-spectral imaging system, Zachary Coker, Benjamin Stein, Vladislav V. Yakovlev, Texas A&M Univ. (USA). [10485-19]

Surface-enhanced fluorescence microscopy on a smartphone, Qingshan Wei, North Carolina State Univ. (USA); Guillermo P. Acuna, Technische Univ. Braunschweig (Germany); Seungkyeum Kim, Univ. of California, Los Angeles (USA); Carolin Vietz, Technische Univ. Braunschweig (Germany); Derek Tseng, Jongjae Chae, Daniel Shir, Wei Luo, Univ. of California, Los Angeles (USA); Philip Tinnefeld, Technische Univ. Braunschweig (Germany); Aydogan Ozcan, Univ. of California, Los Angeles (USA). [10485-20]

Application of smartphone based fluorescence spectroscopy in preliminary skin screening, Aparajita Sahoo, REDX Innovation Lab. (India); Anshuman Das, MIT Media Lab. (USA); Akshat Wahi, Forum Shah, Geetanjali Shinde-Rathod, REDX Innovation Lab. (India). [10485-21]

A portable microscopy system for fluorescence, polarized, and brightfield imaging, Paul Gordon, Rolla Wattinger, Texas A&M Univ. (USA); Cody Lewis, Ctr. for Remote Health Technologies and Systems, Texas A&M Engineering Experiment Station (USA); Vinicius Venancio, Susanne Talcott, Gerard L. Coté, Texas A&M Univ. (USA). [10485-22]

Compact imaging system for quantitative fluorescence sensing through autofluorescent, scattering and absorbing media, Zoltán S. Göröcs, Yair Rivenson, Hatice Ceylan Koydemir, Derek Tseng, Univ. of California, Los Angeles (USA); Tamara L. Troy, Vasiliki Demas, Verily Life Sciences, LLC (USA); Aydogan Ozcan, Univ. of California, Los Angeles (USA). [10485-23]

SESSION 6 SUN 10:30 AM TO 12:20 PM

Optical Methods in Lab-on-a-Chip and Point of Care Applications

Session Chair: **Aydogan Ozcan**, Univ. of California, Los Angeles (USA)

Optical point of care approaches for chronic disease diagnosis and monitoring in underserved communities (Invited Paper), Gerard L. Coté, Texas A&M Univ. (USA). [10485-24]

A low-cost, multiplexed, rapid diagnostic test for iron and vitamin a deficiency, Zhengda Lu, Balaji Srinivasan, Saurabh Mehta, David Erickson, Cornell Univ. (USA). [10485-25]

In situ detection of point mutations and targeted DNA sequencing using mobile phone microscopy, Malte Kühnemund, Uppsala Univ. (Sweden); Qingshan Wei, North Carolina State Univ. (USA); Evangelia Darai, Uppsala Univ. (Sweden); Yingjie Wang, Univ. of California, Los Angeles (USA); Ivan Hernandez-Neuta, Uppsala Univ. (Sweden); Zhao Yang, Derek Tseng, Univ. of California, Los Angeles (USA); Annika Ahlford, Uppsala Univ. (Sweden); Aydogan Ozcan, Univ. of California, Los Angeles (USA); Mats Nilsson, Uppsala Univ. (Sweden). [10485-26]

A versatile low-cost reader for two-dimensional paper network immunoassays, Brady Hunt, Chelsey A. Smith, Kathryn Kundrod, Sai Paul, Rebecca Richards-Kortum, Rice Univ. (USA). [10485-27]

A smartphone based dual-plexed molecular diagnostics platform for point-of-care (POC) inflammation assessment, Xiangkun Cao, Yvon Serge Ongagna Yhombi, David Erickson, Cornell Univ. (USA). [10485-28]

Lunch/Exhibition Break Sun 12:20 pm to 1:30 pm

SESSION 7 SUN 1:30 PM TO 3:10 PM

Emerging Technologies

Session Chair: **David Levitz**, MobileODT Ltd. (Israel)

Air quality monitoring using lens-less holographic on-chip microscopy, Yichen Wu, Ashutosh Shiledar, Yicheng Li, Jeffrey Wong, Steve Feng, Xuan Chen, Christine Chen, Kevin Jin, Saba Janamian, Zhe Yang, Zach Ballard, Zoltán Göröcs, Alborz Feizi, Aydogan Ozcan, Univ. of California, Los Angeles (USA). [10485-29]

Low cost thermal camera for use in preclinical detection of diabetic peripheral neuropathy in primary care setting, Niranchana Manivannan, Zyden Jarry, Justin C. Carmichael, VisionQuest Biomedical LLC (USA); Mark Burge, The Univ. of New Mexico (USA); Peter Soliz, VisionQuest Biomedical LLC (USA). [10485-30]

Smartphone-coupled laryngoscopy at the point of care, Jonah W. Mink, MobileODT Ltd. (USA) and Stoll Medical Group (USA); Frank J. Bolton, Curt W. Peterson, MobileODT Ltd. (Israel); Shai Assia, MobileODT Ltd (Israel); David Levitz, MobileODT Ltd. (Israel). [10485-31]

Light assisted drying (LAD) for protein stabilization: optical characterization of samples, Madison A. Young, Madison E. McKinnon, Gloria D. Elliott, Susan R. Trammell, The Univ. of North Carolina at Charlotte (USA). [10485-32]

Development and characterization of a snapshot Mueller matrix polarimeter for the determination of cervical cancer risk in the low resource setting, Jessica C. Ramella-Roman, Mariacarla Gonzalez, Karla Montejó, Joseph Chue-Sang, Florida International Univ. (USA); A. DeHoog, Optical Engineering & Analysis LLC (USA); Nola Holness, Florida International Univ. (USA). [10485-33]

SESSION 8 SUN 3:40 PM TO 5:20 PM

Computational Imaging and Sensing

Session Chair: **Chetan A. Patil**, Temple Univ. (USA)

Point of care testing for global health: challenges and strategies, Omai B. Garner, Univ. of California, Los Angeles (USA). [10485-34]

3D on-chip microscopy of optically cleared tissue, Yibo Zhang, Yoonjung Shin, Kevin Sung, Sam Yang, Harrison Chen, Hongda Wang, Da Teng, Yair Rivenson, Rajan P. Kulkarni, Aydogan Ozcan, Univ. of California, Los Angeles (USA). [10485-35]

On-chip ultraviolet holography for high-throughput nanoparticle and biomolecule detection, Mustafa Daloglu, Aniruddha Ray, Zoltán Göröcs, Matthew Xiong, Ravinder Malik, Gal Bitan, Univ. of California, Los Angeles (USA); Euan McLeod, College of Optical Sciences, The Univ. of Arizona (USA); Aydogan Ozcan, Univ. of California, Los Angeles (USA). [10485-36]

Compact lens-free transmission off-axis digital holographic microscope, Manon Rostykyus, Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland). [10485-37]

Determination of cervical cancer risk with a snapshot Mueller matrix polarimeter in Mysore India, Jessica C. Ramella-Roman, Mariacarla Gonzalez, Karla Montejó, Florida International Univ. (USA); Karl Krupp, Florida International Univ. (USA) and Public Health Research Institute of India (India); A. DeHoog, Optical Engineering & Analysis LLC (USA); Vijaya Srinivas, Public Health Research Institute of India (India); Purnima Madhivanan, Florida International Univ. (USA) and Public Health Research Institute of India (India). [10485-38]

CONFERENCE 10485

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Description of a multiple reference optical coherence tomography system based on a piezostack actuator with 2 kHz A-line rate, Seán O’Gorman, Kai Neuhaus, National Univ. of Ireland, Galway (Ireland); Paul McNamara, National Univ. of Ireland, Galway (Ireland) and Compact Imaging, Inc. (USA); Sergey Alexandrov, National Univ. of Ireland, Galway (Ireland); Josh Hogan, Carol Wilson, Compact Imaging, Inc. (USA); Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) and Royal College of Surgeons in Ireland (Ireland) [10485-39]

Smartphone-based grading of apple quality, Xianglin Li, Ting Li, Univ. of Electronic Science and Technology of China (China) [10485-40]

A very low cost data acquisition device for photoacoustic computed tomography, Mohammad R. N. Avanaki, Afreen Fatima, Wayne State Univ. (USA); Christopher Harness, Univ. of Detroit Mercy (USA) [10485-41]

Comparison of low-cost handheld retinal camera and traditional table top retinal camera in the detection of retinal features indicating a risk of cardiovascular disease, Vinayak Joshi, Jeffrey Wigdahl, Sheila Nemeth, Gilberto Zamora, VisionQuest Biomedical LLC (USA); Ellaheh Ebrahim, Community Healthcare Ctr. (USA); Peter Soliz, VisionQuest Biomedical LLC (USA) [10485-42]

Portable convective PCR device for point-of-care molecular diagnostics, Vinoth Kumar Rajendran, Macquarie Univ. (Australia); Padmavathy Bakthavathsalam, The Univ. of New South Wales (Australia); Peter Berquist, Macquarie Univ. (Australia) and The Univ. of Auckland (New Zealand); Anwar Sunna, Macquarie Univ. (Australia) [10485-43]

Plasmonics enhanced smartphone fluorescence microscopy with periodic gold nanohole arrays, Taerim Yoon, Heesang Ahn, Taeyoung Kang, Pusan National Univ. (Korea, Republic of); Jong-Ryul Choi, Daegu-Gyeongbuk Medical Innovation Foundation (Korea, Republic of); Kyujung Kim, Pusan National Univ. (Korea, Republic of) [10485-44]

Cost effective wireless embedded multichannel NIRS system, Chuan-Hsiang Yu, National Chiao Tung Univ. (Taiwan) [10485-45]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10486

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10486

Design and Quality for Biomedical Technologies XI

Conference Chairs: **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA); **Rongguang Liang**, College of Optical Sciences, The Univ. of Arizona (USA)

Conference Co-Chair: **T. Joshua Pfefer**, U.S. Food and Drug Administration (USA)

Program Committee: **David W. Allen**, National Institute of Standards and Technology (USA); **Anthony J. Durkin**, Beckman Laser Institute and Medical Clinic (USA); **Jeeseong Hwang**, National Institute of Standards and Technology (USA); **Robert J. Nordstrom**, National Institutes of Health (USA); **Eric J. Seibel**, Univ. of Washington (USA); **Behrouz Shabestari**, National Institutes of Health (USA); **Gracie Vargas**, The Univ. of Texas Medical Branch (USA); **Rudolf M. Verdaasdonk**, Vrije Univ. Medical Ctr. (Netherlands)

SATURDAY 27 JANUARY

SESSION 1 SAT 8:40 AM TO 10:00 AM

Phantom-Based Testing in Photoacoustics

Session Chair: **T. Joshua Pfefer**,
U.S. Food and Drug Administration (USA)

A novel 3D printed phantom for standard characterization of photoacoustic contrast agents (*Invited Paper*), Santiago J Arconada-Alvarez, Junxin Wang, Jeanne Lemaster, Jesse J Jokerst, Univ of California San Diego (USA) [10486-1]

Development of tissue-mimicking phantoms for multispectral photoacoustic imaging, Efthymios Maneas, Wenfeng Xia, Olumide Ogunlade, Martina Fonseca, Daniil I. Nikitichev, Univ. College London (United Kingdom); Anna L. David, Simeon J. West, Univ. College London Hospital (United Kingdom); Paul C. Beard, Sébastien Ourselin, Jeremy C. Hebden, Tom Vercauteren, Adrien E. Desjardins, Univ. College London (United Kingdom) [10486-2]

Motorized photoacoustic tomography probe for enhancement of in vivo photoacoustic lipid signal in the second near-infrared window, Gurneet Sangha, Nick Hale, Craig J. Goergen, Purdue Univ. (USA) .. [10486-3]

Factors impacting gold nanoparticle detectability and quantification accuracy with multispectral photoacoustic imaging, William C. Vogt, U.S. Food and Drug Administration (USA); Nashaat Rasheed, George Mason Univ. (USA) [10486-4]

SESSION 2 SAT 10:30 AM TO 12:30 PM

Phantoms and Test Methods

Session Chair: **Jeeseong Hwang**,
National Institute of Standards and Technology (USA)

A Hertzian approach to viscoelastic modeling of fresh tissue specimens and tissue-mimicking phantoms, Nikan Namiri, Ashkan Maccabi, Univ. of California, Los Angeles (USA); Neha Bajwa, Ctr. for Advanced Surgical and Interventional Technology (USA); Karam W. Badran M.D., Maie A. St. John, David Geffen School of Medicine, Univ. of California, Los Angeles (USA); Zachary Taylor, Warren Grundfest, George Saddik, Univ. of California, Los Angeles (USA) [10486-5]

Biomimetic 3D-printed neurovascular phantoms for macro- and micro-scale Near-infrared Fluorescence Imaging, Yi Liu, Univ. of Maryland, College Park (USA); Pejman Ghassemi, U.S. Food and Drug Administration (USA); Hannah Horng, Univ. of Maryland, College Park (USA); Udayakumar Kanniyappan, U.S. Food and Drug Administration (USA); Yu Chen, Univ. of Maryland, College Park (USA); T. Joshua Pfefer, U.S. Food and Drug Administration (USA) [10486-6]

Comparison of calibration and standardization approaches for fluorescence guided imaging systems to benchtop fluorescence measurements in cellular systems, Maritoni Litorja, National Institute of Standards and Technology (USA) [10486-7]

Evaluation of blood flow in human exercising muscle by diffuse correlation spectroscopy: a phantom model study, Mikie Nakabayashi, Yumie Ono, Masashi Ichinose, Meiji Univ. (Japan) [10486-8]

Influence of low temperature ageing on optical and mechanical properties of transparent yttria stabilized-zirconia cranial prosthesis, Nami Davoodzadeh, David Halaney, Univ. of California, Riverside (USA); Gottlieb Uahengo, Univ. of California, San Diego (USA); Javier E. Garay, Guillermo Aguilar, Univ. of California, Riverside (USA) [10486-9]

Detecting testicular toxicity using label-free multimodal nonlinear optical imaging, Aneesh Alex, GlaxoSmithKline (USA); Jang Hyuk Lee, Univ. of Illinois (USA); Jose J. Rico-Jimenez, Univ. of Illinois (USA); Sunish Mohanan, GlaxoSmithKline (USA); Stephen A. Boppart, Univ. of Illinois (USA); Zane A. Arp, GlaxoSmithKline (USA) [10486-10]

Lunch/Exhibition Break Sat 12:30 pm to 2:00 pm

SESSION 3 SAT 2:00 PM TO 3:20 PM

Innovative Optical Modalities

Session Chair: **Anthony J. Durkin**,
Beckman Laser Institute and Medical Clinic (USA)

Employing wavefront detection system to study soft contact lens in air deformation properties, Minghan Chen, Johnson & Johnson Vision Care, Inc. (USA) [10486-11]

Light field laryngoscopy, Shuaishuai Zhu, Univ. of Illinois (USA) and Harbin Institute of Technology (China); Liang Gao, Univ. of Illinois (USA) ... [10486-12]

Getting more early photons with less background: detection rate and signal-to-background improvements in enhanced early photon imaging, Lagnojita Sinha, Jovan Brankov, Kenneth M. Tichauer, Illinois Institute of Technology (USA) [10486-13]

High definition diffusion tensor imaging for optic nerve fiber tracking: translational implications for whole eye transplantation, Vijay Gorantla, Wake Forest School of Medicine (USA); Vasil Ercüment Erbaş M.D., Ozel Gaziantep Primer Hospital Plastik Cerrahi Poliklinigi (Turkey); Huseyin Sahin M.D., Univ. of Pittsburgh (USA); Liwei Dong M.D., Xijing Hospital (China); Yijun Wu, Michael Steketee, Sudhir Pathak, Walter Schneider, Univ. of Pittsburgh (USA) [10486-14]

SESSION 4 SAT 3:50 PM TO 5:30 PM

Hyperspectral Imaging

Session Chair: **Gracie Vargas**,
The Univ. of Texas Medical Branch (USA)

Emulation and evaluation of multispectral imagers via spatial frequency domain Spectroscopy (SFDS), Rolf Saager, Melissa L. Baldado, Rebecca A. Rowland, Adrien Ponticorvo, Anthony J. Durkin, Beckman Laser Institute and Medical Clinic (USA) [10486-15]

Hyperspectral compressed single pixel imaging in the spatial frequency domain, Mohammad Torabzadeh, Beckman Laser Institute and Medical Clinic (USA) [10486-16]

Domain and task specific multispectral band selection, Sebastian J. Wirkert, Fabian Isensee, Anant S. Vemuri, Klaus Maier-Hein, Deutsches Krebsforschungszentrum (Germany); Baowei Fei, Georgia Institute of Technology (USA) and Winship Cancer Institute, Emory Univ. (USA) and Emory Univ. (USA); Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany) [10486-17]

CONFERENCE 10486

A Multi-LED light source for Hyperspectral Imaging of cells and tissues. Kashif Islam, Macquarie Univ. (Australia); Ewa Goldys, Martin Ploschner, Martin Gosnell, Ctr. for Nanoscale Biophotonics, Macquarie Univ. (Australia) [10486-18]

Hyperspectral camera selection for interventional healthcare. Anant S. Vemuri, Sebastian J. Wirkert, Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany). [10486-19]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:10 AM TO 10:00 AM

OCT Imaging Systems

Session Chair: **Eric J. Seibel**, Univ. of Washington (USA)

Visible-light optical coherence tomography: seeing retinal functions and beyond (*Invited Paper*), Hao F. Zhang, Northwestern Univ. (USA) . . . [10486-20]

Dispersion estimation and compensation in optical coherence tomography, Kanwarpal Singh, Gargi Sharma, Biwei Yin, Guillermo Tearney M.D., Wellman Ctr. for Photomedicine (USA) [10486-21]

Ultra-low noise supercontinuum source for ultra-high resolution optical coherence tomography at 1300 nm, Ivan Bravo Gonzalo, Technical Univ. of Denmark (Denmark); Michael Maria, Univ. of Kent (United Kingdom) and NKT Photonics Inc. (Denmark) and Technical Univ. of Denmark (Denmark); Rasmus Dybbro Engelsholm, Technical Univ. of Denmark (Denmark); Thomas Feuchter, Lasse Leick, Peter Morten Moselund, NKT Photonics A/S (Denmark); Adrian G. H. Podoleanu, Univ. of Kent (United Kingdom); Ole Bang, Technical Univ. of Denmark (Denmark) and NKT Photonics Inc. (Denmark) [10486-22]

Acceleration of OCT image processing by using hash table method for logarithm scaling, Xinyu Li, Jun Zhang, Shanshan Liang, Sun Yat-Sen Univ. (China). [10486-23]

Image-guided intraocular injection using multimodality optical coherence tomography and fluorescence confocal scanning laser ophthalmoscopy in rodent ophthalmological models, Benjamin D. Terrones, Oscar R. Benavides, Kelsey C. Leeburg, Sankarathi B. Mehanathan, Edward M. Levine, Yuankai K. Tao, Vanderbilt Univ. (USA) [10486-24]

SESSION 6 SUN 10:30 AM TO 12:10 PM

NIRS Oximetry Performance Standardization

Session Chair: **David W. Allen**, National Institute of Standards and Technology (USA)

To be announced (*Invited Paper*), Robert Kopotic, Consultant (USA) [10486-25]

Saturation measurement accuracy in clinical near-infrared cerebral oximeters with a 3d-printed channel array phantom, Ali Afshari, Pejman Ghassemi, Molly Halprin, Jonathan Lin, Sandy Weinger, Jianting Wang, T. Joshua Pfefer, U.S. Food and Drug Administration (USA); Amir H. Gandjbakhche, National Institutes of Health (USA) [10486-26]

An applicable approach for extracting human heart rate and oxygen saturation during physical movements using a multi-wavelength illumination optoelectronic sensor system, Sijung Hu, David Mulvaney, Samah Alharbi, Loughborough Univ. (United Kingdom) [10486-27]

A liquid phantom with adjustable oxygenation for evaluating and comparing near-infrared spectroscopy oximeters (*Invited Paper*), Helene Isler, Daniel Ostojic, Stefan Kleiser, UniversitätsSpital Zürich (Switzerland); Nassim Nasser, Univ. Bern (Switzerland); Bjørn Andresen, Copenhagen Univ. Hospital Hvidovre (Denmark); Tanja Karen, UniversitätsSpital Zürich (Switzerland); Gorm Greisen, Copenhagen Univ. Hospital Hvidovre (Denmark); Martin Wolf, UniversitätsSpital Zürich (Switzerland) [10486-28]

Lunch/Exhibition Break Sun 12:10 pm to 1:30 pm

SESSION 7 SUN 1:30 PM TO 2:30 PM

NIH Special Session: NIBIB and NCI Funding Opportunities

Session Chairs: **Behrouz Shabestari**, National Institutes of Health (USA); **Robert J. Nordstrom**, National Cancer Institute (USA)

1:30 TO 1:50 PM

Scientific programs and funding opportunities at the National Institute of Biomedical Imaging and Bioengineering (NIBIB) and the National Cancer Institute (NCI)

Speakers: **Behrouz Shabestari**, Program Director, Optical Imaging and Spectroscopy, and Photoacoustic Imaging, National Institute of Biomedical Imaging and Bioengineering, NIH
Robert J. Nordstrom, Branch Chief, Image Guided Interventions, Cancer Imaging Program, National Cancer Institute, NIH

The NIBIB mission is to improve health by leading the development and accelerating the application of biomedical technologies. The Institute is committed to integrating the physical and engineering sciences with the life sciences to advance basic research and medical care. The NCI coordinates the National Cancer Program, which conducts and supports research, training, health information dissemination, and other programs with respect to the cause, diagnosis, prevention, and treatment of cancer, rehabilitation from cancer, and the continuing care of cancer patients and the families of cancer patients. This presentation will provide an overview of the scientific programs and funding opportunities supported by NIBIB and NCI, highlighting those that are of particular importance to the field of optical imaging and spectroscopy.

1:50 TO 2:20 PM

Preparing successful and competitive NIH grant applications

Speaker: **Behrouz Shabestari**, Program Director, Optical Imaging and Spectroscopy, and Photoacoustic Imaging, National Institute of Biomedical Imaging and Bioengineering, NIH

The goal of this presentation is to provide junior faculty and researchers an introduction to preparing and writing a grant proposal for the National Institutes of Health (NIH), specifically related to the field of biomedical imaging and bioengineering. Topics covered include elements of a good grant proposal, NIH funding mechanisms, understanding the NIH format and review criteria, writing tips for compelling applications, and the Dos and Don'ts of successful grant-writing. The NIBIB Trailblazer Award for New and Early Stage Investigators and the new R21 Exploratory/Developmental Research Grant will be discussed.

2:20 TO 2:30 Final Questions and Discussion

SESSION 8..... SUN 2:30 PM TO 3:20 PM

Smart Phone Imaging Technologies I

Session Chair: **Behrouz Shabestari**,
National Institutes of Health (USA)

Wide-field smartphone fundus photography using trans-pars-planar illumination and miniaturized indirect ophthalmoscopy (*Invited Paper*), Xincheng Yao, Devrim Toslak, Univ. of Illinois at Chicago (USA) . . . [10486-29]

Development and characterization of a dual-modality smartphone-based imaging system for oral cancer detection, Ross Uthoff, Bofan Song, Oliver Spires, College of Optical Sciences, The Univ. of Arizona (USA); Petra Wilder-Smith D.D.S., Beckman Laser Institute and Medical Clinic (USA); Praveen Birur, KLESIDS Bangalore (India); Moni A. Kuriakose, Mazumdar Shaw Cancer Ctr. (India); Mary Platek, Roswell Park Cancer Institute (USA); Rongguang Liang, College of Optical Sciences, The Univ. of Arizona (USA) . . . [10486-30]

SESSION 9..... .SUN 3:50 PM TO 5:10 PM

Smart Phone Imaging Technologies II

Session Chair: **Ramesh Raghavachari**,
U.S. Food and Drug Administration (USA)

A low cost mobile phone dark-field microscope for nanoparticle-based quantitative studies (*Invited Paper*), Dali Sun, Ye Hu, Arizona State Univ. (USA) . . . [10486-31]

Ultra low-cost, portable smartphone optosensors for mobile point-of-care diagnostics (*Invited Paper*), Lei Li, Washington State Univ. (USA) . . . [10486-32]

Optical tests for using smartphones inside medical devices, Amir S. Bernat, Jennifer K. Acobas, David Hassan, David Levitz, MobileODT Ltd. (Israel) . . . [10486-33]

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>. **Best practices for thermographic fever screening: factors affecting estimation of core temperature in human subjects**, Pejman Ghassemi, T. Joshua Pfefer, Jon Casamento, Quanzeng Wang, U.S. Food and Drug Administration (USA) . . . [10486-34]

Investigation of polymer composites using high-resolution spectral domain optical coherence tomography, Muhammad F. Shirazi, Ruchire Eranga H. Wijesinghe, Naresh Kumar Ravichandran, Jaeseok Park, Jae-Hwan Kwon, Oeon Kwon, Kyungpook National Univ. (Korea, Republic of); Pilun Kim, Oz-tec Co., Ltd. (Korea, Republic of); Mansik Jeon, Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of) . . . [10486-35]

Micro cavity ring resonator based sensor for glucose concentration measurement using photonic crystal technology, Mayur K. Chhipa, Engineering College Ajmer (India); K. Srimannarayana, Akhilesh Kumar, K L Univ. (India) . . . [10486-36]

Pixel-reassigned spectral domain optical coherence tomography, En Bo, Linbo Liu, Nanyang Technological Univ. (Singapore) . . . [10486-37]

A dynamic system with digital lock-in detection for pharmacokinetic diffuse fluorescence tomography, Guoyan Yin, Limin Zhang, Yanqi Zhang, Wenwen Du, Tianjin Univ. (China); Wenjuan Ma, Tianjin Medical Univ. Cancer Institute & Hospital (China); Huijuan Zhao, Feng Gao, Tianjin Univ. (China) . . . [10486-38]

A novel multi-wavelength procedure for blood pressure estimation using opto-physiological sensor at peripheral arteries and capillaries, Sijung Hu, Loughborough Univ. (United Kingdom); Francesco Scardulla Scardulla, Leonardo D'Acquisto, Univ. degli Studi di Palermo (Italy); Laura Barrett, Loughborough Univ. (United Kingdom); Salvatore Pasta, Fondazione Ri.MED (Italy); Panagiotis Blanos, Loughborough Univ. (United Kingdom); Liangwen Yan, Shanghai Univ. (China) . . . [10486-39]

Extracting broadband optical properties from uniform optical phantoms: a comparison using two methods, Vinoin Vincely, Jijun Chen, Karthik Vishwanath, Miami Univ. (USA) . . . [10486-40]

Charactering baseline shift with 4th polynomial function for portable biomedical near-infrared spectroscopy device, Ke Zhao, Yaoyao Ji, Univ. of Electronic Science and Technology of China (China); Lina Qiu, Politecnico di Milano (Italy); Ting Li, Univ. of Electronic Science and Technology of China (China) . . . [10486-41]

A commercialized photoacoustic microscopy system with switchable optical and acoustic resolutions, Yang Pu, MicroPhotoAcoustics INC (USA) . . . [10486-42]

Portable measurement system for real-time acquisition and analysis of in-vivo spatially resolved reflectance in the subdiffusive regime, Peter Naglič, Franjo Pernuš, Boštjan Likar, Miran Bürmen, Univ. of Ljubljana (Slovenia) . . . [10486-43]

BIOS SUNDAY PLENARY SESSION.....SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10487

Saturday 27 January 2018 • Proceedings of SPIE Vol. 10487

Multimodal Biomedical Imaging XIII

Conference Chairs: **Fred S. Azar**, Philips Medical Systems (USA); **Xavier Intes**, Rensselaer Polytechnic Institute (USA)

Program Committee: **Caroline Boudoux**, Ecole Polytechnique de Montréal (Canada); **Christophe Chef'd'hotel**, Ventana Medical Systems, Inc. (USA); **Yu Chen**, Univ. of Maryland, College Park (USA); **Qianqian Fang**, Massachusetts General Hospital (USA); **Gultekin Gulsen**, Univ. of California, Irvine (USA); **Changqing Li**, Univ. of California, Merced (USA); **Brian W. Pogue**, Thayer School of Engineering at Dartmouth (USA); **Arjun G. Yodh**, Univ. of Pennsylvania (USA)

SATURDAY 27 JANUARY

SESSION 1SAT 8:20 AM TO 10:20 AM

Multimodality Microscopy

Session Chairs: **Caroline Boudoux**, Ecole Polytechnique de Montréal (Canada); **Fred S. Azar**, Philips Healthcare (USA)

Towards guided biopsy using endoscopic NIR fluorescence imaging and OCT by cancer-specific fluorescent antibodies, Fabio Feroldi, Helene Knaus D.D.S., Mariska Verlaan, Carla Molthoff, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) [10487-1]

Radiometry-based output beams modeling for double-clad fiber components, Kathy Beaudette, Ecole Polytechnique de Montréal (Canada) and Massachusetts General Hospital (USA); Mathias Strupler, Ecole Polytechnique de Montréal (Canada); Jian Ren, Brett E. Bouma, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Caroline Boudoux, Ecole Polytechnique de Montréal (Canada) [10487-2]

Multimodality imaging of glioma cells migration in organotypic brain slice culture, Chao J. Liu, Ghaidan Shamsan, Taner Akkin, David J. Odde, Univ. of Minnesota, Twin Cities (USA) [10487-3]

Classification of optical coherence tomography images for diagnosing different ocular diseases, Peyman Gholami, Univ. of Waterloo (Canada); Mohsen Sheikhhassani, Carleton Univ. (Canada); John S. Zelek, Vasudevan Lakshminarayanan, Univ. of Waterloo (Canada) [10487-4]

Novel low level laser therapy enhanced vascular endothelial growth factor choroidal neovascularization in living rabbits monitored with multimodal photoacoustic, optical coherence tomography, and fluorescence imaging., Van Phuc Nguyen, Univ. of Michigan-Kellogg Eye Ctr. (USA); Wei Zhang, Yanxiu Li, Univ. of Michigan (USA); Yannis M. Paulus M.D., Univ. of Michigan-Kellogg Eye Ctr. (USA) [10487-5]

Towards combined optical coherence tomography and hyper-spectral imaging for gastrointestinal endoscopy, Xavier Attendu, Camille Crunelle, Billie Maubois, Joanie Urbain, Chloe Turrell, Ecole Polytechnique de Montréal (Canada); Nicolas Godbout, Ecole Polytechnique de Montréal (Canada) and Castor Optics, Inc. (Canada); Mathias Strupler, Ecole Polytechnique de Montréal (Canada); Caroline Boudoux, Ecole Polytechnique de Montréal (Canada) and Castor Optics, Inc. (Canada) [10487-6]

SESSION 2SAT 10:50 AM TO 12:10 PM

Multimodality/Multiscale Imaging

Diffuse and nonlinear imaging for in vivo multiscale preclinical monitoring of mammary tumors, Kavon Karrobi, Boston Univ (USA); Matthew B. Applegate, Syeda Tabassum, Boston Univ. (USA); Darren M. Roblyer, Boston Univ (USA) [10487-7]

Frequency-domain photoacoustic and fluorescence microscopy: application on labeled and unlabeled cells, Gregor Langer, Research Ctr. for Non Destructive Testing GmbH (Austria); Jaroslav Jacak, Johannes Kepler Univ. Linz (Austria) and Fachhochschule Oberösterreich (Austria); Bianca Buchegger, Thomas A. Klar, Johannes Kepler Univ. Linz (Austria); Thomas Berer, Research Ctr. for Non Destructive Testing GmbH (Austria) [10487-8]

Multiscale imaging of collagen, Michael A. Pinkert, Univ. of Wisconsin-Madison (USA) and Morgridge Institute for Research (USA); Zachary J. Simmons, Univ. of Wisconsin-Madison (USA); Brittany L. Gray-Woods, Appalachian State Univ. (USA); Adib Keikhosravi, Bing Dai, Univ. of Wisconsin-Madison (USA); Timothy J. Hall, Jeremy D. Rogers, Paul J. Campagnola, Kevin W. Eliceiri, Univ. of Wisconsin-Madison (USA) and Morgridge Institute for Research (USA) [10487-9]

3D Fluorescence Imaging cryomicrotome system for multispectral structural, functional and molecular imaging of whole organs, Paul R. Bloemen, Iwan J. Dobbe, Coen D. Dijkman, Niels H. Kind, Maurice C. G. Aalders, Ton G. van Leeuwen, Maria Siebes, Academisch Medisch Centrum (Netherlands) [10487-10]

SESSION 3SAT 1:30 PM TO 3:30 PM

Clinical Applications

Photoacoustic/ultrasound dual imaging of human superficial lesions: an initial clinical study, Meng Yang, Yuxin Jiang, Peking Union Medical College Hospital (China); Changhui Li, Peking Univ. (China); Fang Yang, Shenzhen Mindray Bio-Medical Electronics Co., Ltd. (China); Na Su, Hewen Tang, Chenyang Zhao, Peking Union Medical College Hospital (China) ... [10487-11]

Multi-modality Photoacoustic Tomography, Ultrasound, and Light Sheet Microscopy for volumetric tumor margin detection, Gurmeet Sangha, Purdue Univ. (USA); Bihe Hu, Daniel Bolus, Mei Wang, Tulane Univ. (USA); Shelby J. Skidmore, Purdue Univ. (USA); Andrew B. Sholl, Tulane Univ. School of Medicine (USA); Jonathan Q. Brown, Tulane Univ. (USA); Craig J. Goergen, Purdue Univ. (USA) [10487-12]

Measurements of coherent hemodynamics to enrich the physiological information provided by near-infrared spectroscopy (NIRS) and functional MRI, Angelo Sassaroli, Kristen T. Tgavalekos, Tufts Univ. (USA); Thao Pham, Tufts Univ (USA); Nishanth Krishnamurthy, Kosar Khaksari, Sergio Fantini, Tufts Univ. (USA) [10487-13]

A polarization sensitive hyperspectral imaging system for detection of differences in tissue properties, Joseph A. Peller, Nancy K. Ceja, Amanda J. Wawak, Susan R. Trammell, The Univ. of North Carolina at Charlotte (USA) [10487-14]

Quantitative polyp size measurements with photometric stereo endoscopy enhanced by deep learning, Faisal Mahmood, Johns Hopkins Univ. (USA); Norman S. Nishioka M.D., Massachusetts General Hospital (USA); Nicholas J. Durr, Johns Hopkins Univ. (USA) [10487-15]

Endoscopic hyperspectral imaging: light guide optimization for spectral light source, Craig M. Browning, Sam Mayes, Makayla Davis, Thomas C. Rich, Silas J. Leavesley, Univ. of South Alabama (USA) [10487-16]

SESSION 4SAT 4:00 PM TO 5:40 PM

Diffuse Optics

Fast in vivo quantification of receptor engagement by phasor analysis of NIR fluorescence lifetime. Sez-Jade Chen, Nattawut Sinsuebphon, Rensselaer Polytechnic Institute (USA); Alena Rudkouskaya, Margarida Barroso, Albany Medical College (USA); Xavier Intes, Rensselaer Polytechnic Institute (USA); Xavier Michalet, Univ. of California, Los Angeles (USA) [10487-17]

Mesh-based Monte Carlo simulations of light propagation using quadratic tetrahedral elements. Anh P. Tran, Zhixiong Cheng, Qianqian Fang, Northeastern Univ. (USA) [10487-18]

X-ray luminescence imaging of water, air, and tissue phantoms. Michael C. Lun, Changqing Li, Univ. of California, Merced (USA) ... [10487-19]

High sensitivity optical molecular imaging system. Yu An, Kun Wang, Jie Tian, Institute of Automation (China) [10487-20]

Optimization of the conical mirror design based on Monte Carlo simulations for fluorescence molecular tomography. Yue Zhao, Wei Zhang, Changqing Li, Univ. of California, Merced (USA) [10487-21]

BIOS SATURDAY HOT TOPICS SESSION7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

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See page 6 for details.

SUNDAY 28 JANUARY

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Poster Sunday

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Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Predicting molecular subtypes of breast cancer on mammograms using selected radiomics features and machine learning algorithm. Peifang Liu, Wenjuan Ma, Yu Ji, Xinpeng Guo, Junjun Liu, Pengfeng Sun, Tianjin Medical Univ. Cancer Institute & Hospital (China) [10487-22]

Multi-target reconstruction based on X-ray luminescence computed tomography. Bo Feng, Zhongxing Zhou, Tianjin Univ. (China) [10487-23]

Modality switchable near-infrared wavelength-swept laser for steady-state and frequency domain diffuse optical spectroscopic imaging. Hansol Jang, Gyeong Hun Kim, Chang-Seok Kim, Pusan National Univ. (Korea, Republic of) [10487-24]

BIOS SUNDAY PLENARY SESSIONSUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

Visit the BIOS Expo Saturday and Sunday to discuss products and possibilities with the best suppliers from around the world.



Saturday-Sunday

BIOS EXPO

200 Companies

Saturday 27 January 10:00 am to 5:00 pm

Sunday 28 January 10:00 am to 5:00 pm

BIOS Expo, the world's largest biomedical optics and biophotonics exhibition, starts the Photonics West week. Find the latest technologies from more than 200 companies supplying biomedical research and healthcare solutions.

FEATURED TECHNOLOGIES

- Biomedical optics components
- Instrumentation
- Lasers used in research, diagnostics, and therapeutics
- Molecular imaging
- Nano/biophotonics
- Biosensors
- Spectroscopic imaging
- Microscopy

CONFERENCE 10488

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10488

Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII

Conference Chair: **Israel Gannot**, Johns Hopkins Univ. (USA), Tel Aviv Univ. (Israel)

Program Committee: **James P. Clarkin**, Polymicro Technologies, A Subsidiary of Molex Incorporated (USA); **Ilko Ilev**, U.S. Food and Drug Administration (USA); **Jin U. Kang**, Johns Hopkins Univ. (USA); **Karl-Friedrich Klein**, Technische Hochschule Mittelhessen (Germany); **Pierre Lucas**, The Univ. of Arizona (USA); **Yuji Matsuura**, Tohoku Univ. (Japan); **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom); **Stefano Taccheo**, Swansea Univ. (United Kingdom)

SATURDAY 27 JANUARY

SESSION 1 SAT 8:20 AM TO 10:00 AM

Sensors Detectors and Treatment Tools I

Analysis of molecular conformation using silicon electro-photonics biosensors, José Juan-Colás, Steven Johnson, Thomas Krauss, Univ. of York (United Kingdom) [10488-1]

Fiber-based 1150-nm femtosecond laser source for the label-free virtual optical biopsy, Tzu-Ming Liu, Univ. of Macau (Macao, China); Jing-Yu Huang, Lun-Zhang Guo, Jing-Zun Wang, Tse-Chung Li, Hsin-Jung Lee, National Taiwan Univ. (Taiwan); Po-Kai Chiu, National Applied Research Labs. (Taiwan); Lung-Han Peng, National Taiwan Univ. (Taiwan) [10488-2]

Transmission properties of dielectric-coated hollow optical fibers based on stainless tube, Katsumasa Iwai, Hiroyuki Takaku, Sendai National College of Technology (Japan); Mitsunobu Miyagi, Miyagi Gakuin Women's Univ. (Japan); Yi-Wei Shi, Xiao-Song Zhu, Fudan Univ. (China); Yuji Matsuura, Tohoku Univ. (Japan) [10488-3]

A new catheter design for combined radiofrequency ablation and optoacoustic treatment monitoring using copper-coated light-guides, Johannes Rebling, Francisco J. Oyaga Landa, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Xosé L. Deán-Ben, Helmholtz Zentrum München GmbH (Germany); Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10488-4]

Polarization management to mitigate misalignment induced fringe fading in fiber-based optical coherence tomography, Nanshuo Wang, Xinyu Liu Sr., Qiaozhou Xiong, Linbo Liu, Nanyang Technological Univ. (Singapore) [10488-5]

SESSION 2 SAT 10:30 AM TO 11:10 AM

Keynote

Smart surgical tools (Keynote Presentation), Jin U. Kang, Johns Hopkins Univ. (USA) [10488-6]

SESSION 3 SAT 11:10 AM TO 12:30 PM

Sensors Detectors and Treatment Tools II

Terahertz gas sensing based on time-domain-spectroscopy using a hollow-optical fiber gas cell, Takahiro Suzuki, Takashi Katagiri, Yuji Matsuura, Tohoku Univ. (Japan) [10488-7]

Investigation of hydrogen sulfide gas using Pd/Pt material based fiber Bragg grating sensor, Amna Bedi, Santosh Kumar, DIT Univ. (India) [10488-8]

A combined glucose and pH sensor on a single optical fiber for continuous point-of-care testing, Krister Hammarling, Mid Sweden Univ. (Sweden); Harald I. Muri, Markus S. Wahl, Norwegian Univ. of Science and Technology (Norway); Magnus Engholm, Mid Sweden Univ. (Sweden); Dag R. Hjølme, Norwegian Univ. of Science and Technology (Norway) [10488-9]

Bragg grating in micro-scaled optical fiber for cardiac biomarker sensing, Tong Liu, Lili Liang, Peng Xiao, Yang Ran, Long Jin, Bai-Ou Guan, Jinan Univ. (China) [10488-10]

Lunch/Exhibition Break Sat 12:30 pm to 1:30 pm

SESSION 4 SAT 1:30 PM TO 3:10 PM

Sensors Detectors and Treatment Tools III

Advanced fiber optic solutions for medical diagnostics and theranostics (Invited Paper), Viacheslav Artyushenko D.D.S., art photonics GmbH (Germany) [10488-11]

Blood glucose measurement with multiple quantum cascade lasers using hollow-optical fiber-based ATR spectroscopy, Kiriko Yoshioka, Tohoku Univ (Japan); Saiko Kino, Yuji Matsuura, Tohoku Univ. (Japan) [10488-12]

Fibre-optic pressure and temperature measurements using phase-resolved low-coherence interferometry, Joanna Cooté, Sandy Mosse, Sacha Noimark, Erwin Alles, Univ. College London (United Kingdom); Callum Little, Chris D. Loder, Roby D. Rakhit, The Royal Free Hospital (United Kingdom); Malcolm C. Finlay, Barts Heart Ctr., William Harvey Research Institute (United Kingdom); Adrien E. Desjardins, Univ. College London (United Kingdom) [10488-13]

Femtosecond translocation of antiretroviral drugs using an optical fibre reduces HIV infection, Rudzani Malabi, Sello L. Manoto, Saturnin S. Ombina-Lemboumba, CSIR National Laser Ctr. (South Africa); Malik Maaza, Univ. of South Africa (South Africa); Patience T. Mthunzi-Kufa, CSIR National Laser Ctr. (South Africa) [10488-14]

Signal-noise-ratio modelling and characterization of a 512 x 16 spad line sensor for time-resolved spectroscopy applications, Neil Finlayson, Ahmet T. Erdogan, Andrea Usai, Robert K. Henderson, The Univ. of Edinburgh (United Kingdom) [10488-15]

SESSION 5 SAT 3:40 PM TO 5:20 PM

Sensors Detectors and Treatment Tools IV

Biomedical and sensing applications of a multi-mode biodegradable phosphate-based optical fiber, Ondrej Podrazky, Pavel Peterka, Jan Mrázek, Soňa Vytýkáčová, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); Martin Kuneš, Biomedical Research Ctr., Univ. Hospital Hradec Králové (Czech Republic); Oleksiy Lyutakov, Univ. of Chemistry and Technology Prague (Czech Republic); Edoardo Ceci-Ginistrelli, Diego Pugliese, Politecnico di Torino (Italy); Nadia G. Boetti, Istituto Superiore Mario Boella (Italy); Davide Janner, Politecnico di Torino (Italy); Daniel Milanese, Politecnico di Torino (Italy), Consiglio Nazionale delle Ricerche (Italy) [10488-16]

A novel liquid-filled microstructured polymer optical fiber as bio-sensing platform for Raman spectroscopy, Mikel Azkune, Eneko Arrospide, Amaia Berganza, Ifñaki Bikandi, Gotzon Aldabaldetretreku, Gaizka Durana, Joseba Zubia, Univ. del País Vasco (Spain) [10488-17]

Ultra-sensitive DNA detection via fiber specklegrams, Wang Chen, Wei Lin, Fu Feng, Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China) [10488-18]

Endoscopic Raman sensing using hollow-core negative curvature fibres, Stephanos Yerolatsitis, Fei Yu, Univ. of Bath (United Kingdom); Sarah McAughtrie, The Univ. of Edinburgh (United Kingdom); Michael G. Tanner, Heriot-Watt Univ. (United Kingdom); James M. Stone, Univ. of Bath (United Kingdom); Colin J. Campbell, The Univ. of Edinburgh (United Kingdom); Tim A. Birks, Jonathan C. Knight, Univ. of Bath (United Kingdom) [10488-19]

Tunable vertical cavity surface emitting lasers for use in the near infrared biological window, Vincent Kitsmiller, Univ. of Notre Dame (USA); Matthew Dummer, Klein Johnson, Vixar Inc. (USA); Thomas D. O'Sullivan, Univ. of Notre Dame (USA) [10488-20]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

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Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 6 SUN 8:00 AM TO 10:00 AM

Sensors Detectors and Treatment Tools V

An all-optical fiber-optic photoacoustic transducer, Shai Ashkenazi, Supriya V. Thathachary, Univ. of Minnesota, Twin Cities (USA); Cameron Motameni, Univ. of Minnesota Twin Cities (USA) [10488-21]

Temperature monitoring of retinal tissues during laser radiation by speckle variance optical coherence tomography, Soohyun Lee, Johns Hopkins Univ. (USA); Changho Lee, Chonnam National Univ. Medical School (Korea, Republic of) and Hwasun Hospital, Chonnam National Univ. (Korea, Republic of); Gyeongwoo Cheon, GE Global Research (USA); Jin U. Kang, Johns Hopkins Univ. (USA) [10488-22]

In-vivo dosimetry in high-dose rate prostate brachytherapy, Luis M. Moutinho, Univ. de Aveiro (Portugal); Joana B. Melo, Hugo Freitas, NU-RISE LDA (Portugal); Joao A. Veloso, Mauricio Torres, Univ. of Aveiro (Portugal); João A. M. Santos, Alexandre Pereira, Sara Pinto, IPO-PORTO (Portugal); Jose Perez Calatayud, Hospital Univ. i Politècnic La Fe (Spain); Jose Maria Blasco, Javier Vijande, Enrique Sanchis, Facundo Ballester, Univ. de València (Spain); Luis Peralta, Univ. de Lisboa (Portugal) [10488-23]

Fluorescence endoscopy using fiber speckle illumination, Shuhei Nakano, Takashi Katagiri, Yuji Matsuura, Tohoku Univ. (Japan) [10488-45]

Integrated sensor biopsy device for real time tissue metabolism analysis, Jesus Delgado Alonso, Intelligent Optical Systems, Inc. (USA); Robert A. Lieberman, Lumoptix, LLC (USA); Paul M. DiCarmino, David Berry, Narciso Guzman, Sreekar B. Marpu, Intelligent Optical Systems, Inc. (USA) [10488-24]

Applications of tapered flat silver halide fiber elements for infrared biospectroscopy with aspects of optical stability and biocompatibility, Herbert M. Heise, Fachhochschule Südwestfalen (Germany); Lukas Küpper IV, Infrared Fiber Sensors (Germany) [10488-25]

SESSION 7 SUN 10:30 AM TO 11:50 AM

Sensors Detectors and Treatment Tools VI

Mid-infrared chalcogenide fiber devices for medical applications (*Invited Paper*), Francois Chenard, Oseas Alvarez, Andrew Buff, IRflex Corporation (USA) [10488-26]

A portable thermal imaging device as a feedback system for breast cancer treatment, Israel Gannot, Johns Hopkins University (USA); Merav Ben-David, Sheba Medical Center (Israel); Oshrit Hopper, Tel-Aviv University (Israel) [10488-27]

High efficient bone ablation with diode pumped Erbium and Thulium lasers including different delivery fibers: a comparative in vitro study, Karl Stock, Florian Hausladen, Institute für Lasertechnologien in der Medizin und Messtechnik (Germany) [10488-28]

A multifunctional endoscope for imaging, fluid delivery and fluid extraction, James M. Stone, Univ. of Bath (United Kingdom); Tushar Choudhary, Heriot Watt Univ. (United Kingdom); Helen Parker, Bethany Mills, The Univ. of Edinburgh (United Kingdom); Adam Marshall, Univ. of Edinburgh (United Kingdom); Debadipta Choudhury, Heriot-Watt Univ. (United Kingdom); Michael G. Tanner, Heriot Watt Univ. (United Kingdom); Harry A. Wood, Kerriane Harrington, Jonathan C. Knight, Tim A. Birks, Univ. of Bath (United Kingdom); Kevin Dhaliwal M.D., Mark Bradley, The Univ. of Edinburgh (United Kingdom) [10488-29]

SESSION 8 SUN 1:00 PM TO 3:00 PM

Sensors Detectors and Treatment Tools VII

Plasmon-enhanced Raman detection of neuropathogenic proteins (*Invited Paper*), Paolo Matteini, Cristiano D'Andrea, Maximilien Cottat, Martina Banchelli, Marella De Angelis, Roberto Pini, Istituto di Fisica Applicata "Nello Carrara" (Italy) [10488-30]

Design and analysis of FBG based sensor for detection of damage in oil and gas pipelines for safety of life at sea, Amna Bedi, Vaishali Kothari, Santosh Kumar, DIT Univ. (India) [10488-31]

Photoacoustic imaging of hidden dental caries by using a bundle of hollow optical fibers, Takuya Koyama, Tohoku Univ. (Japan); Satoko Kakino, Tokyo Medical and Dental Univ. (Japan); Yuji Matsuura, Tohoku Univ. (Japan) [10488-32]

Improved fabrication techniques of extruded simplified hollow core optical fibers for Raman spectroscopy, Erik P. Schartner, Georgios Tsiminis, Mustaf Bekteshi, Heike Ebendorff-Heidepriem, The Univ. of Adelaide (Australia) [10488-33]

25 gauge fibered needle for autofluorescence analysis of breast masses, Alexis Toullec, Institut des Sciences Moléculaires d'Orsay (France); Marie-Christine Mathieu M.D., Institut Gustave Roussy (France); Charlotte Benoit, Nodea Medical (France); Richard Berry, Pierre Validire, Institut Mutualiste Montsouris (France); René Farcy, Lab. Aimé Cotton, Univ. Paris-Sud 11 (France); Suzette Delalogue, Corinne Balleyguier, Institut Gustave Roussy (France); Marie-Pierre Fontaine-Aupart, Institut des Sciences Moléculaires d'Orsay (France) [10488-34]

Fabrication and analysis of cylindrical diffusing optical fiber probe for photodynamic therapy in cancer treatment, Gaye Park, Taihan Fiberoptics Co., Ltd. (Korea, Republic of); Chihwan Ouh, Taihan Fiberoptics Co Ltd (Korea, Republic of); HyungSu Cho, Daeyoung Kim, Jaewan Han, Cui Long, Hyeyeon Lee, Chang Hyun Jung, Taihan Fiberoptics Co., Ltd. (Korea, Republic of) [10488-35]

SESSION 9 SUN 3:30 PM TO 5:10 PM

Sensors Detectors and Treatment Tools VIII

Multilayer polymer dielectric films for hollow glass waveguides, Wesley Y. Kendall, James A. Harrington, Rutgers, The State Univ. of New Jersey (USA) [10488-36]

Optical fibre luminescence sensor for real-time ldr brachytherapy dosimetry, Peter Woulfe, Galway-Mayo Institute of Technology (Ireland); Sinead O'Keefe, Univ. of Limerick (Ireland); Frank Sullivan, Prostate Cancer Institute, National Univ. of Ireland, Galway (Ireland) [10488-37]

Resonant nanopillars as label-free optical biosensors, María-Fe Laguna Heras, Ana López-Hernandez, Rafael Casquel, Miguel Holgado Bolaños, Univ. Politécnica de Madrid (Spain); Iñaki Cornago, Paula Ciaurriz, CEMITEC (Spain); Francisco J. Sanza, BIOD (Spain); Beatriz Santamaría, Univ. Politécnica de Madrid (Spain); María V. Maigler, BIOD (Spain); Fátima Fernandez, CEMITEC (Spain) [10488-38]

Design of tapered optical fibers to achieve high spatial selectivity during infrared neural stimulation, Nelson Salas Jr., Sruhrud Rajguru, Univ. of Miami (USA) [10488-39]

An efficient and selective sensing of creatinine based on fiber optic SPR technique exploiting the advantages of molecular imprinting technique, Sonika Sharma, Indian Institute of Technology Delhi (India); Banshi D. Gupta, Indian Institute of Technology Delhi (India) [10488-40]

CONFERENCE 10488

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Refractive-index-sensing fiber comb using intracavity multi-mode interference fiber sensor, Ryo Oe, Takeo Minamikawa, Tokushima Univ. (Japan) and ERATO MINOSHIMA Intelligent Optical Synthesizer (IOS), Japan Science and Technology Agency (Japan); Shuji Taue, Okayama Univ. (Japan); Hideki Fukano, Okayama Prefectural Univ. (Japan); Yoshiaki Nakajima, Kaoru Minoshima, The Univ. of Electro-Communications (Japan) and ERATO MINOSHIMA Intelligent Optical Synthesizer (IOS), Japan Science and Technology Agency (Japan); Takeshi Yasui, Tokushima Univ. (Japan) and ERATO MINOSHIMA Intelligent Optical Synthesizer (IOS), Japan Science and Technology Agency (Japan) [10488-41]

Balanced detection for spectral-domain optical coherence tomography with fiber-based phase shifter, Seung S. Lee, Ju H. Kim, Hye J. Ma, Eun-Seo Choi, Chosun Univ. (Korea, Republic of) [10488-42]

SRS-sensor ¹³C/¹²C isotops measurements for detecting Helicobacter Pylori, Yan Chubchenko, D.I. Mendeleyev Institute for Metrology (Russian Federation); Leonid Konopelko, Aleksandr S. Grishkanich, ITMO Univ. (Russian Federation). [10488-43]

Robust and sensitive optical hydrophone using a side-polished fiber, Jeongmin Heo, Ryun K. Kim, Pil G. Sang, Hyoung Won Baac, Sungkyunkwan Univ. (Korea, Republic of) [10488-44]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10489

Tuesday–Wednesday 30–31 January 2018 • Proceedings of SPIE Vol. 10489

Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis

Conference Chairs: **Robert R. Alfano**, The City College of New York (USA); **Stavros G. Demos**, Univ. of Rochester Laboratory for Laser Energetics (USA)

Program Committee: **Nicole J. Crane**, Naval Medical Research Ctr. (USA); **Zhiwei Huang**, National Univ. of Singapore (Singapore); **Nicusor V. Iftimia**, Physical Sciences Inc. (USA); **Amir Gandjbakhche**, National Institutes of Health (USA); **Israel Gannot**, Johns Hopkins Univ. (USA), Tel Aviv Univ. (Israel); **Richard M. Levenson M.D.**, Univ. of California, Davis (USA); **Igor V. Meglinski**, Univ. of Oulu (Finland); **Lingyan Shi**, Columbia Univ. (USA); **Milind Rajadhyaksha**, Memorial Sloan-Kettering Cancer Ctr. (USA); **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom); **Kestutis Sutkus**, The City College of New York (USA); **Siavash Yazdanfar**, GE Global Research (USA)

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TUESDAY 30 JANUARY

OPENING REMARKS TUE 8:00 AM TO 8:05 AM

Session Chair: **Robert R. Alfano**, The City College of New York (USA)

SESSION 1 TUE 8:05 AM TO 10:00 AM

Towards Mid-Infrared Optical Biopsy I

Session Chair: **Angela B. Seddon**,
The Univ. of Nottingham (United Kingdom)

High quality and detail in stainless histopathologic images using mid-infrared spectroscopic images (*Invited Paper*), Kianoush Falahkheirkhah, Shachi Mittal, Kevin L. Yeh, Rohit Bhargava, Beckman Institute for Advanced Science and Technology (USA) [10489-1]

Circulating tumor cells enrichment and phenotyping by combining dielectrophoresis and metasurface-enhanced infrared spectroscopy (*Invited Paper*), Gennady B. Shvets, Glen Kelp, Shourya Dutta Gupta, Nicholas DiNapoli, Cornell Univ. (USA) [10489-2]

Diffraction limited mid-infrared spectromicroscopy using a supercontinuum laser (*Invited Paper*), Sébastien Février, XLIM Institut de Recherche (France); Ferenc Borondics, Synchrotron SOLEIL (France); Mathieu Jossent, XLIM Institut de Recherche (France); Christophe L. Sandt, Synchrotron SOLEIL (France); Laure Lavoute, Dmitry A. Gaponov, NOVAE (France); Ammar A. Hideur, CORIA (France); Paul Dumas, Synchrotron SOLEIL (France) [10489-3]

Mid-infrared fiber-coupled supercontinuum spectroscopic imaging using a tapered chalcogenide photonic crystal fiber (*Invited Paper*), Christian Rosenberg R. Petersen, Ole Bang, DTU Fotonik (Denmark); Laurent Brilland, SelenOptics (France); Johann Troles, Univ. de Rennes 1 (France); Nikola Prtljaga, Gooch & Housego (United Kingdom); Mark Farries, Gooch & Housego (Torquay) Ltd. (United Kingdom); Jon D. Ward, Gooch & Housego (UK) Ltd. (United Kingdom); Jayakrupakar Nallala, Nick Stone, Univ. of Exeter (United Kingdom) [10489-4]

Metasurface enhanced infrared reflection spectroscopy: a new tool for differentiating between normal and cancerous cells, Gennady B. Shvets, The Univ. of Texas at Austin (USA); Shourya Dutta Gupta, Kelly R. Hume D.V.M., Cornell Univ. (USA) [10489-5]

SESSION 2 TUE 10:30 AM TO 11:55 AM

Towards Mid-Infrared Optical Biopsy II

Session Chair: **Gennady B. Shvets**, Cornell Univ. (USA)

Multi-spectral fiber spectroscopy for diagnosis of colon abnormalities ex vivo, Olga Bibikova, art photonics GmbH (Germany) and Oulu Univ. (Finland) and Institute of Analytical and Bioanalytical Chemistry, Ulm Univ. (Germany); Viacheslav Artyushenko D.D.S., art photonics GmbH (Germany); Urszula J. Zabarylo, Charité Universitätsmedizin Berlin (Germany); Anastasya Melenteva, Valeria Belikova, Samara State Technical Univ. (Russian Federation); Iskander Usenov, art photonics GmbH (Germany) and Institute for Optics & Atomic Physics, Technische Univ. Berlin (Germany); Olaf Minet, Charité Universitätsmedizin Berlin (Germany); Hans J. Eichler, Institute for Optics & Atomic Physics, Technische Univ. Berlin (Germany); Georgy Danielyan, Tatiana Sakharova, art photonics GmbH (Germany); Andrey Bogomolov, art photonics GmbH (Germany) and Samara State Technical Univ. (Russian Federation) [10489-6]

Chalcogenide infrared fiber sensors for medical diagnosis (*Invited Paper*), Catherine Boussard-Plédel, Bruno Bureau, Univ. de Rennes 1 (France); Maëna Le Corvec, Hugues Tariel, Frédéric Charpentier, DIAFIR (France) [10489-7]

Development of a clinically translatable hyperspectral endoscope exploiting a flexible fibre bundle and a spectrograph, Jonghee Yoon, James Joseph, Univ. of Cambridge (United Kingdom) and Cancer Research UK Cambridge Institute (United Kingdom); George Gordon, Univ. of Cambridge (United Kingdom); Siri A. Luthman, Dale J. Waterhouse, Univ. of Cambridge (United Kingdom) and Cancer Research UK Cambridge Institute (United Kingdom); Calum Williams, Univ. of Cambridge (United Kingdom); Sarah E. Bohndiek, Univ. of Cambridge (United Kingdom) and Cancer Research UK Cambridge Institute (United Kingdom) [10489-8]

Automated pre-processing and multivariate vibrational spectra analysis software for rapid results in clinical settings, Tanmoy T. Bhattacharjee D.D.S., Univ. do Vale do Paraíba (Brazil); Piyush Kumar, Amity Univ. Mumbai (India); L. Carvalho D.D.S., Univ. do Vale do Paraíba (Brazil) [10489-9]

Lunch/Exhibition Break Tue 11:55 am to 1:20 pm

CONFERENCE 10489

SESSION 3 TUE 1:20 PM TO 3:05 PM

Spectroscopic Instrumentation and Designs

Session Chairs: **Laura A. Sordillo**, The City College of New York (USA); **Stavros G. Demos**, Univ. of Rochester (USA)

In vivo, noncontact, real-time, optical and spectroscopic assessment of the immediate local physiological response to spinal cord injury in a rat model, Joseph Chaiken, Seth Fillioe, Kyle K. Bishop, Alexander V. Jannini, Jon J. Kim, Ricky McDonough, Steve Ortiz, Jerry Goodisman, Charles M. Peterson, Julie M. Hasenwinkel, Syracuse Univ. (USA) . . [10489-10]

Multi-color autofluorescence and scattering spectroscopy provides rapid assessment of kidney function following ischemic injury (*Invited Paper*), Rajesh N. Raman, Lawrence Livermore National Lab. (USA); Christopher D. Pivetti, UC Davis Medical Ctr. (USA); Rajendra Ramsamooj, California Northstate Univ. College of Medicine (USA); Christoph Troppmann, UC Davis Medical Ctr. (USA); Stavros G. Demos, Lawrence Livermore National Lab. (USA) and Ctr. for Biophotonics Science and Technology, Univ. of California, Davis (USA) [10489-11]

Implantable calibration-free diffuse light sensor for measuring muscle oxygenation in free diving elephant seals, Antonio Ortega-Martinez, Wellman Ctr. for Photomedicine (USA); Marloes Booker, Xavier Univ. of Louisiana (USA); Allyson Hindle, Massachusetts General Hospital (USA); Walfre Franco, Wellman Ctr. for Photomedicine (USA) [10489-12]

In-vivo fluorescence detection of breast cancer growth factor receptors by fiber-optic probe, Gilbert Bustamante, The Univ. of Texas at San Antonio (USA); Bingzhi Wang, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Frank DeLuna, The Univ. of Texas at San Antonio (USA); Lu-Zhe Sun, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Jing Yong Ye, The Univ. of Texas at San Antonio (USA) [10489-13]

In vivo measurements of optical properties of human muscles with visible and near infrared reflectance spectroscopy, Chiao-Yi Wang, Ting-Wen Yu, Kung-Bin Sung, National Taiwan Univ. (Taiwan) [10489-14]

SESSION 4 TUE 3:30 PM TO 6:10 PM

Imaging Instrumentation and Designs

Session Chair: **Israel Gannot**, Johns Hopkins Univ. (USA)

Micro-Endomicroscopy towards label-free histologic imaging in vivo, Xingde Li, Scott W. Yuan, Wenxuan Liang, Hyeon-Cheol Park, Johns Hopkins Univ. (USA); Ming-Jun Li, Corning Incorporated (USA) [10489-15]

MUSE microscopy for thick tissue imaging with extended depth of field, Farzad Fereidouni, John Tracy, Richard M. Levenson M.D., Univ. of California, Davis (USA) [10489-16]

Microscopy with ultraviolet surface excitation (MUSE) for enhancing K-12 and undergraduate education in life sciences, Chi Z. R. Huang, Univ. of Rochester (USA); Ronald W. Wood, Univ. of Rochester (USA); Stavros G. Demos, Univ. of Rochester (USA) [10489-17]

Novel needle redox endoscopy imager for cancer diagnosis, Udayakumar Kanniyappan, Univ. of Maryland, College Park (USA); Qinggong Tang, Yi Liu, Univ. of Maryland, College Park (USA); He N. Xu, Lin Z. Li, The Univ. of Pennsylvania Health System (USA); Yu Chen, Univ. of Maryland, College Park (USA) [10489-18]

Colorectal cancer detection by hyperspectral imaging using fluorescence excitation scanning, Silas J. Leavesley, Joshua Deal, Shante Hill M.D., Will A. Martin, Malvika Lall, Carmen Lopez, Paul F. Rider M.D., Thomas C. Rich D.D.S., Carole W. Boudreaux M.D., Univ. of South Alabama (USA) [10489-19]

Mapping optical properties of the esophagus using sub-diffuse spatial frequency domain imaging, Jordan Sweer, Nicholas J. Durr, Johns Hopkins Univ. (USA) [10489-20]

Removing the artifacts due to intrinsic instrumental polarization in backscattering Mueller matrix microscopy, Yue Yao, Hui Ma, Tsinghua-Berkeley Shenzhen Institute (China) [10489-21]

Noninvasive optical monitoring multiple physiological parameters response to cytokine storm, Zebin Li, Ting Li, Univ. of Electronic Science and Technology of China (China) [10489-22]

SESSION TUES TUE 6:00 PM TO 8:00 PM

Poster Session

Distinguishing chromophobe renal cell carcinoma and oncocytoma using second harmonic generation imaging and analysis of collagen fibrillar structure, Binlin Wu, Nicolas B. Judd, Jason T. Smith, Michael Icaza, Ryan M. Gallagher, Richard V. Szeligowski, Southern Connecticut State Univ. (USA); Sushmita Mukherjee, Weill Cornell Medical College (USA); Manu Jain, Memorial Sloan-Kettering Cancer Ctr. (USA) [10489-44]

Wide-field optical coherence microscopy for quantitative and statistical pathology in multiple tissues, Ae Gyeong Kang, Yujin Ahn, Songye Baek, Hyeongeun Kim, Sungbea Ban, Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of) [10489-45]

Fluorescence spectroscopy from human saliva for throat precancer detection, Asima Pradhan, Pavan Kumar, Mohammad Zafar, Indian Institute of Technology Kanpur (India); Ashutosh Singh, Ganesh Shankar Vidyarthi Memorial Medical College (India) [10489-46]

Resonance Raman imaging for detection and monitoring of the molecular pathological changes in human brain tumors related to Warburg effect, Yan Zhou M.D., The General Hospital of the Air Force, PLA (China); Cheng-Hui Liu, Institute for Ultrafast Spectroscopy and Lasers (USA); Ke Zhu, Institute of Physics, Chinese Academy of Sciences (China); Chunyuan Zhang, Institute for Ultrafast Spectroscopy and Lasers (USA); Yang Yang, Institute of Physics, Chinese Academy of Sciences (China); Gangge Cheng M.D., The General Hospital of the Air Force, PLA (China); Hailong Hu, WITec (China); Xinguang Yu M.D., The General Hospital of the Air Force, PLA (China); Binlin Wu, CSCU Ctr. for Nanotechnology, Southern Connecticut State Univ. (USA); Lingyan Shi, Columbia Univ. (USA); Robert R. Alfano, Institute for Ultrafast Spectroscopy and Lasers (USA) [10489-47]

Absorption deep-tissue imaging of blood vessels for endoscopic surgery of the intestine, Shirley Chan, Min Jing Zheng, The City College of New York (USA); Yury Budansky, Institute for Ultrafast Spectroscopy and Lasers, The City College of New York (USA); Stewart Russell, Institute for Ultrafast Spectroscopy and Laser, The City College of New York (USA); Robert R. Alfano, Institute for Ultrafast Spectroscopy and Lasers, The City College of New York (USA) [10489-48]

Alzheimer's disease: evaluation using label-free fluorescence of tryptophan metabolites and the kynurenine pathway, Laura A. Sordillo, Lin Zhang, Peter Sordillo M.D., Robert R. Alfano, The City College of New York (USA) [10489-49]

Thermographic analysis of photodynamic therapy with intense pulsed light and needle-free injection photosensitizer delivery: an animal study, Michelle Requena, Instituto de Física de São Carlo (Brazil); Mirian D Stringasci, Instituto de Física de São Carlos (Brazil); Sebastião Pratavieira, Instituto de Física de São Carlo (Brazil); José Vollet-Filho, Andrégo B de Nardi, Andre Escobar, Rozana Rocha, Instituto de Física de São Carlos (Brazil); Vanderlei S Bagnato, Instituto de Física de São Carlo (Brazil); Priscila Menezes, Instituto de Física de São Carlos (Brazil) [10489-50]

Intrinsic fluorescence based in-vivo detection of cervical precancer with hand held prototype device, Asima Pradhan, Indian Institute of Technology Kanpur (India); Bharat Lal Meena, Indian Institute of Technology Kanpur (India) and Univ. of Rajasthan (India); Akanksha Raikwar, Kiran Pnadey, G.S.V.M. Medical College (India); Asha Agarwal, Regency Hospital (India); Chayanika Pantola, L.P.S. Institute of Cardiology (India) [10489-51]

Extracting layer-specific intrinsic fluorescence of cervical mucosa for the diagnosis of premalignant lesions, Ting-Wen Yu, Tsan-Hsueh Huan, Ming-Hwa Hong, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan Univ. (Taiwan); Chi-Hau Chen, Ling-Hong Wei, National Taiwan Univ. Hospital (Taiwan); Kung-Bin Sung, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan Univ. (Taiwan) [10489-52]

Quantum entanglement for the diagnosis of brain tissue, Enrique J. Galvez, Colgate Univ. (USA); Lingyan Shi, Columbia Univ. (USA); Behzad Khajavi, Colgate Univ. (USA); Jhonny Castrillon, Univ. de Antioquia (Colombia); Robert R. Alfano, The City College of New York (USA) [10489-53]

WEDNESDAY 31 JANUARY

SESSION 5 WED 8:00 AM TO 10:00 AM

Applications of Optical Biopsy I

Session Chairs: **Milind Rajadhyaksha**, Memorial Sloan-Kettering Cancer Ctr. (USA); **Nicusor V. Iftimia**, Physical Sciences Inc. (USA)

Towards real-time non contact spatial resolved oxygenation monitoring using a multi spectral filter array camera in various light conditions, Jacob R. Bauer, Norwegian Colour and Visual Computing Lab., Norwegian Univ. of Science and Technology (Norway); Karlijn E. van Bekuum, Vrije Univ. Medical Ctr. (Netherlands); John H. Klaessens, Vrije Univ. Medical Ctr. (Netherlands); Herke Jan Noordmans, Univ. Medical Ctr. Utrecht (Netherlands); Jon Yngve Hardeberg, Norwegian Colour and Visual Computing Lab., Norwegian Univ. of Science and Technology (Norway); Christa Boer, Rudolf M. Verdaasdonk D.D.S., Vrije Univ. Medical Ctr. (Netherlands). [10489-23]

Label-free dynamic cellular metabolic imaging through video-rate two-photon fluorescence lifetime imaging microscopy, Andrew J. Bower, Joanne Li, Eric J. Chaney, Marina Marjanovic, Stephen A. Boppart M.D., Univ. of Illinois (USA). [10489-24]

Stain-free slide-free histopathology using supercontinuum for optical biopsy (Invited Paper), Stephen A. Boppart, Beckman Institute for Advanced Science and Technology (USA). [10489-25]

In vivo and in situ spectroscopic imaging by a handheld stimulated Raman microscope, Ji-Xin Cheng, Chien-Sheng Liao, Boston Univ. (USA). [10489-26]

New advances in RCM-OCT imaging for non-melanoma skin cancer detection and therapy guidance (Invited Paper), Nicusor V. Iftimia, Gopi N. Maguluri, Jesung Park, Physical Sciences Inc. (USA); William J. Fox, Caliber Imaging & Diagnostics, Inc. (USA); Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA). [10489-27]

SESSION 6 WED 10:30 AM TO 12:00 PM

Applications of Optical Biopsy II

Statistical analysis and machine learning algorithms for optical biopsy, Binlin Wu, Southern Connecticut State Univ. (USA). [10489-28]

Determination of human skin optical properties from hyper spectral data with deep-learning neural networks, Alexander Doronin, Yale Univ. (USA); Igor Meglinski, Alexander V. Bykov, Univ. of Oulu (Finland); Holly Rushmeier, Yale Univ. (USA). [10489-29]

Combination absorption and fluorescence for detection of vessels in intestinal sub-mucosa (Invited Paper), Stewart Russell, Thayer School of Engineering at Dartmouth (USA); Shirley Chan, The City College of New York (USA); Min Jing Zheng, The City College of New York (USA); Yury Budansky, Robert R. Alfano, Institute for Ultrafast Spectroscopy and Lasers, The City College of New York (USA). [10489-30]

OCT-based biosensor probe for core needle biopsy guidance, Nicusor V. Iftimia, Gopi N. Maguluri, Jesung Park, Physical Sciences Inc. (USA); Sharjeel Sabir, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA). [10489-31]

Lunch/Exhibition Break Wed 12:00 pm to 1:20 pm

SESSION 7 WED 1:20 PM TO 3:00 PM

Spectroscopic Methods I

Session Chair: **Lingyan Shi**, Columbia Univ. (USA)

Characterization and discrimination of breast cancer and normal human breast tissues using resonance Raman spectroscopy (Invited Paper), Binlin Wu, Jason T. Smith, Southern Connecticut State Univ. (USA); Lin Zhang, The City College of New York (USA); Xin Gao, LaGuardia Community College (USA); Robert R. Alfano, The City College of New York (USA). [10489-32]

Resonance Raman based spectrochemical probe for determination of hemoglobin glycation in clinical blood samples, Rishikesh Pandey, Univ. of Connecticut School of Medicine (USA); Gary L. Horowitz, Tufts Medical Ctr. (USA); Ishan Barman, Johns Hopkins Univ. (USA). [10489-33]

Real-time fiber-optic Raman spectroscopy for in vivo diagnosis of gastrointestinal neoplasia at endoscopy, Wei Zheng, Kan Lin, Zhiwei Huang, National Univ. of Singapore (Singapore). [10489-34]

Stimulated Raman instant histology applied to gastro-intestinal cancer detection (Invited Paper), Barbara Sarri, Rafaël Canonge, Institut Fresnel (France); Fabrice Caillol, Flora Poizat, Marc Giovannini, Institut Paoli-Calmettes (France); Hervé Rigneault, Institut Fresnel (France). [10489-35]

SESSION 8 WED 3:30 PM TO 6:20 PM

Spectroscopic Methods II

Session Chair: **Stavros G. Demos**, Univ. of Rochester (USA)

Early determination of molecular alterations in breast cancer-colonized bone with Raman spectroscopy, Chi Zhang, Johns Hopkins Univ. (USA); Ishan Barman, Johns Hopkins Univ. (USA) and Johns Hopkins Univ. School of Medicine (USA). [10489-36]

Autofluorescence excitation-emission matrices and digital imaging as quantitative tools to determine meat quality (Invited Paper), Kashif Islam, Macquarie Univ. (Australia); Ewa M. Goldys, Macquarie Univ. (Australia) and Ctr. for Nanoscale BioPhotonics (CNBP) (Australia); Sandhya Clement, Sabaah B. Mahbub, Ayad G. Anwer, Macquarie Univ. (Australia). [10489-37]

Diffuse reflectance spectroscopy for noninvasive in situ assessment of implanted tissue-engineered constructs, William R. Lloyd III, Seung Yup Lee, Sakib F. Elahi, Leng-Chun Chen, Shiuhyang Kuo, Hyungjin Myra Kim Kim, Cynthia L. Marcelo, Stephen E. Feinberg, Univ. of Michigan (USA). [10489-38]

Near infrared spectroscopy of human muscles, Giuseppe Bonifazi, Riccardo Gasbarrone, Antonio Currà, Alessandra Cardillo, Silvia Serranti, Sapienza Univ. di Roma (Italy). [10489-39]

Developing visible and near-infrared reflectance spectroscopy to detect changes of the dermal collagen concentration, Chiao-Yi Wang, Andy Ting-Chi Liao, Ting-Wen Yu, National Taiwan Univ. (Taiwan); Kung-Bin Sung, National Taiwan University (Taiwan). [10489-40]

Application of wavelet based MFDDFA on Mueller matrix images for cervical pre-cancer detection, Asima Pradhan, Mohammad Zaffar, Indian Institute of Technology Kanpur (India). [10489-41]

Stokes shift spectroscopy for the early diagnosis of epithelial precancers in DMBA treated mouse skin carcinogenesis, Ebenezer Jeyasingh, Jamal Mohamed College (India); Ganesan Singaravelu, Aruna Prakasa Rao, Anna Univ., Chennai (India). [10489-42]

Fermat single pixel camera for characterizing optical properties of biological tissues over the visible to ir spectral range, Bixin Zeng, Jian Liu, Xin Chen, Wenlei Yu, Dandan Wang, Wenzhou Medical Univ. (China); Min Xu, Fairfield Univ. (USA). [10489-43]

CLOSING REMARKS WED 6:20 PM TO 6:25 PM

CONFERENCE 10490

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10490

Biomedical Vibrational Spectroscopy 2018: Advances in Research and Industry

Conference Chairs: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA); **Wolfgang Petrich**, Roche Diagnostics GmbH (Germany)

Program Committee: **Andrew J. Berger**, Univ. of Rochester (USA); **Rohit Bhargava**, Univ. of Illinois at Urbana-Champaign (USA); **Airton Abrahão Martin**, Univ. do Vale do Paraíba (Brazil); **Michael D. Morris**, Univ. of Michigan (USA); **Dieter Naumann**, Robert Koch-Institut (Germany); **Jürgen Popp**, Institut für Photonische Technologien e.V. (Germany); **Nicholas Stone**, Gloucestershire Royal Hospital (United Kingdom)

SATURDAY 27 JANUARY

SESSION 1 SAT 1:30 PM TO 3:10 PM

Neurology and Internal Medicine

Session Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

Application of confocal Raman micro-spectroscopy for label-free monitoring of oxidative stress in living bronchial cells, Jakub Surmacki, Isabel Quirós-Gonzalez, Univ. of Cambridge (United Kingdom); Sarah E. Bohndiek, Univ. of Cambridge (United Kingdom) and Cancer Research UK (United Kingdom) and The Cambridge Institute (United Kingdom) [10490-1]

Quantitative IR spectro-microscopy for brain 3D histopathology, Cyril Petibois, Academia Sinica (Taiwan). [10490-2]

Simultaneous fingerprint and high-wavenumber fiber-optic Raman endoscopy enhances in vivo detection and demarcation of malignant lesions in stomach, Kan Lin, Wei Zheng, Zhiwei Huang, National Univ. of Singapore (Singapore) [10490-3]

Heterodyne-detected rapid-scan Fourier-transform CARS spectroscopy, Kotaro Hiramatsu, Yizhi Luo, Takuro Ideguchi, Keisuke Goda, The Univ. of Tokyo (Japan) [10490-4]

Robust and brilliant Raman tags based on core-satellite assemblies for brain tumor cell imaging, Yung-Ching Chang, Li-Ching Huang, Wei-Lun Sun, Shih-Yi Chuang, Tien-Hsin Lin, Yi-Syuan Wu, Chun-I Sze, Shiu-an-Yeh Chen, National Cheng Kung Univ. (Taiwan) [10490-5]

SESSION 2 SAT 3:40 PM TO 5:00 PM

Dermatology and Endocrinology

Session Chair: **Wolfgang Petrich**, Roche Diagnostics GmbH (Germany)

Towards a quantum cascade laser-based continuous glucose monitoring system, Katharina Haase, Roche Diabetes Care GmbH (Germany) and Ruprecht-Karls-Univ. Heidelberg (Germany); Niklas Müller, Ruprecht-Karls-Univ. Heidelberg (Germany); Wolfgang Petrich, Roche Diabetes Care GmbH (Germany) [10490-6]

Combined Raman spectroscopy and Optical coherence tomography to assess burn depth, Dayna Every, Vanderbilt Univ. (USA) [10490-7]

In vivo mid-IR spectroscopy of human skin using tunable quantum cascade lasers and photothermal detection, Werner Maentele, Otto Hertzberg, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany) [10490-8]

Raman spectroscopy reveals biophysical markers in skin cancer surgical margins, Xu Feng, Austin J. Moy, Hieu T. M. Nguyen, Yao Zhang, Matthew C. Fox, Katherine R. Sebastian, Jason S. Reichenberg, Mia K. Markey, James W. Tunnell, The Univ. of Texas at Austin (USA) [10490-9]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 3 SUN 8:30 AM TO 10:10 AM

Women's Health

Session Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

Feasibility of using CARS for in situ margins assessment in breast cancer, Elena Beletkaia, The Netherlands Cancer Institute (Netherlands) and Univ. Twente (Netherlands); Koen Dijkstra, Herman Offerhaus, Univ. Twente (Netherlands); Theo Ruers, The Netherlands Cancer Institute (Netherlands) and Univ. Twente (Netherlands) [10490-10]

Compressive Raman technology versus hyperspectral Raman imaging for breast microcalcifications cancer assessment, Camille Scotte, Institut Fresnel (France); Hilton B. deAguiar, Ecole Normale Supérieure (France); Frédéric Galland, Philippe Réfrégier, Institut Fresnel (France); Peter Winlove, Nicholas Stone, Univ. of Exeter (United Kingdom); Hervé Rigneault, Institut Fresnel (France) [10490-11]

Long wavelength identification of microcalcifications in breast cancer tissue, Yu-Pei Tseng, Technical Univ. of Denmark (Denmark) and DTU Fotonik (Denmark); Pascaline Bouzy, Nicholas Stone, Univ. of Exeter (United Kingdom); Christian Pedersen, Technical Univ. of Denmark (Denmark); Peter Tidemand-Lichtenberg, Technical Univ. of Denmark (Denmark) and DTU Fotonik (Denmark) [10490-12]

A novel transmission Raman spectroscopy platform for non-invasive detection of breast micro-calcifications, Adrian G. Ghita, Univ. of Exeter (United Kingdom); Pavel Matousek, STFC Rutherford Appleton Lab. (United Kingdom); Nicholas Stone, Univ. of Exeter (United Kingdom) [10490-13]

Using Raman spectroscopy to track therapeutic response in breast cancer cells, Giju Thomas, Vanderbilt Univ. (USA) [10490-14]

SESSION 4..... SUN 10:40 AM TO 12:00 PM

Further Applications

Session Chair: **Wolfgang Petrich**, Roche Diagnostics GmbH (Germany)

Simultaneous fingerprint and high wavenumber Raman spectroscopy to quantify hydration in tissues, Laura Masson, Vanderbilt Univ. (USA) [10490-15]

Dual Raman-Brillouin spectroscopic investigation of plant stress response and development, Zachary Coker, Narangerel Altangerel, Maria Troyanova-Wood, Vladislav Yakovlev, Texas A&M Univ. (USA) [10490-16]

Drawing new boundaries for biomedical Raman spectroscopy, Iwan W. Schie, Jürgen Popp, Saif Abdullah Mondol, Leibniz-Institut für Photonische Technologien e.V. (Germany) [10490-17]

Translation of Raman spectroscopy for cell identification into clinical laboratories, Christoph Krafft, Roman Kiselev, Mohamed Hassoun, Leibniz-Institut für Photonische Technologien e.V. (Germany); Joachim H. Clement, Universitätsklinikum Jena (Germany); Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany)..... [10490-18]

Lunch/Exhibition Break Sun 12:00 pm to 1:30 pm

SESSION 5.....SUN 1:30 PM TO 3:10 PM

Technical Advances I

Session Chair: **Wolfgang Petrich**, Roche Diagnostics GmbH (Germany)

A Mach Zehnder interferometer for measuring proteins in aqueous solutions using external cavity quantum cascade lasers, Bernhard Lendl, Andreas Schwaighofer, Stephan Freitag, Jakob Hayden, Christian Kristament, Technische Univ. Wien (Austria)..... [10490-19]

Impact of coherence in mid-infrared widefield imaging with quantum cascade lasers, Arthur Schönhals, Ruprecht-Karls-Univ. Heidelberg (Germany); Niels Kröger-Lui, Ruprecht-Karls-Univ. Heidelberg (Germany) and IRM2 GmbH (Germany); Annemarie Pucci, Wolfgang Petrich, Ruprecht-Karls-Univ. Heidelberg (Germany)..... [10490-20]

Dynamic sparse sampling in Raman imaging, Garth J. Simpson, Shijie Zhang, Azhad Chowdhury, Zhengtian Song, G. M. Dilshan P. Godaliyadda, Dong Hye Ye, Gregory T. Buzzard, Charles A. Bouman, Purdue Univ. (USA); Atanu Sengupta, Dr. Reddy's Labs Ltd. (India) . [10490-21]

Development of accelerated Raman and fluorescent Monte Carlo method, Alexander P. Dumont, Chetan A. Patil, Temple Univ. (USA) [10490-22]

Rigid endoscope for multimodal nonlinear endoscopy, Tobias Meyer, Christoph Krafft, Leibniz-Institut für Photonische Technologien e.V. (Germany); Bernhard Messerschmidt, Grintech GmbH (Germany); Thomas Bocklitz, Leibniz-Institut für Photonische Technologien e.V. (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Michael Schmitt, Friedrich-Schiller-Univ. Jena (Germany); Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany) [10490-23]

SESSION 6..... SUN 3:40 PM TO 5:00 PM

Technical Advances II

Session Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

Lab-on-a-chip-SERS as analytical tool in drug monitoring, Karina Weber, Leibniz-Institut für Photonische Technologien e.V. (Germany) and Friedrich-Schiller-Univ. Jena (Germany) and Abbe Ctr. of Photonics, Friedrich-Schiller-Univ. Jena (Germany); Dana Cialla-May, Izabella I. Jahn, Martin Jahn, Leibniz-Institut für Photonische Technologien e.V. (Germany); Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany) and Friedrich-Schiller-Univ. Jena (Germany) and Abbe Center of Photonics, Friedrich-Schiller-Univ. Jena (Germany) [10490-24]

Assessing the performance of lower cost Raman spectrometers for use in the developing world, Matthew D. Keller, Wenbo Wang, Changwon Lee, Benjamin Wilson, Intellectual Ventures Lab (USA) [10490-25]

Towards ultra-miniature Raman spectrometers for real-world samples and applications: some industrial experience and perspective, William Yang, Lynn L. Chandler, Jeff MacCubbin, BaySpec, Inc. (USA)..... [10490-26]

High throughput virtual slit enables compact, inexpensive Raman spectral imagers, Edward A. Gooding, Erik R. Deutsch, Joseph Huehnerhoff, Arsen R. Hajian, Hindsight Imaging, Inc. (USA)..... [10490-27]

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Poster Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PW/PosterGuidelines>.

Raman cytology for identifying continuously changing cervical precancerous lesions, Shiyamala Duraipandian, Fiona Lyng, Damien Traynor, Dublin Institute of Technology (Ireland); Padraig Kearney, Cara Martin, John O'Leary, Coombe Women and Infants Univ. Hospital (Ireland) . [10490-28]

Raman imaging of lipid bilayer membrane by surface enhanced raman scattering, Motoaki Mori, Shunsuke Abe, Takahiro Kondo, Yuika Saito, Gakushuin Univ. (Japan)..... [10490-29]

Discrimination of pathogenic bacteria species using Raman spectroscopy, Fernanda Oliveira, Adriano Silva, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil); Hector Giana, Fundacao Oswaldo Cruz (Brazil); Landulfo Silveira Jr., Univ. Camilo Castelo Branco (Brazil)..... [10490-30]

Phonon-phonon interactions in the vibrational spectra of squamous cell carcinoma in the amide region, Daiana Ribeiro Bortoletto, Herculano Martinho, Univ. Federal do ABC (Brazil) [10490-31]

Detecting creatine in urine of swimming athletes through Raman spectroscopy, Letícia P. Moreira, Débora D.F. M. Rocco, Alexandre G. da Silva, Univ. Santa Cecília (Brazil); Marcos T. T. Pacheco, Landulfo Silveira Jr., Univ. Anhembi Morumbi (Brazil)..... [10490-32]

BIOS SUNDAY PLENARY SESSION.....SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10491

Saturday–Monday 27–29 January 2018 • Proceedings of SPIE Vol. 10491

Microfluidics, BioMEMS, and Medical Microsystems XVI

Conference Chairs: **Bonnie L. Gray**, Simon Fraser Univ. (Canada); **Holger Becker**, microfluidic ChipShop GmbH (Germany)

Program Committee: **Brian W. Anthony**, Massachusetts Institute of Technology (USA); **Yolanda Fintschenko**, LabSmith, Inc. (USA); **Bruce K. Gale**, The Univ. of Utah (USA); **Albert K. Henning**, Aquarian Microsystems (USA); **Yu-Cheng Lin**, National Cheng Kung Univ. (Taiwan); **Yuehe Lin**, Pacific Northwest National Lab. (USA); **Ciara K. O'Sullivan**, Univ. Rovira i Virgili (Spain); **Ian Papautsky**, Univ. of Cincinnati (USA); **Bastian E. Rapp**, Karlsruher Institut für Technologie (Germany); **Thomas Stieglitz**, Albert-Ludwigs-Univ. Freiburg (Germany); **Sindy Kam-Yan Tang**, Stanford Univ. (USA); **Albert van den Berg**, MESA+ Institute for Nanotechnology (Netherlands); **WanJun Wang**, Louisiana State Univ. (USA); **Bernhard H. Weigl**, PATH (USA)

Conference Cosponsors:  



SATURDAY 27 JANUARY

SESSION 1 SAT 1:30 PM TO 3:20 PM

Microfluidics Devices I

Session Chairs: **Bonnie L. Gray**, Simon Fraser Univ. (Canada); **Holger Becker**, microfluidic ChipShop GmbH (Germany)

Silicon microneedle array for minimally invasive human health monitoring (*Invited Paper*), Rosemary Smith, Scott Collins, The Univ. of Maine (USA); Janice Duy, Timothy Minogue, U.S. Army Medical Research Institute of Infectious Diseases (USA) [10491-1]

Identification of hydrodynamic forces around 3D surrogates using particle image velocimetry in a microfluidic channel, Sepideh Afshar, Shubhankar Nath, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Utkan Demirci, Stanford Univ. (USA); Tayyaba Hasan, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Giuliano Scarcelli, Univ. of Maryland, College Park (USA); Imran Rizvi, Walfre Franco, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard Medical School (USA) [10491-2]

Photoactuation: novel MEMS-based constructs and applications of azobenzene, Logan Butt, Matthew Strohmayer, Lauren Sfakis, Natalya Tokranova, James Castracane, SUNY Polytechnic Institute (USA) ... [10491-3]

Modeling fluid transport in 2d paper networks, Jaione Tirapu-Azpiroz, Ademir Ferreira Silva, Matheus Esteves Ferreira, IBM Research - Brazil (Brazil); William Fernando Lopez Candela, Pontifical Catholic Univ. of Rio de Janeiro (Brazil); Peter William Bryant, Michael Engel, Ricardo Luis Ohta, Mathias Bernhard Steiner, IBM Research - Brazil (Brazil) [10491-4]

Droplet guiding along shallow tracks defined by laser ablation in microfluidic chips, Zeeshan Rashid, Koç Univ. (Turkey); Umut Can Coşkun, Istanbul Technical Univ. (Turkey); Yazig Morova, Berna Morova, Koç Univ. (Turkey); Asuman Aşikoğlu Bozkurt, Yıldız Technical Univ. (Turkey); Ahmet Erten, Koç Univ. (Turkey); Alexandr Jonáš, Istanbul Technical Univ. (Turkey); Alper Kiraz, Koç Univ. (Turkey) [10491-5]

SESSION 2 SAT 3:50 PM TO 5:40 PM

Manufacturing I

Session Chair: **Rosemary Smith**, The Univ. of Maine (USA)

To be announced (Guenther) (*Invited Paper*), [10491-6]

Integration of silicon photonic devices in microfluidic cartridges, Holger Becker, Birgit Anton, microfluidic ChipShop GmbH (Germany) [10491-7]

Automated assembly of microfluidic "lab-on-a-disc", Marvin Berger, Tobias Müller, Bernd Meiers, Toni Christopher Voebel, Christoph Baum, Fraunhofer-Institut für Produktionstechnologie IPT (Germany) [10491-8]

Additive manufacturing of microfluidic glass chips, Frederik Kotz, Bastian E. Rapp, Karlsruher Institut für Technologie (Germany) [10491-9]

Characterization and optimization of a stereolithography-based hydrogel for improved properties, A. Camila Uzcategui, Archish Muralidharan, Virginia L. Ferguson, Stephanie J. Bryant, Robert R. McLeod, Univ. of Colorado Boulder (USA) [10491-10]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 3 SUN 8:40 AM TO 10:00 AM

Applications I

Session Chair: **Sang-Seok Lee**, Tottori Univ. (Japan)

1 million-Q optomechanical microdisk resonators for sensing with very large scale integration, Maxime Hermouet, Louise Banniard, Marc Sansa, CEA-LETI (France) and Univ. Grenoble Alpes (France); Alexandre Fafin, CEA-LETI (France) and Univ. Grenoble Alpes (France) and Matériaux et Phénomènes Quantiques, Univ. Paris Diderot (France); Marc Gely, CEA-LETI (France) and Univ. Grenoble Alpes (France); Pierre-Etienne Allain, Eduardo-Gil Santos, Ivan Favero, Univ. Paris Diderot (France); Thomas Alava, Guillaume Jourdan, Sébastien Hentz, CEA-LETI (France) and Univ. Grenoble Alpes (France) [10491-11]

A microfluidic array for high-content screening at whole-organism resolution, Daniel Migliozi, Matteo Cornaglia, Martin Gijs, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10491-12]

Ultra-sensitive diatomite microfluidic devices for hazardous chemical sensing, Xianming Kong, Kenneth Squire, Xinyuan Chong, Alan X. Wang, Oregon State Univ. (USA) [10491-13]

Progress on CD-DVD laser microfabrication method to develop cell culture scaffolds integrating biomimetic characteristics, Mathieu Hautefeuille, Univ. Nacional Autónoma de México (Mexico) and Lab. Nacional de Soluciones Biomiméticas para Diagnóstico y Terapia (Mexico); Genaro Vazquez-Victorio, Aaron Cruz-Ramirez, Lucia Cabriales, Edgar Jimenez-Diaz, Lidia Escutia-Guadarrama, Jehu Lopez-Aparicio, Daniel Perez-Calixto, Raul Sanchez-Olvera, Univ. Nacional Autónoma de México (Mexico) [10491-14]

SESSION 4..... SUN 10:30 AM TO 12:20 PM

Manufacturing II

Session Chair: **Axel Guenther**, Consultant (Canada)

Microscale manipulation of phase-separating fluids for development of advanced cellular and biomolecular assays (*Invited Paper*), John Frampton, Dalhousie Univ. (Canada) [10491-15]

Structuring unbreakable hydrophobic barriers in paper, Tobias M. Nargang, Frederik Kotz, Bastian E. Rapp, Karlsruhe Institut für Technologie (Germany). [10491-16]

3D printing of conductive polymers using scanned nanopipettes, Alex Wibawa, Pavel Novak, Queen Mary Univ. of London (United Kingdom). [10491-17]

Suspended liquid subtractive lithography: printing three dimensional channels directly into uncured PDMS, Dorothea Helmer, Achim Voigt, Bastian E. Rapp, Karlsruhe Institut für Technologie (Germany) [10491-18]

Ship-in-a-bottle integration of two-protein patterns inside 3D glass microfluidics by femtosecond laser, Daniela Serien, Hiroyuki Kawano, Atsushi Miyawaki M.D., Katsumi Midorikawa, Koji Sugioka, RIKEN (Japan). [10491-19]

Lunch/Exhibition Break Sun 12:20 pm to 1:50 pm

SESSION 5.....SUN 1:50 PM TO 3:20 PM

Applications II

Session Chair: **John Frampton**, Dalhousie Univ. (Canada)

To be announced (Veres) (*Invited Paper*), [10491-20]

Lab-on-a-chip analyzer for zoonotic pathogens in remotely-controlled robotic air and ground vehicles, Holger Becker, Richard Klemm, microfluidic ChipShop GmbH (Germany) [10491-21]

Ultrasound enhanced mid-IR spectroscopy for sensing bacteria in aqueous solutions, Bernhard Lendl, Stephan Freitag, Technische Univ. Wien (Austria). [10491-22]

Micro-engineering a novel platform to reconstruct physiology and functionality of the human brain microvasculature in vitro, Yasaman Daghighi, Hossein Heidari, Hayden Taylor, Univ. of California, Berkeley (USA) [10491-23]

SESSION 6..... SUN 3:50 PM TO 5:40 PM

Microfluidic Devices II

Session Chair: **Bastian E. Rapp**,
Karlsruher Institut für Technologie (Germany)

Toward microscale flow control and configurable microstructures using non-uniform electroosmotic flow (*Invited Paper*), Federico Paratore, Evgeniy Boyko, Ran Eshel, Baruch Rofman, Amir Gat, Technion - Israel Institute of Technology (Israel); Govind V Kaigala, IBM Research Zurich (Switzerland); Moran Bercovici, Technion - Israel Institute of Technology (Israel) [10491-24]

Fluid transient characteristics of a 3D printed microfluidic tesla pump, Joe F. Lo, Jessica Hallgath, Hussam Mawari, Univ. of Michigan-Dearborn (USA). [10491-25]

LED based opto-wetting platforms for micromixing, Tony Thomas, Hari Krishnan Narayanan Unni, Indian Institute of Technology Hyderabad (India). [10491-26]

Q-factor control of multilayer micromembrane using PZT composite material, Elingas Čekas, Giedrius Janušas, Arvydas Palevičius, Justas Ciganas, Tomas Janušas, Kaunas Univ. of Technology (Lithuania) [10491-27]

Measurement of composition of mixtures at high pressures with high sensitivity using frequency response of microcantilevers, Shadi Khan Baloch, Alper Kiraz, Koç Univ. (Turkey); Alexandr Jonáš, Istanbul Technical Univ. (Turkey); B. Erdem Alaca, Can Erkey, Koç Univ. (Turkey) [10491-28]

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Poster Sunday

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Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Optical coherence tomography characterization of femtosecond laser manufactured microfluidic circuits, Lucas R. De Pretto, Ricardo E. Samad, Wagner de Rossi, Anderson Z. de Freitas, Instituto de Pesquisas Energéticas e Nucleares (Brazil). [10491-46]

BIOS SUNDAY PLENARY SESSION.....SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Göttingen
2014 Nobel Laureate in Chemistry

See page 7 for details

MONDAY 29 JANUARY

SESSION 7.....MON 8:40 AM TO 10:30 AM

Medical Microsystems

Session Chair: **Moran Bercovici**,
Technion-Israel Institute of Technology (Israel)

To be announced (Rapp) (*Invited Paper*), [10491-29]

Design of point-of-care (POC) microfluidic medical diagnostic devices, James F. Leary, Aurora Life Technologies, LLC (USA) [10491-30]

Thermally-assisted acoustofluidic separation of extracellular vesicles from cells, Elnaz Mirtaheri, Ata Dolatmoradi, Krystine Pimentel, Shekhar Bhansali, Bilal El-Zahab, Florida International Univ. (USA). [10491-31]

Effective label-free biosensing system for food allergy diagnostics: comparative detection of standard Ige with ImmunoCAP, María-Fe Laguna Heras, Rocio López-Espinosa, Univ. Politécnica de Madrid (Spain); Fátima Fernandez, CQS Lab. (Spain); Beatriz Santamaría, Univ. Politécnica de Madrid (Spain); F. Javier Sanza, Mavi Maigler, BIOD (Spain); Juan Jose Millán, CQS Lab. (Spain) [10491-32]

Development of microfluidic platform to investigate hepatocellular cancer biology and sorafenib killing mechanisms, Hande Karamahmutoglu, Meltem Elitas, Sabanci Univ. (Turkey); Tamer Yagci, Gebze Teknik Üniv. (Turkey); Serdar Turhal, Anadolu Medical Ctr. (Turkey) [10491-33]

SESSION 8..... MON 11:00 AM TO 12:30 PM

Optofluidics I

Session Chair: **Teodor Veres**,
National Research Council Canada (Canada)

Chemical and biological sensing using DNA origami nanostructures (*Invited Paper*), Ilko Bald, Univ. Potsdam (Germany). [10491-34]

Cell-based quantification of biomarkers from an ultra-fast microfluidic immunofluorescent staining: application to human breast cancer cell lines, Daniel Migliozi, Huu T. Nguyen, Martin Gijss, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10491-35]

An optofluidic reverse combustion reactor for photothermocatalytic conversion of CO2 into hydrocarbons, Xiangkun Cao, David Erickson, Cornell Univ. (USA). [10491-36]

On-chip photonic particle sensor, Robin Singh, Danhao Ma, Anu Agarwal, Brian Anthony, Massachusetts Institute of Technology (USA) [10491-37]

Lunch Break Mon 12:30 pm to 2:00 pm

CONFERENCE 10491

SESSION 9 MON 2:00 PM TO 3:00 PM

Optofluidics II

Session Chair: **Ilko Bald**, Univ. Potsdam (Germany)

An optofluidic metasurface for lateral flow-through detection of cancer biomarker, Yifei Wang, Md Azahar Ali, Liang Dong, Meng Lu, Iowa State Univ. of Science and Technology (USA) [10491-38]

A novel multimodal optical concept for the detection of bacteria and microplastics in the environment, Jürgen Schnekenburger, Steffi Ketelhut, Björn Kemper, Westfälische Wilhelms-Univ. Münster (Germany). . . [10491-39]

HIL sensor at shorter optical path length, Kalpesh B. Mehta, Azhar Mohiudeen, Ragavendra M.S., Sudipa Galgalkar, Ishita Chakraborty, Siemens Healthcare Pvt. Ltd. (India); David Ledden, Siemens Healthcare Diagnostic, Inc. (USA). [10491-40]

SESSION 10 MON 3:30 PM TO 5:20 PM

Medical Microsystems II

Session Chairs: **Bonnie L. Gray**, Simon Fraser Univ. (Canada); **Holger Becker**, microfluidic ChipShop GmbH (Germany)

Breath analysis based on micropreconcentrator for early cancer diagnosis (*Invited Paper*), Sang-Seok Lee, Tottori Univ. (Japan) . . . [10491-41]

Fabrication of an optically-penetrating, multi-layered organ-on-chip device to study longitudinal changes in blood-brain barrier optical redox ratios, Nasya Sturdivant, Univ. of Arkansas (USA); Syed Ali, National Ctr. for Toxicological Research, U.S. Food and Drug Administration (USA); Kartik Balachandran, Univ. of Arkansas (USA) [10491-42]

Pathology in a tube: Step 2. Simple, rapid fabrication of curved, circular cross section millifluidic channels for biopsy preparation/3D imaging towards pancreatic cancer diagnosis., Ronnie Das, Univ. of Washington (USA); Chris W. Burfeind, Synapse Product Development (USA); Shubham Patle, Indian Institute of Technology (India); Eric J. Seibel, Univ. of Washington (USA) [10491-43]

Dissecting cell-cycle phase dependency of cancer cells invasiveness and migration speed, Bojana Gilgorijevic, Kamyar Esmaeili Pourfarhangi, Temple Univ. (USA) [10491-44]

Using a stepper motor to enhance the accuracy of endoscopic Raman spectroscopy for improved characterization of peripheral lung cancers, Sayed Mohammad Hashem Jayhooni, The Univ. of British Columbia (Canada); Michael Short, Haishan Zeng, Kenichi Takahata, Univ. of British Columbia (Canada) [10491-45]

PANEL DISCUSSION MON 5:20 PM TO 6:00 PM

Prospects and Future of Microfluidics

Session Chair: **Holger Becker**, microfluidic ChipShop GmbH (Germany)

Best Student Paper Award

MON 6:00 PM TO 6:05 PM

We are pleased to announce that a cash prize will be awarded to the best student paper in this conference. Qualifying papers and presentations will be evaluated by the awards committee and the winner will be notified at the end of or after the meeting.

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CONFERENCE 10492

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10492

Optical Interactions with Tissue and Cells XXIX

Conference Chairs: **E. Duco Jansen**, Vanderbilt Univ. (USA); **Hope Thomas Beier**, Air Force Research Lab. (USA)

Program Committee: **Randolph Glickman**, The Univ. of Texas Health Science Ctr. at San Antonio (USA); **Steven L. Jacques**, Oregon Health & Science Univ. (USA); **Bennett L. Ibey**, Tri Service Research Lab. (USA); **Beop-Min Kim**, Korea Univ. (Korea, Republic of); **Alexander J. Makowski**, Prozeess Technologie (USA); **Jessica C. Ramella-Roman**, Florida International Univ. (USA); **Marissa Nicole Rylander**, Virginia Polytechnic Institute and State Univ. (USA); **Zachary D. Taylor**, Univ. of California, Los Angeles (USA); **Robert J. Thomas**, Air Force Research Lab. (USA); **Alfred Vogel**, Univ. zu Lübeck (Germany); **Gerald J. Wilmink**, WiseWear Corp. (USA)

MONDAY 29 JANUARY

SESSION 1 MON 8:40 AM TO 10:00 AM

Ultrafast Pulsed Laser Interactions

Session Chair: **Hope T. Beier**, Air Force Research Lab. (USA)

Targeted control and analysis of DNA damage repair in human cells with a multicolor femtosecond fiber laser system, Michael Schmalz, Ines Wieser, Felix Schindler, Martin Stoeckl, Alfred Leitenstorfer, Elisa Ferrando-May, Univ. Konstanz (Germany) [10492-1]

Fully automated z-scan setup based on a tunable fs-oscillator, Wolfgang Steiger, Peter Gruber, Technische Univ. Wien (Austria) and Austrian Cluster for Tissue Regeneration (Austria); Maximilian Tromayer, Technische Univ. Wien (Austria); Agnes Dobos, Markus Lunzer, Robert Liska, Aleksandr Ovsianikov, Technische Univ. Wien (Austria) and Austrian Cluster for Tissue Regeneration (Austria) [10492-2]

Infrared laser damage thresholds in corneal tissue phantoms using femtosecond laser pulses, Adam R. Boretsky, Joseph E. Clary, Gary D. Noojin, Engility Corp. (USA); Dawson T. Nodurft, Engility Corp. (USA) and Texas A&M Univ. (USA); Benjamin A. Rockwell, Air Force Research Lab. (USA) [10492-3]

Femtosecond laser assisted photo-transfection and differentiation of mouse embryonic stem cells, Setumo Lebogang Thobakgale, Sello Manoto, Satuurnin Ombinda Lemboumba, CSIR National Laser Ctr. (South Africa); Malik Maaza, Univ. of South Africa (South Africa); Patience Mthunzi-Kufa, CSIR National Laser Ctr. (South Africa) [10492-4]

SESSION 2 MON 10:30 AM TO 12:20 PM

Photothermal Effects

Session Chair: **Joel N. Bixler**, Texas A&M Univ. (USA)

Diffuse reflectance spectroscopy during laser coagulation of soft tissue (Invited Paper), Martin M. Wehner, Mirko Aden, Fraunhofer-Institut für Lasertechnik (Germany); Aleksejs Lihacovs, Ilze Lihacova, Janis Spigulis, Univ. of Latvia (Latvia); Tilmann Trebst, LifePhotonic GmbH (Germany) [10492-5]

Porcine skin damage thresholds for multiple nanosecond-scale laser pulses at 1064-nm, Michael P. DeLisi, Amanda M. Peterson, Gary D. Noojin, Aurora D. Shingledecker, Amanda J. Tjerina, Adam R. Boretsky, Engility Corp. (USA); Morgan S. Schmidt, Semih S. Kumru, Robert J. Thomas, Air Force Research Lab. (USA) [10492-6]

In vivo gene expression of heat shock proteins following short pulse laser radiation, Neda Parchami, Kiran G Naga Sai, Israa Al-Rawe, Eric Guisbert, Kenia P. Nunes, Kunal Mitra, Florida Institute of Technology (USA) [10492-7]

Imaging guided photo-mediated ultrasound therapy, Haonan Zhang, Tongji Univ. (China) and Univ. of Michigan (USA); Jia Li, Nanjing Medical Univ. (China) and Univ. of Michigan (USA); Wei Zhang, Chinese Academy of Medical Sciences (China) and Univ. of Michigan (USA) and Peking Union Medical College (China); Xinyi Xie, Nanjing Medical Univ. (China) and Univ. of Michigan (USA); Qian Cheng, Tongji Univ. (China); Yannis M. Paulus, Univ. of Michigan (USA); Xinmai Yang, The Univ. of Kansas (USA); Xueding Wang, Tongji Univ. (China) and Univ. of Michigan (USA) [10492-8]

Photothermal effect of infrared lasers on ex vivo lamb brain tissues, Baturay Ozgurun, Bogaziçi Univ. (Turkey) and Medipol Univ. (Turkey) and Sabanci Univ. (Turkey); Murat Gülsoy, Bogaziçi Univ. (Turkey) [10492-9]

Lunch Break Mon 12:20 pm to 1:50 pm

SESSION 3 MON 1:50 PM TO 3:20 PM

Photomechanical Effects

Session Chair: **Morgan S. Schmidt**, Air Force Research Lab. (USA)

Precise and controlled tissue cutting using (photo-)mechanical ‘energy’: comparison of a pulsed Erbium laser with a new pulsed water jet (Invited Paper), Rudolf M. Verdaasdonk, Marjolein Lemkes, Maggy Sallons, Danny Koops, Albert van der Veen, John Klaessens, Vrije Univ. Medical Ctr. (Netherlands) [10492-10]

Performance of Er:YAG laser-ablation in hard bone under different spray cooling conditions, Lina Marcela Beltran Bernal, Gabor Kosa, Marek Zelechowski, Georg Rauter, Niklaus Friederich, Philippe Cattin, Azhar Zam, Univ. Basel (Switzerland) [10492-11]

Direct comparison of 308nm and 355nm pulsed laser ablation of porcine tissue using fiber optic delivery, Kenneth P. Grace, Spectranetics Corp. (USA) [10492-12]

Quantitative evaluation of the safety of mucosal incision and submucosal dissection for colon during endoscopic submucosal dissection using carbon dioxide laser, Takuma Noguchi, Norihiro Honda, Hisanao Hazama, Osaka Univ. (Japan); Yoshinori Morita, Kobe Univ. School of Medicine (Japan); Kunio Awazu, Osaka Univ. (Japan) [10492-13]

SESSION 4 MON 3:50 PM TO 5:10 PM

Laser Modulation of Cells

Session Chair: **Michael L Denton**, Tri Service Research Lab. (USA)

Myocardial electrical conduction blockade time dominated by irradiance on photodynamic reaction: in vitro and in silico study, Emiyu Ogawa, Mariko Kurotsu, Tsunenori Arai, Keio Univ. (Japan) . . [10492-14]

NIR action potential inhibition in neurons, Maria A. Troyanova-Wood, Texas A&M Univ. (USA) [10492-15]

Control of intracellular ionic concentrations by mid-infrared laser irradiation, Toyohiko Yamauchi, Yoshiyuki Shimizu, Tatsuo Dougakiuchi, Gen Takebe, Hamamatsu Photonics K.K. (Japan) [10492-16]

Effects of short infrared laser pulses on neuron metabolism, Roxanne Glazier, Georgia Institute of Technology (USA) and Emory Univ. School of Medicine (USA); Joel Bixler, Alex Walsh, Anna Sedelnikova, Hope Beier, Air Force Research Lab. (USA) [10492-17]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Comparison of light absorption levels with different skin phantoms and the Monte Carlo simulation using Fourier-domain optical coherence tomography, Hang Chan Jo, INHA Univ. (Korea, Republic of); Jae Hun Kim, Korea Institute of Science and Technology (Korea, Republic of); Dae Yu Kim, INHA Univ. (Korea, Republic of) [10492-33]

CONFERENCE 10492

Simulation analysis of the transmittance of cornea and sclera, Jia-Hao Li, Snow H. Tseng, National Taiwan Univ. (Taiwan) [10492-34]

Effects of application of the photobiomodulation with laser therapy in fiber of collagen in random skin flap in rats, Cintia Martignago, Univ. Federal de São Carlos (Brazil); Carla Roberta Tim, Univ. Federal de São Paulo (Brazil) and Univ. de Brasília (Brazil); Lia Mara Neves, Univ. Federal de São Carlos (Brazil); Lívia Assis, Univ. Federal de São Paulo (Brazil) and Univ. de Brasília (Brazil); Richard Liebano, Paulo Bossini, Lucimar Retto da Silva de Avó, Nivaldo Parizotto, Univ. Federal de São Carlos (Brazil) [10492-35]

Assessment of varying width illumination in hyperspectral push-broom optical properties for scattering anisotropy measurements, Jošt Stergar, Univ. of Ljubljana (Slovenia); Matija Milanic, Univ. of Ljubljana (Slovenia), Jožef Stefan Institut (Slovenia) [10492-36]

Approaching through-skull optical brain imaging and phototherapy: optical properties of head tissues in near and short-wave infrared regions, Sergii Golovynskiy, Iuliia Golovynska, Shenzhen Univ. (China); Oleksandr Datsenko, Ludmila Stepanova, Taras Shevchenko National Univ. of Kyiv (Ukraine); Junle Qu, Tymish Y. Ohulchanskyy, Shenzhen Univ. (China) [10492-37]

Effects of laser (808nm) on articular cartilage degeneration, Carla Roberta Tim, Univ. de Brasília (Brazil) and Univ. Federal de São Paulo (Brazil); Cintia Martignago, Univ. Federal de São Paulo (Brazil); Lívia Assis, Univ. de Brasília (Brazil); Lia Mara Neves, Cyntia Criniti, Univ. Federal de São Paulo (Brazil); Nivaldo Parizotto, Univ. Federal de São Carlos (Brazil); Ana Cláudia Rennó, Univ. Federal de São Paulo (Brazil); Karina Nogueira Zambone Pinto Rossi, Univ. Federal de São Carlos (Brazil) [10492-38]

Nonlinear characterization of water, Sean O'Connor, Dawson T. Nodurft, Christopher Marble, Vladislav Yakovlev, Texas A&M Univ. (USA) [10492-39]

Characterization of high-voltage nanosecond pulsed electric field by electro-optic effects and interferometric analysis, Zachary Coker, Texas A&M Univ. (USA); Kassie Marble, Tarleton State Univ. (USA); Nathan Arnold, Vladislav Yakovlev, Texas A&M Univ. (USA) [10492-40]

Fullerene C60 and graphene photosensibles for photodynamic virus inactivation, Artemy Hovorostovsky, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [10492-41]

Understanding the bio stimulatory effects of He-Ne laser irradiation on eggplant (solanum melongena L.): A combined molecular and metabolomics approach, Shwathy Puthanvila Surendrababu, Krishna K. Mahato II, Kapaettu Satyamoorthy III, Annamalai Muthusamy, Manipal Univ. (India) [10492-42]

TUESDAY 30 JANUARY

SESSION 5 TUE 8:20 AM TO 10:00 AM

Novel Applications of Lasers in Biosystems

Session Chair: **Bennett L. Ibey**, Air Force Research Lab. (USA)

Frequency of resonance of human sweat duct in different modes of operation, Saroj Tripathi, Shogo Takahashi, Kento Kinumura, Shizuoka Univ. (Japan); Kodo Kawase, Nagoya Univ. (Japan) [10492-18]

Continuous optical measurement system of hemolysis during a photosensitization reaction using absorption spectrum, Risa Hamada, Emiyo Ogawa, Tsunenori Arai, Keio Univ. (Japan) [10492-19]

Light scattering influence in cyanobacteria suspensions inside a photobioreactor, Félix Fanjul-Vélez, José Luis Arce-Diego, Univ. de Cantabria (Spain) [10492-20]

Combining optical coherence tomography and finite element modelling for non-contact chemical analysis, Leah S. Wilk, Maurice C. G. Aalders, Academisch Medisch Centrum (Netherlands) [10492-21]

Superficial imaging of therapeutic radiation dose using deconvolution by the Cerenkov scatter function, Eric Brost, Yoichi Watanabe, Univ. of Minnesota, Twin Cities (USA) [10492-22]

TUESDAY PLENARY SESSION TUE 10:30 AM TO 11:30 AM

Nano/Biophotonics Plenary Session

Shaped Light for BioNanophotonics: a new chapter in imaging
Kishan Dholakia, Univ. of St. Andrews (United Kingdom)

Lunch/Exhibition Break Tue 11:30 am to 1:20 pm

SESSION 6 TUE 1:20 PM TO 3:00 PM

Optical Properties of Tissues

Session Chair: **Alexandra J. Walsh**, Air Force Research Lab. (USA)

Fabricating and characterizing long lived tissue phantoms using intralipid-infused solids, Glenn H. Chapman, Peter Le, Simon Fraser Univ. (Canada) [10492-23]

Single fiber reflectance spectroscopy calibration, Xu U. Zhang, Anouk L. Post, Dirk J. Faber, Ton G. van Leeuwen, Academisch Medisch Centrum (Netherlands); Dick J.C. M. Sterenborg, Academisch Medisch Centrum (Netherlands) and Netherlands Cancer Institute (Netherlands) [10492-24]

Estimation of biological tissue refractive index using an optical fiber probe, Matic Ivančič, Peter Naglič, Franjo Pernuš, Boštjan Likar, Miran Bürmen, Univ. of Ljubljana (Slovenia) [10492-25]

Optical coefficient measurements using bulk living tissue by an optical fiber puncture with FOV change, Haruna Nakazawa, Marika Doi, Emiyo Ogawa, Tsunenori Arai, Keio Univ. (Japan) [10492-26]

Regression models for real-time estimation of optical and structural sample properties from subdiffusive spatially resolved reflectance, Peter Naglič, Matic Ivančič, Peter Naglič, Matic Ivančič, Franjo Pernuš, Boštjan Likar, Miran Bürmen, Univ. of Ljubljana (Slovenia) [10492-27]

SESSION 7 TUE 3:30 PM TO 5:10 PM

Numerical Approaches Simulating Laser-Tissue Interactions

Session Chair: **Robert J. Thomas**, Air Force Research Lab. (USA)

Modeling backscattered light from biological tissue for short source-detector separations, Anouk L. Post, Academisch Medisch Centrum (Netherlands); Steven L. Jacques, Oregon Health & Science Univ. (USA); Dick J.C. M. Sterenborg, Dirk J. Faber, Ton G. van Leeuwen, Academisch Medisch Centrum (Netherlands) [10492-28]

Massively parallelized Monte Carlo software to calculate the light propagation in arbitrarily shaped 3D turbid media, Christian Zoller, Ansgar Hohmann, Alwin Kienle, Institute für Lasertechnologien in der Medizin und Messtechnik (Germany) [10492-29]

Monte Carlo modeling of fluorescence in semi-infinite turbid media, Yi Hong Ong, Jarod C. Finlay, Timothy C. Zhu, Perelman Ctr. for Advanced Medicine (USA) [10492-30]

Weighted algorithms of the Monte Carlo method for the solution of direct and inverse problems of biomedical optics, Alexander V. Lappa, Anastasiya E. Anchugova, Chelyabinsk State Univ. (Russian Federation) [10492-31]

Raman Monte Carlo simulation for light propagation for tissue with embedded objects, Vijitha Periyasamy, Humaira Binte Jaafar, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10492-32]

CONFERENCE 10493

Sunday–Monday 28–29 January 2018 • Proceedings of SPIE Vol. 10493

Dynamics and Fluctuations in Biomedical Photonics XV

BIOS

Conference Chairs: **Valery V. Tuchin**, N.G. Chernyshevsky Saratov National Research State Univ. (Russian Federation), National Research Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control RAS (Russian Federation); **Kirill V. Larin**, Univ. of Houston (USA); **Martin J. Leahy**, National Univ. of Ireland, Galway (Ireland); **Ruikang K. Wang**, Univ. of Washington (USA)

Program Committee: **Wei R. Chen**, Univ. of Central Oklahoma (USA); **Joseph P. Culver**, Washington Univ. School of Medicine in St. Louis (USA); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain); **Ling Fu**, Huazhong Univ. of Science and Technology (China); **Ekaterina I. Galanzha**, Univ. of Arkansas for Medical Sciences (USA); **Jana M. Kainerstorfer**, Carnegie Mellon Univ. (USA); **Brendan F. Kennedy**, The Univ. of Western Australia (Australia); **Faisal Khan**, Univ. of Dundee (United Kingdom); **Vesa Kiviniemi**, Univ. of Oulu (Finland); **Jürgen M. Lademann**, Charité Universitätsmedizin Berlin (Germany); **Irina V. Larina**, Baylor College of Medicine (USA); **Jan Laufer**, Martin-Luther-Univ. Halle-Wittenberg (Germany); **Qingming Luo**, Huazhong Univ. of Science and Technology (China); **Igor V. Meglinski**, Univ. of Oulu (Finland); **Melissa C. Skala**, Univ. of Wisconsin-Madison (USA); **Peter H. Tomlins**, Queen Mary, Univ. of London (United Kingdom); **Vladislav Toronov**, Ryerson Univ. (Canada); **Lihong V. Wang**, California Institute of Technology (USA); **Anna N. Yaroslavsky**, Univ. of Massachusetts Lowell (USA); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA); **Dan Zhu**, Huazhong Univ. of Science and Technology (China)

SUNDAY 28 JANUARY

CHAIRS' WELCOME. 8:30 AM TO 8:40 AM

Conference Chairs: **Valery V. Tuchin**, N.G. Chernyshevsky Saratov National Research State Univ. (Russian Federation), National Research Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control RAS (Russian Federation); **Kirill V. Larin**, Univ. of Houston (USA); **Martin J. Leahy**, National Univ. of Ireland, Galway (Ireland); **Ruikang K. Wang**, Univ. of Washington (USA)

SESSION 1 SUN 8:40 AM TO 10:30 AM

Speckle Technologies

Session Chairs: **Wei R. Chen**, Univ. of Central Oklahoma (USA); **Anna N. Yaroslavsky**, Univ. of Massachusetts Lowell (USA); **Qingming Luo**, Huazhong Univ. of Science and Technology (China)

Non-invasive measurement of blood flow with diffuse speckle statistics (*Invited Paper*), Turgut Durduran, ICFO - Instituto de Ciencias Fotónicas (Spain) [10493-1]

Laser speckle imaging of brain blood flow through a transparent nanocrystalline yttria-stabilized-zirconia cranial implant, Nami Davoodzadeh, Amir Hessam Aminfar, David L. Halaney, Carrie Jonak, Natanael Cuando, Devin K. Binder, Guillermo Aguilar, Univ. of California, Riverside (USA) [10493-2]

Biodynamic imaging of therapeutic efficacy for canine B-cell lymphoma: Preclinical trial results, Honggu Choi, Zhe Li, Michael Childress, John J. Turek, David Nolte, Purdue Univ. (USA) [10493-3]

Poincaré descriptors of long and short-range correlations in the spatial and temporal fluctuations of coherently scattered light, Anindya Majumdar, Sean J. Kirkpatrick, Michigan Technological Univ. (USA) [10493-4]

A non-iterative method for estimating the infinitesimal strain tensor in optical coherence elastography, Lixin Chin, Philip Wijesinghe, Brendan F. Kennedy, Harry Perkins Institute for Medical Research (Australia) and The Univ. of Western Australia (Australia) [10493-5]

SESSION 2 SUN 11:00 AM TO 12:40 PM

Tissue and Cell Dynamics

Session Chairs: **Joseph P. Culver**, Washington Univ. School of Medicine in St. Louis (USA); **Vesa Kiviniemi**, Univ. of Oulu (Finland); **Melissa C. Skala**, Univ. of Wisconsin-Madison (USA)

What optical nanoscopy reveals about the structure of the genome and its role in carcinogenesis (*Invited Paper*), Vadim Backman, Northwestern Univ. (USA) [10493-6]

Energy intake rate index (EIRI) estimated by monitoring resting heart rate changes using a PPG sensor on a smartphone, So Hyun Chung, Samsung Electronics Co., Ltd. (Korea, Republic of) [10493-7]

Electrifying catheters by fiber optics, MRI compatibility and everything else that comes for free (*Invited Paper*), Martin B. van der Mark, Philips Research (Netherlands) [10493-69]

Approaches of molecular imaging of bio-tissue and machine learning methods for medical applications, Yury V. Kistenev, Alexey V. Borisov, Victor V. Nikolaev, Denis A. Vrazhnov, National Research Tomsk State Univ. (Russian Federation); Ludmila V. Spirina, Research Institute of Oncology, Tomsk National Research Medical Ctr. of the RAS (Russian Federation); Oksana S. Kurochkina, The Institute of Microsurgery (Russian Federation) [10493-9]

Lunch/Exhibition Break Sun 12:40 pm to 2:00 pm

SESSION 3 SUN 2:00 PM TO 2:45 PM

Keynote Session

Session Chair: **Martin J. Leahy**, National Univ. of Ireland, Galway (Ireland)

Optical coherence tomography based angiography: principles and applications (*Keynote Presentation*), Ruikang K. Wang, Univ. of Washington (USA) [10493-10]

PANEL DISCUSSION 2:45 PM TO 3:35 PM

Session Chair: **Martin J. Leahy**, National Univ. of Ireland, Galway (Ireland)

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SESSION 4. SUN 4:05 PM TO 5:55 PM

Functional Imaging and Spectroscopy I

Session Chairs: **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA); **Vladislav Toronov**, Ryerson Univ. (Canada)

Functional optical coherence tomography for live dynamic analysis of mouse embryonic cardiogenesis (*Invited Paper*), Shang Wang, Andrew L. Lopez III, Irina V. Larina, Baylor College of Medicine (USA) [10493-11]

Use of OCTA to visualize and assess the role of skin's vasculature, Wendy Wang, Anthony J. Deegan, Univ. of Washington (USA) [10493-12]

Measurement of oxygen saturation with dual beam photothermal optical coherence tomography, Cerine Lal, Hresh M. Subhash, Kai Neuhaus, Sergey A. Alexandrov, Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) [10493-13]

Numerically phase-stabilized phase-sensitive swept-source optical coherence tomography for highly-sensitive optical microangiography, Shaozhen Song, Jingjiang Xu, Shaojie Men, Ruikang K. Wang, Univ. of Washington (USA) [10493-14]

OCT Eigen decomposition based penetrating vessel mapping, Wei Wei, Yuandong Li, Woo June Choi, Ruikang K. Wang, Univ. of Washington (USA) [10493-15]

SUNDAY POSTER SESSION. SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Control of epileptic seizures in WAG/Rij Rats by means of brain-computer interface, Vladimir V. Makarov, Saratov State Univ. (Russian Federation); Vladimir A. Maximenko, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Gilles van Luijtelaar, Donders Institute, Radboud Univ. (Netherlands); Annika Lüttjohann, Westfälische Wilhelms-Universität Münster (Germany); Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) [10493-34]

Emergence of spatiotemporal coherent-incoherent patterns in a multi-scale network, Vladimir V. Makarov, Saratov State Univ. (Russian Federation); Mikhail V. Goremyko, Vladimir A. Maksimenko, Vladimir O. Nedaivozov, Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) [10493-35]

Dynamics and adaptation in complex multiplex network with competitive inter-layer interactions, Vladimir V. Makarov, Saratov State Univ. (Russian Federation); Daniil V. Kirsanov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Vladimir O. Nedaivozov, Elena Pitsik, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Stefano Boccaletti, CNR-ISC (Italy); Mikhail V. Goremyko, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) [10493-36]

Characterization of vascular dynamics based on experimental recordings with extreme data loss, Alexey N. Pavlov, Saratov State Univ. (Russian Federation) and Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Arkady S. Abdurashitov, Olga N. Pavlova, Maria V. Ulanova, Oxana V. Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation) [10493-37]

Detection of EEG-patterns associated with real and imaginary movements, Alexey N. Pavlov, Saratov State Univ. (Russian Federation) and Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Vladimir A. Maksimenko, Anastasiya E. Runnova, Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) . [10493-38]

Classification of brain states in the perception of ambiguous images by processing multichannel data MEG, Svetlana Pchelintseva, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Alexander N. Pisarchik, Ctr. for Biomedical Technology, Technical Univ. of Madrid (Spain); Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) [10493-39]

Nonlinear dynamics and coherent resonance in a network of coupled neural-like oscillators, Andrei V. Andreev, Anastasiya E. Runnova, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Alexander N. Pisarchik, Centro de Investigaciones en Óptica, A.C. (Mexico) and Ctr. for Biomedical Technology, Technical Univ. of Madrid (Spain) and Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) [10493-40]

Intravital molecular tagging velocimetry of cerebral blood flow using Evans Blue dye, Anton A. Namykin, Natalia Shushunova, Maria V. Ulanova, Oxana V. Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation); Valery V. Tuchin, Saratov State Univ. (Russian Federation) and Tomsk State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation); Ivan V. Fedosov, Saratov State Univ. (Russian Federation) [10493-41]

The study of human higher mental functions as they relate to neurophysiological processes and personal characteristics, Maxim O. Zhuravlev, Saratov State Univ. (Russian Federation); Anastasiya E. Runnova, Pavel Protasov, Saratov State Technical Univ. (Russian Federation); Alexey A. Koronovskii, Saratov State Univ. (Russian Federation) . . . [10493-42]

Comparison of methods for reconstructing the system of baroreflexory regulation of arterial pressure from noisy data, Yurii Ishbulatov, Kotel'nikov Institute of Radio Engineering and Electronics of RAS (Russian Federation); Anton R. Kiselev, Saratov State Medical Univ. (Russian Federation); Anatoly S. Karavaev, Kotel'nikov Institute of Radio Engineering and Electronics of RAS (Russian Federation) [10493-43]

Laser Doppler spectrum decomposition applied in diagnostics of microcirculatory disturbances, Igor O. Kozlov, Orel State Univ. named after I.S. Turgenev (Russian Federation); Evgeny A. Zherebtsov, Aston Univ. (United Kingdom); Victor V. Dremmin, Elena V. Zharkikh, Andrey V. Dunaev, Orel State Univ. named after I.S. Turgenev (Russian Federation); Edik U. Rafailov, Aston Univ. (United Kingdom) [10493-44]

Application of the fluorescence spectroscopy for the analysis of the state of abdominal cavity organs tissues in mini-invasive surgery, Ksenia Kandurova, Victor V. Dremmin, Orel State Univ. named after I.S. Turgenev (Russian Federation); Evgeny A. Zherebtsov, Aston Univ. (United Kingdom); Andrey V. Dunaev, Orel State Univ. named after I.S. Turgenev (Russian Federation); Andrian V. Mamoshin, Alexandr L. Alyanov, Orel State Univ. named after I.S. Turgenev (Russian Federation) and Orel Regional Clinical Hospital (Russian Federation); Vadim F. Muradyan, Orel Regional Clinical Hospital (Russian Federation) [10493-45]

Optimization of multimodal optical measurements for assessment of the dynamics in cutaneous blood flow and fluorescence in patients with diabetes, Elena V. Zharkikh, Viktor V. Dremmin, Orel State Univ. named after I.S. Turgenev (Russian Federation); Evgeny A. Zherebtsov, Aston Univ. (United Kingdom); Elena V. Potapova, Andrey V. Dunaev, Orel State Univ. named after I.S. Turgenev (Russian Federation); Viktor V. Sidorov, SPE LAZMA Ltd. (Russian Federation); Alexander I. Krupatkin, Central Scientific-Research Institute of Traumatology and Orthopedics, n.n. Priorova (Russian Federation); Edik U. Rafailov, Aston Univ. (United Kingdom) [10493-46]

Use of fluorescent optical fibre probe for recording parameters of brain metabolism in rat model, Olga Stelmashchuk, Evgeniya Seryogina, Gennadii Pivachenko, Alexander Alekseyev, Orel State Univ. named after I.S. Turgenev (Russian Federation); Evgeny A. Zherebtsov, Ilya Rafailov, Aston Univ. (United Kingdom); Evgeny Vorobyev, Alyona Kuznetsova, Elena Kuznetsova, Orel State Univ. named after I.S. Turgenev (Russian Federation); Edik U. Rafailov, Aston Univ. (United Kingdom) [10493-47]

Brain-computer interface for alertness estimation and improving, Alexander E. Hramov, Vladimir A. Maksimenko, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation); Marina V. Khramova, Saratov State Univ. (Russian Federation) [10493-48]

Nonlinear correlation method for the separation of couplings in EEG experiments with neural ensembles, Alexander E. Hramov, Anton O. Selskiy, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) [10493-49]

Effect of filtration of signals of brain activity on quality of recognition of brain activity patterns using artificial intelligence methods, Alexander E. Hramov, Nikita S. Frolov, Vyachaslav Y. Musatov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation) [10493-50]

The studying of the 0.1Hz oscillations of autonomic regulatory system using invasive signals of pressure and photoplethysmograms recorded from the earlobe, Viktoriya Skazkina, Anatolii Karavaev, Ekaterina Borovkova, Anton R. Kiselev, Saratov State Univ. (Russian Federation) [10493-51]

Multi-color backscattering Mueller matrix imaging on thick fresh tissues and on living nude mice skin, Yuanhuan Zhu, Tsinghua-Berkeley Shenzhen Institute, Tsinghua Univ. (China); Yang Dong, Tsinghua Univ. (China); Hui Ma, Tsinghua-Berkeley Shenzhen Institute, Tsinghua Univ. (China) [10493-52]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details.

MONDAY 29 JANUARY

SESSION 5 MON 8:20 AM TO 10:30 AM

Cerebral Hemo- Lympho- and Glymphatic Dynamics

Session Chairs: **Dan Zhu**, Huazhong Univ. of Science and Technology (China); **Lihong V. Wang**, California Institute of Technology (USA); **Jürgen Lademann**, Charité Universitätsmedizin Berlin (Germany)

Combined NIRS and DCS measurements of cerebral hemodynamics during intracranial and blood pressure changes (*Invited Paper*), Alexander Ruesch, Carnegie Mellon Univ. (USA); Samantha Schmitt, Matthew A. Smith, Univ. of Pittsburgh (USA); Jana M. Kainerstorfer, Carnegie Mellon Univ. (USA) [10493-16]

Monitoring of injury induced brain regeneration of the adult zebrafish by using optical coherence tomography, Zhen Yuan, Univ. of Macau (Macao, China) [10493-17]

Monitoring of acute injury in experimental cerebral ischemic stroke using optical coherence tomography, Woo June Choi, Yuandong Li, Ruikang K. Wang, Univ. of Washington (USA) [10493-18]

OCT angiography reveals age-related differences in cerebral blood flow of anesthetized mice, Woo June Choi, Yuandong Li, Wei Wei, Ruikang K. Wang, Univ. of Washington (USA) [10493-19]

Evaluating vasculature changes in the murine embryonic brain due to prenatal alcohol exposure using optical coherence tomography, in utero, Raksha Raghunathan, Chen Wu, Manmohan Singh, Jennifer Nguyen, Chih-Hao Liu, Univ. of Houston (USA); Rajesh C. Miranda, Texas A&M College of Medicine (USA); Kirill V. Larin, Univ. of Houston (USA) and Interdisciplinary Lab. of Biophotonics, Tomsk State Univ. (Russian Federation) [10493-20]

OCT velocimetry reveals electrical-evoked temporal capillary hemodynamics in mouse cerebral cortex during functional activation, Wei Wei, Yuandong Li, Ruikang K. Wang, Univ. of Washington (USA) [10493-21]

SESSION 6 MON 11:00 AM TO 12:50 PM

Clinical Imaging and Evaluation

Session Chairs: **Irina V. Larina**, Baylor College of Medicine (USA); **Peter H. Tomlins**, Queen Mary Univ. of London (United Kingdom); **Igor Meglinski**, Univ. of Oulu (Finland)

Photoacoustic imaging to probe tumour oxygenation and oxidative stress dynamics (*Invited Paper*), Sarah E. Bohndiek, Univ. of Cambridge (United Kingdom) [10493-22]

Quantitative detection of breast ductal carcinoma tissues at different progression stages using Mueller matrix microscope, Honghui He, Yang Dong, Wei Sheng, Hui Ma, Graduate School at Shenzhen, Tsinghua Univ. (China) [10493-23]

In-vivo assessment of microvascular functional dynamics by combination of cmOCT and wavelet transform, Salvatore Smirni, Michael P. MacDonald, Catherine P. Y. Robertson, Univ. of Dundee (United Kingdom); Paul M. McNamara, Seán O’Gorman, National Univ. of Ireland, Galway (Ireland); Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) and RCSI Royal College of Surgeons in Ireland (Ireland); Faisal Khan, Univ. of Dundee (United Kingdom) [10493-24]

Kagome fiber-based ultrafast laser surgery probe with custom CaF2 miniaturized optics for rapid in vivo tissue dissection, Kaushik Subramanian, Liam Andrus, The Univ. of Texas at Austin (USA); Michal E. Pawlowski, Tomasz S. Tkaczyk, Rice Univ. (USA); Adela Ben-Yakar, The Univ. of Texas at Austin (USA) [10493-25]

Motion and compression correction for in vivo OCT with synthesized aperture, Alexander A. Moiseev, Grigory V. Gellikonov, Sergey Y. Ksenofontov, Pavel A. Shilyagin, Valentine M. Gellikonov, Institute of Applied Physics of the Russian Academy of Sciences (Russian Federation) [10493-26]

Lunch Break Mon 12:50 pm to 2:00 pm

Analysis of bistable perception based on MEG data, Vladimir A. Maksimenko, Nikita S. Frolov, Saratov State Technical Univ. (Russian Federation); Alexander N. Pisarchik, Saratov State Technical Univ. (Russian Federation) and Ctr. for Biomedical Technology, Technical Univ. of Madrid (Spain) [10493-53]

Use of parallel computing for analyzing big data in EEG studies of ambiguous perception, Vladimir A. Maksimenko, Vadim V. Grubov, Daniil V. Kirsanov, Saratov State Technical Univ. (Russian Federation) [10493-54]

Study of the interactions in neural ensemble of the brain using wavelet analysis, Vladimir A. Maksimenko, Vladimir V. Makarov, Mikhail V. Goremyko, Saratov State Technical Univ. (Russian Federation) [10493-55]

Laboratory evaluation of dentin color, Natalia I. Kazadaeva, Valery V. Tuchin, Alexander B. Pravdin, Leonid E. Dolotov, Saratov State Univ. (Russian Federation) [10493-56]

Effect of luminescence transport through adipose tissue on measurement of tissue temperature by using ZnCdS nanothermometers, Elena K. Volkova, Irina Yu Yanina, Saratov State Univ. (Russian Federation) and Tomsk State Univ. (Russian Federation); Elena Sagaidachnaya, Julia G. Konyukhova, Saratov State Univ. (Russian Federation); Valery V. Tuchin, Saratov State Univ. (Russian Federation) and Tomsk State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation); Vyacheslav I. Kochubey, Saratov State Univ. (Russian Federation) and Tomsk State Univ. (Russian Federation) [10493-57]

Fibre-optic probe for fluorescence diagnostics with blood influence compensation, Evgeny A. Zherebtsov, Aston Univ. (United Kingdom); Viktor V. Dremmin, Elena V. Zharkikh, Angelina Zherebtsova, Orel State Univ. named after I.S. Turgenev (Russian Federation); Ilya Rafailov, Aston Univ. (United Kingdom); Andrey V. Dunaev, Orel State Univ. named after I.S. Turgenev (Russian Federation); Edik U. Rafailov, Aston Univ. (United Kingdom) [10493-58]

Action of dyes based on carbon nanoparticles on red blood cell membranes, Natalia V. Tkachenko, Anna A. Doronkina, Alexander B. Pravdin, Valery V. Tuchin, Saratov State Univ. (Russian Federation); Nikita A. Navolokin, Saratov State Medical Univ. (Russian Federation) [10493-59]

Quantitative assessment on optical clearing methods of mouse organs, Jianyi Xu, Yilin Ma, Tingting Yu, Dan Zhu, Britton Chance Ctr. for Biomedical Photonics (China) [10493-60]

Visualization of skin microvascular dysfunction of type 1 diabetic mice using in vivo skin optical clearing, Dan Zhu, Feng Wei, Shi Rui, Britton Chance Ctr. for Biomedical Photonics (China) [10493-61]

Role of glycerol in penetration depth of the terahertz radiation in the rat skin in the frequency range 0.1 - 2.0 THz, Ilya S. Goryachev, Evgeni L. Odlyanitskiy, ITMO Univ. (Russian Federation); Yana G. Toporova, Almazov National Medical Research Ctr. (Russian Federation); Irina J. Schelkanova, Anton N. Tsyarkin, Olga A. Smolyanskaya, ITMO Univ. (Russian Federation); Valery V. Tuchin, Saratov National Research State Univ. (Russian Federation) [10493-62]

Identification of the patterns of brain activity during the imagination of movements using an artificial neural network, Semen Kurkin, Vyacheslav Y. Musatov, Anastasiya E. Runnova, Svetlana Pchelintseva, Vadim V. Grubov, Saratov State Technical Univ. (Russian Federation) [10493-63]

Development and validation of factor analysis for dynamic in-vivo imaging data sets, Lukas Goldschmied, Technische Univ. Wien (Austria); Peter Knoll, Univ. Wien (Austria); Vyacheslav Kalchenko, Weizmann Institute of Science (Israel) [10493-64]

Polarization effects in the prediction of blood flow speed using laser speckle contrast imaging, Jinjun Xia, Lawrence Technological Univ. (USA) [10493-65]

High speed, spatially-resolved diffuse imaging for jet injection depth estimation, Kieran Brennan, Poul M. F. Nielsen, Bryan P. Ruddy, Andrew J. Taberner, The Univ. of Auckland (New Zealand) [10493-66]

Evaluation of microvascular disturbances in rheumatic diseases by analysis of skin blood flow oscillations, Irina N. Makovik, Orel State Univ. named after I.S. Turgenev (Russian Federation); Irina A. Mizeva, Institute of Continuous Media Mechanics (Russian Federation); Alexander I. Krupatkin, Central Scientific-Research Institute of Traumatology and Orthopedics, n.n. Priorova (Russian Federation); Igor V. Meglinski, Univ. of Oulu (Finland); Andrey V. Dunaev, Orel State Univ. named after I.S. Turgenev (Russian Federation) [10493-67]

Laser assisted nanoceramics reinforced polymer scaffolds for tissue engineering: additional heating and stem cells behavior, Igor V. Shishkovsky, Vladimir I. Scherbakov, P.N. Lebedev Physical Institute (Russian Federation) [10493-68]

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SESSION 7..... MON 2:00 PM TO 3:40 PM

Functional Imaging and Spectroscopy II

Session Chairs: **Brendan F. Kennedy**, The Univ. of Western Australia (Australia); **Jana M. Kainerstorfer**, Carnegie Mellon Univ. (USA); **Jan Laufer**, Martin-Luther-Univ. Halle-Wittenberg (Germany)

Low-cost and high-performance 3D light-sheet fluorescence imaging on pre-owned conventional microscopes (*Invited Paper*), Tingting Zhu, Xinlin Xie, Yao Yao, Dan Zhu, Peng Fei, Huazhong Univ. of Science and Technology (China).....[10493-27]

Multicolor selective excitation two-photon microscopy by phase-shaping with broadband fiber-continuum (*Invited Paper*), Quan Cui, Ling Fu, Xinyuan Huang, Zhongyun Chen, Wuhan National Lab. for Optoelectronics (China); Min Chen, Huazhong Univ. of Science and Technology (China).....[10493-28]

A weighting function method for the analysis of multilayer scattering tissues in time-resolved functional near-infrared spectroscopy (TR-fNIRS), Junwoo Kim, Yonsei Univ. (Korea, Republic of); Dug Young Kim, Yonsei Univ (Korea, Republic of).....[10493-29]

Plasmonic gold nanostars for biomedical imaging and theranostic applications, Vijay Raghavan, National Univ. of Ireland, Galway (Ireland); Hreesh M. Subhash, National Univ. of Ireland, Galway (Ireland) and Colgate-Palmolive Co. (USA); Malini C. Olivo, National Univ. of Ireland, Galway (Ireland) and Singapore Bioimaging Consortium (Singapore); Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) and ICFO - Institut de Ciències Fotòniques (Spain).....[10493-30]

SESSION 8..... MON 4:10 PM TO 5:20 PM

Optical Clearing and Biomechanics

Session Chairs: **Faisal Khan**, Univ. of Dundee (United Kingdom); **Ekaterina I. Galanzha**, Univ. of Arkansas for Medical Sciences (USA); **Ling Fu**, Huazhong Univ. of Science and Technology (China)

Footpad skin optical clearing-enhanced visualization of vascular and cell motility (*Invited Paper*), Dan Zhu, Britton Chance Ctr. for Biomedical Photonics (China).....[10493-31]

The microstructural variation during tissue optical clearing by Mueller matrix polarimetry, Nan Zeng, Qiaolin Xie, Dongsheng Chen, Hui Ma, Graduate School at Shenzhen, Tsinghua Univ. (China); Valery V. Tuchin, Saratov State Univ. (Russian Federation).....[10493-32]

DAS: A simple, efficient, scalable and Dil-compatible optical clearing method for intact systems, Lingling Chen, Lina Liu, Guiye Li, Ang Liu, Yingchao Li, Xuejuan Hu, Shuangchen Ruan, Shenzhen Univ. (China).....[10493-33]

CHAIRS' FINAL REMARKS 5:20 PM TO 5:40 PM

Conference Chairs: **Valery V. Tuchin**, N.G. Chernyshevsky Saratov National Research State Univ. (Russian Federation), National Research Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control RAS (Russian Federation); **Kirill V. Larin**, Univ. of Houston (USA); **Martin J. Leahy**, National Univ. of Ireland, Galway (Ireland); **Ruikang K. Wang**, Univ. of Washington (USA)

CONFERENCE 10494

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Photons Plus Ultrasound: Imaging and Sensing 2018

Conference Chairs: **Alexander A. Oraevsky**, TomoWave Laboratories, Inc. (USA); **Lihong V. Wang**, California Institute of Technology (USA)

Program Committee: **Mark A. Anastasio**, Washington Univ. in St. Louis (USA); **Paul C. Beard**, College London (United Kingdom); **A. Claude Boccara**, Institut Langevin (France); **Peter Burgholzer**, Research Ctr. for Non Destructive Testing GmbH (Austria); **Stanislav Y. Emelianov**, Georgia Institute of Technology (USA); **Rinat O. Esenaliev**, The Univ. of Texas Medical Branch (USA); **Martin Frenz**, Univ. Bern (Switzerland); **Miya Ishihara**, National Defense Medical College (Japan); **Chulhong Kim**, Pohang Univ. of Science and Technology (Korea, Republic of); **Changhui Li**, Peking Univ. (China); **Pai-Chi Li**, National Taiwan Univ. (Taiwan); **Andreas Mandelis**, Univ. of Toronto (Canada); **Srirang Manohar**, Univ. Twente (Netherlands); **Vasilis Ntziachristos**, Helmholtz Zentrum München GmbH (Germany); **Matthew O'Donnell**, Univ. of Washington (USA); **Günther Paltauf**, Karl-Franzens-Univ. Graz (Austria); **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **William M. Whelan**, Univ. of Prince Edward Island (Canada); **Roger J. Zemp**, Univ. of Alberta (Canada); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA); **Qifa Zhou**, The Univ. of Southern California (USA); **Quing Zhu**, Washington Univ. in St. Louis (USA)

Conference Cosponsor:



SUNDAY 28 JANUARY

SESSION 1..... SUN 8:00 AM TO 10:15 AM

Clinical Applications

Session Chairs: **Srirang Manohar**, Univ. Twente (Netherlands);
Alexander A. Oraevsky, TomoWave Labs, Inc. (USA)

LED based photoacoustic imaging of human inflammatory arthritis, Janggun Jo, Guan Xu, Yunhao Zhu, Gandikota Girish, Elena Schiopu, Xueding Wang, Univ. of Michigan (USA) [10494-1]

In vivo imaging of human ovarian cancer using co-registered ultrasound and photoacoustic tomography, Sreyankar Nandy, Atahar Mostafa, Quing Zhu, Washington Univ. in St. Louis (USA) [10494-2]

Real-time in vivo imaging of human lymphatic system using an LED-based photoacoustic/ultrasound imaging system, Mithun Kuniyil Ajith Singh, PreXion Corp. (Netherlands); Toshitaka Agano, Naoto Sato, Yusuke Shigeta, PreXion Corp. (Japan); Tetsuji Uemura, Saga Univ. Hospital (Japan) [10494-3]

Clinical photoacoustic computed tomography of the human breast in vivo within a single breath hold, Li Lin, Peng Hu, Junhui Shi, Konstantin I. Maslov, Washington Univ. in St. Louis (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) [10494-4]

Automated full-breast photoacoustic tomography with non-uniform illumination, Corey J. Kelly, Septimiu E. Salcudean, The Univ. of British Columbia (Canada) [10494-5]

Clinical evaluation of a high resolution photoacoustic scanner for the assessment of peripheral vascular disease, Nam Trung Huynh, Andrew Plumb, Benjamin T. Cox, Edward Z. Zhang, Paul C. Beard, Univ. College London (United Kingdom) [10494-6]

Real-time in vivo blood oxygenation measurements with an open-source software platform for translational photoacoustic research, Thomas Kirchner, Janek Gröhl, Franz Sattler, Deutsches Krebsforschungszentrum (Germany); Moritz S. Bischoff, UniversitätsKlinikum Heidelberg (Germany); Angelika Laha, Marco Nolden, Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany) [10494-7]

Assessing hyperthermia-induced vasodilation in human skin in vivo using photoacoustic mesoscopy, Andrei Berezhnoi, Helmholtz Zentrum München GmbH (Germany); Mathias Schwarz, iThera Medical GmbH (Germany); Andreas Buehler, Saak V. Ovsepian, Juan Aguirre, Helmholtz Zentrum München GmbH (Germany); Vasilis Ntziachristos, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany) [10494-8]

Noninvasive measurement of cerebral venous oxygenation in neonates with a multi-wavelength, fiber-coupled laser diode photoacoustic system, Stephen Herrmann, Irene Y. Petrov, Yuriy Petrov, Rafael Fonseca, Joanne Richardson, Ekaterina Shanina, Donald S. Prough, Rinat O. Esenaliev, The Univ. of Texas Medical Branch (USA) [10494-9]

SESSION 2..... SUN 10:45 AM TO 12:00 PM

Therapy Monitoring and Guidance I

Session Chairs: **Miya Ishihara**, National Defense Medical College (Japan); **William M. Whelan**, Univ. of Prince Edward Island (Canada)

Dual-modal photoacoustic and ultrasound imaging of dental implants, Donghyun Lee, Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-10]

Transurethral illumination probe design for prostate photoacoustic imaging, Min Ai, Shuo Tang, Tim Salcudean, Robert Rohling, Puring Abolmaesumi, The Univ. of British Columbia (Canada) [10494-11]

Four-dimensional photoacoustic temperature mapping in laser-induced thermotherapy, Francisco Javier Oyaga Landa, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Xosé Luis Deán-Ben, Helmholtz Zentrum München GmbH (Germany); Ronald Sroka, Laser-Forschungslabor (Germany); Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10494-12]

Real-time monitoring the alignment of x-ray beam relative to treatment target during radiation treatment based on ultrasound and x-ray acoustic dual-modality imaging, Wei Zhang, Univ. of Michigan (USA) and Chinese Academy of Medical Sciences (China) and Peking Union Medical College Hospital (China); Hao Lei, Ibrahim Oraiqat, Issam El Naqa, Xueding Wang, Univ. of Michigan (USA) [10494-13]

2D x-ray dosimetry monitoring during radiotherapy using x-ray acoustic computed tomography, Hao Lei, Univ. of Michigan (USA); Wei Zhang, Univ. of Michigan (USA) and Chinese Academy of Medical Sciences (China) and Peking Union Medical College (China); Ibrahim Oraiqat, Issam El Naqa, Xueding Wang, Univ. of Michigan (USA) [10494-14]

Lunch/Exhibition Break Sun 12:00 pm to 1:30 pm

SESSION 3..... SUN 1:30 PM TO 2:45 PM

Therapy Monitoring and Guidance II

Session Chairs: **Miya Ishihara**, National Defense Medical College (Japan); **William M. Whelan**, Univ. of Prince Edward Island (Canada)

Development of a clinical grade photoacoustic transesophageal echocardiography system for continuous monitoring of mixed venous oxygen saturation, Li Li, Massachusetts General Hospital (USA); Balachundhar Subramaniam, Beth Israel Deaconess Medical Ctr., Harvard Medical School (USA); Aaron D. Aguirre, Guillermo J. Tearney, Massachusetts General Hospital (USA) [10494-15]

Simultaneous ultrasound and photoacoustics based flow cytometry, Vaskar Gnyawali, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (iBEST) (Canada) and St. Michael's Hospital (Canada); Eric M. Strohm, Univ. of Toronto (Canada) and Ted Rogers Ctr. for Heart Research (Canada); Scott S. H. Tsai, Michael C. Kolios, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (iBEST) (Canada) and St. Michael's Hospital (Canada) [10494-16]

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In-vivo assessment of radiation-induced cerebrovascular damage in mice by hybrid optoacoustic-ultrasound bio-microscopy, Johannes Rebling, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Héctor Estrada, Helmholtz Zentrum München GmbH (Germany); Wolfgang Sievert, Technische Univ. München (Germany); Daniela Hladik, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Soile Tapio, Helmholtz Zentrum München GmbH (Germany); Daniel Razansky, Technische Univ. München (Germany) [10494-17]

A novel drill design for photoacoustic guided surgeries, Joshua Shubert, Muynatu Bell, The Johns Hopkins Univ. (USA) [10494-18]

Ultrasound, photoacoustics, and nanoparticles in glaucoma therapies and research, Kelsey P. Kubelick, Eric Snider, C. Ross Ethier, Stanislav Y. Emelianov, Georgia Institute of Technology (USA) and Emory Univ. School of Medicine (USA) [10494-19]

SESSION 4 SUN 3:15 PM TO 6:00 PM

Preclinical Imaging

Session Chairs: **Vasilis Ntziachristos**,

Helmholtz Zentrum München GmbH (Germany); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA)

In-vivo three-dimensional optoacoustic molecular imaging of the synovial vasculature in a mouse model of knee joint osteoarthritis (*Invited Paper*), Zhongyu LIU, The Third Affiliated Hospital, Sun Yat-Sen Univ. (China); Xuan Wang, The Third Affiliated Hospital (China); Manting Au, Duojia Li, Yongping Zheng, The Hong Kong Polytechnic Univ. (Hong Kong, China); Chunxiao Luo, Limin Rong, The Third Affiliated Hospital (China); Chunyi Wen, The Hong Kong Polytechnic Univ. (China) [10494-20]

Multi-view Fabry Perot scanner for whole-body small animal imaging, Robert Ellwood, Edward Z. Zhang, Paul C. Beard, Benjamin T. Cox, Univ. College London (United Kingdom) [10494-21]

In vivo photoacoustic prostate cancer imaging using PSMA-targeting contrast agents, Haichong K. Zhang, Ying Chen, Jeeun Kang, Ala Lisok, Emad M. Bocror, Johns Hopkins Univ. (USA) [10494-22]

Non-invasive detection of matrix-metalloproteinase activity in a mouse model of cerebral ischemia using multispectral optoacoustic tomography, Ruiqing Ni, ETH Zürich (Switzerland) and Univ. Zürich (Switzerland); Markus Vaas, ETH Zurich (Switzerland) and Univ. Zürich (Switzerland); Wuwei Ren, ETH Zurich (Switzerland); Jan Klohs, ETH Zurich (Switzerland) and Univ. Zürich (Switzerland) [10494-23]

In vivo preclinical photoacoustic imaging of polycystic kidney disease in rodent models, Olumide Ogunlade, John Connell, Jennifer Huang, Edward Z. Zhang, Mark Lythgoe, David Long, Paul C. Beard, Univ. College London (United Kingdom) [10494-24]

Photoacoustic needle biopsy for prostate cancer diagnosis in human prostates ex vivo and in vivo, Guan Xu, Univ. of Michigan (USA); Shengsong Huang, Yu Qin, Jing Pan, Yingna Chen, Denglong Wu, Tongji Univ. (China); Xueding Wang, Univ. of Michigan (USA); Qian Cheng, Tongji Univ. (China) [10494-25]

Deep-tissue optoacoustic micro-tomography at 100Hz volumetric image rate, Xosé Luis Deán-Ben, Hernan Lopez-Schier, Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) [10494-26]

Spiral volumetric optoacoustic tomography visualizes 3D distribution of brown adipose tissue and angiopathy in diabetic mice, Avihai Ron, Institute for Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany) and Technical Univ. of Munich (Germany); Josefine Reber, Xosé Luis Deán-Ben, Institute for Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany); Vasilis Ntziachristos, Daniel Razansky, Institute for Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany) and Technical Univ. of Munich (Germany) [10494-27]

Spectroscopic photoacoustics for assessing ischemic kidney damage, Elizabeth Berndt, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science, and Technology (Canada); Xiaolin He, Keenan Research Ctr. for Biomedical Science, St. Michael's Hospital (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) and Univ. of Toronto (Canada); Andrew Heinmiller, FUJIFILM VisualSonics, Inc. (Canada); Darren Yuen, Keenan Research Ctr. for Biomedical Science, St. Michael's Hospital (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) and Univ. of Toronto (Canada); Michael C. Kolios, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) [10494-28]

Using optical resolution photoacoustic microscopy to study the effect of Hif1 α and EGF expression on hemodynamic responses to intestinal resection, Toru Imai, California Institute of Technology (USA) and Washington Univ. in St. Louis (USA) and Canon Inc. (Japan); Bola G. Aladegbami, Lauren K. Barron, Jun Guo, Washington Univ. School of Medicine in St. Louis (USA); Junjie Yao, Cheng-Hung Yeh, Washington Univ. in St. Louis (USA); Brad W. Warner, Washington Univ. School of Medicine in St. Louis (USA); Lihong V. Wang, California Institute of Technology (USA) [10494-29]

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Theoretical and experimental sensitivity characterization of waveguide-based ultrasound detectors, Shai Tsesses, Assaf Grinberg, Daniel Aronovich, Evgeny Hahamovich, Amir Rosenthal, Technion-Israel Institute of Technology (Israel) [10494-103]

Parallelised signal acquisition using a Fabry-Perot sensor and a camera-based interrogation scheme, Taravat Saeb Gilani, Technische Univ. Berlin (Germany); Claus Villringer, Technische Hochschule Wildau (Germany); Edward Z. Zhang, Univ. College London (United Kingdom); Heiko Gundlach, Jens Buchmann, Technische Univ. Berlin (Germany); Sigurd Schrader, Technische Hochschule Wildau (Germany); Jan Laufer, Martin-Luther-Univ. Halle-Wittenberg (Germany) [10494-104]

Multi-dynamic range compressional wave detection using optical-frequency-comb, Takeo Minamikawa, Takashi Masuoka, Ryo Oe, Tokushima Univ. (Japan) and Japan Science and Technology Agency (Japan); Yoshiaki Nakajima, The Univ. of Electro-Communications (Japan) and Japan Science and Technology Agency (Japan); Yoshihisa Yamaoka, Saga Univ. (Japan); Kaoru Minoshima, The Univ. of Electro-Communications (Japan) and Japan Science and Technology Agency (Japan); Takeshi Yasui, Tokushima Univ. (Japan) and Japan Science and Technology Agency (Japan) . [10494-105]

Realistic tissue visualization using photoacoustic image, Seonghee Cho, Pohang Univ. of Science and Technology (Korea, Republic of); Ravi Managuli, Univ. of Washington (USA); Seungwan Jeon, Jeesu Kim, Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-106]

High speed multi-beam Fabry-Perot scanner for fast high resolution photoacoustic imaging, Nam Trung Huynh, Felix Lucka, Edward Z. Zhang, Marta Betcke, Simon R. Arridge, Benjamin T. Cox, Paul C. Beard, Univ. College London (United Kingdom) [10494-107]

Materials and methods for calibrating and benchmarking MSOT devices for clinical use, Ruben Moreno, Stefan Morscher, Christian Wiest, iThera Medical GmbH (Germany) [10494-108]

Phantoms for calibration of photoacoustic imaging systems, Joanna Brunker, Univ. of Cambridge (United Kingdom); Efthymios Maneas, Univ. College London (United Kingdom); James Joseph, Univ. of Cambridge (United Kingdom); Srinath Rajagopal, National Physical Lab. (United Kingdom); Wenfeng Xia, Tom Vercauteren, Adrien E. Desjardins, Univ. College London (United Kingdom); Sarah E. Bohndiek, Univ. of Cambridge (United Kingdom) [10494-109]

Photoacoustic imaging of controlled blood oxygenation within a programmable dynamic flow system, Marcel Gehrung, Sarah E. Bohndiek, Joanna Brunker, Univ. of Cambridge (United Kingdom) [10494-110]

Quantitative photoacoustic tumour volume estimation for PI3 kinase-beta knockout study, Ryan K. Chee, Abul Azad, Allan Murray, Roger J. Zemp, Univ. of Alberta (Canada) [10494-111]

Multi-spectral photoacoustic elasticity tomography, Zhen Yuan, Yubin Liu, Univ. of Macau (Macao, China) [10494-112]

Quantification of chromophore concentrations from 3D photoacoustic images using a Monte Carlo light model, Jens Buchmann, Technische Univ. Berlin (Germany); Bernhard A. Kaplan, Steffen Prohaska, Konrad-Zuse-Zentrum für Informationstechnik Berlin (Germany); Jan Laufer, Martin-Luther-Univ. Halle-Wittenberg (Germany) [10494-113]

A method for 3D quantitative photoacoustic tomography using a Monte-Carlo based adjoint fluence approximation, Bernhard A. Kaplan, Konrad-Zuse-Zentrum für Informationstechnik Berlin (Germany); Samuel Powell, Univ. College London (United Kingdom); Jens Buchmann, Technische Univ. Berlin (Germany); Steffen Prohaska, Konrad-Zuse-Zentrum für Informationstechnik Berlin (Germany); Jan Laufer, Martin-Luther-Univ. Halle-Wittenberg (Germany) [10494-114]

Uniform light delivery for quantitative volumetric optoacoustic tomography, Ben Mc Larney, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Johannes Rebling, Zhenyue Chen, Xosé Luis Deán-Ben, Helmholtz Zentrum München GmbH (Germany); Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10494-115]

Quantitative photoacoustic potassium imaging via ion-sensing nanoprobe, Joel W. Y. Tan, Chang H. Lee, Jeff Folz, Janggun Jo, Raoul Kopelman, Xueming Wang, Univ. of Michigan (USA) [10494-116]

An effective implementation of quantitative photoacoustic tomography for small animals using multi-angle light-sheet illuminations, Yihan Wang, Tong Lu, Jiao Li, Tianjin Univ. (China); Wenjuan Ma, Tianjin Medical Univ. Cancer Institute & Hospital (China); Huijuan Zhao, Feng Gao, Tianjin Univ. (China) [10494-117]

Strain-photoacoustic imaging: feasibility study in phantoms and an animal model in vivo, Yunhao Zhu, Univ. of Michigan (USA) and Nanjing Univ. (China); Laura Johnson, Jonathan Rubin, Xueming Wang, Peter Higgins, Guan Xu, Univ. of Michigan (USA) [10494-118]

Photoacoustic (PA) imaging and fluence mapping using acousto-optic (AO) with a single laser, Altaf Hussain, Wiendelt Steenbergen, Univ. Twente (Netherlands) [10494-119]

Photoacoustic speckle: Effects of imaging transducer, Eno Hysi, Michael J. Moore, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (iBEST) (Canada) and St. Michael's Hospital (Canada); Subhajit Karmakar, The Univ. of Burdwan (India); Ratan K. Saha, Indian Institute of Information Technology, Allahabad (India); Eric M. Strohm, Univ. of Toronto (Canada) and Ted Rogers Ctr. for Heart Research (Canada); Michael C. Kolios, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (iBEST) (Canada) and St. Michael's Hospital (Canada) [10494-120]

Axial-resolution improved optical resolution photoacoustic microscopy using minimum-variance apodization, Hong-Sheng Chen, Meng-Lin Li, National Tsing Hua Univ. (Taiwan) [10494-121]

2D autocorrelation based blood flow estimation for optical resolution photoacoustic microscopy, Chin-Chao Cho, Meng-Lin Li, National Tsing Hua Univ. (Taiwan) [10494-122]

Bayesian Eigenspectra optoacoustic tomography, Ivan Olefir, Helmholtz Zentrum München GmbH (Germany); Stratis Tzoumas, Stanford Univ. (USA); Hong Yang, Helmholtz Zentrum München GmbH (Germany); Vasilis Ntziachristos, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany) [10494-123]

Phantom-based evaluation of out-of-plane resolution, sensitivity, and artifacts in photoacoustic imaging, William C. Vogt, Congxian Jia, Keith A. Wear, Brian S. Garra, U.S. Food and Drug Administration (USA) [10494-124]

Photoacoustic imaging at 1064nm wavelength with exogenous contrast agents, Paul Kumar Upputuri, Yuyan Jiang, Kanyi Pu, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-125]

Comparison of continuous and stop-and-go scanning techniques in photoacoustic tomography, Arunima Sharma, Sandeep Kumar Kalva, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-126]

Multispectral photoacoustic tomography for detection of small tumors inside biological tissues, Takeshi Hirasawa, Shinpei Okawa, Kazuhiro Tsujita, Toshihiro Kushibiki, Masanori Fujita, National Defense Medical College (Japan); Yasuteru Urano, The Univ. of Tokyo (Japan); Miya Ishihara, National Defense Medical College (Japan) [10494-127]

High-speed photoacoustic imaging using an LED-based photoacoustic imaging system, Naoto Sato, PreXion Corp. (Japan); Mithun Kuniyil Ajith Singh, PreXion Corp. (Netherlands); Yusuke Shigeta, Takamitsu Hanaoka, Toshitaka Agano, PreXion Corp. (Japan) [10494-128]

Multispectral photoacoustic characterization of ICG and porcine blood using an LED-based photoacoustic imaging system, Yusuke Shigeta, Naoto Sato, PreXion Corp. (Japan); Mithun Kuniyil Ajith Singh, PreXion Corp. (Netherlands); Toshitaka Agano, PreXion Corp. (Japan) [10494-129]

Capacitive micromachined ultrasonic transducer for forward-looking 3D photoacoustic imaging catheter, Taiichi Takezaki, Masakazu Kawano, Ryo Imai, Shinsuke Onoe, Takahiro Matsuda, Tomohiko Tanaka, Hitachi, Ltd. (Japan) [10494-130]

Ring detector arrays for large depth of field scanning photoacoustic macroscopy, Günther Palttauf, Paul Torke, Robert Nuster, Karl-Franzens-Univ. Graz (Austria); Johannes Bauer-Marschallinger, Thomas Berer, Research Ctr. for Non Destructive Testing GmbH (Austria); Gerhard Haudum, Radiologie West (Austria); Peter Burgholzer, Research Ctr. for Non Destructive Testing GmbH (Austria) [10494-131]

Spatial-impulse-response-dependent back-projection using the non-stationary convolution in optoacoustic mesoscopy, Tong Lu, Yihan Wang, Songhe Zhang, Jiao Li, Tianjin Univ. (China); Vasilis Ntziachristos, Lehrstuhl für Biologische Bildgebung, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10494-132]

Performances of FP interferometer ultrasound sensors for photoacoustics imaging, Edward Z. Zhang, James A. Guggenheim, Benjamin T. Cox, Paul C. Beard, Univ. College London (United Kingdom) [10494-133]

Photoacoustic transcutaneous bilirubinometer, Sathiyamoorthy Krishnan, Ryerson Univ. (Canada); Michael C. Kolios, Ryerson Univ and iBEST (St. Michael's Hospital) (Canada) [10494-134]

Characterizing intestinal strictures of Crohn's disease with a capsule-shaped acoustic resolution photoacoustic endoscope, Hao Lei, Laura Johnson, Jun Ni, Xueming Wang, Peter Higgins, Guan Xu, Univ. of Michigan (USA) [10494-135]

Miniature all-optical probe for photoacoustic and ultrasound dual-modality imaging, Guangyao Li, Sung-Liang Chen, Zhendong Guo, Shanghai Jiao Tong Univ. (China) [10494-136]

Super-contrast photoacoustic resonance imaging, Fei Gao, ShanghaiTech Univ. (China) and Nanyang Technological Univ. (Singapore); Ruochong Zhang, Nanyang Technological Univ. (Singapore); Xiaohua Feng, California Institute of Technology (USA) and Nanyang Technological Univ. (Singapore); Siyu Liu, Yuanjin Zheng, Nanyang Technological Univ. (Singapore) [10494-137]

Tunable phononic lens for deep tissue imaging, Delfino Reyes Contreras, Univ. Autónoma del Estado de México (Mexico) and Univ. of North Texas (USA); Ezekiel Walker, Arup Neogi, Univ. of North Texas (USA) [10494-138]

A novel algorithm for fast and efficient multifocus wavefront shaping, Mohammad R. N. Avanaki, Wayne State Univ (USA); Zahra Fayyaz, Sharif University of Technology (Iran, Islamic Republic of) [10494-227]

A new dictionary-based image reconstruction for PACT, Mohammad R. N. Avanaki, Parsa Omid, Wayne State Univ. (USA); Moein Mozaffarzadeh, Mahdi Orooji, Tarbiat Modares Univ. (Iran, Islamic Republic of) ... [10494-228]

Model-based photoacoustic image reconstruction using compressed sensing and smoothed L0 norm, Moein Mozaffarzadeh, Ali Mahloojifar, Tarbiat Modares Univ. (Iran, Islamic Republic of); Mohammad R. N. Avanaki, Wayne State Univ. (USA); Mahdi Orooji, Tarbiat Modares Univ. (Iran, Islamic Republic of) [10494-239]

Three-dimensional photoacoustic tomography using delay multiply and sum beamforming algorithm, Roya Paridar, Moein Mozaffarzadeh, Mahdi Orooji, Ali Mahloojifar, Tarbiat Modares Univ. (Iran, Islamic Republic of); Mohammad R. N. Avanaki, Wayne State Univ. (USA) [10494-240]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10494

MONDAY 29 JANUARY

SESSION 5. MON 8:00 AM TO 9:45 AM

Multimodality Imaging and Contrast Agents

Session Chairs: **Pai-Chi Li**, National Taiwan Univ. (Taiwan);
Quing Zhu, Washington Univ. in St. Louis (USA)

Integrated photoacoustic/ultrasound/HFU system based on a clinical ultrasound imaging platform, Jeesu Kim, Wonseok Choi, Eunyong Park, Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of). [10494-30]

In vivo photoacoustic imaging of 700nm region absorbed nanoparticles with stimulated Raman scattering fiber laser source, Soon-Woo Cho, Pusan National Univ. (Korea, Republic of); Bui Nhat Quang, Pukyong National Univ. (Korea, Republic of); Sang Min Park, Pusan National Univ. (Korea, Republic of); Junghwan Oh, Pukyong National Univ. (Korea, Republic of); Chang-Seok Kim, Pusan National Univ. (Korea, Republic of) [10494-31]

Human placental vasculature imaging using an LED-based photoacoustic/ultrasound imaging system, Efthymios Maneas, Wenfeng Xia, Univ. College London (United Kingdom); Mithun Kuniyil Ajith Singh, PreXion Corp. (Netherlands); Naoto Sato, Toshitaka Agano, PreXion Corp. (Japan); Sebastien Ourselin, Simeon J. West, Anna L. David, Tom Vercauteren, Adrien E. Desjardins, Univ. College London (United Kingdom) [10494-32]

A multimodal imaging platform with integrated simultaneous photoacoustic microscopy, optical coherence tomography, optical Doppler tomography and fluorescence microscopy, Arash Dackhah, Nusrat Yeasmin, Jun Zhou, Shuliang Jiao, Florida International Univ. (USA) [10494-33]

Characterization and technical validation of a multi-wavelength LED-based photoacoustic/ultrasound imaging system, James Joseph, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom); Mithun Kuniyil Ajith Singh, PreXion Corp. (Netherlands); Joanna Brunker, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom); Naoto Sato, Toshitaka Agano, Yusuke Shigeta, PreXion Corp. (Japan); Sarah E. Bohndiek, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom) [10494-34]

A 3D imaging system integrating photoacoustic and fluorescence orthogonal projections for anatomical, functional and molecular assessment of rodent models, Hans-Peter F. Brecht, Vassili Ivanov, PhotoSound Technologies, Inc. (USA); Diego S. Dumani, Georgia Institute of Technology (USA); Stanislav Y. Emelianov, Georgia Tech Research Institute (USA); Mark A. Anastasio, Washington Univ. in St. Louis (USA); Sergey A. Ermilov, PhotoSound Technologies, Inc. (USA) [10494-35]

Dual-imaging contrast agent for ultrasound and photoacoustic imaging: gas-generating plasmonic-core nanoconstruct, In-Cheol Sun, Stanislav Y. Emelianov, Georgia Institute of Technology (USA) [10494-36]

SESSION 6. MON 10:15 AM TO 12:00 PM

Endoscopy and Intravascular Imaging

Session Chairs: **Wiendelt Steenbergen**, Univ. Twente (Netherlands);
Qifa Zhou, The Univ. of Southern California (USA)

A capillary waveguide as an ultrathin optical-resolution photoacoustic endoscope, Antonio M. Caravaca-Aguirre, Lab. Interdisciplinaire de Physique, Univ. Grenoble Alpes (France); Florian Poisson, Emmanuel Bossy, Univ. Grenoble Alpes (France) [10494-37]

Forward viewing 3D photoacoustic endoscopic probe for guiding interventional procedures, Rehman Ansari, Edward Z. Zhang, Adrien E. Desjardins, Paul C. Beard, Univ. College London (United Kingdom). [10494-38]

Speckle based optical-resolution photoacoustic endoscopy, Antonio M. Caravaca-Aguirre, Lab. Interdisciplinaire de Physique, Univ. Grenoble Alpes (France); Florian Poisson, Emmanuel Bossy, Univ. Grenoble Alpes (France) [10494-39]

All-optical intravascular probe for dual-mode photoacoustic imaging and optical coherence tomography, Sunish J. Mathews, Univ. College London (United Kingdom); Callum Little, Chris D. Loder, Roby D. Rakhit, The Royal Free Hospital (United Kingdom); Wenfeng Xia, Edward Z. Zhang, Paul C. Beard, Univ. College London (United Kingdom); Malcolm C. Finlay, Barts Heart Ctr., St. Bartholomew's Hospital (United Kingdom); Adrien E. Desjardins, Univ. College London (United Kingdom) [10494-40]

Analyzing the necessary detection bandwidth for photoacoustic esophagus imaging, Hailong He, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Andreas Buehler, Dmitry Bozhko, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) [10494-41]

Forward-looking 3D photoacoustics for intravascular imaging, Tomohiko Tanaka, Ryo Imai, Taiichi Takezaki, Takahiro Matsuda, Shinsuke Onoe, Hitachi, Ltd. (Japan). [10494-42]

Endoscopic photoacoustic microscopy probe for human colorectal cancer imaging, Xiandong Leng, Bin Rao, Quing Zhu, Washington Univ. in St. Louis (USA) [10494-43]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 7. MON 1:30 PM TO 3:00 PM

Quantitative Imaging

Session Chairs: **Martin Frenz**, Univ. Bern (Switzerland);
Andreas Mandelis, Univ. of Toronto (Canada)

On iterative algorithms for quantitative photoacoustic tomography in the radiative transport regime, Chao Wang, Tie Zhou, Peking Univ. (China) [10494-44]

Quantitative photoacoustic measurement of absolute oxygen saturation in deep tissue, Guoha Wen, Lidai Wang, City Univ. of Hong Kong (Hong Kong, China) [10494-45]

Confidence estimation for quantitative photoacoustic imaging, Janek Gröhl, Thomas Kirchner, Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany). [10494-46]

Non-invasive perfusion-rate estimation using photoacoustic-ultrasound imaging of tissue compression and relaxation, Min Choi, Roger J. Zemp, Univ. of Alberta (Canada) [10494-47]

Fluence-matching method based on photoacoustic radiofrequency spectraTR, Muhannad N. Fadhel, Eno Hysi, Michael C. Kolios, Ryerson Univ. (Canada) [10494-48]

Optoacoustic theranostics, Irene Y. Petrov, Adelaide Micci, Donald S. Prough, Yuriy Petrov, Jutatip Guptarak, Auston Grant, Margaret O. Parsley, Ian J. Bolding, Rinat O. Esenaliev, The Univ. of Texas Medical Branch (USA) [10494-49]

SESSION 8. MON 3:30 PM TO 6:00 PM

Functional Imaging and Brain Imaging

Session Chairs: **A. Claude Boccara**, Institut Langevin (France);
Rinat O. Esenaliev, The Univ. of Texas Medical Branch (USA)

Quantification of amyloid deposits and oxygen extraction fraction in the brain with multispectral photoacoustic imaging in arcAbeta mouse model of Alzheimer's disease, Ruiqing Ni, Markus Vaas, Markus Rudin, Jan Klohs, ETH Zurich (Switzerland) and Univ. Zürich (Switzerland) [10494-50]

Linear-array based full-view high-resolution photoacoustic computed tomography of whole mouse brain functional imaging in vivo, Lei Li, California Institute of Technology (USA); Pengfei Zhang, Li Lin, Peng Hu, Liren Zhu, Junhui Shi, Yun He, Washington Univ. in St. Louis (USA); Lihong Wang, California Institute of Technology (USA) [10494-51]

Spiral volumetric photoacoustic tomography for imaging of multi-scale dynamics in solid tumors, Avihai Ron, Xosé Luis Deán-Ben, Sven Gottschalk, Institut für Biologische und Medizinische Bildgebung, Helmholtz Zentrum München GmbH (Germany); Daniel Razansky, Institut für Biologische und Medizinische Bildgebung, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10494-58]

Transcranial recording of stimulated neuronal activity in vivo using photoacoustic voltage-sensitive dye imaging, Jeeun Kang, Haichong K. Zhang, Shilpa Kadam, Julie Fedorko, Heather Valentine, Arman Rahmim, Johns Hopkins Univ. (USA); Leslie M. Loew, Univ. of Connecticut (USA); Dean F. Wong, Emad M. Boctor, Johns Hopkins Univ. (USA). [10494-53]

Noninvasive photoacoustic monitoring of cerebral venous blood oxygenation in humans: Validation with invasive measurements, Yuriy Petrov, Irene Y. Petrov, Donald S. Prough, The Univ. of Texas Medical Branch (USA); Claudia S. Robertson, Baylor College of Medicine (USA); Rinat O. Esenaliev, The Univ. of Texas Medical Branch (USA) [10494-54]

Characterization of intestinal fibrosis and inflammation with transcutaneous spectroscopic PA imaging, Yunhao Zhu, Univ. of Michigan (USA) and Nanjing Univ. (China); Laura Johnson, Jonathan Rubin, Xueding Wang, Peter Higgins, Guan Xu, Univ. of Michigan (USA) . . . [10494-55]

Multi-parametric photoacoustic microscopy with 1.2-MHz A-line rate, Tianxiang Wang, Rui Cao, Sushanth Govinahallisathyanarayana, John Hossack, Song Hu, Univ. of Virginia (USA) [10494-56]

Ultrafast high-frequency blood flow imaging and photoacoustic imaging, Bingjie Ma, Univ. of Alberta (Canada) [10494-57]

Real-time volumetric mapping of calcium activity in living mice by functional optoacoustic neuro-tomography, Sven Gottschalk, Xosé Luis Deán-Ben, Institut für Biologische und Medizinische Bildgebung, Helmholtz Zentrum München GmbH (Germany); Shy Shoham, Technion-Israel Institute of Technology (Israel) and Neuroscience Institute, NYU Langone Medical Ctr. (USA); Daniel Razansky, Institut für Biologische und Medizinische Bildgebung, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10494-52]

Photoacoustics for assessing ischemic kidney damage in vivo, Elizabeth Berndt, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada); Xiaolin He, Keenan Research Ctr. for Biomedical Science, St. Michael's Hospital (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) and Univ. of Toronto (Canada); Melissa Yin, FUJIFILM VisualSonics, Inc. (Canada); Darren Yuen, Keenan Research Ctr. for Biomedical Science, St. Michael's Hospital (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) and Univ. of Toronto (Canada); Michael C. Kolios, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) [10494-59]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Photoacoustic cystography using handheld dual modal clinical ultrasound photoacoustic imaging system, Kathyayini Sivasubramanian, Vijitha Periyasamy, Dienzo Rhonnie Austria, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-139]

Photoacoustic microscopy enables multilayered histological imaging of human breast cancer without staining, Terence T. W. Wong, Washington Univ. in St. Louis (USA) and California Institute of Technology (USA); Ruiying Zhang, Pengfei Hai, Rebecca L. Aft, Washington Univ. in St. Louis (USA); Deborah V. Novack, Washington Univ. School of Medicine in St. Louis (USA); Lihong V. Wang, California Institute of Technology (USA) . . . [10494-140]

Combining 3D optoacoustics and ultrasound for imaging of finger vasculature, Marc Fournelle, Wolfgang Bost, Steffen Weber, Steffen Tretbar, Fraunhofer-Institut für Biomedizinische Technik (Germany) [10494-141]

Developing a real-time photoacoustic-ultrasound dual modality functional imaging system, Fang Yang, Shenzhen Mindray Bio-Medical Electronics Co., Ltd. (China); Lingyi Zhao, Peking Univ. (China); Meng Yang, Peking Union Medical College Hospital (China) and Chinese Academy of Medical Sciences (China); Lei Zhu, Xujin He, Shenzhen Mindray Bio-Medical Electronics Co., Ltd. (China); Changhui Li, Peking Univ. (China); Lianxi Xiang, Shenzhen Mindray Bio-Medical Electronics Co., Ltd. (China) [10494-142]

Patient imaging using a mobile multimodal photoacoustic and optical coherence tomography system, Zhe Chen, Christoph Sinz, Medizinische Univ. Wien (Austria); Kristen Meiburger, Politecnico di Torino (Italy); Elisabet Rank, Medizinische Univ. Wien (Austria); Edward Zhang, University College London (United Kingdom); Erich Hoover, Michael Minneman, Jason Ensher, Insight Photonic Solutions (USA); Paul Beard, University College London (United Kingdom); Rainer A Leitgeb, Harald Kittler, Wolfgang Drexler, Mengyang Liu, Medizinische Univ. Wien (Austria) [10494-143]

Feasibility evaluation of 3D photoacoustic imaging of blood vessel structure using multiple wavelengths with a handheld probe, Yo Uchimoto, Takeshi Namita, Kengo Kondo, Makoto Yamakawa, Tsuyoshi Shiina, Kyoto Univ. (Japan) [10494-144]

Applicability of photoacoustic imaging system to skin aging evaluation, Yuya Murata, Takeshi Namita, Kengo Kondo, Makoto Yamakawa, Kyoto Univ. (Japan); Tsuyoshi Shiina, Kyoto Univ. (Japan) [10494-145]

Development of photoacoustic imaging system of finger vasculature using ring-shaped ultrasound transducer, Misaki Nishiyama, Kyoto Univ. (Japan) [10494-146]

Transrectal photoacoustic imaging for guidance of targeted prostate biopsies, Miya Ishihara, Akio Horiguchi, Masayuki Shinchi, Hiroshi Shinmoto, National Defense Medical College (Japan); Kaku Irisawa, Takatsugu Wada, Medical Systems Research & Development Ctr., FUJIFILM Corp. (Japan); Hitoshi Tsuda, Tomohiko Asano, National Defense Medical College (Japan) [10494-147]

Clinically applicable real-time photoacoustic imaging system with optical/acoustic coaxial design probes, Chengbo Liu, Yuanyuan Bai, Muyue Xing, Liang Song, Shenzhen Institutes of Advanced Technology (China) [10494-148]

Eigenspace-based adaptive beamforming for photoacoustic computed tomography, Jiake Li, Tianjin Univ. (China) and City Univ. of Hong Kong (China); Guohua Wen, City Univ. of Hong Kong (China); Xiaodong Chen, Daoyin Yu, Tianjin Univ. (China); Lidai Wang, City Univ. of Hong Kong (China) [10494-149]

Photoacoustic projection imaging using an all-optical detector array, Johannes Bauer-Marschallinger, Karoline Felbermayer, Thomas Berer, Research Ctr. for Non Destructive Testing GmbH (Austria) [10494-150]

Multiple single-element transducer photoacoustic computed tomography system, Sandeep Kumar Kalva, Zhe Zhi Hui, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-151]

Exploiting nonlinear characteristics for selective detection of gold nanospheres using photoacoustic tomography, Susanne Schrof, Technische Univ. Berlin (Germany); Genny Pang, Technische Univ. München (Germany); Jens Buchmann, Technische Univ. Berlin (Germany); Jan Laufer, Martin-Luther-Univ. Halle-Wittenberg (Germany) [10494-152]

Semiconducting polymer dot as a highly-effective contrast agent for photoacoustic imaging, Zhen Yuan, Jian Zhang, Univ. of Macau (Macao, China) [10494-153]

Novel microfluidics-based nitrogen microbubbles formed by flow-focusing in methylene blue solution as a dual-modality contrast agent for photoacoustic and ultrasound imaging, Dhiman Das, Kathyayini Sivasubramanian, Yang Chun, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-154]

PLGA nanoparticles containing gold nanorods as theranostic agents for photoacoustic imaging and cancer therapy, Yanjie Wang, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (iBEST) (Canada) and St. Michael's Hospital (Canada); Maurice Pasternak, Sunnybrook Research Institute (Canada); Sathiyamoorthy Krishnan, Michael C. Kolios, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (iBEST) (Canada) and St. Michael's Hospital (Canada) [10494-155]

Contrast-enhanced photoacoustic imaging with an optical wavelength of 1064 nm, Jeesu Kim, Sara Park, Wonseok Choi, Gyeong Bae Park, Unyong Jeong, Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-156]

Comprehensive characterization of microvascular remodeling in vivo using multi-parametric photoacoustic microscopy, Naidi Sun, Univ. of Virginia (USA); Bo Ning, Johns Hopkins Univ. (USA); Anthony Bruce, Scott Seaman, Shayn Peirce-Cottler, Song Hu, Univ. of Virginia (USA) [10494-157]

Co-registered photoacoustic and ultrasound system for real-time in-vivo ovarian cancer imaging and diagnosis, Atahar Mostafa, Sreyankar Nandy, Eghbal Amidi, Bin Rao, Quing Zhu, Washington Univ. in St. Louis (USA) [10494-158]

Non-invasive photoacoustic diagnosis of perinatal arterial ischemic stroke: preliminary in vivo validation using arterial carotid occlusion in neonatal piglet, Jeeun Kang, Shawn Adams, Haichong Zhang, Ernest Graham, Raymond Koehler, Emad M. Bector, Johns Hopkins Univ. (USA) [10494-159]

Label-free photoacoustic microscopy system for in vivo tendon imaging, Hwi Don Lee, Bong-Ahn Yu, Jun Geun Shin, Tae Joong Eom, Gwangju Institute of Science and Technology (Korea, Republic of) [10494-160]

Comprehensive photoacoustic characterization of the cerebral vasculature in awake mice, Rui Cao, Jun Li, Chenchu Zhang, Naidi Sun, Zhiyi Zuo, Song Hu, Univ. of Virginia (USA) [10494-161]

Longitudinal photoacoustic imaging of placental ischemia, Dylan J. Lawrence, Megan Escott, Carolyn L. Bayer, Tulane Univ. (USA) [10494-162]

Novel methods for accelerating reconstructions of large optoacoustic datasets toward 3D model-based inversions in real time, Lu Ding, Xosé Luis Deán-Ben, Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) [10494-163]

Computational photoacoustic imaging reconstruction using sparsity-based optimization, Ruibo Shang, Thayer School of Engineering at Dartmouth (USA); Richard Archibald, Oak Ridge National Lab. (USA); Anne Gelb, Dartmouth College (USA); Geoffrey Luke, Thayer School of Engineering at Dartmouth (USA) [10494-164]

A novel matrix used in regularization term for model-based photoacoustic reconstruction, Tong Tong, Kun Wang, Jie Tian, Institute of Automation (China) [10494-165]

Artifact-suppressed photoacoustic linear array imaging using virtual-receiving element derived correlation weighting, Meng-Lin Li, Chi-Yang Lin, National Tsing Hua Univ. (Taiwan) [10494-166]

Sparse-view photoacoustic tomography using virtual parallel-beam projections and spatially adaptive filtering, Yihan Wang, Tong Lu, Wenbo Wan, Songhe Zhang, Jiao Li, Huijuan Zhao, Feng Gao, Tianjin Univ. (China) [10494-167]

Photoacoustic image reconstruction from sparse data via deep learning, Stephan Antholzer, Univ. of Innsbruck (Austria); Markus Haltmeier, Univ. of Innsbruck (Austria); Robert Nuster, Karl-Franzens-Univ. Graz (Austria); Johannes Schwab, Univ. of Innsbruck (Austria) [10494-168]

Algebraic calculation of back-projection formulae, Amir Rosenthal, Technion-Israel Institute of Technology (Israel) [10494-169]

Speed of sound reconstruction in optoacoustic imaging, Svenja Schoeder, Technische Univ. München (Germany); Ivan Olefir, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Martin Kronbichler, Wolfgang Wall, Technische Univ. München (Germany) [10494-170]

Two-dimensional directional synthetic aperture focusing technique using acoustic-resolution photoacoustic microscopy, Seungwan Jeon, Jihoon Park, Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-171]

3D quantitative photoacoustic image reconstruction using Monte Carlo method and linearization, Shinpei Okawa, Takeshi Hirasawa, Kazuhiro Tsujita, Toshihiro Kushibiki, Miya Ishihara, National Defense Medical College (Japan) [10494-172]

Quantitative image reconstruction in photoacoustic tomography and ultrasound modulated optical tomography using Monte-Carlo solutions of the radiative transport equation, Samuel Powell, Simon R. Arridge, Felix Lucka, Roman Hochuli, Univ. College London (United Kingdom) [10494-173]

Photoacoustic image reconstruction in Bayesian framework, Jenni Tick, Aki Pulkkinen, Univ. of Eastern Finland (Finland); Felix Lucka, Robert Ellwood, Benjamin T. Cox, Simon R. Arridge, Univ. College London (United Kingdom); Tanja Tarvainen, Univ. of Eastern Finland (Finland) [10494-174]

Photoacoustic imaging optimization with raw signal deconvolution and empirical mode decomposition, Chengwen Guo, Nanjing Univ. (China); Yu Qin, Tongji Univ. (China); Yunhao Zhu, Jie Yuan, Nanjing Univ. (China); Qian Cheng, Tongji Univ. (China); Xueding Wang, Univ. of Michigan (USA) [10494-175]

Three-dimensional optoacoustic imaging at kHz rates via sparse signal acquisition, Ali Özbek, Xosé Luís Dean-Ben, Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) [10494-176]

In vivo low-cost photoacoustic imaging using LED light source and clinical ultrasound scanner, Haichong K. Zhang, Jeeun Kang, Emad M. Boctor, Johns Hopkins Univ. (USA) [10494-177]

Point-counting based image reconstruction for photoacoustic computed tomography, Chuangjian Cai, Kexin Deng, Tsinghua Univ. School of Medicine (China); Cheng Ma, Tsinghua Univ. (China); Jianwen Luo, Tsinghua Univ. School of Medicine (China) [10494-178]

SESSION 9 TUE 8:00 AM TO 10:00 AM

Novel Methods and Systems

Session Chairs: **Rinat O. Esenaliev**, The Univ. of Texas Medical Branch (USA); **Changhui Li**, Peking Univ. (China)

Acousto-optic imaging using plane waves, Maimouna Bocoum, Jean-Baptiste Laudereau, Institut Langevin (France); Alexander Grabar, Uzhgorod National Univ. (Ukraine); Caroline Venet, Jean-Luc Gennisson, Clément Dupuy, Mickaël Tanter, François Ramaz, Institut Langevin (France) . [10494-60]

Laser-induced photo-thermal strain imaging, Changhoon Choi, Joongho Ahn, Seungwan Jeon, Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-61]

Ultra-thin spectral filter for acousto-optic imaging for medical applications, Caroline Venet, Maimouna Bocoum, Jean-Baptiste Laudereau, Institut Langevin (France); Thierry Chanénière, Lab. Aimé Cotton (France); François Ramaz, Institut Langevin (France); Anne Louchet-Chauvet, Lab. Aimé Cotton (France) [10494-62]

Beating the photoacoustic imaging diffraction limit using flow-induced absorption fluctuation, Bastien Arnal, Lab. Interdisciplinaire de Physique, Univ. Grenoble Alpes (France) and Ctr. National de la Recherche Scientifique (France); Thomas Chaigne, Charité Universitätsmedizin Berlin (Germany) and Humboldt-Univ. zu Berlin (Germany); Sergey Vilov, Emmanuel Bossy, Lab. Interdisciplinaire de Physique, Univ. Grenoble Alpes (France) and Ctr. National de la Recherche Scientifique (France); Ori Katz, The Hebrew Univ. of Jerusalem (Israel) [10494-63]

Imaging dichroism by photoacoustic computed tomography, Yuan Qu, Washington Univ. School of Medicine in St. Louis (USA); Lei Li, Washington Univ. in St. Louis (USA); Yuecheng Shen, California Institute of Technology (USA); Junjie Yao, Duke Univ. (USA); Terence T. W. Wong, Washington Univ. in St. Louis (USA); Lihong V. Wang, California Institute of Technology (USA) [10494-64]

Chirped or time modulated excitation compared to short pulses for photoacoustic imaging in acoustic attenuating media, Peter Burgholzer, Research Ctr. for Non Destructive Testing GmbH (Austria); Christian Motz, Oliver Lang, Johannes Kepler Univ. Linz (Austria); Thomas Berer, Research Ctr. for Non Destructive Testing GmbH (Austria); Mario Huemer, Johannes Kepler Univ. Linz (Austria) [10494-65]

Localization-based super-resolution photoacoustic imaging, Sergey Vilov, Bastien Arnal, Emmanuel Bossy, Lab. Interdisciplinaire de Physique, Univ. Grenoble Alpes (France) and Ctr. National de la Recherche Scientifique (France) [10494-66]

Breaking the acoustic diffraction barrier with localization optoacoustic tomography, Xosé Luís Dean-Ben, Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) [10494-67]

SESSION 10 TUE 10:30 AM TO 12:00 PM

All-optical and Laser Ultrasound Systems

Session Chairs: **Paul C. Beard**, Univ. College London (United Kingdom); **Günther Paltauf**, Karl-Franzens-Univ. Graz (Austria)

Photoacoustic imaging with highly sensitive 2D planoconcave optical microresonators arrays, James A. Guggenheim, Edward Z. Zhang, Paul C. Beard, Univ. College London (United Kingdom) [10494-68]

Compact fibre laser system with 15mJ pulse energy for photoacoustic tomography, Thomas J. Allen, Univ. College London (United Kingdom); Martin O. Berendt, Shaif-ul U. Alam, Optoelectronics Research Ctr. (United Kingdom); Nam Trung Huynh, Univ. College London (United Kingdom); David J. Richardson, Optoelectronics Research Ctr. (United Kingdom); Paul C. Beard, Univ. College London (United Kingdom) [10494-69]

Bias-sensitive crossed-electrode relaxor 2D arrays for 3D photoacoustic imaging, Chris Cerocici, Univ. of Alberta (Canada); Katherine Latham, Dalhousie Univ. (Canada); Ryan K. Chee, Univ. of Alberta (Canada); Jeremy A. Brown, Dalhousie Univ. (Canada); Roger J. Zemp, Univ. of Alberta (Canada) [10494-70]

Development of tunable Fabry-Pérot polymer film sensors for parallelised photoacoustic signal acquisition, Claus Villringer, Technische Hochschule Wildau (Germany) and Univ. degli Studi di Roma "Tor Vergata" (Italy); Taravat Saeb Gilani, Technische Univ. Berlin (Germany); Sara Gehauf, Clemens Wiedenhöft, Patrick Steglich, Silvio Pulwer, Technische Hochschule Wildau (Germany); Maria Richetta, Univ. degli Studi di Roma "Tor Vergata" (Italy); Sigurd Schrader, Technische Hochschule Wildau (Germany); Jan Laufer, Martin-Luther-Univ. Halle-Wittenberg (Germany) [10494-71]

Coherence-gated photoacoustic remote sensing microscopy, Kevan L. Bell, Univ. of Alberta (Canada); Parsin Hajireza, Roger J. Zemp, Univ. of Alberta (Canada) and illumiSonics Inc. (Canada) [10494-72]

High-speed photoacoustic remote sensing microscopy, Logan Snider, Kevan L. Bell, Univ. of Alberta (Canada); Parsin H. Reza, Roger J. Zemp, Univ. of Alberta (Canada) and illumiSonics Inc. (Canada) [10494-73]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 11 TUE 1:30 PM TO 2:45 PM

Phantoms and Standards for Photoacoustic Imaging

Session Chairs: **Alexander A. Oraevsky**, TomoWave Labs, Inc. (USA); **Srirang Manohar**, Univ. Twente (Netherlands)

Novel 3D printing technology for direct fabrication of tissue-mimicking phantoms, Daniil I. Nikitichev, Sandy Mosse, Sebastien Ourselin, Tom Vercauteren, Univ. College London (United Kingdom) [10494-74]

Patient-specific tissue-mimicking phantoms for photoacoustic and ultrasound imaging, Efthymios Maneas, Wenfeng Xia, Daniil I. Nikitichev, Rosalind Pratt, Sebastien Ourselin, Simeon J. West, Anna L. David, Malcolm C. Finlay, Tom Vercauteren, Adrien E. Desjardins, Univ. College London (United Kingdom) [10494-75]

Performance evaluation of photoacoustic oximetry imaging systems using a dynamic blood flow phantom with tunable oxygen saturation, William C. Vogt, Congxian Jia, Keith A. Wear, Brian S. Garra, U.S. Food and Drug Administration (USA) [10494-76]

Development of photoacoustic phantoms towards quantitative evaluation of photoacoustic imaging devices, Jeeseong Hwang, National Institute of Standards and Technology (USA); Madhusoodanan Mannoor, Dong-A Univ. (Korea, Republic of); Toru Imai, California Institute of Technology (USA); Christopher Yung, National Institute of Standards and Technology (USA); Lei Li, California Institute of Technology (USA); John Lehman, National Institute of Standards and Technology (USA); Sangmo Kang, Dong-A Univ. (Korea, Republic of); Kimberly Briggman, National Institute of Standards and Technology (USA); Lihong V. Wang, California Institute of Technology (USA) [10494-77]

Proposal for an international standardization effort in technical validation of photoacoustic imaging systems to facilitate accelerated clinical translation, Jeff Bamber, The Institute of Cancer Research (United Kingdom) and The Royal Marsden, NHS Foundation Trust (United Kingdom); Sarah E. Bohndiek, Univ. of Cambridge (United Kingdom); Richard Bouchard, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Kimberly Briggman, National Institute of Standards and Technology (USA); Joanna Brunker, Univ. of Cambridge (United Kingdom); Adrien E. Desjardins, Univ. College London (United Kingdom); Jeeseong Hwang, National Institute of Standards and Technology (USA); James Joseph, Univ. of Cambridge (United Kingdom); Efthymios Maneas, Univ. College London (United Kingdom); Mark Pagel, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Geoff Parker, The Univ. of Manchester (United Kingdom); Srinath Rajagopal, National Physical Lab. (United Kingdom); Wenfeng Xia, Univ. College London (United Kingdom); Bajram Zeqiri, National Physical Lab. (United Kingdom) [10494-78]

SESSION 12 TUE 2:45 PM TO 5:30 PM

Molecular Imaging

Session Chairs: **Stanislav Y. Emelianov**, Georgia Institute of Technology (USA); **Matthew O'Donnell**, Univ. of Washington (USA)

Photoacoustic signal amplification of methylene blue via aggregation, Junxin Wang, AnanthaKrishnan Soundaram Jeevarathinam, Jesse V. Jokerst, Univ. of California, San Diego (USA) [10494-79]

Photoacoustic imaging of bio-electrical activity using quantum dots, Nashaat Rasheed, George Mason Univ. (USA); Okhil K. Nag, Michael H. Stewart, Alan L. Huston, U.S. Naval Research Lab. (USA); John R. Cressman, George Mason Univ. (USA); James B. Delehanty, U.S. Naval Research Lab. (USA); Parag V. Chitnis, George Mason Univ. (USA) [10494-80]

A photoacoustic imaging approach using food grade contrast agent for pocket depth measurements, Ching-Yu Lin, Fang Chen, Ali Hariri, Chien-Ju Chen, Jesse V. Jokerst, Univ. of California, San Diego (USA) [10494-81]

A portable and economical LED-based photoacoustic imaging system for molecular imaging, Ali Hariri, Jeanne Lemaster, Jesse V. Jokerst, Univ. of California, San Diego (USA) [10494-82]

Light-activated microbubbles around gold nanorods for photoacoustic microsurgery, Lucia Cavigli, Istituto di Fisica Applicata "Nello Carrara" (Italy); Paolo Tortoli, Univ. degli Studi di Firenze (Italy); Sonia Centi, Sarah Lai, Claudia Borri, Filippo Micheletti, Istituto di Fisica Applicata "Nello Carrara" (Italy); Ilaria Panettieri, Politecnico di Torino (Italy); Ingolf Streit, Asclepion Laser Technologies GmbH (Germany); Francesca Rossi, Fulvio Ratto, Roberto Pini, Istituto di Fisica Applicata "Nello Carrara" (Italy) [10494-83]

Intraoperative margin assessment with photoacoustic molecular imaging, Katherine E. Wilson, Juergen K. Willmann, Stanford Univ. (USA) [10494-84]

Multiplexed in vivo photoacoustic imaging of photoswitchable chromoproteins GAF2 and BphP1 with difference spectra differentiation, Ryan K. Chee, Yan Li, Robert Campbell, Roger J. Zemp, Univ. of Alberta (Canada) [10494-85]

A model-based acoustic reconstruction algorithm for deep tissue clinical photoacoustic imaging of cancerous tissues labeled with contrast agents, Idan Steinberg, David M. Huland, Willemieke Tummers, Sri Rajasekhar (Raj) Kothapalli, Sanjiv S. Gambhir, Stanford Univ. (USA) [10494-86]

Lymph node metastasis detection using photoacoustic imaging and glycol-chitosan-coated gold nanoparticles, Diego S. Dumani, In-Cheol Sun, Stanislav Y. Emelianov, Georgia Institute of Technology (USA) [10494-87]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the BIOS/LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

A 2.8mm diameter scanhead for multispectral photoacoustic microscopy and optical coherence tomography, Zhendong Guo, Jie Wang, Zhongfei Li, Yang Hu, Jigang Wu, Sung-Liang Chen, Shanghai Jiao Tong Univ. (China) [10494-179]

Quantitative analysis of lipids concentration in atherosclerotic plaque based on multivariate curve resolution-alternating least squares, Xiaojing Gong, Shenzhen Institutes of Advanced Technology (China); Fan Zhang, Shenzhen Institutes of Advanced Technology (China) and Guangzhou Univ. (China); Ji Leng, Kang Yan, Shenzhen Institutes of Advanced Technology (China) [10494-180]

Micro-precision sonothrombolysis using laser-generated focused ultrasound, Pilgyu Sang, Juhyun Woo, Chaejeong Heo, Hyoung Won Baac, Sungkyunkwan Univ. (Korea, Republic of) [10494-181]

Body surface detection method for photoacoustic image data using cloth-simulation technique, Hiroyuki Sekiguchi, Yoshiaki Matsumoto, Kyoto Univ. Hospital (Japan); Yasufumi Asao, Takayuki Yagi, Japan Science and Technology Agency (Japan); Kaori Togashi, Masakazu Toi, Kyoto Univ. Hospital (Japan) [10494-182]

Differential photoacoustic spectroscopy with continuous wave lasers for non-invasive blood glucose monitoring, Yujiro Tanaka, Takuro Tajima, NTT Device Technology Labs. (Japan) [10494-183]

Reflection artifact reduction in photoacoustic imaging using multiple wavelengths, Ho Nhu Y Nguyen, Univ. Twente (Netherlands) [10494-184]

Design and simulation of a wearable system for the multimodal imaging of breast abnormalities, David M. Huland, Idan Steinberg, Michael A. Mastanduno, Sanjiv S. Gambhir, Stanford Univ. School of Medicine (USA) [10494-185]

Design considerations and characterization aspects of photoacoustic imaging phantoms, James Joseph, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom); Holly Herbert, Univ. of Cambridge (United Kingdom) and Trinity College Dublin (Ireland); Joanna Brunker, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom); Damion Box, Megan Wilson, Callum R. Stevens, Samuel Watcham, Oshaani Abeyakoon, Fiona J. Gilbert, Univ. of Cambridge (United Kingdom); Sarah E. Bohndiek, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom) [10494-186]

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- Photoacoustic monitoring of distance dependent fluorescence quenching**, James Joseph, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom); Kevin N. Baumann, Philipp Koehler, Cavendish Lab., Univ. of Cambridge (United Kingdom); Tim J. Zuehlsdorff, Univ. of California, Merced (USA); Daniel J. Cole, Newcastle Univ. (United Kingdom); Judith Weber, Sarah E. Bohndiek, Cancer Research UK Cambridge Institute, Univ. of Cambridge (United Kingdom); Silvia Hernández-Ainsa, Cavendish Lab., Univ. of Cambridge (United Kingdom) and Instituto de Nanociencia de Aragón, Univ. de Zaragoza (Spain) [10494-187]
- On the principal spectrum decomposition of multiply scattered light in deep tissue**, Bangyan Wang, Cheng Ma, Tsinghua Univ. (China) . . [10494-188]
- Pulse-to-pulse dual-wavelength switched SRS laser source for functional photoacoustic microscopy**, Sang Min Park, Soon-Woo Cho, Pusan National Univ. (Korea, Republic of); Sang-Won Lee, Korea Research Institute of Standards and Science (Korea, Republic of); Chang-Seok Kim, Pusan National Univ. (Korea, Republic of) [10494-189]
- Using convolutional neural networks to eliminate reflection artifacts in experimental photoacoustic images**, Derek Allman, Austin Reiter, Muyinatu Bell, Johns Hopkins Univ. (USA) [10494-190]
- In vivo real-time intravascular photoacoustic/ultrasound imaging of rabbit and swine models**, Yi Zhang, Boston Univ. (USA); Jie Hui, Yingchun Cao, Ayeeshik Kole, Purdue Univ. (USA); Ji-Xin Cheng, Boston Univ. (USA) [10494-191]
- Monitoring of tissue heating with medium intensity focused ultrasound via four dimensional photoacoustic tomography**, Francisco Javier Oyaga Landa, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany); Silvia Ronda Penacoba, Instituto de Tecnologías Físicas y de la Información (Spain); Xosé Luis Deán-Ben, Helmholtz Zentrum München GmbH (Germany); Francisco Montero de Espinosa, Instituto de Tecnologías Físicas y de la Información (Spain); Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) [10494-192]
- Development and validation of a short-lag spatial coherence theory for photoacoustic imaging**, Michelle Graham, Muyinatu Bell, Johns Hopkins Univ. (USA) [10494-193]
- Quantitative analysis for peripheral vascularity assessment based on clinical photoacoustic and ultrasound images**, Dai Murakoshi, Kazuhiro Hirota, Atsushi Hashimoto, Hiroyasu Ishii, Kaku Irisawa, Takatsugu Wada, Toshiro Hayakawa, FUJIFILM Corp. (Japan); Kenji Itoh, Miya Ishihara, National Defense Medical College (Japan) [10494-194]
- Enabling vendor independent photoacoustic imaging systems with asynchronous laser source**, Yixuan Wu, Haichong K. Zhang, Emad M. Boctor, Johns Hopkins Univ. (USA) [10494-195]
- Simulation analysis of laser generated leaky acoustic waves for needle detection within biological tissue**, [10494-196]
- Fast photoacoustic imaging using low cost laser diodes**, Antonios Styliogiannis, Ludwig Prade, Andreas Buehler, Juan Buenno Aguirre, George Sergiadis, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) [10494-198]
- Photoacoustic microscopy imaging for microneedle drug delivery**, Mohesh Moothanchery, Razina Z. Seeni, Chenjie Xu, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-199]
- Microcapillary imaging of lamina cribrosa in porcine eyes using photoacoustic microscopy**, Mohesh Moothanchery, Nanyang Technological Univ. (Singapore); Thanadet Chuangsuwanich, Alvan Yan, National Univ. of Singapore (Singapore); Leopold Schmetterer, Nanyang Technological Univ. (Singapore) and Singapore National Eye Ctr. (Singapore) and Medizinische Univ. Wien (Austria); Michael J. A. Girard, National Univ. of Singapore (Singapore) and Singapore National Eye Ctr. (Singapore); Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-200]
- High resolution and deep tissue imaging using a near infrared acoustic resolution photoacoustic microscopy**, Mohesh Moothanchery, Arunima Sharma, Vijitha Periyasamy, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10494-201]
- Development of fiber-based optical-resolution photoacoustic microscopy for biomedical applications**, Bui Nhat Quang, Pukyong National Univ. (Korea, Republic of); Soon-Woo Cho, Chang-Seok Kim, Pusan National Univ. (Korea, Republic of); Junghwan Oh, Pukyong National Univ. (Korea, Republic of) [10494-202]
- Super-resolution photoacoustic microscopy using a localized near-field of a plasmonic nanoaperture: a three-dimensional simulation study**, Byullee Park, Pohang Univ. of Science and Technology (Korea, Republic of); Hongki Lee, Yonsei Univ. (Korea, Republic of); Paul Kumar Upputuri, Manojit Pramanik, Nanyang Technological Univ. (Singapore); Donghyun Kim, Yonsei Univ. (Korea, Republic of); Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-203]
- Integrated photoacoustic microscopy, optical coherence tomography, and fluorescence microscopy for multi-modal chorioretinal imaging**, Chao Tian, Wei Zhang, Van Phuc Nguyen, Ziyi Huang, Xueding Wang, Yannis M. Paulus, Univ. of Michigan (USA) [10494-204]
- Photoacoustic scanning macroscopy with interferometric ultrasound detection based on a fiber-optic ring array**, Johannes Bauer-Marschallinger, Astrid Höllinger, Research Ctr. for Non Destructive Testing GmbH (Austria); Paul Torke, Günther Paltauf, Karl-Franzens-Univ. Graz (Austria); Gerhard Haudum, Radiologie West (Austria); Bernhard Jakoby, Johannes Kepler Univ. Linz (Austria); Peter Burgholzer, Thomas Berer, Research Ctr. for Non Destructive Testing GmbH (Austria) [10494-205]
- Real-time measurement and adaptive compensation for chromatic dispersion of ultrashort laser pulses**, Jih-Liang Hsieh, National Chiao Tung Univ. (Taiwan); Chia-Yuan Chang, National Cheng Kung Univ. (Taiwan); Shean-Jen Chen, National Chiao Tung Univ. (Taiwan) [10494-206]
- Photoacoustic microscopy for label-free optical-sectioning cell nuclear imaging based on the Gruneisen relaxation effect**, Terence T. W. Wong, Washington Univ. in St. Louis (USA) and California Institute of Technology (USA); Xiaowei Liu, Washington Univ. in St. Louis (USA) and Zhejiang Univ. (China); Junhui Shi, Lihong V. Wang, California Institute of Technology (USA) [10494-207]
- Electro-optical modulator-based fast-wavelength switching for multispectral photoacoustic remote sensing microscopy**, Kevan L. Bell, Univ. of Alberta (Canada); Parsin Hajireza, Roger J. Zemp, Univ. of Alberta (Canada) and illumisSonic Inc. (Canada) [10494-208]
- Magnetic nanoparticle sensing based on the magnetoacoustic effect**, Stephan Kellnberger, Massachusetts General Hospital (USA); Amir Rosenthal, Technion-Israel Institute of Technology (USA); Ahne Myklatan, Gil Westmeyer, Helmholtz Zentrum München GmbH (Germany); George Sergiadis, Aristotle Univ. of Thessaloniki (Greece); Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) [10494-209]
- In vivo photoacoustic monitoring of anti-obesity photothermal lipolysis**, Donghyun Lee, Jung Ho Lee, Sei Kwang Hahn, Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-210]
- Novel CuS-based nanoprobe for photoacoustic molecular imaging in the second near-infrared region**, Zhen Yuan, Duyang Gao, Univ. of Macao (Macao, China) [10494-211]
- Dual-wavelength OR-PAM with compressed sensing for cell tracking in a 3D cell culture system**, Rou-Xuan Huang, National Taiwan Univ. (Taiwan); Ying Fu, Yang Liu, Harbin Institute of Technology (China); Yu-Ting Ma, National Taiwan Univ. (Taiwan); Bao-Yu Hsieh, China Medical Univ. (Taiwan); Shu-Ching Chen, National Taiwan Univ. (Taiwan); Mingjian Sun, Harbin Institute of Technology (China); Pai-Chi Li, National Taiwan Univ. (Taiwan) [10494-212]
- Photoacoustic assay for probing amyloid formation: feasibility study**, Elena Petrova, Soon Joon Yoon, Ivan Pelivanov, Matthew O'Donnell, Univ. of Washington (USA) [10494-213]
- Influence of the excited state lifetimes on the photoacoustic signal**, Gregor Langer, Thomas Berer, Research Ctr. for Non Destructive Testing GmbH (Austria) [10494-214]
- Performance evaluation of a small animal PET detector for the FOV variable gantry**, Hankyeol Song, Chanwoo Park, In Soo Kang, Minkyu Baek, Kyu Bom Kim, Yong Hyun Chung, Yonsei Univ. (Korea, Republic of) [10494-215]
- Photoacoustic imaging of tumor targeting with biotin conjugated nanostructured phthalocyanine assemblies**, Seunghyun Lee, Pohang Univ. of Science and Technology (Korea, Republic of); Xingshu Li, Dayoung Lee, Juyoung Yoon, Ewha Womans Univ. (Korea, Republic of); Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10494-216]
- Detect the process of whole blood coagulation based on photoacoustics**, Zuoran Li, Huaqin Wu, Yongping Lin, Zhifang Li, Hui Li, Fujian Normal Univ. (China) [10494-217]
- In vivo time-serial evaluation of laser-induced choroidal neovascularization in rats simultaneously using photoacoustic microscopy and optical coherence tomography**, Cuixia Dai, Shanghai Institute of Technology (China) [10494-218]

Novel realistic tissue-mimicking prostate cancer phantom for the diagnostic and training, Daniil I. Nikitichev, Racheal Rodell, Wenfeng Xia, Ester Bonmati, Yipeng Hu, Marios Yiannakas, Ferran Prados, Efthymios Maneas, Adrien E. Desjardins, Sebastien Ourselin, Dean Barratt, Tom Vercauteren, Univ. College London (United Kingdom) [10494-219]

In-vitro 3D multispectral photoacoustic microscopy and optical coherence tomography using a supercontinuum source, Magalie M. Bondu, Univ. of Kent (United Kingdom) and NKT Photonics (Denmark); Manuel J. Marques, Univ. of Kent (United Kingdom); Peter M. Moselund, NKT Photonics A/S (Denmark); Gurprit Lall, Adrian Bradu, Adrian Podoleanu, Univ. of Kent (United Kingdom) [10494-220]

Hybrid system for in vivo real-time planar fluorescence and volumetric optoacoustic imaging, Zhenyue Chen, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany); Xosé Luis Deán-Ben, Daniel Razansky, Helmholtz Zentrum München GmbH (Germany) . [10494-221]

Functional multimodal imaging with Doppler optical coherence and spectroscopic photoacoustic microscopy, Richard Haindl, Stefan Preisser, Medizinische Univ. Wien (Austria); Wolfgang Rohringer, XARION Laser Acoustics GmbH (Austria); Caterina Sturtzel, Martin Distel, St. Anna Kinderkrebsforschung e.V., Children's Cancer Research Institute (Austria); Harald Sattmann, Medizinische Univ. Wien (Austria); Balthasar Fischer, XARION Laser Acoustics GmbH (Austria); Wolfgang Drexler, Mengyang Liu, Medizinische Univ. Wien (Austria) [10494-222]

Developing multimodal photoacoustic tomography system for three-dimensional imaging, Changhui Li, Kaiye Xia, Xiaohui Zhai, Peking Univ. (China) [10494-223]

A novel photoacoustic sensing probe using optical fiber acoustic delay line, Arif Kivanc Ustun, Jun Zou, Texas A&M Univ. (USA) [10494-224]

Adaptive coherent photoacoustic sensing, Fei Gao, ShanghaiTech Univ. (China) and Nanyang Technological Univ. (Singapore); Xiaohua Feng, California Institute of Technology (USA) and Nanyang Technological Univ. (Singapore); Ruochong Zhang, Siyu Liu, Yuanjin Zheng, Nanyang Technological Univ. (Singapore) [10494-225]

Investigation of cancer cell lines at different risk level using optoacoustic spectroscopic technique, Kenneth J. Zhou, Optoacoustic Microscopy (OAM) Inc. (USA); Jun Chen, Tianjin Medical Univ. General Hospital (China) [10494-226]

Comparative assessment of five algorithms to control an SLM for focusing coherent light through scattering media, Mohammad R. N. Avanaki, Wayne State Univ (USA); zahra fayyaz, Sharif University of Technology (Iran, Islamic Republic of); Nafiseh Mohammadian, Wayne State Univ. (USA) [10494-229]

Wavefront shaping using simulated annealing algorithm for focusing light through turbid media, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Zahra Fayyaz, Sharif Univ. of Technology (Iran, Islamic Republic of); Faraneh Salimi, Wayne State Univ. (USA); Nafiseh Mohammadian, Wayne State Univ. (USA) and Univ. of Central Florida (USA); Afreen Fatima, Wayne State Univ. (USA) [10494-233]

An inexpensive method to acquire photoacoustic signal, Mohammad R. N. Avanaki, Afreen Fatima, Mohsin Zafar, Wayne State Univ. (USA); Christopher Harness, Univ. of Detroit Mercy (USA) [10494-230]

Skull's acoustic attenuation and dispersion modeling on photoacoustic signal, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Leila Mohammadi, Islamic Azad University (Iran, Islamic Republic of); Hamid Behnam, Iran Univ. of Science and Technology (Iran, Islamic Republic of); Jahan Tavakkoli, Ryerson Univ. (Canada) [10494-231]

Feasibility of transfontanelle photoacoustic imaging: Towards neonatal functional brain imaging, Mohammad R. N. Avanaki, Ali Hariria, Karl Kratkiewicz, Juri Gelovai, Wayne State Univ. (USA); Mohammad Ali Ansari, Shahid Beheshti Univ. (Iran, Islamic Republic of); Saba Abadi, Wayne State Univ. (USA); Sadreddin Mahmoodkalayeh, Shahid Beheshti Univ. (Iran, Islamic Republic of); Emytis Tavakoli, Tehran Psychiatric Institute (Iran, Islamic Republic of) [10494-232]

A numerical study of temperature rise on infant's head in photoacoustic computed tomography, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Najme Meimani, Wayne State Univ. (USA) and Basir Eye Health Research Ctr. (Iran, Islamic Republic of); Nina Abani, Wayne State Univ. (USA) . [10494-234]

Development of a low-cost neonatal brain imaging system using photoacoustic technology: phantom study, Mohammad R. N. Avanaki, Karl Kratkiewicz, Wayne State Univ. (USA); Kailai Ji, Nanjing Medical Univ. (China) [10494-235]

Specific melanoma antigen radiomics of tumors with photoacoustic imaging (S.M.A.R.T. - PAI) of melanoma, Mohammad R. N. Avanaki, Preethi Sriranga, Wei Chen, Steven Daveluy, Darius Mehregan, Juri Gelovani, Wayne State Univ. (USA) [10494-236]

A novel light illumination scheme for linear array-based photoacoustic tomography probes, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Ann Marie Santiago, Wayne State Univ. School of Medicine (USA); Mohsen Ranjbaran, Wayne State Univ. (USA) [10494-237]

Resting-state functional connectivity measurement in the mouse brain using laser scanning optical resolution photoacoustic microscopy, Mohammad R. N. Avanaki, Mohsin Zafar, Wayne State Univ. (USA); Seyed Hamid Hosseiny Darbazi, Harvard Univ. (USA) [10494-238]

Effects of important parameters variations on computing Eigenspace-based minimum variance weights for ultrasound tissue harmonic imaging, Mehdi Haji Heidari, Moein Mozaffarzadeh, Tarbiat Modares Univ. (Iran, Islamic Republic of); Mohammad R. N. Avanaki, Wayne State Univ. (USA) [10494-241]

An image registration-based technique for noninvasive vascular elastography, Sina Valizadeh, Bahador Makkiabadi, Alireza Mirbagheri, Mehdi Soozande, Tehran Univ. of Medical Sciences (Iran, Islamic Republic of) and Institute for Advanced Medical Technologies (Iran, Islamic Republic of); Moein Mozaffarzadeh, Tarbiat Modares Univ. (Iran, Islamic Republic of); Mohammad R. N. Avanaki, Wayne State Univ. (USA) [10494-242]

A new illumination scheme for photoacoustic computed tomography, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Sadreddin Mahmoodkalayeh, Mohammad Ali Ansari, Shahid Beheshti Univ. (Iran, Islamic Republic of) [10494-243]

Optimization of light illumination for photoacoustic computed tomography of human infant brain, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Sadreddin Mahmoodkalayeh, Mohammad Ali Ansari, Shahid Beheshti Univ. (Iran, Islamic Republic of); Hengguang Li, Xun Lu, Wayne State Univ. (USA) [10494-244]

Hybrid co-planar diffuse optical tomography and photoacoustic imaging, Mohammad R. N. Avanaki, Wayne State Univ. (USA); Mehrdad Zarei, Mohammad Ali Ansari, Shahid Beheshti Univ. (Iran, Islamic Republic of) [10494-245]

Experiment and modeling of the photoacoustic response of silica-coated gold nanospheres, Genny A. Pang, Technische Univ München (Germany); Florian Poisson, Institut Langevin (France); Jan Laufer, Martin-Luther-Universität Halle-Wittenberg (Germany); Emmanuel Bossy, Institut Langevin (France); Christoph Haisch, Technische Univ München (Germany) [10494-246]

WEDNESDAY 31 JANUARY

SESSION 13 WED 8:00 AM TO 10:00 AM

Microscopy

Session Chairs: **Chulhong Kim**, Pohang Univ. of Science and Technology (Korea, Republic of); **Lihong V. Wang**, California Institute of Technology (USA)

A fast MEMS scanning photoacoustic microscopy system and its application in glioma study, Renzhe Bi, Ghayathri Balasundaram, Singapore Bioimaging Consortium (Singapore); Seungwan Jeon, Pohang Univ. of Science and Technology (Korea, Republic of); Hui Chien Tay, Singapore Bioimaging Consortium (Singapore); Chulhong Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Malini Olivo, Singapore Bioimaging Consortium (Singapore) [10494-88]

Fast focus-scanning head in two-photon photoacoustic microscopy with electrically-controlled liquid lens, Yoshihisa Yamaoka, Yuka Kimura, Saga Univ. (Japan); Yoshinori Harada, Tetsuro Takamatsu, Kyoto Prefectural Univ. of Medicine (Japan); Eiji Takahashi, Saga Univ. (Japan) [10494-89]

A short switching time pulsed laser for functional photoacoustic microscopy, Chao LIU, City Univ. of Hong Kong (Hong Kong, China); Yizhi Liang, Long Jin, Bai-Ou Guan, Jinan Univ. (China); Lidai Wang, City Univ. of Hong Kong (Hong Kong, China) [10494-90]

Photoacoustic microscopy of single cells employing an intensity-modulated diode laser, Gregor Langer, Research Ctr. for Non Destructive Testing GmbH (Austria); Bianca Buchegger, Jaroslav Jacak, Thomas A. Klar, Johannes Kepler Univ. Linz (Austria); Thomas Berer, Research Ctr. for Non Destructive Testing GmbH (Austria) [10494-91]

Intravital hybrid optical-optoacoustic microscopy based on fiber-Bragg interferometry, Rami Shnaiderman, Georg Wissmeyer, Markus Seeger, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) [10494-92]

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Whole-organ atlas imaged by label-free high-resolution photoacoustic microscopy assisted by a microtome, Terence T. W. Wong, Washington Univ. in St. Louis (USA) and California Institute of Technology (USA); Ruiying Zhang, Washington Univ. in St. Louis (USA); Hsun-Chia Hsu, Washington Univ. in St. Louis (USA) and California Institute of Technology (USA); Konstantin I. Maslov, Junhui Shi, California Institute of Technology (USA); Ruimin Chen, Kirk Shung, Qifa Zhou, The Univ. of Southern California (USA); Lihong V. Wang, California Institute of Technology (USA) [10494-93]

Ultra-high frequency photoacoustic microscopy of zebrafish larvae in vivo, Michael J. Moore, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) and St. Michael's Hospital (Canada); Suzan El-Rass, St. Michael's Hospital (Canada) and Univ. of Toronto (Canada); Yongliang Xiao, St. Michael's Hospital (Canada); Xiao-Yan Wen, St. Michael's Hospital (Canada) and Univ. of Toronto (Canada); Michael C. Kolios, Ryerson Univ. (Canada) and Institute for Biomedical Engineering, Science and Technology (Canada) and St. Michael's Hospital (Canada) [10494-94]

Label-free hypoxia measurement in a xenograft multiple myeloma model using optical-resolution photoacoustic microscopy, Toru Imai, California Institute of Technology (USA) and Washington Univ. in St. Louis (USA) and Canon Inc. (Japan); Barbara Muz, Washington Univ. School of Medicine in St. Louis (USA); Cheng-Hung Yeh, Junjie Yao, Ruiying Zhang, Washington Univ. in St. Louis (USA); Abdel K. Azab, Washington Univ. School of Medicine in St. Louis (USA); Lihong V. Wang, California Institute of Technology (USA) [10494-95]

SESSION 14 WED 10:30 AM TO 12:15 PM

Signal Processing, Image Reconstruction

Session Chairs: **Mark A. Anastasio**, Washington Univ. in St. Louis (USA); **Peter Burgholzer**, Research Ctr. for Non Destructive Testing GmbH (Austria)

Real-time delay multiply and sum beamforming for multispectral photoacoustics, Franz Sattler, Thomas Kirchner, Janek Gröhl, Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany) [10494-96]

Super-resolution photoacoustic imaging of sparse absorbers using L1-norm minimization, David Egolf, Ryan K. Chee, Golam Chowdhury, Roger J. Zemp, Univ. of Alberta (Canada) [10494-97]

Reconstruction of initial pressure from limited view photoacoustic images using deep learning, Dominik Waibel, Janek Gröhl, Fabian Isensee, Thomas Kirchner, Klaus Maier-Hein, Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany) [10494-98]

Compressed sensing techniques for fast high-resolution 3D photoacoustic tomography, Felix Lucka, Nam Trung Huynh, Marta Betcke, Edward Z. Zhang, Paul C. Beard, Simon R. Arridge, Benjamin T. Cox, Univ. College London (United Kingdom) [10494-99]

Joint reconstruction of initial pressure distribution and acoustic skull parameters in transcranial photoacoustic computed tomography, Joemini Poudel, Thomas P. Matthews, Mark A. Anastasio, Washington Univ. in St. Louis (USA); Lihong V. Wang, California Institute of Technology (USA) [10494-100]

Parameterized joint reconstruction of the initial pressure and sound speed distributions in photoacoustic computed tomography, Thomas P. Matthews, Joemini Poudel, Washington Univ. in St. Louis (USA); Lei Li, Lihong V. Wang, California Institute of Technology (USA); Mark A. Anastasio, Washington Univ. in St. Louis (USA) [10494-101]

Co-registered photoacoustic and fluorescent imaging of a switchable nanoprobe based on J-aggregates of indocyanine green, Diego S. Dumani, Georgia Institute of Technology (USA); Hans-Peter F. Brecht, Vassili Ivanov, PhotoSound Technologies, Inc. (USA); Ryan Deschner, Justin T. Harris, Kimberly A. Homan, Jason Cook, NanoHybrids, Inc. (USA); Stanislav Y. Emelianov, Georgia Tech Research Institute (USA); Sergey A. Ermilov, PhotoSound Technologies, Inc. (USA) [10494-102]

Lunch/Exhibition Break Wed 12:15 pm to 1:45 pm

SESSION 15 WED 1:45 PM TO 2:30 PM

Hot Latest Results

Session Chairs: **Lihong V. Wang**, California Institute of Technology (USA); **Alexander A. Oraevsky**, TomoWave Labs, Inc. (USA)

Seno Medical Best Paper Awards

2:30 PM TO 2:45 PM

Session Chairs: **Alexander A. Oraevsky**, TomoWave Laboratories, Inc. (USA); **Lihong V. Wang**, California Institute of Technology (USA)

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CONFERENCE 10495

Monday 29 January 2018 • Proceedings of SPIE Vol. 10495

Biophotonics and Immune Responses XIII

Conference Chair: **Wei R. Chen**, Univ. of Central Oklahoma (USA)

Program Committee: **Sandra O. Gollnick**, Roswell Park Cancer Institute (USA); **Michael R. Hamblin**, Wellman Ctr. for Photomedicine (USA); **Tomas Hode**, Immunophotonics, Inc. (USA); **Yih-Chih Hsu**, Chung Yuan Christian Univ. (Taiwan); **Zheng Huang**, Univ. of Colorado Denver (USA); **Vyacheslav Kalchenko**, Weizmann Institute of Science (Israel); **Mladen Korbelik**, BC Cancer Research Ctr. (Canada); **Mark F. Naylor**, Dermatology Associates of San Antonio (USA); **Junle Qu**, Shenzhen Univ. (China); **Karl-Goran Tranberg**, CLS Ltd. (Sweden); **Valery V. Tuchin**, N.G. Chernyshevsky Saratov National Research State Univ. (Russian Federation), National Research Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control RAS (Russian Federation); **Xunbin Wei**, Shanghai Jiao Tong Univ. (China); **Da Xing**, South China Normal Univ. (China); **Zhihong Zhang**, Huazhong Univ. of Science and Technology (China); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA); **Feifan Zhou**, Univ. of Central Oklahoma (USA)

MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:05 AM

Photoimmunotherapy and Immune Response

Session Chairs: **Mladen Korbelik**, BC Cancer Research Ctr. (Canada); **Michael R. Hamblin**, Wellman Ctr. for Photomedicine (USA)

Stress signaling networks mobilized in response of tumors to photothermal therapy (PTT) (*Invited Paper*), Mladen Korbelik, BC Cancer Research Ctr. (Canada) [10495-1]

Photodynamic therapy produces an anti-tumor immune response (*Invited Paper*), Michael R. Hamblin, Wellman Ctr. for Photomedicine (USA) [10495-2]

Laser immunotherapy in combination with checkpoint inhibition for treatment of melanoma, Mark F. Naylor, Baylor Scott & White Healthcare (USA); Robert E. Nordquist, Wound Healing of Oklahoma, Inc. (USA); Wei R. Chen, Feifan Zhou, Univ. of Central Oklahoma (USA) [10495-3]

INCVAX: Turning local thermal ablation into systemic cancer immunotherapy, Siu Kit "Samuel" Lam, Immunophotonics, Inc. (USA); Feifan Zhou, Univ. of Central Oklahoma (USA); Tomas Hode, Immunophotonics, Inc. (USA); Robert E. Nordquist, Univ. of Central Oklahoma (USA); Luciano Alleruzzo, Joseph Raker, Immunophotonics, Inc. (USA) [10495-4]

Prostaglandin E2 (PGE2) is a candidate for regulatory role in PDT-induced anti-tumor immunity, Riddhi Falk-Mahapatra, Sandra O. Gollnick, Roswell Park Cancer Institute (USA) [10495-5]

Monitoring 3D tumor-macrophage interactions using optical metabolic imaging, Tiffany M. Heaster, Univ. of Wisconsin-Madison (USA) and Morgridge Institute for Research (USA); Jiaquan Yu, David J. Beebe, Univ. of Wisconsin-Madison (USA); Melissa C. Skala, Univ. of Wisconsin-Madison (USA) and Morgridge Institute for Research (USA) [10495-6]

SESSION 2 MON 10:30 AM TO 12:05 PM

In vivo Detection of Immune Response

Session Chairs: **Zhihong Zhang**, Huazhong Univ. of Science and Technology (China); **Xunbin Wei**, Shanghai Jiao Tong Univ. (China)

Studying site-specific circulating tumor cells by in vivo flow cytometry (*Invited Paper*), Xunbin Wei, Shanghai Jiao Tong Univ. (China) [10495-7]

Intravital imaging of the migration of monocytes/macrophages in allergic contact dermatitis (*Invited Paper*), Zhihong Zhang, Huazhong Univ. of Science and Technology (China) [10495-8]

Therapeutic targeting of circulating tumor cells in vivo (*Invited Paper*), Ekaterina I. Galanzha, Univ. of Arkansas for Medical Sciences (USA); Marina V. Novoselova, Saratov State Univ. (Russian Federation); Dmitry A. Gorin, Saratov State Univ. (Russian Federation) and Skolkovo Institute of Science and Technology (Russian Federation); Alexandru S. Biris, Univ. of Arkansas at Little Rock (USA); Robert J. Griffin, Univ. of Arkansas for Medical Sciences (USA); Valery V. Tuchin, Saratov State Univ. (Russian Federation) and Precision Mechanics and Control Institute (Russian Federation) and National Research Tomsk State Univ. (Russian Federation); Boris N. Khlebtsov, Saratov National Research State Univ. (Russian Federation) and Institute of Biochemistry and Physiology of Plants and Microorganisms (Russian Federation) [10495-9]

Monitoring therapeutic response of murine tumor allografts of colon carcinoma in response to combined immunotherapy and chemotherapy, Gage J. Greening, Sandra Gordon, Haley James, Timothy Muldoon, Univ. of Arkansas (USA) [10495-10]

Lunch Break Mon 12:05 pm to 1:30 pm

SESSION 3 MON 1:30 PM TO 3:35 PM

Nano-immunotherapy

Session Chairs: **Yih-Chih Hsu**, Chung Yuan Christian Univ. (Taiwan); **Feifan Zhou**, Univ. of Central Oklahoma (USA)

Photo-nano immunotherapy for metastatic cancer (*Invited Paper*), Feifan Zhou, Alex Pettitt, Connor L. West, Univ. of Central Oklahoma (USA) [10495-11]

Novel liposomal cisplatin used in esophageal cancer treatment (*Invited Paper*), Yei-San Hsieh, Taoyuan General Hospital (Taiwan); Leaf Huang, Chung Yuan Christian Univ. (Taiwan); Pei-wen Yang, National Taiwan Univ. Hospital (Taiwan); Yih-Chih Hsu, Chia-Hsien Yeh, Chung Yuan Christian Univ. (Taiwan) [10495-12]

Design of high affinity peptide to integrin $\alpha v \beta 3$ based on molecular simulation for precise tumor identification, Zhihao Han, Yi Ma, China Pharmaceutical Univ. (China); Zhiyu Qian, Nanjing Univ. of Aeronautics and Astronautics (China); Yueqing Gu, China Pharmaceutical Univ. (China) [10495-13]

Optimizing the synthesis of core/shell structured Au@Cu2S nanocrystals as contrast-enhanced for bioimaging detection, Llwei Liu, Shenzhen Univ. (China) [10495-14]

Peptide-lipid nanoparticles prevent the liver metastasis by targeting hepatic sinusoidal endothelial cells, Zhihong zhang, Wuhan National Lab. for Optoelectronics (China); Xiang Yu, Britton Chance Ctr. for Biomedical Photonics (China) and Wuhan National Lab. for Optoelectronics (China) [10495-15]

Effects of single-walled carbon nanotubes and gold nanorods in laser immunotherapy, Connor L. West, Elivia Layton, Sana Mesiya, Alex Pettitt, Feifan Zhou, Univ. of Central Oklahoma (USA); Hong Liu, The Univ. of Oklahoma (USA); Wei R. Chen, Univ. of Central Oklahoma (USA) ... [10495-16]

SESSION 4 MON 4:00 PM TO 6:05 PM

Novel Detection Technology

Session Chairs: **Ekaterina I. Galanzha**, Univ. of Arkansas for Medical Sciences (USA); **Junle Qu**, Shenzhen Univ. (China)

Fluorescence lifetime imaging and its applications in cellular microenvironment measurement and auxiliary diagnosis (*Invited Paper*), Junle Qu II, Shenzhen Univ. (China) [10495-17]

Optical technologies for in vivo monitoring of lymphatic system in the brain (*Invited Paper*), Oxana V. Semyachkina-Glushkovskaya, Arkady Abdurashitov, Anton Namykin, Ivan Fedosov, Saratov State Univ. (Russian Federation); Alexander Shirokov, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russian Federation); Maria Ulanova, Natalia Shushunova, Alexander Khorovodov, Anastasiya Bodrova, Madina Sagatova, Elena Saranceva, Maria Dvoryatkina, Saratov State Univ. (Russian Federation); Valery V. Tuchin, Saratov State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation) and National Research Tomsk State Univ. (Russian Federation) [10495-18]

Developing a new quantitative image analysis scheme for early stage prediction of ovary cancer patients' response to chemotherapy, Abolfazl Zargari Khuzani, Yue Du, The Univ. of Oklahoma (USA); Theresa C. Thai, Camille C. Gunderson, Katherine M. Moxley, Kathleen Moore, Robert S. Mannel, The Univ. of Oklahoma Health Sciences Ctr. (USA); Hong Liu, Bin Zheng, Yuchen Qiu, The Univ. of Oklahoma (USA) ... [10495-19]

CONFERENCE 10495

Two-photon flow cytometer with laser scanning Airy beams, Yu Ding, Aurelio Paez, Andres Reyes, Chunqiang Li, The Univ. of Texas at El Paso (USA) [10495-20]

Potential of phase contrast x-ray imaging for detecting tumors in dense breast: initial phantom studies, Farid H. Omoumi, Di Wu, Yuran Guo, Muhammad U. Ghani, Yuhua Li, Hong Liu, The Univ. of Oklahoma (USA) [10495-21]

Fluorescence lifetime imaging of macrophage polarization in vivo, Elizabeth S. Berge, Veronika Miskolci, Anna Huttenlocher, Univ. of Wisconsin-Madison (USA); Melissa C. Skala, Morgridge Institute for Research (USA) [10495-22]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

RGD peptide-targeted polyethylenimine-entrapped gold nanoparticles radiolabeled with ^{99m}Tc for targeted SPECT/CT and CT imaging of hepatic carcinomas in situ, Benqing Zhou, Junle Qu II, Shenzhen Univ. (China) [10495-23]

Simulation and measurement of temperature distribution in tumor photothermal treatment, Xiyang Zhang, Shaoping Qiu, Shulian Wu, Zhifang Li, Hui Li, Fujian Normal Univ. (China) [10495-24]

Real time, in situ monitoring of nanoporation using electric field-induced acoustic signal, Ali Zarafshani, Liangzhong Xiang, Bin Zheng, Pratik Samant, Rowzat Faiz, The Univ. of Oklahoma (USA) [10495-25]

Fluorescence lifetime imaging for biological microviscosity, Wenhui Pan, Wanjun Gong, Ying He, Bhowmira Rathore, Junle Qu II, Zhigang Yang, Shenzhen Univ. (China) [10495-26]

Effects of blood vessel on tumor photo-thermal therapy, Shulian Wu, Zhifang Li, Liangjun Hu, Fujian Normal Univ. (China) [10495-27]

Label-free counting of circulating cells by in vivo photoacoustic flow cytometry, Xunbin Wei, Shanghai Jiao Tong Univ. (China) [10495-28]

Improving label-free detection of circulating melanoma cells by photoacoustic flow cytometry, Xunbin Wei, Shanghai Jiao Tong Univ. (China) [10495-29]

A supramolecular sensor array using lanthanide-doped nanoparticles for sensitive detection of glyphosate and proteins, Meng Wang, Benqing Zhou, Jun Song, Junle Qu II, Shenzhen Univ. (China) [10495-30]

Autofluorescence lifetime imaging of immune cell response to environmental pH, Ava VanDommelen, Amani Gillette, Morgridge Institute for Research (USA); Arvinder Kapur, Manish S. Patankar, Univ. of Wisconsin-Madison (USA); Melissa C. Skala, Morgridge Institute for Research (USA) [10495-31]

The inflammation markers in serum of tumor-bearing rats after plasmonic photothermal therapy, Alla B. Bucharskaya, Galina N. Maslyakova, Saratov State Medical Univ. (Russian Federation); Georgy S. Terentyuk, Saratov State Medical Univ. (Russian Federation) and National Research Saratov State Univ. (Russian Federation); Galina A. Afanasyeva, Nikita A. Navolokin, Natalia B. Zakharova, Saratov State Medical Univ. (Russian Federation); Boris N. Khlebtsov, Nikolai G. Khlebtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russian Federation); Alexey N. Bashkatov, Elina A. Genina, Valery V. Tuchin, Saratov State Univ. (Russian Federation) [10495-32]

Laser immunotherapy for cutaneous squamous cell carcinoma with optimal thermal effects to enhance tumor immunogenicity, Lei Shi, Min Luo, Shanghai Skin Disease Hospital (China); Guolong Zhang, Shanghai Skin Diseases and STD Hospital (China); Feifan Zhou, Wei R. Chen, Univ. of Central Oklahoma (USA); Xiuli Wang, Shanghai Skin Disease Hospital (China) [10495-33]

A computer model for evaluating the efficiency of photo-thermal treatment for prostate cancer based on dynamic optical and thermal properties of tissue, Zhifang Li, Xiyang Zhang, Shaoping Qiu, Shulian Wu, Hui Li, Fujian Normal Univ. (China) [10495-34]

The role and mechanics of dendritic cells in tumor antigen acquisition and presentation following laser immunotherapy, Sean M. Lavery, Univ. of Central Oklahoma (USA); Bryan Dawkins, Univ. of Tulsa (USA); Wei R. Chen, Univ. of Central Oklahoma (USA) [10495-35]

Fluorescence evaluation of AX-024 inhibitor of new drugs in autoimmune diseases by means of biophotonic sensing cells (BICELLS): Performance comparison with label-free biosensing, Maria-Fe Laguna Heras, Univ. Politécnic de Madrid (Spain); Yolanda Ramirez, Bio Optical Detection S.L. (Spain); Miguel Holgado, Beatriz Santamaría, Univ. Politécnic de Madrid (Spain); Francisco J. Sanza, Bio Optical Detection S.L. (Spain); M. Victoria Maigler, Bio Optical Detection S.L. (Spain) [10495-36]

Novel LCP combination therapy using HIF-1 α and EGFR gene knockdown in oral cancer treatment, Jyun Sian Wu, Chia-Hsien Yeh, Chung Yuan Christian Univ. (Taiwan); Leaf Huang, UNC Eshelman School of Pharmacy (USA); Yih-Chih Hsu, Chung Yuan Christian Univ. (Taiwan) [10495-37]

Conventional and phase contrast x-ray imaging techniques and ultrasound imaging method in breast tumor detection: initial comparison studies using phantom, Yuran Guo, Di Wu, Farid H. Omoumi, Yuhua Li, Muhammad U. Ghani, Bin Zheng, Hong Liu, The Univ. of Oklahoma (USA) [10495-38]

Development of a novel empirical model of interstitial laser irradiation and its implications for laser immunotherapy, Austin Doughty, Univ. of Central Oklahoma (USA); Shaojie Liu, Univ. of Central Oklahoma (USA) and South China Normal Univ. (China); Connor L. West, Feifan Zhou, Wei R. Chen, Univ. of Central Oklahoma (USA) [10495-39]

Effects of low- and high-dose laser irradiation on destruction and migration of metastatic cancer cells, Elivia Layton, Feifan Zhou, Wei R. Chen, Univ. of Central Oklahoma (USA) [10495-40]

Cellular localization of gold nanorods within mouse mammary tumor cells, Cayman McNair, Rianna Ingalls, Elivia Layton, Univ. of Central Oklahoma (USA); Hong Liu, The Univ. of Oklahoma (USA); Feifan Zhou, Wei R. Chen, Univ. of Central Oklahoma (USA) [10495-41]

Viability of cancer cells under low- and high-dose laser irradiation with absorption enhancement using gold nanorods, Wei R. Chen, Sana Mesiya, Rianna Ingalls, Elivia Layton, Connor L. West, Univ. of Central Oklahoma (USA); Hong Liu, The Univ. of Oklahoma (USA); Feifan Zhou, Univ. of Central Oklahoma (USA) [10495-42]

Effect of near-infrared lasers and glycated chitosan on myofibroblast differentiation and contraction, Christiana C. Obioma, Elivia Layton, Tu T. K. Doan, Wei R. Chen, Melville B. Vaughan, Univ. of Central Oklahoma (USA) [10495-43]

Integrated oxide graphene based device for laser inactivation of pathogenic microorganisms, Aleksandr S. Grishkanich, Nail Khafizov, ITMO Univ. (Russian Federation); Mikhail Afanasyev, Research Institute of Influenza (Russian Federation) [10495-44]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10496

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10496

Optical Elastography and Tissue Biomechanics V

Conference Chairs: **Kirill V. Larin**, Univ. of Houston (USA); **David D. Sampson**, The Univ. of Western Australia (Australia)

Program Committee: **Jeffrey C. Bamber**, Institute of Cancer Research (United Kingdom); **Albert Claude Boccara**, Institut Langevin (France); **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign (USA); **Brett E. Bouma**, Wellman Ctr. for Photomedicine (USA); **Zhongping Chen**, Beckman Laser Institute and Medical Clinic (USA); **Kishan Dholakia**, Univ. of St. Andrews (United Kingdom); **Christine P. Hendon**, Columbia Univ. (USA); **Davide Iannuzzi**, Vrije Univ. Amsterdam (Netherlands); **Brendan F. Kennedy**, The Univ. of Western Australia (Australia); **Sean J. Kirkpatrick**, Michigan Technological Univ. (USA); **Seemantini K. Nadkarni**, Harvard Univ. (USA); **Matthew O'Donnell**, Univ. of Washington (USA); **Amy L. Oldenburg**, The Univ. of North Carolina at Chapel Hill (USA); **Gabriel Popescu**, Univ. of Illinois at Urbana-Champaign (USA); **Jannick P. Rolland**, Univ. of Rochester (USA); **Giuliano Scarcelli**, Univ. of Maryland, College Park (USA); **Gijs van Soest**, Erasmus MC (Netherlands); **Peter Török**, Imperial College London (United Kingdom); **Ruikang K. Wang**, Univ. of Washington (USA); **Vladislav V. Yakovlev**, Texas A&M Univ. (USA); **Seok Hyun A. Yun**, Harvard Univ. (USA); **Vladimir Y. Zaitsev**, Russian Academy of Science Nizhny Novgorod (Russian Federation); **Qifa Zhou**, The Univ. of Southern California (USA)

Conference Cosponsor: **THORLABS**

SATURDAY 27 JANUARY

CONFERENCE CHAIRS' WELCOME 8:20 AM TO 8:30 AM

SESSION 1 SAT 8:30 AM TO 10:15 AM

Novel Methods

Session Chairs: **Stephen Allen Boppart**, Univ. of Illinois at Urbana-Champaign (USA); **Kishan Dholakia**, Univ. of St. Andrews (United Kingdom); **Jannick P. Rolland**, Univ. of Rochester (USA)

Acoustic micro-tapping (AuT) for non-contact optical coherence elastography (*Invited Paper*), Mitchell A. Kirby, Matthew O'Donnell, Lukasz Ambrozinski, Ivan Pelivanov, Shaozhen Song, Liang Gao, David Li, Soon Joon Yoon, Tueng Shen, Ruikang Wang, Univ. of Washington (USA) [10496-1]

FF-OCT based full field passive elastography using a time-reversal method, Amir Nahas, Egidijus Aukorius, Thu-Mai Nguyen, Institut Langevin (France); Ali Zorgani, LabTAU (France); Mathias Fink, Institut Langevin (France); Stefan Catheline, LabTAU (France); Claude Boccara, Institut Langevin (France) [10496-2]

BISTRO measurement also means better measurement, Vladislav V. Yakovlev, Texas A&M Univ. (USA) [10496-3]

Optical elastography using dye nanoparticles, Chih-Hao Liu, Alexander Schill, Susobhan Das, Univ. of Houston (USA); Dmitry Nevozhay, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Manmohan Singh, Achuth Nair, Univ. of Houston (USA); Konstantin V. Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Kirill V. Larin, Univ. of Houston (USA) [10496-4]

High-resolution optical polarimetric elastography for measuring the mechanical properties of tissue, Alexa W. Hudnut, Andrea M. Armani, The Univ. of Southern California (USA) [10496-5]

A multimodal scanning probe microscope for the mechanical characterization of inhomogeneous samples: When optical coherence tomography meets depth-controlled micro-indentation, Luca Bartolini, Fabio Feroldi, Martin Slaman, Johannes F. de Boer, Davide Iannuzzi, Vrije Univ. Amsterdam (Netherlands) [10496-6]

SESSION 2 SAT 10:45 AM TO 12:00 PM

Optical Coherence Elastography I

Session Chairs: **Seok-Hyun Yun**, Harvard Univ. (USA); **Gijs van Soest**, Erasmus MC (Netherlands); **Peter Török**, Imperial College London (United Kingdom)

Optical elastography and applications in ocular biomechanics (*Invited Paper*), Michael D. Twa, The Univ. of Alabama at Birmingham (USA) [10496-7]

In-vivo quantitative elasticity imaging of the posterior ocular globe with acoustic radiation force optical coherence elastography, Yueqiao Qu, Youmin He, Arya Saidi, Yihang Xin, Yongxiao Zhou, Jiang Zhu, Beckman Laser Institute and Medical Clinic (USA); Teng Ma, Roski Eye Institute, The Univ. of Southern California (USA); Ronald H. Silverman, Columbia Univ. Medical Ctr. (USA); Donald S. Minckler, Gavin Herbert Eye Institute, Univ. of California, Irvine (USA); Qifa Zhou, Roski Eye Institute, The Univ. of Southern California (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) [10496-8]

In vivo elastography of porcine airways with anatomic optical coherence tomography, Ruofei Bu, Santosh Balakrishnan, Hillel Price, Carlton Zdanski, Amy L. Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) [10496-9]

Non-contact detection of reduced corneal elasticity following refractive correction surgery, Mitchell A. Kirby, Liang Gao, Shaozhen Song, Ivan Pelivanov, David Li, Soon Joon Yoon, Tueng Shen, Ruikang Wang, Matthew O'Donnell, Univ. of Washington (USA) [10496-10]

Lunch/Exhibition Break Sat 12:00 pm to 1:30 pm

SESSION 3 SAT 1:30 PM TO 3:30 PM

Optical Coherence Elastography II

Session Chairs: **Jeffrey C. Bamber**, Institute of Cancer Research (United Kingdom); **Sean J. Kirkpatrick**, Michigan Technological Univ. (USA); **Giuliano Scarcelli**, Univ. of Maryland, College Park (USA)

Optical coherence elastography assesses tissue modifications in laser reshaping of cornea and cartilages, Vladimir Y. Zaitsev, Alexandr Matveyev, Lev A. Matveev, Grigory V. Gelikonov, Dmitry V. Shabanov, Aleksandr A. Sovetsky, Aleksandr I. Omelchenko, Institute of Applied Physics of the Russian Academy of Sciences (Russian Federation); Olga I. Baum, Institute on Laser and Information Technologies (Russian Federation); Alex Vitkin, Univ. of Toronto (Canada) [10496-11]

Reverberant shear wave fields for the elastic characterization of corneal layers in optical coherence elastography: a feasibility study, Fernando Zvietcovich, Jannick P. Rolland, Geesue Hah, Kevin J. Parker, Univ. of Rochester (USA) [10496-12]

CONFERENCE 10496

IOP-related changes in corneal hysteresis derived from air-puff SS-OCT in ex vivo porcine eyes and in vivo human eyes, Ewa Maczynska, Jagoda Rzeszewska, Nicolaus Copernicus Univ. (Poland); Karol Karnowski, Nicolaus Copernicus Univ. (Poland) and The Univ. of Western Australia (Australia); Maciej Wojtkowski, Nicolaus Copernicus Univ. (Poland) and Polish Academy of Sciences (Poland); Bartłomiej Kaluzny, Ireneusz Grukowski, Nicolaus Copernicus Univ. (Poland) [10496-13]

Design and characterization of a multimodal system for 3D structural and mechanical imaging, Rishyashring R. Iyer, Nichaluk Leartprapun, Steven G. Adie, Nancy E. and Peter C. Meinig School of Biomedical Engineering, Cornell Univ. (USA) [10496-14]

Elastographic comparison between thermoelastic and ablative regimes of soft media using ultra-fast line-field low coherent holography with pulsed laser excitation, Susobhan Das, Chih-Hao Liu, Alexander Schill, Univ. of Houston (USA); ThienKim Ho, Univ. of California, Berkeley (USA); Kirill V. Larin, Univ. of Houston (USA) and Tomsk State Univ. (Russian Federation) [10496-15]

The measurement of elasticity of the skin tissue treated with an ablative fractional laser by using optical coherence elastography, Kairui Feng, Kanheng Zhou, Chunhui Li, Zhihong Huang, Univ. of Dundee (United Kingdom) [10496-16]

High resolution SAW elastography for human skin specimen, Kanheng Zhou, Kairui Feng, Mingkai Wang, Tanatswa Jamera, Chunhui Li, Zhihong Huang, Univ. of Dundee (United Kingdom) [10496-17]

Relationship between wave frequency and elasticity for non-contact acoustic micro-tapping, Liang Gao, Mitchell A. Kirby, Shaozhen Song, David Li, Soon Joon Yoon, Tueng Shen, Ivan Pelivanov, Ruikang Wang, Matthew O'Donnell, Univ. of Washington (USA) [10496-18]

SESSION 4 SAT 4:00 PM TO 5:15 PM

Cellular Biomechanics and Applications I

Session Chairs: **Albert Claude Boccara**, Institut Langevin (France); **Seemantini K. Nadkarni**, Harvard Univ. (USA)

3D traction force microscopy: Current challenges and future opportunities (*Invited Paper*), Wesley R. Legant, Howard Hughes Medical Institute (USA) [10496-19]

Multi-scale optical, structural, and mechanical analysis of tumorous tissues, Delphine Gourdon, Maryam Asadishekari, Mihir Samak, Univ. of Ottawa (Canada) [10496-20]

Optical coherence elastography for improved characterization of biomaterials, Philip Wijesinghe, Luke Major, Qi Fang, Yu Suk Choi, Brendan F. Kennedy, The Univ. of Western Australia (Australia) [10496-21]

Characterizing micro-mechanical viscoelastic properties of soft tissues and (bio)materials in physiological-like conditions, Giorgio Mattei, Optics11 (Netherlands); Luca Bartolini, Vrije Univ. Amsterdam (Netherlands); Christine Mummery, Leiden Univ. Medical Ctr. (Netherlands); Davide Iannuzzi, Vrije Univ. Amsterdam (Netherlands) [10496-22]

SESSION 5 SAT 5:15 PM TO 5:45 PM

Computation and Modeling

Session Chairs: **Brendan F. Kennedy**, The Univ. of Western Australia (Australia); **Brett E. Bouma**, Wellman Ctr. for Photomedicine (USA)

Validation of SAW elastography Fourier analysis based algorithm using ANSYS simulation, Kanheng Zhou, Chunhui Li, Zhihong Huang, Univ. of Dundee (United Kingdom) [10496-23]

Viscoelastic characterization of dispersive media by inversion of a general wave propagation model in optical coherence elastography applications, Fernando Zvietcovich, Univ. of Rochester (USA); Jannick P. Rolland, The Institute of Optics, Univ. of Rochester (USA); Emma Grygotis, Sarah Wayson, Univ. of Rochester (USA); Maria Helguera, Instituto Tecnológico José Mario Molina Pasquel y Henríquez (Mexico); Diane Dalecki, Kevin J. Parker, Univ. of Rochester (USA) [10496-24]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 6 SUN 8:00 AM TO 10:00 AM

Brillouin Elastography

Session Chairs: **Zhongping Chen**, Beckman Laser Institute and Medical Clinic (USA); **Matthew O'Donnell**, Univ. of Washington (USA); **Christine P. Hendon**, Columbia Univ. (USA)

Brillouin microscopy for cell and tissue biomechanics (*Invited Paper*), Giuliano Scarcelli, Univ. of Maryland, College Park (USA) [10496-25]

Brillouin scattering imaging of stiffness heterogeneity in multicellular systems, Taro Ichimura, Tomonobu M. Watanabe, RIKEN Quantitative Biology Ctr. (Japan) [10496-26]

Non-contact detection of mechanical properties of intact cellular nucleus by Brillouin flow cytometry, Jitao Zhang, Xuefei A. Nou, Milos Nikolic, Univ. of Maryland, College Park (USA); Hanyoung Kim, Canon U.S. Life Sciences, Inc. (USA); Giuliano Scarcelli, Univ. of Maryland, College Park (USA) [10496-27]

In vivo Brillouin microscopy of the larval zebrafish spinal cord, Raimund Schlüßler, Stephanie Möllmert, Jürgen Czarske, Jochen Guck, TU Dresden (Germany) [10496-28]

High-contrast Brillouin microscopy for noncontact subcellular biomechanical imaging, Giuseppe Antonacci, Istituto Italiano di Tecnologia (Italy); Giancarlo Ruocco, Istituto Italiano di Tecnologia (Italy) and Sapienza Univ. di Roma (Italy) [10496-29]

Assessing the effect of antihistamines in rodents with Raman and Brillouin spectroscopy, Maria A. Troyanova-Wood, Texas A&M Univ. (USA) [10496-30]

Brillouin light scattering spectroscopy applications for liquid biopsies, Kareem Elsayad, Anoop Kavirayani, Vienna Biocenter Core Facilities GmbH (Austria) [10496-31]

SESSION 7 SUN 10:30 AM TO 12:15 PM

Cellular Biomechanics and Applications

Joint Session with Conferences 10496 and 10503

Session Chairs: **Kirill V. Larin**, Univ. of Houston (USA); **YongKeun Park**, KAIST (Korea, Republic of); **Gabriel Popescu**, Univ. of Illinois at Urbana-Champaign (USA); **David D. Sampson**, The Univ. of Western Australia (Australia)

The mechanics and mechanisms of tumor cell extravasation (*Keynote Presentation*), Roger Kamm, Massachusetts Institute of Technology (USA) [10496-32]

High definition wave front sensor for quantitative phase imaging, Anaïs Saintoyant, Benoit Wattellier, Antoine Federici, Sherazade Aknoun, PHASICS S.A. (France) [10503-89]

Long-term imaging of cellular forces with high precision, Nils M. Kronenberg, Philipp Liehm, Elena Dalaka, Andrew T. Meek, Malte C. Gather, Univ. of St. Andrews (United Kingdom) [10496-33]

Coherent imaging microscopy for biomedical diagnostics at lab on chip scale (*Invited Paper*), Pietro Ferraro, Istituto di Scienze applicata e Sistemi Intelligenti (Italy) [10503-6]
Lunch/Exhibition Break Sun 12:15 pm to 2:00 pm

SESSION 8 SUN 2:00 PM TO 3:15 PM

Elastography Methods and Applications

Session Chairs: **Vladislav V. Yakovlev**, Texas A&M Univ. (USA);
Ruikang K. Wang, Univ. of Washington (USA);
Davide Iannuzzi, Vrije Univ. Amsterdam (Netherlands)

Cartilage microindentation using cylindrical and spherical optical fiber indenters with integrated Bragg gratings as force sensors, Gabriele Marchi, Okay Canti, Hochschule für Angewandte Wissenschaften München (Germany); Valentin Baier, Technische Univ. München (Germany); Hartmann Bastian, Hochschule für Angewandte Wissenschaften München (Germany); Paolo Alberton, Attila Aszodi, Ludwig-Maximilians-Univ. München (Germany); Hauke Clausen-Schaumann, Johannes Roths, Hochschule für Angewandte Wissenschaften München (Germany) [10496-34]

In vivo quantification of the effects of skin product formulations on the mechanical stiffness of skin surface layers using optical elastography, Robert Maidhof, Avon Products, Inc. (USA); Abhinav Madhavachandran, Holly Eyrych, Ami Kling, Anindya Majumdar, Michigan Technological Univ. (USA); John Lyga, Avon Products, Inc. (USA); Sean J. Kirkpatrick, Michigan Technological Univ. (USA) [10496-35]

Measuring in-vivo 3D deformation of the lamina cribrosa microstructure under elevated intraocular pressure, Junchao Wei, Bin Yang, Andrew Voorhees, Huong Tran, Bo Wang, Univ. of Pittsburgh (USA); Joel Schuman, New York Univ. (USA); Matthew Smith, Univ. of Pittsburgh (USA); Gadi Wollstein, New York Univ. (USA); Ian A. Sigal, Univ. of Pittsburgh (USA) [10496-36]

Optical elastography of human breast tissue using a handheld probe, Andrea Curatolo, Qi Fang, Lixin Chin, Brooke Krajancich, Lucinda Watts, Renate Zilkens, The Univ. of Western Australia (Australia); Ben Dessauvagie, Bruce Latham, Fiona Stanley Hospital (Australia); Christobel Saunders, Brendan F. Kennedy, The Univ. of Western Australia (Australia) [10496-37]

Strain-photoacoustic imaging: an alternative approach for elasticity measurement, Guan Xu, Univ. of Michigan (USA); Yunhao Zhu, Univ. of Michigan (USA) and Nanjing Univ. (China); Laura Johnson, Univ. of Michigan (USA); Jie Yuan, Nanjing Univ. (China); Xueding Wang, Jonathan Rubin, Peter Higgins, Univ. of Michigan (USA) [10496-38]

SESSION 9 SUN 3:45 PM TO 5:30 PM

Tissue Mechanical Properties

Session Chairs: **Amy L. Oldenburg**, The Univ. of North Carolina at Chapel Hill (USA); **Vladimir Yu. Zaitsev**, Russian Academy of Science Nizhny Novgorod (Russian Federation); **Qifa Zhou**, The Univ. of Southern California (USA)

Structure-stiffness relation of the brain tissue determined by oscillatory indentation mapping, Nelda Antonovaité, Vrije Univ. Amsterdam (Netherlands); Wytse J. Wadman, Univ. van Amsterdam (Netherlands); Ely M. Hol, Univ. Medical Ctr. Utrecht (Netherlands); Davide Iannuzzi, Vrije Univ. Amsterdam (Netherlands) [10496-39]

Mechanical properties of chicken embryo mesoderm during somite formation, Marica Marrese, Nelda Antonovaité, Vrije Univ. Amsterdam (Netherlands); Ben K. A. Nelemans, Vrije Univ. Medical Ctr. (Netherlands); Erik J. Paardekam, Vrije Univ. Amsterdam (Netherlands); Theodoor H. Smit, Academisch Medisch Centrum (Netherlands); Davide Iannuzzi, Vrije Univ. Amsterdam (Netherlands) [10496-40]

Elastic wave measurement for biomechanical assessment of the crystalline lens using optical coherence elastography, Jiang Zhu, Junxiao Yu, Yueqiao Qu, Youmin He, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) [10496-41]

Thermo-mechanical mechanism of laser-assisted alteration and stabilization of micro pore structure in eye-sclera, Olga I. Baum, Emil Sobol, Institute on Laser and Information Technologies (Russian Federation); Sebastian Wachsmann-Hogiu, McGill Univ. (Canada) [10496-42]

Heterogeneity study of the human cervix between the internal os and the external os using optical coherence tomography, Yu Gan, Wang Yao, Kristin M. Myers, Columbia Univ. (USA); Joy-Sarah Y. Vink, Ronald J. Wapner, Columbia Univ. Medical Ctr. (USA); Christine P. Hendon, Columbia Univ. (USA) [10496-43]

Simultaneous tissue birefringence and deformation measurement by polarization sensitive optical coherence elastography with active compression, En Li, Shuichi Makita, Deepa Kasaragod, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) [10496-44]

Optical coherent elastography method for stiffness assessment of heart muscle tissues, Andrei B. Karpouk, Don J. VanderLaan, Georgia Institute of Technology (USA); Kirill V. Larin, Univ. of Houston (USA); Stanislav Y. Emelianov, Georgia Institute of Technology (USA) and Emory Univ. School of Medicine (USA) [10496-45]

CONFERENCE CHAIRS' FINAL REMARKS 5:30 PM TO 5:35 PM

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Brillouin spectroscopy measurement of blood plasma viscosity during coagulation, Milos Nikolic, Giuliano Scarcelli, Univ. of Maryland, College Park (USA) [10496-46]

Experimental analysis of laser modulation parameters in photothermal optical coherence tomography, Ashish Gupta, Marjan Razani, York Univ. (Canada); Martin Villiger, York Univ. (Canada) and Harvard Medical School (USA) and Massachusetts General Hospital (USA); Nima Tabatabaei, York Univ. (Canada) [10496-47]

Detecting ulcerative colitis using optical coherence elastography, Achuth Nair, Chih-Hao Liu, Susobhan Das, Univ. of Houston (USA); ThienKim Ho, Univ. of California, Berkeley (USA); Yong Du, Sanam Soomro, Chandra Mohan, Univ. of Houston (USA); Kirill V. Larin, Univ. of Houston (USA) and Tomsk State Univ. (Russian Federation) and Baylor College of Medicine (USA) [10496-48]

Determination of human corneal biomechanics in vivo through detection of damped oscillatory displacement using phase-sensitive optical coherence elastography, Michael D. Twa, Gongpu Lan, The Univ. of Alabama at Birmingham (USA); Manmohan Singh, Salavat Aglyamov, Kirill V. Larin, Univ. of Houston (USA) [10496-49]

The potential of high intensity focused ultrasound (HIFU) combine phase-sensitive optical coherence tomography (PhS-OCT) for diagnosis, treatment and monitoring, Kanheng Zhou, Kairui Feng, Chunhui Li, Zhihong Huang, Univ. of Dundee (United Kingdom) [10496-50]

Opto mechanical nano elastography: a new tool for tissue characterization, Marica Marrese, Davide Iannuzzi, Vrije Univ. Amsterdam (Netherlands) [10496-51]

Design of photo-sensitive bioink for 3D bioprinting, Chung-Hao Wang, Chia-Wei Chang, Gene'e Tech Co., Ltd. (Taiwan); Shu-Jyuan Yang, Ming-Jium Shieh, National Taiwan Univ. (Taiwan) [10496-52]

Assessing brain elasticity using air-pulse based optical coherence elastography, Chih-Hao Liu, Susobhan Das, Megan Goh, Kirill V. Larin, Univ. of Houston (USA) [10496-53]

Brillouin light scattering spectroscopy for tissue engineering application, Dana Akilbekova, Nazarbayev Univ. (Kazakhstan) [10496-54]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10497

Monday-Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10497

Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XVI

Conference Chairs: **Daniel L. Farkas**, Univ. of Southern California (USA), SMI (USA); **Dan V. Nicolau**, McGill Univ. (Canada); **Robert C. Leif**, Newport Instruments (USA)

Conference Co-Chairs: **James F. Leary**, Purdue Univ. (USA); **Attila Tarnok**, Univ. Leipzig (Germany)

Program Committee: **Vadim Backman**, Northwestern Univ. (USA); **Christopher H. Contag**, Michigan State Univ. (USA); **Paul M. W. French**, Imperial College London (United Kingdom); **Yuval Garini**, Bar-Ilan Univ. (Israel); **Jaе Youn Hwang**, DGIST (Korea, Republic of); **Charles P. Lin**, Wellman Ctr. for Photomedicine (USA); **Sacha Loiseau**, Mauna Kea Technologies (France); **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA); **Sebastian Wachsmann-Hogiu**, Univ. of California, Davis (USA); **Warren S. Warren**, Duke Univ. (USA)

MONDAY 29 JANUARY

SESSION 1..... MON 8:00 AM TO 12:30 PM

Functional Imaging

Session Chair: **Daniel L. Farkas**,
Univ. of Southern California (USA), SMI (USA)

Development and potential clinical applications of photoacoustic imaging based on light emitting diodes, Yunhao Zhu, Nanjing Univ. (China); Guan Xu, Univ. of Michigan Medical School (USA); Jie Yuan, Nanjing Univ. (China); Janggün Jo, Hakan Demirci, Univ. of Michigan (USA); Naoto Sato, Toshitaka Agano, PreXion Corp. (Japan); Xueding Wang, Univ. of Michigan (USA) [10497-1]

Micro-optical coherence tomography image-based metrics to define biomarkers of barrier integrity, Colleen Foley, Massachusetts Institute of Technology (USA) and Massachusetts General Hospital (USA) and Wellman Ctr. for Photomedicine (USA); Hui Min Leung, Avira Som, Massachusetts General Hospital (USA) and Wellman Ctr. for Photomedicine (USA); Bernard Lanter, Bryan Hurley, Massachusetts General Hospital (USA) and Mucosal Immunology and Biology Research Ctr. (USA); Guillermo Tearney, Massachusetts General Hospital (USA) and Wellman Ctr. for Photomedicine (USA) [10497-2]

In vivo two-photon imaging of macrophage activities in skeletal muscle regeneration, Zhongya Qin, Yanyang Long, Qiqi Sun, Zhenguo Wu, Jianan Y. Qu, Hong Kong Univ. of Science and Technology (Hong Kong, China) [10497-3]

A novel small molecule mediate 18F-FDG excited fluorescence molecular imaging, Zeyu Zhang, Institute of Automation (China); Hongbo Guo, Northwest Univ. (China); Zhenhua Hu, Jie Tian, Institute of Automation (China) [10497-4]

Applications and assessment of an excitation-scanning hyperspectral imaging system, Sam A. Mayes, Pihwat Klomkaew, Silas J. Leavesley, Tom C. Rich, Univ. of South Alabama (USA) [10497-5]

Predicting treatment sensitivity in colorectal cancer with autofluorescence microscopy, Peter F. Favreau, Morgridge Institute for Research (USA); Cheri Pasch, Susan N. Payne, Univ. of Wisconsin Carbone Cancer Ctr. (USA); Dustin A. Deming, Univ. of Wisconsin Carbone Cancer Ctr. (USA) and Univ. of Wisconsin-Madison (USA) and William S. Middleton Memorial Veterans Hospital (USA); Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA) [10497-6]

Preliminary analysis of facial hair follicle distribution for forensic identification using OCT, Ning Zhang, Institute of Forensic Science (China); Chengming Wang, Tsinghua Univ. (China); Lanchi Xie, Zhihui Li, Xiaojing Xu, Institute of Forensic Science (China) [10497-7]

Optical cryoimaging for assessment of radiation-induced injury to rat kidney metabolic state, Shima Mehrvar, Mette Funding la Cour, Univ. of Wisconsin-Milwaukee (USA); Meetha Medhora, Amadou K. S. Camara, Medical College of Wisconsin (USA); Mahsa Ranji, Univ. of Wisconsin-Milwaukee (USA) [10497-8]

Miniaturized microscope for high throughput screening of tumor spheroids in microfluidic devices, Carlos Ortiz de Solórzano, Centro de Investigación Médica Aplicada (Spain); Javier Uranga, USCAL, S.L. (Spain); Alejandro Rodríguez-Pena, Centro de Investigación Médica Aplicada (Spain); Desire Gahigiro, USCAL S.L. (Spain) [10497-9]

Label-free cell viability assay using lens-free microscopy, Cédric Allier, CEA-LETI (France) and Univ. Grenoble Alpes (France); Thomas Bordy, CEA-LETI (France) and Univ. Grenoble Alpes (France); Olivier Cioni, Lionel Hervé, CEA-LETI (France) and Univ. Grenoble Alpes (France); Geoffrey Esteban, Martin Pisaneschi, IPRASENSE SAS (France); Sophie Morales, CEA-LETI (France) and Univ. Grenoble Alpes (France) [10497-10]

Optical metabolic imaging of colorectal cancer derived organoids as a predictive model of treatment response in vivo, Haley M. James, Sandra P. Prieto, Anna Blackshare, Andrew J. Sweatt, Timothy J. Muldoon, Univ. of Arkansas (USA) [10497-11]

Necrosis and apoptosis pathways of cell death at photodynamic treatment in vitro as revealed by digital holographic microscopy, Irina V. Semenova, Ioffe Institute (Russian Federation); Andrey Belashov, Ioffe Institute (Russian Federation) and ITMO Univ. (Russian Federation); Tatyana Belyaeva, Elena Kornilova, Anna Salova, Institute of Cytology (Russian Federation); Anna Zhikhoreva, Ioffe Institute (Russian Federation) and ITMO Univ. (Russian Federation) [10497-12]

Lunch Break Mon 12:30 pm to 2:00 pm

SESSION 2..... MON 2:00 PM TO 3:00 PM

Monitoring

Session Chair: **Attila Tarnok**, Univ. Leipzig (Germany)

Fluorescence lifetime microscopy for monitoring cell adhesion and detachment, Wonsang Hwang, JinWon Seo, Jun Ho Song, DongEun Kim, Yonsei Univ. (Korea, Republic of); In-Hong Choi, Yonsei Univ. College of Medicine (Korea, Republic of); Kyung-Hwa Yoo, Dug Young Kim, Yonsei Univ. (Korea, Republic of) [10497-13]

Oxygen sensing PLIM together with FLIM of intrinsic cellular fluorophores for metabolic mapping, Sviatlana Kalinina, Patrick M. Schaefer, Jasmin Breymayer, Dominik Bisinger, Univ. Ulm (Germany); Sabyasachi Chakraborty, Max-Planck-Institut für Polymerforschung (Germany); Angelika Rueck, Univ. Ulm (Germany) [10497-14]

In vivo flowcytometry for blood cell analysis using differential epidection of forward scattered light, Hari P. Paudel, Yookyung Jung, Anthony Raphael, Clemens Alt, Juwell Wu, Judith Runnels, Charles Lin, Massachusetts General Hospital, Harvard Medical School (USA) .. [10497-15]

SESSION 3..... MON 3:30 PM TO 5:10 PM

Regenerative Medicine

Session Chair: **Attila Tárnok**, Univ. Leipzig (Germany)

Photoacoustic imaging of human mesenchymal stem cells labeled with Prussian blue-poly-L-lysine nanocomplexes, Taeho Kim, Jeanne Lemaster, Fang Chen, Jin Li, Jesse Jokerst, Univ. of California, San Diego (USA)..... [10497-16]

Label-free unsupervised hyperspectral analysis for regenerative treatments on various cartilage layers, Saabah B. Mahbub, Martin E. Gosnell, Ayad G. Anwer, Ewa M. Goldys, Macquarie Univ. (Australia)..... [10497-17]

Labeling single-cell for in vivo study of cell fate mapping and lineage tracing, Sicong He, Jin Xu, Yi Wu, Zilong Wen, Jianan Y. Qu, Hong Kong Univ. of Science and Technology (Hong Kong, China)..... [10497-18]

Femtosecond-laser setup for cell-membrane poration, Karsten König, Hans Georg Breunig, Ana Batista, Benjamin Sauer, JenLab GmbH (Germany); Aisada Uchugonova, Univ. des Saarlandes (Germany)..... [10497-19]

Autofluorescence multiphoton microscopy for quality control of human vascular tissue constructs, Daniel A. Gil, Gaurav Kaushik, Elizabeth Torr, Univ. of Wisconsin-Madison (USA); Elizabeth S. Berge, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA); Cheryl Soref, Peyton Uhl, Gianluca Fontana, Univ. of Wisconsin-Madison (USA); Jessica Antosiewicz-Bourget, Morgridge Institute for Research (USA); Collin Edington, Massachusetts Institute of Technology (USA); Michael P. Schwartz, Univ. of Wisconsin-Madison (USA); Linda G. Griffith, Massachusetts Institute of Technology (USA); James A. Thomson, Morgridge Institute for Research (USA); William T. Daly, William L. Murphy, Univ. of Wisconsin-Madison (USA); Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA)..... [10497-20]

TUESDAY 30 JANUARY

SESSION 4..... TUE 8:00 AM TO 10:20 AM

Bioinformatics

Session Chair: **James F. Leary**, Purdue Univ. (USA)

Automated hyper-dimensional live cell tracking, Madhuri Suthar, Univ. of California, Los Angeles (USA); Jonathan Mendelson, Brentwood School (USA); Ata Mahjoubfar, Univ. of California, Los Angeles (USA) and California NanoSystems Institute (USA); Cejo K. Lonappan, Koushik Roy, Simon Mitchell, Alexander Hoffmann, Univ. of California, Los Angeles (USA); Bahram Jalali, Univ. of California, Los Angeles (USA) and California NanoSystems Institute (USA)..... [10497-21]

Automated facial acne assessment from smartphone images, William Kemp, Fartash Vasefi, Nicholas MacKinnon, eTreat Medical Diagnostics Inc. (Canada)..... [10497-22]

CytometryML with DICOM and FCS, Robert C. Leif, Newport Instruments (USA)..... [10497-23]

Is a dataset built on ex vivo measurements usable for in vivo tissue classification? Kelly Aubertin, Mirela Birlea, CRCHUM (Canada); Michael Pinto, Ecole Polytechnique de Montréal (Canada); Andr e-Anne Grosset, Dominique Trudel, CRCHUM (Canada); Fr d ric Leblond, Ecole Polytechnique de Montr al (Canada)..... [10497-24]

Early discrimination between seborrheic dermatitis and psoriasis by smartphone-based multispectral imaging and machine learning-based analysis, Sewoong Kim, Manjae Kim, DGIST (Korea, Republic of); Dong Hun Lee, Seoul National Univ. (Korea, Republic of); Jae Youn Hwang, DGIST (Korea, Republic of)..... [10497-25]

Choosing optimum wavelength combination for retinal vessel oximetry: Effect of haemoglobin packaging, Mathi Damodaran, Vrije Univ. Amsterdam (Netherlands); Arjen Amelink, TNO (Netherlands); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands)..... [10497-26]

Blind multi-exponential deconvolution for FLIM data processing, Daniel U. Campos-Delgado, Univ. Aut noma de San Luis Potos  (Mexico); Elvis Duran, Texas A&M Univ. (USA); Ramon Rosa, S o Carlos Institute of Physics, Univ. de S o Paulo (Brazil); Javier A. Jo, Texas A&M Univ. (USA)..... [10497-27]

PAPERS OF INTEREST..... 10:30 AM TO 11:30 AM

Conference 10546: Emerging Digital Micromirror Device Based Systems and Applications X

Biomedical Imaging using a DMD or other Light Structuring Devices for Ophthalmological Applications

Session Chairs: **Michael R. Douglass**, Texas Instruments Inc. (USA); **Robert C. Leif**, Newport Instruments (USA)

Confocal retinal imaging using a digital light projector with a near infrared VCSEL source, Matthew S. Muller, Aeon Imaging, LLC (USA); Ann E. Elsner, Aeon Imaging, LLC (USA) and Indiana Univ. (USA)..... [10546-16]

DMD based ophthalmoscope with concentric circle scanning for fixation, Mathi Damodaran, Kari V. Vienola, Boy Braaf, Vrije Univ. Amsterdam (Netherlands); Koenraad A. Vermeer, Rotterdam Ophthalmic Institute (Netherlands) and Rotterdam Eye Hospital (Netherlands); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands)..... [10546-17]

Structured polarized light microscopy (SPLM) for mapping collagen fiber orientation of ocular tissues, Bin Yang, Bryn Brazile, Ning-Jiun Jan, Ian Sigal, Univ. of Pittsburgh (USA)..... [10546-18]

Lunch/Exhibition Break.....Tue 11:30 am to 1:40 pm

SESSION 5..... TUE 1:40 PM TO 5:30 PM

Cytomics

Session Chair: **Robert C. Leif**, Newport Instruments (USA)

High-throughput screening of encapsulated islets using wide-field lens-free on-chip imaging, Yibo Zhang, Univ. of California, Los Angeles (USA); Michael Alexander, Univ. of California, Irvine (USA); Sam Yang, Univ. of California, Los Angeles (USA); Rahul Krishnan, Univ. of California, Irvine (USA); Yinxu Bian, Univ. of California, Los Angeles (USA); Elliot Botvinick, Jonathan Lakey, Univ. of California, Irvine (USA); Aydogan Ozcan, Univ. of California, Los Angeles (USA)..... [10497-28]

Design of portable ultraminiature flow cytometers for initial medical diagnostics and environmental monitoring, James F. Leary, Aurora Life Technologies, LLC (USA)..... [10497-29]

Multimodal nanoscale imaging of chromatin with super resolution microscopy and partial wave spectroscopy, Adam Esheir, Xiang Zhou, Luay M. Almassalha, Scott Gladstein, Yue Li, Thi-Quyen Nguyen, John E. Chandler, Graham Spicer, Cheng Sun, Hao F. Zhang, Vadim Backman, Northwestern Univ. (USA)..... [10497-30]

Antibody-oligonucleotide based cyclic immunofluorescence facilitates highly multiplexed quantitative analysis for clinical histology, Jocelyn Jones, Koel Chin, Sunjong Kwon, Young Hwan Chang, Oregon Health & Science Univ. (USA); Michel Nederlof, Quantitative Imaging Systems (USA); Joe Gray, Summer L. Gibbs, Oregon Health & Science Univ. (USA)..... [10497-31]

Diagnosis of myocardial infarction based on lectin-induced erythrocyte agglutination: Revisited, Susanne Melzer, Jozsef Bocsi, Anja Mittag, Univ. Leipzig (Germany); Thomas Reichert, AMAC ASIC- und Mikrosensorenanwendung Chemnitz GmbH (Germany); Wiebke Laffers, Universit tsklinikum Bonn (Germany); Arkadiusz Pierzchalski, Medical Univ. of Gdansk (Germany); Joachim Piltz, amtec Analysentechnik GmbH (Germany); Hans-J rgen Esche, amtec Analysentechnik GmbH (Germany); Gerhard Schuler, Herzzentrum Leipzig GmbH (Germany); Holger Thiele, Univ. zu Leipzig Heart Ctr. (Germany); G nther Wolf, AMAC ASIC- und Mikrosensorenanwendung Chemnitz GmbH (Germany); Adolf Baumgartner, York St John Univ. (United Kingdom); Attila T rnok, Univ. Leipzig (Germany)..... [10497-32]

Cell classification and tracking improvement by morphology and quantitative phase feature combination, Benoit Wattellier, Sherazade Aknoun, PHASICS S.A. (France); Michel Barlaud, Lionel Fillatre, Univ. de Nice Sophia Antipolis (France); Gr goire Malandain, INRIA Sophia Antipolis - M diterran e (France); Philippe Pognonec, Thierry Pourcher, Univ. de Nice Sophia Antipolis (France); Manuel Yonnet, PHASICS S.A. (France)..... [10497-33]

Dual camera, low cost, multi-spectral colposcope for visualization and analysis of the cervix, Amir Bernat, Kfir Bar-Am, MobileODT Ltd. (Israel); Leigh Cataldo, Scripps Health (USA); Frank J. Bolton, MobileODT Ltd. (Israel); Bruce Kahn, Scripps Clinic Carmel Valley (USA); David Levitz, MobileODT Ltd. (Israel)..... [10497-34]

Imaging malignant and normal melanocytes using simultaneous Brillouin and Raman microspectroscopy, Maria A. Troyanova-Wood, Texas A&M Univ. (USA)..... [10497-35]

CONFERENCE 10497

Angular scattering of induced apoptosis in HeLa cells, Robert Draham, Andrew J. Berger, Univ. of Rochester (USA) [10497-36]

Validation of hand and foot anatomical feature measurements from smartphone images, Mohammad Amini, Fartash Vasefi, Nicholas B. MacKinnon, eTreat Medical Diagnostics Inc. (Canada) . . [10497-53]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the BIOS/LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Detection of glycosaminoglycan degradation in articular cartilage by fluorescence lifetime imaging, Xiangnan Zhou, Anne Haudenschild, Ben E. Sherlock, Jerry Hu, Kent Leach, Univ. of California, Davis (USA); Kyriacos Athanasiou, Univ. of California, Irvine (USA); Laura Marcu, Univ. of California, Davis (USA) [10497-54]

Direct visualization of bio-distribution of near infrared imaging agent loaded targeted drug nanoparticles in pancreatic tumor using multiphoton and harmonic generation imaging, Thomas Abraham, Gary Clawson, Chris McGovern, Samuel Linton, Penn State College of Medicine (USA); Xiaomeng Tang, James Adair, The Pennsylvania State Univ. (USA); Gail Matters, Penn State College of Medicine (USA) [10497-55]

Angular resolved light scattering microscopy on human chromosomes, Dennis Müller, Julian Stark, Alwin Kienle, Institute für Lasertechnologien in der Medizin und Messtechnik (Germany) [10497-56]

Profiling pleural effusion cells by confocal and diffraction imaging, Safaa Al-Qaysi, East Carolina Univ. (USA) and College of Pharmacy, Al-Mustansiriyah Univ. (Iraq); Heng Hong, Brody School of Medicine, East Carolina Univ. (USA); Yuhua Wen, Hunan Institute of Science and Technology (China); Jun Q. Lu, Xin-Hua Hu, East Carolina Univ. (USA) and Hunan Institute of Science and Technology (China) [10497-57]

Characterization of bone collagen organization defects in murine hypophosphatasia using a Zernike model of optical aberrations, Kayvan F. Tehrani, Emily G. Pendleton, Ruth P. Barrow, Luke J. Mortensen, The Univ. of Georgia (USA) [10497-58]

Fluorescent Periodic-Acid Schiff and Masson's Trichrome staining in fluorescence histology for non-destructive tissue analysis, Katherine N. Elfer, Quincy Brown, Tulane Univ. (USA) [10497-59]

In vivo observation of transient photoreceptor movement correlated with oblique light stimulation, Yiming Lu, Changgeng Liu, Jacopo Benedetti, Xincheng Yao, Univ. of Illinois at Chicago (USA) . [10497-60]

A multi-channel patched-type multimodal pulse oximeter system combined with Doppler ultrasound for quantitative determination of cardiopulmonary resuscitation, Sangyeon Youn, DGIST (Republic of Korea); Jihun Kim, Kijoon Lee, DGIST (Korea, Republic of); Jae Gwan Kim, Gwangju Institute of Science and Technology (Korea, Republic of); Jae Youn Hwang, DGIST (Korea, Republic of) [10497-61]

Low-cost polarization microscopy for cholesterol crystals, Kyungmin Kim, Seonghee Cho, Chulhoon Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Taehoon Kim, Hyeon Park, Jinmoo Kim, Seunghoon Lee, The Catholic Univ. of Korea (Korea, Republic of); Yeonsu Kang, The Catholic Univ. of Korea (Korea, Republic of); Kiyuk Chang, The Catholic Univ. of Korea (Korea, Republic of) [10497-62]

Improvement of spin-exchange optical pumping of xenon-129 using in situ NMR measurement in ultra-low magnetic field, Shun Takeda, Hiroshi Kumagai, Kitasato Univ. (Japan) [10497-63]

Mobility study of photogem and curcumin in candida albicans using photobleaching technique, Renan A. Romano, Univ. de São Paulo (Brazil); Sebastiao Pratavieira, Ana P. da Silva, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil); Cristina Kurachi, Francisco E. G. Guimarães, Instituto de Física de São Carlos, Univ. de São Paulo (Brazil) [10497-64]

Global blind deconvolution of time-domain FLIM data processing, Daniel U. Campos-Delgado, Univ. Autónoma de San Luis Potosí (Mexico); Elvis Duran, Texas A&M Univ. (USA); Ramon Rosa, São Carlos Institute of Physics, Univ. de São Paulo (Brazil); Javier A. Jo, Texas A&M Univ. (USA) [10497-65]

Method of active contours for segmentation of raster images of bone systems, Vu Hai Anh, Roman A. Safonov, Anna Kolesnikova, Irina V. Kirillova, Leonid Yu Kossovich, Saratov State Univ. (Russian Federation) . . . [10497-66]

Segmentation and analysis of mouse pituitary cells with GUI (graphical user interface), Erika A. Gonzalez, Univ. Nacional Autónoma de México (Mexico); Lucía Medina, Univ. Nacional Autónoma de México (Mexico); Tatiana Fiordelisio, Mathieu Hautefeuille, Univ. Nacional Autónoma de México (Mexico) [10497-67]

Characterization of the anisotropy of bone collagen fibers in murine hypophosphatasia model using second harmonic generation polarimetry, Emily Pendleton, Kayvan F. Tehrani, Ruth P. Barrow, Ana D. Maslesa, Luke J. Mortensen, The Univ. of Georgia (USA) . . . [10497-68]

Biological tissues inspection based on the indices of polarimetric purity, Albert Van Eeckhout, Angel Lizana, Univ. Autónoma de Barcelona (Spain); Enric Garcia-Caurel, Ecole Polytechnique (France); Jose Jorge Gil, Univ. de Zaragoza (Spain); Adrià Sansa, Carla Rodríguez, Irene Estévez, Univ. Autónoma de Barcelona (Spain); Emilio González, Univ. Autónoma de Madrid (Spain) and Hospital Univ. de Canarias (Spain); Juan Carlos Escalera, Univ. Autónoma de Barcelona (Spain); Ignacio Moreno, Univ. Miguel Hernández de Elche (Spain); Juan Campos, Univ. Autónoma de Barcelona (Spain) . . . [10497-69]

pblCS microscopy technique for determining oligomeric state, Alireza Lajevardipour, Swinburne Univ. of Technology (Australia) [10497-70]

Optical mesoscopic techniques to probe the structural disorder of cancerous biological systems, Huda M. Almabadi, Peeyush Sahay, Shiva Bhandari, Omar Skalli, The Univ. of Memphis (USA); Prashanth K. B. Nagesh, Murali M. Yallapu, Meena Jaggi, Subhash C. Chauhan, The Univ. of Tennessee Health Science Ctr. (USA); Prabhakar Pradhan, The Univ. of Memphis (USA) [10497-71]

Exploration and research on fluorescent material enhanced radionuclide optical signal strength, Sheng Zheng, Yawei Qu, General Hospital of Chinese People's Armed Police Forces (China); Xiaojun Zhang, Chinese PLA General Hospital (China); Zeyu Zhang, Xiaojing Shi, Zhenhua Hu, Chinese Academy of Sciences (China); Haifeng Liu, General Hospital of Chinese People's Armed Police Forces (China); Jie Tian, Institute of Automation (China) [10497-72]

A smartphone-based multispectral and multifunctional imaging system for cosmetic applications, Haeyun Lee, DGIST (Korea, Republic of); Minjoo Hwang, Daegu Gyeongbuk Institute of Science and Technology (Korea, Republic of); Sewoong Kim, Jae Youn Hwang, DGIST (Korea, Republic of) [10497-73]

Epi-fluorescence imaging with novel, portable illumination in microscopes, Kashif Islam, Macquarie Univ. (Australia); Ewa M. Goldys, Macquarie Univ. (Australia) and Ctr. for Nanoscale Biophotonics (CNBP) (Australia); Martin Ploschner, Martin G. Gosnell, Ayad G. Anwer, Macquarie Univ. (Australia) [10497-74]

Photopolymerization of BSA using visible light, William Pelletier, Gabriel Chouinard, Jonathan M. Belisle, Cégep de La Pocatière (Canada) [10497-75]

Detection of changes in bone quality of osteoporotic model induced by sciatic nerve resection by using Raman spectroscopy, Yasumitsu Ishimaru, Yusuke Oshima, Yuuki Imai, Tadahiro Iimura, Sota Takanezawa, Kazunori Hino, Hiromasa Miura, Ehime Univ. Graduate School of Medicine (Japan) [10497-76]

Quantifying cancer cell receptors with paired-agent fluorescence imaging: a novel method to account for tissue optical property effects, Negar Sadeghipour, Illinois Institute of Technology (USA); Scott C. Davis, Dartmouth College (USA); Kenneth M. Tichauer, Illinois Institute of Technology (USA) [10497-77]

Experimental realization of high quality biochemical XOR gate with optical detection, Yaroslav Filipov, Maria Gamella, Vladimir Privman, Evgeny Katz, Clarkson Univ. (USA) [10497-78]

Assessing indocyanine green loaded in different nanoparticles pharmacokinetics in tumor with a dynamic diffuse fluorescence tomography system, Yanqi Zhang, Guoyan Yin, Huijuan Zhao, Tianjin Univ. (China); Wenjuan Ma, Tianjin Medical Univ. Cancer Institute & Hospital (China); Feng Gao, Tianjin Univ (China); Limin Zhang, Tianjin Univ. (China) . . [10497-79]

Comparison of soil cultivation and hydroponic vegetables for analyzing microelement content using laser induced breakdown, Ming Zhu, Menghan Wang, Chuangsheng Lian, Xiao Peng, Junle Qu, Shenzhen Univ. (China) [10497-80]

Study of the cell activity in three-dimensional cell culture by using Raman spectroscopy, Pakajiraporn Arunngam, Anggara Mahardika, Kwasei Gakuin Univ. (Japan); Ishimaru Junko, Kyoto Univ. (Japan); Matsuyoshi Hiroko, Bibin B. Andriana, Kwasei Gakuin Univ. (Japan); Yasuhiko Tabata, Kyoto Univ. (Japan); Hidetoshi Sato, Kwasei Gakuin Univ. (Japan) [10497-81]

Forensic studies of fingerprints using a quantum cascade laser, Dongkwan Lee, Kevin Yeh, Univ. of Illinois (USA); Edward Bartick, The George Washington Univ. (USA); Rohit Bhargava, Univ. of Illinois (USA) [10497-82]

Fast antimicrobial susceptibility test based on hydrodynamic trapping, Giampaolo Pitruzzello, University of York (United Kingdom); Stephen Thorpe, Hermes Gadelha, Thomas F. Krauss, Univ. of York (United Kingdom). [10497-83]

WEDNESDAY 31 JANUARY

SESSION 6 **WED 8:00 AM TO 11:50 AM**

Spectral Imaging I

Session Chair: **Dan V. Nicolau**, McGill Univ. (Canada)

Imaging deep in the brain using dendritic upconverting nanoparticles, Mirna El Khatib, Perelman School of Medicine, Univ. of Pennsylvania (USA); Shane Plunkett, Univ. of Pennsylvania (USA); Ikbal Sencan, Massachusetts General Hospital (USA); Joshua E. Collins, Intelligent Material Solutions Inc. (USA); Sava Sakadžić, Massachusetts General Hospital (USA). [10497-37]

In situ detection of cancerous kidney tissue by means of fiber ATR-FTIR spectroscopy, Valdas Sablinskas, Martynas Velicka, Milda Pucetaite, Vidita Urboniene, Justinas Ceponkus, Rimante Bandzeviciute, Vilnius Univ. (Lithuania); Feliksas Jankevicius, Vilnius Univ. (Lithuania) and National Cancer Institute (Lithuania); Gerald Steiner, Vilnius Univ. (Lithuania) and TU Dresden (Germany) [10497-38]

Fiber-coupled multimodal imaging for non-destructive longitudinal assessment of novel vascular biomaterials, Ben E. Sherlock, Jennifer E. Phipps, Julien Bec, Laura Marcu, Univ. of California, Davis (USA) [10497-39]

Demystifying autofluorescence with excitation scanning hyperspectral imaging, Joshua Deal, Bradley Harris, Will Martin, Malvika Lall, Carmen Lopez, Paul Rider, Carole Boudreaux, Thomas Rich, Silas Leavesley, Univ. of South Alabama (USA). [10497-40]

High-speed precision-enhanced fluorescence lifetime imaging microscopy for combination with optical coherence tomography, Hyeong Soo Nam, Hanyang Univ. (Korea, Republic of); Woo Jae Kang, KAIST (Korea, Republic of); Min Woo Lee, Hanyang Univ. (Korea, Republic of); Joon Woo Song, Guro Hospital, Korea Univ. Medical Ctr. (Korea, Republic of); Jin Won Kim, Guro Hospital, Korea Univ. Medical Ctr. (Korea, Republic of); Wang-Yuhl Oh, KAIST (Korea, Republic of); Hongki Yoo, Hanyang Univ. (Korea, Republic of) [10497-41]

Microbeads embedded in AFM cantilevers broaden the atomic force microscopy to high resolution optical microscopy, Francesco Tantussi, Marti Duocastella, Remo Proietti Zaccaria, Andrea Jacassi, Alberto Diaspro, Francesco De Angelis, Istituto Italiano di Tecnologia (Italy) [10497-42]

Extended depth measurement for a Stokes sample imaging polarimeter, Alexander Dixon, Andrew Taberner, Martyn Nash, Poul Nielsen, The Univ. of Auckland (New Zealand) [10497-43]

Highly-sensitive quantitative thermal microscopy using gold nanoparticles as heat sources, Antoine Federici, PHASICS S.A. (France); Hadrien Robert, PHASICS S.A. (France) and Institut Fresnel (France); Kahina Meziane, PHASICS S.A. (France) and Univ. Paris-Saclay (France); Serge Monneret, Guillaume Baffou, Institut Fresnel (France); Benoit Wattellier, PHASICS S.A. (France) [10497-44]

Evaluation of degenerative changes in articular cartilage of osteoarthritis by Raman spectroscopy, Yusuke Oshima, Hiroshi Kiyomatsu, Hiromasa Miura, Ehime Univ. (Japan) [10497-45]

Age determination of animal bones and tusks by Raman spectroscopy, Anna V. Sharikova, Lubna N. Peerzada, Univ. at Albany (USA) [10497-46]

Lunch/Exhibition Break Wed 11:50 am to 1:20 pm

SESSION 7 **WED 1:20 PM TO 3:20 PM**

Spectral Imaging II

Session Chair: **Dan V. Nicolau**, McGill Univ. (Canada)

Real-time mapping of cytokine gradients photonic resonant imaging technology, José Juan-Colás, Steven Johnson, Thomas F. Krauss, Univ. of York (United Kingdom) [10497-47]

Mie scattering characterization by ultra-spectral illumination using micro-sized tunable liquid crystal optical filters, Fartash Vasefi, Spectral Molecular Imaging, Inc. (USA); Russell Barbour, Spectral Molecular Imaging, Inc. (USA) and Advanced Microcavity Sensors LLC (USA); Caleb Stoltzfus, Montana State Univ. (USA) and Advanced Microcavity Sensors LLC (USA); Zeb Barber, Montana State Univ. (USA); Daniel Farkas, Spectral Molecular Imaging, Inc. (USA) and The Univ. of Southern California (USA) [10497-48]

Fully packaged confocal endomicroscopic system using Lissajous fiber scanner for indocyanine green in-vivo imaging, Kyungmin Hwang, Jinhyo Ahn, Yeong-Hyeon Seo, Jeo-Beom Kim, KAIST (Korea, Republic of); Kyunghee Han, Hyunjoo In-Tech Co., Ltd. (Korea, Republic of); Daniel Y. Kim, Pilhan Kim, Ki-Hun Jeong, KAIST (Korea, Republic of) [10497-49]

Quantitative 3D collagen fiber orientation using polarized light microscopy, Ian A. Sigal, Ning-Jiun Jan, Bryn Brazile, Kira Lathrop, Bin Yang, Univ. of Pittsburgh (USA) [10497-50]

Investigating the potentials of multimodal imaging based on multispectral imaging, high-frequency ultrasound B-mode and elastographic techniques for 3D examination of human colorectal tumors ex vivo, Jihun Kim, Daegu Gyeongbuk Institute of Science and Technology (Korea, Republic of); Hyung-Jin Yoon, Seoul National Univ. (Korea, Republic of); Jun-Young Kim, Kyungpook National Univ. Hospital (Korea, Republic of); Eunjoon Kim, Daegu Gyeongbuk Institute of Science and Technology (Korea, Republic of); Anna Seo, Kyungpook National Univ. (Korea, Republic of); Jae Youn Hwang, Daegu Gyeongbuk Institute of Science and Technology (Korea, Republic of) [10497-51]

Supramolecular organization of collagenous tissues probed by polarization-modulated SHG microscopy, Raffaella Mercatelli, Istituto Nazionale di Ottica (Italy); Fulvio Ratto, Francesca Rossi, Francesca Tatini, Istituto di Fisica Applicata "Nello Carrara" (Italy); Luca Menabuoni, Alex Malandrini, Azienda USL 4 (Italy); Roberto Pini, Istituto di Fisica Applicata "Nello Carrara" (Italy); Francesco S. Pavone, Univ. degli Studi di Firenze (Italy); Riccardo Cicchi, Istituto Nazionale di Ottica (Italy). [10497-52]

CONFERENCE 10498

Sunday–Tuesday 28–30 January 2018 • Proceedings of SPIE Vol. 10498

Multiphoton Microscopy in the Biomedical Sciences XVIII

Conference Chairs: Ammasi Periasamy, Univ. of Virginia (USA); Peter T. C. So, Massachusetts Institute of Technology (USA); Karsten König, Univ. des Saarlandes (Germany); Xiaoliang S. Xie, Harvard Univ. (USA), Peking Univ. (China)

Program Committee: Holly Aaron, Univ. of California, Berkeley (USA); Margarida Barroso, Albany Medical College (USA); Wolfgang Becker, Becker & Hickl GmbH (Germany); Alberto Diaspro, Istituto Italiano di Tecnologia (Italy); Chen-Yuan Dong, National Taiwan Univ. (Taiwan); Paul J. Campagnola, Univ. of Wisconsin–Madison (USA); Ji-Xin Cheng, Purdue Univ. (USA); Kevin W. Eliceiri, Univ. of Wisconsin–Madison (USA); Scott Fraser, The Univ. of Southern California (USA); Paul M. W. French, Imperial College London (United Kingdom); Katsumasa Fujita, Osaka Univ. (Japan); Enrico Gratton, Univ. of California, Irvine (USA); Min Gu, RMIT Univ. (Australia); Stefan W. Hell, Max-Planck-Institut für Biophysikalische Chemie (Germany); Fu-Jen Kao, National Yang-Ming Univ. (Taiwan); Arnd K. Krueger, Spectra-Physics (USA); Joseph R. Lakowicz, Univ. of Maryland School of Medicine (USA); Steve M. McDonald, Coherent, Inc. (USA); Wei Min, Columbia Univ. (USA); Junle Qu, Shenzhen Univ. (China); Angelika C. Rueck, Univ. Ulm (Germany); Yuansheng Sun, ISS, Inc. (USA); Steven S. Vogel, National Institutes of Health (USA); Chris Xu, Cornell Univ. (USA); Elena V. Zagaynova, Nizhny Novgorod State Medical Academy (Russian Federation); Bernhard Zimmermann, Carl Zeiss Jena GmbH (Germany)

Conference Cosponsors:



SUNDAY 28 JANUARY

OPENING REMARKS 8:15 AM TO 8:30 AM

SESSION 1 SUN 8:30 AM TO 11:00 AM

Keynote Session

Session Chair: Ammasi Periasamy, Univ. of Virginia (USA)

Seeing molecular vibrations: chemical imaging for biomedicine (Keynote Presentation), Wei Min, Columbia Univ. (USA) [10498-1]

Spectroscopic signatures of cells metabolism and extracellular species using phasor-FLIM (Keynote Presentation), Enrico Gratton, Univ. of California, Irvine (USA) [10498-2]

Metabolic imaging of tumor for diagnosis and response for therapy (Keynote Presentation), Elena V. Zagaynova, Marina V. Shirmanova, Nizhny Novgorod State Medical Academy (Russian Federation); Maria Lukina, Nizhny Novgorod State Medical Academy (Russian Federation) and Nizhny Novgorod State Univ. (Russian Federation); Tatiana Kalganova, Varvara Dudenkova, Vadim Elagin, Irena Shlivko, Nizhny Novgorod State Medical Academy (Russian Federation); Vladislav I. Shcheslavskiy, Becker & Hickl GmbH (Germany) [10498-3]

Photoacoustic tomography: Ultrasonically beating optical diffusion for deep imaging (Keynote Presentation), Lihong V. Wang, California Institute of Technology (USA) [10498-4]

SESSION 2 SUN 11:00 AM TO 12:10 PM

Metabolism/NADH/FAD.Tryptophan I

Session Chair: Angelika C. Rueck, Univ. Ulm (Germany)

Ultra-fast hybrid detectors improve NAD(P)H FLIM (Invited Paper), Wolfgang Becker, Becker & Hickl GmbH (Germany) [10498-5]

Multiparametric analysis of tumor development and chemotherapy-induced changes using FLIM (Invited Paper), Marina V. Shirmanova, Maria Lukina, Irina Druzhkova, Lyubov Shimolina, Nizhny Novgorod State Medical Academy (Russian Federation); Marina Kuimova, Imperial College London (United Kingdom); Tatyana Sergeeva, Alena Gavrina, Varvara Dudenkova, Elena V. Zagaynova, Nizhny Novgorod State Medical Academy (Russian Federation) [10498-6]

Phasor fluorescence lifetime microscopy of NADH to analyze metabolic activity of adipocytes, Michael Evers, Nunciada Salma, Sam Osseiran, Malte J. Casper, Massachusetts General Hospital (USA); Reginald Birngruber, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Conor L. Evans, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Dieter Manstein, Massachusetts General Hospital (USA) [10498-7]

Single-cell metabolism predicts drug response in patient-derived pancreatic cancer organoids, Joe T. Sharick, Vanderbilt Univ. (USA) and Morgridge Institute for Research (USA); Alexander A. Parikh, Vanderbilt Univ. (USA); Jillian K. Johnson, Lingjun Li, Cheri A. Pasch, Dustin A. Deming, Univ. of Wisconsin–Madison (USA); Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin–Madison (USA) [10498-8]

Lunch/Exhibition Break Sun 12:10 pm to 1:30 pm

SESSION 3 SUN 1:30 PM TO 4:00 PM

Metabolism/NADH/FAD.Tryptophan II

Session Chair: Elena V. Zagaynova, Nizhny Novgorod State Medical Academy (Russian Federation)

Two-photon luminescence lifetime imaging microscopy (LIM) to follow up cell metabolism and oxygen consumption during theranostic applications (Invited Paper), Angelika C. Rueck, Jasmin Brey Mayer, Univ. Ulm (Germany); Lothar D. Lilge, Univ. Health Network (Canada) and Univ. of Toronto (Canada); Arkadii Mandel, Theralase Technologies, Inc. (Canada); P. Schäfer, Bjorn von Einem, Christine A. F. von Arnim, Sviatlana Kalinina, Univ. Ulm (Germany) [10498-9]

Metabolic imaging for breast cancer detection and treatment (Invited Paper), V. Krishnan Ramanujan, Cedars-Sinai Medical Ctr. (USA) .. [10498-10]

3D multiphoton autofluorescence imaging of fixed tissues: feasibility and potential values for biomedical applications (Invited Paper), Lin Z. Li, The Univ. of Pennsylvania Health System (USA); Marissa Masek, TissueVision, Inc. (USA); Ting Wang, He N. Xu, Lily Moon, Min Feng, Karthikeyani Chellappa, Shoko Nioka, Joseph A. Baur, The Univ. of Pennsylvania Health System (USA); Timothy M. Ragan, TissueVision, Inc. (USA) [10498-11]

Non-invasive metabolic imaging of melanoma progression, Hauke Studier, Becker & Hickl GmbH (Germany); Michael S. Roberts, The Univ. of Queensland School of Medicine (Australia); Michael Pastore, Univ. of South Australia (Australia); Wolfgang Becker, Becker & Hickl GmbH (Germany) [10498-12]

Discrete region-of-interest (ROI) method detects differential responses to treatment measuring redox states in auto-fluorescent NAD(P)H, FAD and Trp in prostate cancer cells: A TCSPC FLIM study, Horst K. Wallrabe, Shaguftha Rehman Alam, Zdeněk Svindrych, Ammasi Periasamy, Univ. of Virginia (USA) [10498-13]

Mitochondrial protein knockouts induce changes in the fluorescence lifetimes of NAD(P)H and FAD, Amani Gillette, Univ. of Wisconsin-Madison (USA) and Morgridge Institute for Research (USA); Peter Favreau, Jarred Rensvold, Ava VanDommelen, Morgridge Institute for Research (USA); David Pagliarini, Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA) [10498-14]

Protoporphyrins in multimodal fluorescence cancer detection, Julia Horilova, Univ. of SS. Cyril and Methodius (Slovakia); Dusan Chorvat Jr., International Laser Ctr. (Slovakia); Michal Cagalinec, Slovak Academy of Sciences (Slovakia); Alzbeta Marcek Chorvatova, International Laser Ctr. (Slovakia) and Univ. of SS. Cyril and Methodius (Slovakia) [10498-15]

SESSION 4 SUN 4:00 PM TO 5:05 PM

Technology and In Vivo Imaging I

Session Chair: **Peter T. C. So**, Massachusetts Institute of Technology (USA)

Liquid tunable microscopy under two-photon excitation regime (*Invited Paper*), Alberto Diaspro, Istituto Italiano di Tecnologia (Italy) [10498-16]

Tunable high peak power femtosecond laser sources for biological imaging, Sebastian Peck, Spectra-Physics (USA) [10498-17]

Recent advances in lasers for multiphoton microscopy, Marco Arrigoni, Darryl McCoy, Coherent, Inc. (USA) [10498-18]

Module for multiphoton high-resolution hyperspectral imaging and spectroscopy, Aram Zeytunyan, Tommaso Baldacchini, Ruben Zadoyan, Newport Corp. (USA) [10498-19]

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Session Chairs: **Holly Aaron**, Univ. of California, Berkeley (USA); **Eric O. Potma**, Univ. of California, Irvine (USA); **Michael Börsch**, Universitätsklinikum Jena (Germany); **Chen-Yuan Dong**, National Taiwan Univ. (Taiwan); **Vladislav I. Shcheslavskiy**, Becker & Hickl GmbH (Germany)

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Photoacoustic detection of molecular-specific CARS signals, Marco Andreana, Angelika Unterhuber, Medizinische Univ. Wien (Austria); Wolfgang Rohringer, Balthasar Fischer, XARION Laser Acoustics GmbH (Austria); Wolfgang Drexler, Medizinische Univ. Wien (Austria); Stefan Preisser, Medizinische Univ. Wien (Austria) and XARION Laser Acoustics GmbH (Austria) [10498-69]

Simple fibre based dispersion management for two-photon excited fluorescence imaging through an endoscope, Dominik Marti, Konstantinos Dimopoulos, Peter E. Andersen, DTU Risø Campus (Denmark) [10498-70]

Ultra-fast stimulated Raman scattering (SRS) hyper-spectral imaging with an acousto-optic delay line, Xavier Audier, Naveen Balla, Institut Fresnel (France); Nicolas Forget, Fastlite (France); Hervé Rigneault, Institut Fresnel (France) [10498-71]

Rapid and lossless bandwidth-switching of a fiber-based optical parametric oscillator for multimodal nonlinear microscopy, Maximilian Brinkmann, Tim Hellwig, Carsten Fallnich, Westfälische Wilhelms- Univ. Münster (Germany) [10498-72]

Electronically tunable femtosecond all-fiber optical parametric oscillator for multi-photon microscopy, Tim Hellwig, Maximilian Brinkmann, Carsten Fallnich, Westfälische Wilhelms- Univ. Münster (Germany) [10498-73]

Optimizing Ti:Sa laser for quantitative biomedical imaging, Jeemol James, Hanna Thomsen, Dag Hanstorp, Felipe Ademir Alemán Hernández, Göteborgs Univ. (Sweden); Sebastian Rothe, CERN (Switzerland); Jonas Enger, Marica B. Ericson, Göteborgs Univ. (Sweden) [10498-74]

Spatially confined photoinactivation of bacteria: towards novel tools for detailed mechanistic studies, Hanna Thomsen, Fabrice Graf, Jeemol James, Anne Farewell, Göteborgs Univ. (Sweden) [10498-75]

Femtosecond semiconductor disk lasers: a promising tool for the future of multiphoton imaging, Florian M. Emaury, ETH Zurich (Switzerland); Fabian F. Voigt, Brain Research Institute, Univ. Zürich (Switzerland) and Neuroscience Ctr. Zurich, Univ. Zürich (Switzerland) and ETH Zurich (Switzerland); Philipp Bethge, Brain Research Institute, Univ. Zürich (Switzerland); Dominik Waldburger, Sandro M. Link, ETH Zurich (Switzerland); Stefano Carta, Alexander van der Bourg, Brain Research Institute, Univ. Zürich (Switzerland); Fritjof Helmchen, Brain Research Institute, Univ. Zürich (Switzerland) and Neuroscience Ctr. Zurich, Univ. Zürich (Switzerland) and ETH Zurich (Switzerland); Ursula Keller, ETH Zurich (Switzerland) . . [10498-76]

In vivo multiphoton and fluorescence lifetime imaging microscopy of the healthy and diseased liver, Daria Kuznetsova, Varvara Dudenkova, Nizhny Novgorod State Medical Academy (Russian Federation); Nikolay Bobrov, Nikolay Kiselev, The Volga District Medical Ctr. of Federal Medical and Biological Agency (Russian Federation); Vladimir Zagainov, Nizhny Novgorod State Medical Academy (Russian Federation) and The Volga District Medical Ctr. of Federal Medical and Biological Agency (Russian Federation); Elena V. Zagaynova, Nizhny Novgorod State Medical Academy (Russian Federation) [10498-77]

Two-photon activation of endogenous store-operated calcium channels without optogenetics, Pan Cheng, Wanyi Tang, Hao He, Shanghai Jiao Tong Univ. (China) [10498-78]

Non-planar microscopy via multi-pupil wavefront shaping, Lingjie Kong, Tsinghua Univ. (China); Yifeng Zhou, Meng Cui, Purdue Univ. (USA) . [10498-79]

Integrated SRS and two-photon fluorescence microscopy for in vivo study of spinal cord injury, Wanjie Wu, Congping Chen, Jianan Y. Qu, Xuesong Li, Hong Kong Univ. of Science and Technology (Hong Kong, China) [10498-80]

Stimulated emission and spontaneous loss pump-probe microscopy for background removal, Subir Das, Bo-Wei Ho, Fu-Jen Kao, National Yang-Ming Univ. (Taiwan) [10498-81]

Rapid volumetric multiphoton imaging with the combination of an ultrasonic lens and a resonant mirror, Chia Wei Hsu, Shean-Jen Chen, National Chiao Tung Univ. (Taiwan) [10498-82]

Novel excitation source using active mode-locked SOA fiber laser for multi-photon microscopy, Seung Won Jun, Chang-Seok Kim, Hansol Jang, Gyeong Hun Kim, Pusan National Univ. (Korea, Republic of) [10498-83]

Three-dimensional deformation tracking of collagen scaffold induced by the cell motions using second harmonic microscopy with digital volume correlation method, Yong Guk Kang, Hwanseok Jang, Taeseok Daniel Yang, Korea Univ. (Korea, Republic of); Jacob Notbohm, Univ. of Wisconsin-Madison (USA); Youngwoon Choi, Yongdoo Park, Beop-Min Kim, Korea Univ. (Korea, Republic of) [10498-84]

Enhancement of measurement speed and photon economy in multiphoton detected fluorescence lifetime imaging microscopy, Dongeun Kim, Wonsang Hwang, Yonsei Univ. (Korea, Republic of); Youngjae Won, Medical Device Development Ctr., Osong Medical Innovation Foundation (Korea, Republic of); Sucbe Moon, Kookmin Univ. (Korea, Republic of); Dugyoung Kim, Yonsei Univ. (Korea, Republic of) . . . [10498-85]

Three-photon tissue imaging by using moxifloxacin, Seunghun Lee, Jun Ho Lee, Tae Jun Wang, Won Hyuk Jang, Yeoreum Yoon, Bumju Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Myoung Joon Kim, Univ. of Ulsan College of Medicine (Korea, Republic of) and Asan Medical Ctr. (Korea, Republic of); Ki Hean Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [10498-86]

Label-free imaging of acanthamoeba using multimodal nonlinear optical microscopy, Tsubasa Kobayashi, Yuichi Kaji, Tetsuo Oshika, Univ. of Tsukuba (Japan); Philippe Leproux, Vincent Couderc, XLIM Institut de Recherche (France); Hideaki Kano, Univ. of Tsukuba (Japan) [10498-87]

Wide field video-rate two-photon imaging by using spinning disk beam scanner, Yasuhiro Maeda, Kazuo Kurokawa, Yoko Ito, Akihiko Nakano, Satoshi Wada, RIKEN Ctr. for Advanced Photonics (Japan) [10498-88]

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- Improvement of two-photon microscopic imaging in deep regions of living mouse brains by utilizing a light source based on an electrically controllable gain-switched laser diode**, Kazuaki Sawada, Ryosuke Kawakami, Hokkaido Univ. (Japan); Yi-Cheng Fang, Jui-Hung Hung, Yuichi Kozawa, Tohoku Univ. (Japan); Kohei Otomo, Hokkaido Univ. (Japan); Shunichi Sato, Hiroyuki Yokoyama, Tohoku Univ. (Japan); Tomomi Nemoto, Hokkaido Univ. (Japan) [10498-89]
- Two-dimensional auto-correlation analysis and Fourier-transform analysis of second-harmonic-generation image for quantitative analysis of collagen fiber in human facial skin**, Yuki Ogura, Shiseido Co., Ltd. (Japan); Yuji Tanaka, Osaka Univ. (Japan); Eiji Hase, Tokushima Univ. (Japan); Toyonobu Yamashita, Shiseido Co., Ltd. (Japan); Takeshi Yasui, Tokushima Univ. (Japan) [10498-90]
- A RhoA-FRET biosensor mouse for intravital imaging in normal tissue homeostasis and disease contexts**, Max Nobis, David Herrmann, Sean C. Warren, Garvan Institute of Medical Research (Australia); Kurt I. Anderson, The Francis Crick Institute (United Kingdom); Paul Timpson, Garvan Institute of Medical Research (Australia) [10498-91]
- Large scale serial two-photon microscopy to investigate local vascular changes in whole rodent brain models of Alzheimer's disease**, Patrick Delafontaine-Martel, Ecole Polytechnique de Montréal (Canada) [10498-92]
- Hyperspectral and multimodal CARS microscopy in the spectral fingerprint region: Live imaging of *Euglena gracilis***, Joel T. Tabarangao, Jeremy G. Porquez, Aaron D. Slepokov, Trent Univ. (Canada) [10498-93]
- Enabling random access imaging in spatial frequency-modulated multifocal multiphoton microscopy**, Alyssa Allende Motz, Jeff Squier, Nathan G. Worts, Colorado School of Mines (USA); Randy A. Bartels, Colorado State Univ. (USA); Chris Hoy, Boulder Nonlinear Systems (USA); Jeff J. Field, Colorado State Univ. (USA); Michael D. Young, Colorado School of Mines (USA) [10498-94]
- In vivo nonlinear optical microscopy of human skin using a dual-wavelength compact femtosecond fiber laser**, Mihaela Balu, Jue Hou, Beckman Laser Institute and Medical Clinic (USA); Eric O. Potma, Univ. of California, Irvine (USA); Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA) [10498-95]
- An isogeometric approach to the forward problem of multi-photon tomography with radiative transfer equation**, Vahid Bateni, Virginia Polytechnic Institute and State Univ. (USA) [10498-96]
- Automated processing workflow for broadband coherent anti-Stokes Raman scattering (BCARS) microspectroscopy**, Charles H. Camp Jr., Marcus T. Cicerone, National Institute of Standards and Technology (USA) [10498-97]
- A nonlinear concentration effect in coherent anti-Stokes Raman scattering (CARS)**, Charles H. Camp Jr., Marcus T. Cicerone, National Institute of Standards and Technology (USA) [10498-98]
- Two-photon excitation STED microscopy towards deep imaging**, Iván Coto Hernández, Massachusetts Eye and Ear Infirmary (USA); Giuseppe Vicidomini, Luca Lanzaò, Alberto Diaspro, Istituto Italiano di Tecnologia (Italy); Nate Jowett, Massachusetts Eye and Ear Infirmary (USA) [10498-99]
- Information-efficient spectral imaging using a spectral phasor camera**, Farzad Fereidouni, Richard Levenson, Univ. of California, Davis (USA) [10498-100]
- Quantitative 3-dimensional imaging of auxin and cytokinin levels in transgenic soybean and medicago truncatula roots via two-photon induced fluorescence imaging**, Jon Fisher, South Dakota School of Mines and Technology (USA); Paul Gaillard, Carl Fellbaum, Sen Subramaniam, South Dakota State Univ. (USA); Steve J. Smith, South Dakota School of Mines and Technology (USA) [10498-101]
- Morphological image features of spontaneous and colitis-associated murine colorectal tumors**, Sandra P. Gordon, Cassandra L. Reed, Timothy J. Muldoon, Univ. of Arkansas (USA) [10498-102]
- Polymer dots enable deep in vivo multiphoton fluorescence imaging of cerebrovascular architecture**, Ahmed Hassan, The Univ. of Texas at Austin (USA); Xu Wu, Univ. of Washington (USA); Jeremy W. Jarrett, David R. Miller, Yen-Liang Liu, Evan P. Perillo, The Univ. of Texas at Austin (USA); Daniel T. Chiu, Univ. of Washington (USA); Hsin-Chih Yeh, Andrew K. Dunn, The Univ. of Texas at Austin (USA) [10498-103]
- Characterization of a reflective objective with multiphoton microscopy**, Mohammad M. Kabir, Kimani C. Toussaint Jr., Mayandi Sivaguru, Aakash M. Choubal, Univ. of Illinois (USA) [10498-104]
- Improved reference standards for femtosecond three-photon excitation of fluorescence in the wavelength range 950 - 1750 nm**, Aleksander K. Rebane, Alexander Mikhaylov, Montana State Univ. (USA) [10498-105]
- High-sensitivity label-free imaging with Doppler Raman microscopy**, David Smith, Randy A. Bartels, Jeff J. Field, Jesse Wilson, Colorado State Univ. (USA); David Winters, Kapteyn-Murnane Labs., Inc. (USA); Daniel Kane, Mesa Photonics, LLC (USA); Scott Domingue, Kapteyn-Murnane Labs., Inc. (USA) [10498-106]
- Optical parametric amplification of gated confocal reflectance microscopy signals in scattering media**, Yi Sun, Haohua Tu, JangHyuk Lee, Sixian You, Stephen A. Boppart, Univ. of Illinois (USA) [10498-107]
- Resolution enhancement of 2-photon microscopy using high-refractive index microspheres**, Kayvan F. Tehrani, The Univ. of Georgia (USA); Arash Darafsheh, Washington Univ. School of Medicine in St. Louis (USA); Luke J. Mortensen, The Univ. of Georgia (USA) [10498-108]
- Emission of polarized second harmonic generation from a depolarized source**, James R. W. Ulcickas, Changqin Ding, Fengyuan Deng, Garth J. Simpson, Purdue Univ. (USA) [10498-109]
- Comparison of excitation wavelengths for in vivo deep imaging of mouse brain**, Mengran Wang, Chunyan Wu, Bo Li, Fei Xia, David Sinefeld, Chris Xu, Cornell Univ. (USA) [10498-110]
- Laser machined modulation masks enable enhanced resolution for spatial frequency modulated imaging**, Nathan G. Worts, Michael D. Young, Jeff Squier, Colorado School of Mines (USA); Patrick Stockton, Keith Wernsing, Jeff J. Field, Randy A. Bartels, Colorado State Univ. (USA); Jason Jones, Moog Inc. (USA) [10498-111]
- Label-free intravital imaging of cellular dynamics by simultaneous tetra-modal multiphoton microscopy**, Sixian You, Haohua Tu, Yi Sun, Eric J. Chaney, Marina Marjanovic, Stephen A. Boppart, Univ. of Illinois (USA) [10498-112]
- Monitoring agrochemical diffusion through cuticle wax with coherent Raman scattering**, Nick Gaunt, Julian Moger, Univ. of Exeter (United Kingdom); Niall Thomson, Faheem Padia, Syngenta Holdings Ltd. (United Kingdom) [10498-113]
- Novel snapshot hyperspectral imager for fluorescence imaging**, Andrea Chandler, Palo Alto High School (USA); Ammasi Periasamy, Univ. of Virginia (USA); Lynn L. Chandler, BaySpec, Inc. (USA) [10498-114]
- Monitoring of the caspase-3 activity in tumor xenografts by FLIM-FRET**, Victoria V. Zherdeva, A.N. Bach Institute of Biochemistry (Russian Federation); Vladislav I. Shcheslavskiy, Becker & Hickl GmbH (Germany); Alexander P. Savitsky, A.N. Bach Institute of Biochemistry (Russian Federation) [10498-115]
- Quantitative birefringence assessment of spinal cord injury using circularly polarized coherent anti-Stokes Raman scattering microscopy**, Kideog Bae, Wei Zheng, Zhiwei Huang, Optical Bioimaging Lab (Singapore) [10498-116]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

MONDAY 29 JANUARY

SESSION 5..... MON 8:00 AM TO 10:00 AM

FLIM/FRET/FCS I

Session Chair: **Kevin W. Eliceiri**, Univ. of Wisconsin-Madison (USA)

Discrimination of autofluorescence and immunofluorescence in lung tissue using spectral FLIM, Sumeet Rohilla, Benedikt Kraemer, Paja Reisch, Eugeny Ermilov, Felix Koberling, Matthias Patting, Uwe Ortmann, PicoQuant GmbH (Germany); Ingo Gregor, Georg-August-Univ. Göttingen (Germany); Rainer Erdmann, PicoQuant GmbH (Germany); Andreas Hocke, Charité Universitätsmedizin Berlin (Germany)[10498-27]

A time-gated large-array SPAD camera for picosecond resolution real-time FLIM, Arin Can Ulku, Claudio Bruschini, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Shimon Weiss, Xavier Michalet, Univ. of California, Los Angeles (USA); Edoardo Charbon, Ecole Polytechnique Fédérale de Lausanne (Switzerland)[10498-21]

Spectro-temporal multiphoton lifetime imaging, Sebastian Nino Karpf, Bahram Jalali, Univ. of California, Los Angeles (USA)[10498-22]

Unmixing spectrally overlapping FRET biosensors in vivo using multispectral FLIM, Sean C. Warren, Astrid Magenau, Max Nobis, David Herrmann, Pauline Méléneç, Garvan Institute of Medical Research (Australia); Kurt I. Anderson, The Francis Crick Institute (United Kingdom); Owen J. Sansom, Jennifer P. Morton, The Beatson Institute for Cancer Research (United Kingdom); Heidi C. Welch, Babraham Institute (United Kingdom); Paul Timpson, Garvan Institute of Medical Research (Australia)[10498-23]

Two-photon FLIM imaging and femtosecond laser nano processing of IPS cells and stem cells (Invited Paper), Karsten König, JenLab GmbH (Germany); Aisada Uchugonova, Univ. des Saarlandes (Germany); Hans Georg Breunig, Ana Batista, JenLab GmbH (Germany)[10498-24]

Measuring upconversion nanoparticles photoluminescence lifetime with FastFLIM and phasor plots (Invited Paper), Yuansheng Sun, Ulas C. Coskun, Shih-Chu Jeff Liao, Beniamino Barbieri, ISS, Inc. (USA)[10498-25]

Near infrared fluorescence lifetime FRET imaging of target engagement at multiscale (Invited Paper), Margarida Barroso, Alena Rudkouskaya, Jamie Ward, Joseph E. Mazurkiewicz, Albany Medical College (USA); Nattawut Sinsuebphon, Sez-Jade Chen, Xavier Intes, Rensselaer Polytechnic Institute (USA)[10498-26]

SESSION 6..... MON 10:30 AM TO 12:10 PM

FLIM/FRET/FCS II

Session Chairs: **Yuansheng Sun**, ISS, Inc. (USA); **Margarida Barroso**, Albany Medical College (USA)

Quantitative ultra-fast FLIM (Invited Paper), Uwe Ortmann, Paja Reisch, Benedikt Kraemer, Mariano Gonzales Pistil, Marcelle Koenig, Rhys Dowler, Marcus Sackrow, Matthias Patting, Tino Roehlicke, Hans-Jürgen Rahn, Michael Wahl, Felix Koberling, Rainer Erdmann, PicoQuant GmbH (Germany)[10498-20]

Monitoring conformational changes of the GPCR neurotensin receptor 1 by single-molecule FRET (Invited Paper), Thomas Heitkamp, Hendrik Sielaff, Universitätsklinikum Jena (Germany); Reinhard Grisshammer, National Institute of Neurological Disorders and Stroke (USA); Michael Börsch, Universitätsklinikum Jena (Germany)[10498-28]

A non-Euclidean phasor approach for distinction of fluorescent compounds using two-photon fluorescence lifetime imaging microscopy in ex vivo human skin, Sam Osseiran, Elisabeth M. Roeder, Hequn Wang, Yusuke Suita, Michael Murphy, David E. Fisher, Conor L. Evans, Massachusetts General Hospital (USA)[10498-29]

Macroscopic time-resolved imaging of tumor, Vladislav I. Shcheslavskiy, Becker & Hickl GmbH (Germany); Marina V. Shirmanova, Nizhny Novgorod State Medical Academy (Russian Federation); Victoria Zherdeva, A.N. Bach Institute of Biochemistry (Russian Federation); Alena Gavrina, Varvara Dudenkova, Elena V. Zagaynova, Nizhny Novgorod State Medical Academy (Russian Federation); Alexander Savitskiy, A.N. Bach Institute of Biochemistry (Russian Federation); Wolfgang Becker, Becker & Hickl GmbH (Germany)[10498-30]

FastFLIM, the all-in-one engine for measuring photoluminescence lifetime of 100 picoseconds to 100 milliseconds, Yuansheng Sun, Ulas C. Coskun, Shih-Chu Jeff Liao, Beniamino Barbieri, ISS, Inc. (USA)[10498-31]

In vivo measurement of astrocytic endfoot Ca²⁺ and parenchymal vessel responses during 4-AP induced epilepsy using two-photon fluorescence lifetime microscopy, Cong Zhang, Maryam Tabatabaei, Samuel Bélanger, Ecole Polytechnique de Montréal (Canada); Hélène Girouard, Univ. de Montréal (Canada); Mohammad Moeini, Xuecong Lu, Frédéric Lesage, Ecole Polytechnique de Montréal (Canada)[10498-32]

Lunch Break Mon 12:10 pm to 1:30 pm

SESSION 7..... MON 1:30 PM TO 2:50 PM

Second/Third Harmonic Generation

Session Chair: **Paul J. Campagnola**, Univ. of Wisconsin-Madison (USA)

Analysis of collagen architecture alterations in human ovarian cancer via pixel based SHG polarization analyses (Invited Paper), Kirby Campbell, Rajeev Chaudhary, Julia Handel, Paul J. Campagnola, Univ. of Wisconsin-Madison (USA)[10498-33]

Polarization resolved second harmonic microscopy, Fu-Jen Kao, National Yang-Ming Univ. (Taiwan); Gitanjal Deka, National Taiwan Univ. (Taiwan); Nirmal Mazumder, Manipal Univ. (India); Guan-Yu Zhuo, Institute of Medical Science & Technology, National Sun Yat-sen Univ. (Taiwan); Ankur Gogoi, Jagannath Barooah College (India); Wei-Wen Wu, Taipei City Hospital (Taiwan)[10498-34]

Second harmonic generation microscopy of the living human cornea, Pablo Artal, Francisco Ávila, Juan Bueno, Lab. de Óptica Univ. de Murcia (Spain)[10498-35]

Construction of a combined Mueller Matrix polarimeter and second harmonic generation imaging system for tissue characterization, Jessica C. Ramella-Roman, Pedro Lopez, Ilyas Saytashev, Florida International Univ. (USA)[10498-36]

Live imaging with wide-field second harmonic generation microscopy, Virginijus Barzda, Haitao Zhao, Richard Cisek, Abiramy Karunendiran, Univ. of Toronto Mississauga (Canada)[10498-37]

AWARD PRESENTATION.....2:50 PM TO 3:05 PM
Session Chair: **Ammasi Periasamy**, Univ. of Virginia (USA)

SESSION 8..... MON 3:25 PM TO 5:00 PM

Technology and In Vivo Imaging II

Session Chair: **Fu-Jen Kao**, National Yang-Ming Univ. (Taiwan)

Multiphoton imaging of tissue physiology in 3D (Invited Paper), Tzu Hsiang Lin, National Taiwan Univ. (Taiwan); Ji Wang, The Chinese Univ. of Hong Kong (Hong Kong, China); Hui-Wen Chen, National Taiwan Univ. College of Medicine (Taiwan); Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China); Chen-Yuan Dong, National Taiwan Univ. (Taiwan)[10498-38]

Rapid in vivo vertical tissue sectioning by multiphoton tomography, Ana Batista, Univ. des Saarlandes (Germany) and JenLab GmbH (Germany); Hans Georg Breunig, JenLab GmbH (Germany); Karsten König, JenLab GmbH (Germany) and Univ. des Saarlandes (Germany)[10498-39]

Scanless three-dimensional excitation and detection by selective access multifoci multiphoton microscopy, Yi Xue, Massachusetts Institute of Technology (USA)[10498-40]

In vivo three-photon imaging of deep mouse cerebellum, Mengran Wang, Tianyu Wang, Chunyan Wu, Bo Li, Dimitrie G. Ouzounov, David Sinefeld, Akash Guru, Cornell Univ. (USA); Hyung-Song Nam, Univ. of Utah (USA); Mario R. Capocchi, The Univ. of Utah (USA); Melissa R. Warden, Chris Xu, Cornell Univ. (USA)[10498-41]

High-scanning speed, high-resolution, and large-field of view fiber-optic two-photon endomicroscope, Wenxuan Liang, Johns Hopkins Univ. (USA); Kaiyan Li, Johns Hopkins Univ. (USA) and Southeastern Univ. (China); OHyeon-Cheol Park, Johns Hopkins Univ. (USA); Ming-Jun Li, Corning Incorporated (USA); Xingde Li, Johns Hopkins Univ. (USA)[10498-42]

Frequency-multiplexed multi-beam two photon imaging for recording of Ca²⁺ signals in neural ensembles, Dmitri A. Tsybolski, Natalia Orlova, Peter Saggau, Allen Institute (USA)[10498-43]

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TUESDAY 30 JANUARY

SESSION 9 TUE 8:10 AM TO 10:00 AM

Coherent Raman I

Session Chair: **Ji-Xin Cheng**, Purdue Univ. (USA)

Rapid fingerprint coherent Raman imaging and application to histopathology (*Invited Paper*), Marcus T. Cicerone, Charles H. Camp Jr., Wei-Wen Chen, National Institute of Standards and Technology (USA) [10498-44]

Bioimaging with a home-built multimodal nonlinear microscope based on a compact fiber-format laser system (*Invited Paper*), Francesco Crisafi, Vikas Kumar, Antonio Perri, Daniele Viola, Marco Marangoni, Giulio Cerullo, Dario Polli, Politecnico di Milano (Italy) [10498-45]

Spatial and spectral multiplexed stimulated Raman scattering with spectroscopic optical coherence tomography (*Invited Paper*), Francisco E. Robles, Georgia Institute of Technology (USA) [10498-46]

Improving sensitivity of stimulated Raman scattering microscopy with cavity dumped optical parametric oscillator and its application in brain imaging (*Invited Paper*), Wenlong Yang, Harvard Univ. (USA); Ingo Rimke, APE Angewandte Physik & Elektronik GmbH (Germany); Xiaoliang S. Xie, Harvard Univ. (USA); Gary Holtom, Consultant (USA) [10498-47]

From spectroscopy to chemical imaging: machine learning for hyperspectral coherent Raman imagery, Charles H. Camp Jr., National Institute of Standards and Technology (USA); Sean McIntyre, Arizona State Univ. (USA); Marcus T. Cicerone, National Institute of Standards and Technology (USA) [10498-48]

Metrology in nonlinear microscopy using harmonic generation nanoprobes, Pierre Mahou, Guy Malkinson, Elodie Chaudan, Thierry Gacoin, Emmanuel Beaurepaire, Willy Supatto, Ecole Polytechnique (France) [10498-49]

SESSION 10 TUE 10:20 AM TO 12:05 PM

Coherent Raman II

Session Chair: **Wei Min**, Columbia Univ. (USA)

Spectroscopic mapping with coherent IR and Raman microscopy (*Invited Paper*), Eric O. Potma, Richard Prince, Adam M. Hanninen, of California, Irvine (USA) [10498-50]

Seeing unseen, knowing unknown: Application of stimulated Raman scattering microscopy in revealing lipid metabolic regulation (*Invited Paper*), Meng Wang, Baylor College of Medicine (USA) [10498-51]

Integrated SRS and fluorescence imaging for study of thermogenesis and lipid metabolism in vivo (*Invited Paper*), Jianan Y. Qu, Hong Kong Univ. of Science and Technology (Hong Kong, China) [10498-52]

Imaging the general metabolic activities in solid tumor using SRS, Lingyan Shi, Wei Min, Columbia Univ. (USA) [10498-53]

From coherent Raman microscopy to coherent Raman endoscopy, Hervé Rigneault, Institut Fresnel (France) [10498-54]

Hyperspectral imaging with laser-scanning sum-frequency generation microscopy, Adam M. Hanninen, Eric O. Potma, Univ. of California, Irvine (USA) [10498-55]

Lunch/Exhibition Break Tue 12:05 pm to 1:05 pm

SESSION 11 TUE 1:05 PM TO 3:10 PM

Coherent Raman III

Session Chair: **Lingyan Shi**, Columbia Univ. (USA)

High-speed multicolor SRS imaging (*Invited Paper*), Yuta Suzuki, Keisuke Goda, Yasuyuki Ozeki, The Univ. of Tokyo (Japan) [10498-56]

Dual-phase stimulated Raman scattering microscopy for simultaneous two-color imaging (*Invited Paper*), Minbiao Ji, Fudan Univ. (China) [10498-57]

Sub-micrometer resolution mid-infrared photothermal imaging of live cells and organism (*Invited Paper*), Delong Zhang, Yeran Bai, Ji-Xin Cheng, Boston Univ. (USA) [10498-58]

CARS molecular fingerprinting using a sub-nanosecond supercontinuum light source (*Invited Paper*), Hideaki Kano, Univ. of Tsukuba (Japan); Akihito Inoko, Aichi Cancer Ctr. Research Institute (Japan); Tsubasa Kobayashi, Univ. of Tsukuba (Japan); Philippe Leproux, Vincent Couderc, XLIM Institut de Recherche (France); Yuichi Kajii, Tetsuro Oshika, Univ. of Tsukuba (Japan) [10498-59]

In vivo stimulated Raman scattering imaging of lipid synthesis and lipolysis dynamics, Xuesong Li, Yan Li, Sicong He, Congping Chen, Zhongya Qin, Ho Yi Mak, Jianan Y. Qu, Hong Kong Univ. of Science and Technology (Hong Kong, China) [10498-60]

Resonantly enhanced coherent anti-Stokes Raman scattering, Vladislav V. Yakovlev, Texas A&M Univ. (USA) [10498-61]

Recent advances in imaging and sequencing single cells, Aaron M. Streets, Univ. of California, Berkeley (USA); Yanyi Huang, Peking Univ. (China) [10498-62]

SESSION 12 TUE 3:30 PM TO 5:00 PM

Technology and In Vivo Imaging III

Session Chair: **Karsten König**, Univ. des Saarlandes (Germany)

Enhanced signal signatures for clinical multiphoton/CARS tomography, Martin Weinigel, Hans Georg Breunig, Karsten König, JenLab GmbH (Germany) [10498-63]

Multi-photon photoacoustic imaging, Depeng Wang, Wei Wei, Ajay Singh, Guanying Chen, Guang He, Univ. at Buffalo (USA); Loon-Seng Tan, Ramamurthi Kannan, Air Force Research Lab. (USA); Paras Prasad, Jun Xia, Univ. at Buffalo (USA) [10498-64]

In vivo, two-color multiphoton microscopy using a femtosecond diamond Raman laser, Jeremy W. Jarrett, Evan P. Perillo, Ahmed Hassan, David R. Miller, Andrew K. Dunn, The Univ. of Texas at Austin (USA) [10498-65]

Measurement of retinal capillary oxygenation in mice, Ikbal Sencan, Massachusetts General Hospital (USA); Tatiana Esipova, Univ. of Pennsylvania (USA); Mohammad A. Yaseen, Buyin Fu, Massachusetts General Hospital (USA); David A. Boas, Massachusetts General Hospital (USA) and Boston Univ. (USA); Sergei A. Vinogradov, Univ. of Pennsylvania (USA); Mahnaz Shahidi, The Univ. of Southern California (USA) [10498-66]

Adaptive optics plug-and-play setup for high-resolution microscopes with multi-actuator adaptive lens, Martino Quintavalla, Univ. degli Studi di Padova (Italy); Paolo Pozzi, Michelle Verhaegen, Hielke Bijlsma, Hans Verstraete, Technische Univ. Delft (Netherlands); Stefano Bonora, Univ. degli Studi di Padova (Italy) [10498-67]

3D brain oxygenation measurements in awake hypertensive mice using two photon phosphorescence lifetime imaging, Xuecong Lu, Mohammad Moeini, Ecole Polytechnique de Montréal (Canada) and Montréal Heart Institute (Canada); Baoqiang Li, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Cong Zhang, Ecole Polytechnique de Montréal (Canada) and Montréal Heart Institute (Canada); Sava Sakadžić, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Frédéric Lesage, Ecole Polytechnique de Montréal (Canada) and Montréal Heart Institute (Canada) [10498-68]

CONFERENCE 10499

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10499

Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV

Conference Chairs: **Thomas G. Brown**, Univ. of Rochester (USA); **Carol J. Cogswell**, Univ. of Colorado at Boulder (USA); **Tony Wilson**, Univ. of Oxford (United Kingdom)

Program Committee: **Martin Booth**, Univ. of Oxford (United Kingdom); **Charles A. DiMarzio**, Northeastern Univ. (USA); **Jonathan T.C. Liu**, Univ. of Washington (USA); **Raimund J. Ober**, Texas A&M Univ. (USA); **Chrysanthe Preza**, Univ. of Memphis (USA); **Monika Ritsch-Marte**, Innsbruck Medical Univ. (Austria); **Laura Waller**, Univ. of California, Berkeley (USA)

MONDAY 29 JANUARY

SESSION 1 MON 8:20 AM TO 10:00 AM

Structured Illumination in Multidimensional Microscopy

Session Chair: **Thomas G. Brown**, Univ. of Rochester (USA)

Structured illumination microscopy with scattering media, Shwetadwip Chowdhury, Li-Hao Yeh, Laura Waller, Univ. of California, Berkeley (USA) [10499-1]

3D structured illumination microscopy using an incoherent illumination system based on a Fresnel biprism, Hasti Shabani, Ana Doblas, The Univ. of Memphis (USA); Genaro Saavedra, Univ. de València (Spain); Chrysanthe Preza, The Univ. of Memphis (USA) [10499-2]

Control of noise enhancement in image reconstruction for structured illumination microscopy, Sjoerd Stallinga, Technische Univ. Delft (Netherlands); Carlas Smith, Univ. of Oxford (United Kingdom); Johan Slotman, Erasmus MC (Netherlands); Sangheeta Hari, Technische Univ. Delft (Netherlands); Gert van Cappellen, Adriaan Houtsmuller, Erasmus MC (Netherlands); Jacob Hoogenboom, Yoram Vos, Nadya Chakrova, Technische Univ. Delft (Netherlands) [10499-3]

3D structured illumination microscopy with algorithmic self-calibration, Li-Hao Yeh, Laura Waller, Univ. of California, Berkeley (USA) [10499-4]

DMD-based structured illumination microscopy for high-speed 3D imaging, Dongping Wang, Wei Lin, Qiang Geng, The Chinese Univ. of Hong Kong (Hong Kong, China); Fu Feng, The Chinese Univ. of Hong Kong (Hong Kong, China); Yeung Yam, Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China) [10499-5]

SESSION 2 MON 10:30 AM TO 12:10 PM

Holography and Scatterometry

Session Chair: **Carol J. Cogswell**, Univ. of Colorado Boulder (USA)

Quantitative phase imaging for angular scattering measurements, Andrew J. Berger, Univ. of Rochester (USA) [10499-6]

3D+time acquisitions of 3D cell culture by means of lens-free tomographic microscopy, Cédric Allier, CEA-LETI (France); Anthony Berdeu, CEA-LETI (France) and Univ. Grenoble Alpes (France); Bastien Laperrousaz, Institut de Biosciences et Biotechnologies de Grenoble, CEA Grenoble (France) and Univ. Grenoble Alpes (France) and INSERM (France); Thomas Bordy, CEA-LETI (France) and Univ. Grenoble Alpes (France); Sophie Morales, CEA-LETI (France) and Univ. Grenoble Alpes (France); Xavier Gidrol, Nathalie D'hahan, Institut de Biosciences et Biotechnologies de Grenoble, CEA Grenoble (France) and Univ. Grenoble Alpes (France) and INSERM (France) [10499-7]

Three-wavelength digital holographic microscopy for imaging protozoa in intensity and phase, James K. Wallace, Jet Propulsion Lab. (USA) [10499-8]

Towards high throughput image cytometry utilizing digital holographic microscopy, Junwei Min, State Key Lab. of Transient Optics and Photonics, Chinese Academy of Sciences (China); Lilith Brandt, Veselina Trendafilova, Steffi Ketelhut, Jürgen Schneckeburger, Westfälische Wilhelms-Univ. Münster (Germany); Baoli Yao, Xi'an Institute of Optics and Precision Mechanics, CAS (China); Burkhard Greve, Björn Kemper, Westfälische Wilhelms-Univ. Münster (Germany) [10499-9]

Scatterer density sensitive tomography utilizing light and ultrasound, Ali Vakili, Northeastern Univ. (USA); Joseph L. Hollmann, ICFO - Institut de Ciències Fotòniques (Spain); R. G. Holt, Boston Univ. (USA); Charles A. DiMarzio, Northeastern Univ. (USA) [10499-10]

Lunch Break Mon 12:10 pm to 1:40 pm

SESSION 3 MON 1:40 PM TO 3:00 PM

Algorithms and Imaging Theory

Session Chair: **Tony Wilson**, Univ. of Oxford (United Kingdom)

A software framework for designing localization analyses and its use in optimizing single molecule localization, Anish V. Abraham, Jerry Chao, Dukwhan D. Kim, Raimund J. Ober, Texas A&M Univ. (USA) [10499-11]

Optical imaging theory for structured light single pixel imaging, Robert Stokoe, Patrick A. Stockton, Ali Pezeshki, Colorado State Univ. (USA) [10499-12]

Tradeoff between insensitivity to depth-induced spherical aberration and resolution of 3D fluorescence imaging due to the use of wavefront encoding with a radially symmetric phase mask, Ananya Dutta, Ana Doblas, The Univ. of Memphis (USA); Genaro Saavedra, Univ. de València (Spain); Chrysanthe Preza, The Univ. of Memphis (USA) [10499-13]

Development of GPU-based algorithms for the optical simulation of multi-layer configurations with surface roughness, François Maurice Torner, Indek Raid, Matthias Eifler, Kim Scheffler, Lukas Anslinger, Jörg Seewig, Technische Univ. Kaiserslautern (Germany) [10499-14]

SESSION 4 MON 3:30 PM TO 5:30 PM

25 Years of Multidimensional Microscopy I

Session Chair: **Thomas G. Brown**, Univ. of Rochester (USA)

CONFERENCE 10499

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Hyper-spectrum scanning laser optical tomography, Lingling Chen, Guiye Li, Yingchao Li, Lina Liu, Ang Liu, Xuejuan Hu, Shuangchen Ruan, Shenzhen Univ. (China)[10499-46]

Upgrade of supercritical angle fluorescence (vSAF) microscopy, Iván Coto Hernández, Institut des Sciences Moléculaires d'Orsay (France) and Ctr. National de la Recherche Scientifique (France); Clement Cabriel, Institut des Sciences Moléculaires d'Orsay (France); Siddharth Sivankutty, Aix-Marseille Univ. (France); Marco Castello, Istituto Italiano di Tecnologia (Italy); Nicolas Bourg, Institut des Sciences Moléculaires d'Orsay (France); Guillaume Dupuis, Le Ctr. de Photonique BioMédicale, Univ. Paris-Sud 11 (France); Sandrine Leveque-Fort, Institut des Sciences Moléculaires d'Orsay (France) and Ctr. National de la Recherche Scientifique (France)[10499-47]

Cross-level sampling for bandwidth effective time-domain fluorescence lifetime imaging implementation, Elvis Duran, Sebastian Hoyos, Javier A. Jo, Texas A&M Univ. (USA)[10499-48]

Estimation of point spread function of an imaging system using a programmable target, Satya Siddhartha Goutam Buddha, Ranjan Kalita, Bosanta R. Boruah, Indian Institute of Technology Guwahati (India)[10499-49]

Suitability of holographic beam scanning in high resolution applications, Ranjan Kalita, Satya Siddhartha Goutam Buddha, Bosanta R. Boruah, Indian Institute of Technology Guwahati (India)[10499-50]

Volumetric bioimaging based on light field microscopy with temporal focusing illumination, Feng-Chun Hsu, Yong Da Sie, National Cheng Kung Univ. (Taiwan); Shean-Jen Chen, National Chiao Tung Univ. (Taiwan)[10499-51]

Hybrid of two-photon microscopy and optical multimodality imaging for multi-scale imaging of small animals, Tianmeng Li, Sino-Dutch Biomedical and Information Engineering School, Northeastern Univ. (China) and Key Lab. of Molecular Imaging, Institute of Automation (China); Hui Hui, Institute of Automation, Chinese Academy of Sciences (China); He Ma, Sino-Dutch Biomedical and Information Engineering School, Northeastern Univ. (China); Xin Yang, Jie Tian, Key Lab. of Molecular Imaging, Institute of Automation (China)[10499-52]

Observation of immunostained tubulin fibers intertwined in a cell using three-dimensional super-resolution microscope with two-color annular wave plate, Hiroshi Kumagai, Kitasato Univ. (Japan); Yoshinori Iketaki, Olympus Corp. (Japan); Nandor Bokor, Budapest Univ. of Technology and Economics (Hungary); Daisuke Okada, Kitasato Univ. (Japan)[10499-53]

Fabrication and quantitative evaluation of resolution target for super-resolution microscopy, Hiroshi Kumagai, Kitasato Univ. (Japan); Yoshinori Iketaki, Olympus Corp. (Japan); Hideo Oi, Kyodo International Inc. (Japan); Nandor Bokor, Budapest Univ. of Technology and Economics (Japan)[10499-54]

Light-sheet enhanced resolution of light field microscopy for rapid imaging of large volumes, Jorge Madrid Wolff, Diego Castro, Pablo Arbelaez, Manu Forero-Shelton, Univ. de los Andes (Colombia)[10499-55]

Autofocusing in digital holography using deep learning, Zhenbo Ren, Edmund Y. M. Lam, The Univ. of Hong Kong (Hong Kong, China) . . . [10499-56]

Multiplexing and de-multiplexing with scattering media for large field of view and multispectral imaging, Sujit Kumar Sahoo, National Univ. of Singapore (Singapore) and Nanyang Technological Univ. (Singapore); Dongliang Tang, Cuong Dang, Nanyang Technological Univ. (Singapore)[10499-57]

Multimodal frequency-domain fluorescence lifetime imaging and optical coherence tomography system for simultaneous nondestructive morphological and biochemical imaging, Michael J. Serafino, Texas A&M Univ. (USA); Brian L. Walton, Ctr. for Advanced Hearth Failure, Memorial Hermann Heart & Vascular Institute (USA); L. Maximilian Buja, The Univ. of Texas Health Science Ctr. at Houston (USA); Jessie Adame, Autopsy and Pathology Services, P.A. (USA); Brian E. Applegate, Javier A. Jo, Texas A&M Univ. (USA)[10499-58]

Cost-effective optical-reference-free frequency domain fluorescence lifetime imaging (FLIM) implementation using field programmable gate arrays (FPGAs) for real time acquisition and processing, Michael J. Serafino, Texas A&M Univ. (USA); Brian L. Walton, Ctr. for Advanced Hearth Failure, Memorial Hermann Heart & Vascular Institute (USA); L. Maximilian Buja, The Univ. of Texas Health Science Ctr. at Houston (USA); Jessie Adame, Autopsy and Pathology Services, P.A. (USA); Brian E. Applegate, Javier A. Jo, Texas A&M Univ. (USA) [10499-59]

Preprocessing method to correct illumination pattern in sinusoidal-based structured illumination microscopy, Hasti Shabani, Ana Doblas, The Univ. of Memphis (USA); Genaro Saavedra, Univ. de València (Spain); Chrysanthe Preza, The Univ. of Memphis (USA)[10499-60]

Correlative FRET: New method improves rigor and reproducibility in determining distances within synaptic nanoscale architecture, Heather Shinogle-Decker, Noraida Martinez-Rivera, The Univ. of Kansas (USA); John O'Brien, The Univ. of Texas Health Science Ctr. at Houston (USA); Richard D. Powell, Vishwas N. Joshi, Nanoprobes, Inc. (USA); Samuel Connell, Intelligent Imaging Innovations, Inc. (USA); Eduardo Rosa-Molinar, The Univ. of Kansas (USA) [10499-61]

Engineering on-axis intensity of Bessel beam by a feedback tuning loop, Runze Li, Xi'an Institute of Optics and Precision Mechanics, CAS (China) and Xi'an Jiaotong Univ. (China) and Univ. of Chinese Academy of Sciences (China); Yanlong Yang, Baoli Yao, Xi'an Institute of Optics and Precision Mechanics, CAS (China); Tong Ye, Clemson Univ. (USA)[10499-62]

Imaging system calibration in multifocal plane microscopy, Sung Yong You, Sreevidhya Ramakrishnan, Jerry Chao, Anish V. Abraham, Elizabeth S. Ward, Raimund J. Ober, Texas A&M Univ. (USA)[10499-63]

TUESDAY 30 JANUARY

SESSION 5 TUE 8:30 AM TO 10:30 AM

25 Years of Multidimensional Microscopy II

Session Chair: **Laura Waller**, Univ. of California, Berkeley (USA)

A brief history of adaptive optical microscopy (Invited Paper), Martin J. Booth, Univ. of Oxford (United Kingdom) [10499-15]

SESSION 6 TUE 11:00 AM TO 12:20 PM

Polarization and Light Field Microscopy

Session Chair: **Raimund J. Ober**, Texas A&M Univ. (USA)

PolScope based imaging and quantification of fibrillar collagen organization, Adib Keikhosravi, Kevin W. Eliceiri, Yuming Liu, Univ. of Wisconsin-Madison (USA) [10499-16]

Intracellular 3D tracking of insulin granules with multifocal microscopy, Xiaolei Wang, Matthew Daddysman, Martha Renn, Theresa Haunold, Itay Gdor, Norbert Scherer, The Univ. of Chicago (USA) [10499-17]

High contrast light field microscopy with single-objective selective volume illumination, Sara Madaan, Univ. of California, Los Angeles (USA); Matthew Jones, Scott E. Fraser, Thai V. Truong, The Univ. of Southern California (USA) [10499-18]

Demonstration of ghost imaging in the spectral domain, Tiancheng Huo, Beckman Laser Institute and Medical Clinic (USA); Li Qi, Southern Medical Univ. (China); Qiang Yang, Buyun Zhang, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) [10499-19]

Lunch/Exhibition Break Tue 12:20 pm to 1:50 pm

SESSION 7 TUE 1:50 PM TO 3:10 PM

Optical Systems for Multidimensional Microscopy

Session Chair: **Charles A. DiMarzio**, Northeastern Univ. (USA)

Handheld optical system for fast and accurate in vivo fluorescence lifetime imaging (FLIM), Rodrigo Cuenca, Shuna Cheng, Texas A&M Univ. (USA); Beena Ahmed, Texas A&M Univ. at Qatar (Qatar); Kristen C. Maitland, Javier A. Jo, Texas A&M Univ. (USA) [10499-20]

Two-photon focal modulation microscopy with sinusoidal continuous phase filters, Rui Chen, Shuhao Shen, Nanguang Chen, National Univ. of Singapore (Singapore) [10499-21]

Fabrication and characterization of novel microsphere-embedded optical devices for enhancing microscopy resolution, Arash Darafsheh, Washington Univ. School of Medicine in St. Louis (USA); Julian Goerger, SphereVis LLC (USA); Harim Jeon, Univ. of Pennsylvania (USA); Consuelo Guardiola, Ctr. National de la Recherche Scientifique (France); Gary Fletcher, SphereVis LLC (USA); Alejandro Cárabe, Daeyeon Lee, Univ. of Pennsylvania (USA) [10499-22]

Optimal design of line-scan focal modulation microscopy: a theoretical approach, Shuhao Shen, Shilpa Pant, Nanguang Chen, National Univ. of Singapore (Singapore) [10499-23]

SESSION 8 TUE 3:40 PM TO 5:20 PM

New Methods for Particle Tracking

Session Chair: **Monika Ritsch-Marte**, Medizinische Univ. Innsbruck (Austria)

High-density single particle tracking in thick media with depth selectivity, Roni Shaashoua, Alberto Bilenca, Ben-Gurion Univ. of the Negev (Israel) [10499-24]

Dual-view inverted selective plane illumination microscopy (diSPIM) with improved background rejection for accurate 3D digital pathology, Bihe Hu, Daniel Bolus, Jonathon Brown, Tulane Univ. (USA) [10499-25]

High-speed remote focusing for improvement of 3D imaging performance in confocal microscopy and optical coherence microscopy, Krzysztof Szulczycki, Viktoriya Savaryn, Ireneusz Grulkowski, Nicolaus Copernicus Univ. (Poland) [10499-26]

Particle tracking using repetitive phase shift in interferometric super resolution microscopy, Itay Gdor, Xiaolei Wang, Matthew Dadysman, Martha Renn, The Univ. of Chicago (USA); Nicola J. Ferrier, Mark Herold, Argonne National Lab. (USA); Kuan He, Oliver Cossairt, Aggelos Katsaggelos Katsaggelos, Northwestern Univ. (USA); Rosemarie Wiltton, Argonne National Lab. (USA); Norbert Scherer, The Univ. of Chicago (USA) [10499-27]

Spatial and spectral mapping of optical scattering phase function, $p(\theta, \phi; x, y, \lambda)$, from layered tissues, Jeremy D. Rogers, Zach J. Simmons, Univ. of Wisconsin-Madison (USA) [10499-28]

WEDNESDAY 31 JANUARY

SESSION 9 WED 8:30 AM TO 10:10 AM

Progress in Nonlinear Microscopy

Session Chair: **Carol J. Cogswell**, Univ. of Colorado Boulder (USA)

Investigation of second harmonic generation and multispectral imaging as new contrast mechanisms in scanning laser optical tomography, Lena Nolte, Georgios Antonopoulos, Laser Zentrum Hannover e.V. (Germany); Alexander Heisterkamp, Leibniz Univ. Hannover (Germany) and Laser Zentrum Hannover e.V. (Germany); Tammo Ripken, Laser Zentrum Hannover e.V. (Germany) [10499-29]

3D texture analysis for classification of second harmonic generation images of human ovarian cancer, Bruce Wen, Kirby Campbell, Emily Shelton, Vikas Singh, Paul J. Campagnola, Univ. of Wisconsin-Madison (USA) [10499-30]

Super-resolution temporal focusing microscopy via multifocal structured illumination, Yunlong Meng, Yina Chang, Wei Lin, Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China) [10499-31]

Spatiotemporal polarization modulation microscopy with a microretarder array, Garth J. Simpson, Purdue Univ. (USA) [10499-32]

Compressive 3D deep-tissue imaging using temporally focused two-photon microscopy, Dushan N. Wadduwage, Jong K. Park, Peter T.C. So, Massachusetts Institute of Technology (USA) [10499-33]

SESSION 10 WED 10:40 AM TO 12:00 PM

Wavefront Coding and Point Spread Function Engineering

Session Chair: **Chrysanthe Preza**, The Univ. of Memphis (USA)

Single image structured illumination to minimize phase errors in turbid media, Zachary R. Hoffman, Draper Lab. (USA); Charles A. DiMarzio, Northeastern Univ. (USA) [10499-34]

Point spread function based image reconstruction in optical projection tomography, Jeroen Kalkman, Technische Univ. Delft (Netherlands) [10499-35]

Evaluation of the use of wavefront encoding to reduce depth-induced aberration in structured illumination microscopy, Nurmohammed Patwary, Jorge Sola-Pikabea, The Univ. of Memphis (USA); Ana Doblas, The Univ. of Memphis (United Arab Emirates); Genaro Saavedra, Manuel Martínez-Corral, Univ. de València (Spain); Chrysanthe Preza, The Univ. of Memphis (USA) [10499-36]

3D fluorescence microscopy with multi-shot coded aperture measurements, Hsiou-Yuan Liu, Laura Waller, Univ. of California, Berkeley (USA) [10499-37]

Lunch/Exhibition Break Wed 12:00 pm to 1:30 pm

SESSION 11 WED 1:30 PM TO 3:10 PM

Multidimensional Imaging of Biological Systems

Session Chair: **Martin J. Booth**, Univ. of Oxford (United Kingdom)

Imaging a seizure model in zebrafish with structured illumination light sheet microscopy, Yang Liu, The Univ. of Georgia (USA); Savannah Dale, Clemson Univ. (USA); Rebecca Ball, Ariel J. VanLeuven, The Univ. of Georgia (USA); Scott Baraban, Univ. of California, San Francisco (USA); Andrew Sornborger, Univ. of California, Davis (USA); James D. Lauderdale, Peter Kner, The Univ. of Georgia (USA) [10499-38]

Optical coherence computed tomography for quantitative 3D imaging of adult zebrafish, Jelle Van der Horst, Anna Trull, Jeroen Kalkman, Technische Univ. Delft (Netherlands) [10499-39]

4D blood flow mapping using SPIM-microPIV in the developing zebrafish heart, Vytautas Zickus, Jonathan M. Taylor, Univ. of Glasgow (United Kingdom) [10499-40]

Imaging the developing heart: synchronized time-lapse microscopy during developmental changes, Carl J. Nelson, Univ. of Glasgow (United Kingdom); Charlotte Buckley, John J. Mullins, Martin A. Denvir, The Univ. of Edinburgh (United Kingdom); Jonathan Taylor, Univ. of Glasgow (United Kingdom) [10499-41]

Optimization and characterization of a line-scan OCT for measuring hemodynamics of chicken embryo's developing heart with comparison to a point-scan OCT counterpart, Shau Poh Chong, Zhen Yu Ko, Nanguang Chen, National Univ. of Singapore (Singapore) [10499-42]

SESSION 12 WED 3:40 PM TO 4:40 PM

New Methods in Microscopy

Session Chair: **Thomas G. Brown**, Univ. of Rochester (USA)

Laser written fluorescence in plastic slides for microscope calibration, Patrick S. Salter, Martin J. Booth, Tony Wilson, Univ. of Oxford (United Kingdom); Alex Corbett, Univ. of Exeter (United Kingdom) [10499-43]

Low cost light-sheet microscopy for whole brain imaging, Manish Kumar, Jordan Nasenbeny, Yevgenia Kozorovitskiy, Northwestern Univ. (USA) [10499-44]

Simple lipid-preserving optical clearing for fluorescent imaging, Yehe Liu, Michiko Watanabe, Andrew M. Rollins, Michael W. Jenkins, Case Western Reserve Univ. (USA) [10499-45]

CONFERENCE 10500

Saturday–Sunday 27–28 January 2018 • Proceedings of SPIE Vol. 10500

Single Molecule Spectroscopy and Superresolution Imaging XI

Conference Chairs: **Jörg Enderlein**, Georg-August-Univ. Göttingen (Germany); **Ingo Gregor**, Georg-August-Univ. Göttingen (Germany); **Zygmunt Karol Gryczynski**, Univ. of North Texas Health Science Ctr. at Fort Worth (USA), Texas Christian Univ. at Fort Worth (USA); **Rainer Erdmann**, PicoQuant GmbH Berlin (Germany); **Felix Koberling**, PicoQuant GmbH (Germany)

Program Committee: **Sohail Ahmed**, A*STAR Institute of Medical Biology (Singapore); **Michael Börsch**, Friedrich-Schiller-Univ. Jena (Germany); **Christian Eggeling**, Univ. of Oxford (United Kingdom); **Paul M. W. French**, Imperial College London (United Kingdom); **Ewa M. Goldys**, Macquarie Univ. (Australia); **Johan Hofkens**, Katholieke Univ. Leuven (Belgium); **Zhen-Li Huang**, Huazhong Univ. of Science and Technology (China); **Thomas R. Huser**, Univ. Bielefeld (Germany); **Maria Teresa Neves-Petersen**, Aalborg Univ. (Portugal); **Markus Sauer**, Univ. Bielefeld (Germany); **Shimon Weiss**, Univ. of California, Los Angeles (USA); **Andong Xia**, Institute of Chemistry (China)

Conference Cosponsor:



SATURDAY 27 JANUARY

OPENING REMARKS 9:05 AM TO 9:10 AM

Conference Chairs: **Jörg Enderlein**, Georg-August-Univ. Göttingen (Germany); **Ingo Gregor**, Georg-August-Univ. Göttingen (Germany); **Zygmunt Karol Gryczynski**, Univ. of North Texas Health Science Ctr. at Fort Worth (USA), Texas Christian Univ. at Fort Worth (USA); **Rainer Erdmann**, PicoQuant GmbH Berlin (Germany); **Felix Koberling**, PicoQuant GmbH (Germany)

SESSION 1 SAT 9:10 AM TO 10:10 AM

FLIM, FCS and FRET I

Session Chair: **Felix Koberling**, PicoQuant GmbH (Germany)

Photon spectroscopy by picoseconds differential Geiger-mode Si photomultiplier, Masanobu Yamamoto, Purdue Univ. (USA) and Miftek Corp. (USA); Keegan Hernandez, Miftek Corp. (USA); J. Paul Robinson, Purdue Univ. (USA) and Miftek Corp. (USA) [10500-1]

Direct monitoring of the complex motion of one-dimensional particles, Gi-Hyun Go, Seungjin Heo, Jong-Hoi Cho, Yang-Seok Yoo, Min Kwan Kim, Chung-Hyun Park, Yong-Hoon Cho, KAIST (Korea, Republic of) [10500-2]

Plasmonic planar nanoantenna for single molecule fluorescence enhancement and diffusion analysis in bio-membranes, Valentin Flauraud, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Raju Regmi, Institut Fresnel (France); Pamina Winkler, ICFO - Institut de Ciències Fotòniques (Spain); Ducan Alexander, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Carlo Manzo, Kyra Borgman, ICFO - Institut de Ciències Fotòniques (Spain); Jürgen Brugger, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Niek Van Hulst, ICFO - Institut de Ciències Fotòniques (Spain); Hervé Rigneault, Jérôme Wenger, Institut Fresnel (France); Maria Garcia-Parajo, ICFO - Institut de Ciències Fotòniques (Spain) [10500-3]

SESSION 2 SAT 10:40 AM TO 12:20 PM

FLIM, FCS and FRET II

Session Chair: **Rainer Erdmann**, PicoQuant GmbH (Germany)

A 48-spot single-molecule FRET setup with periodic acceptor excitation, Antonino Ingargiola, Maya Segal, Univ. of California, Los Angeles (USA); Angelo Gulinatti, Ivan Rech, Ivan Labanca, Politecnico di Milano (Italy); Piera Maccagnani, Consiglio Nazionale delle Ricerche (Italy); Massimo Ghioni, Politecnico di Milano (Italy); Shimon Weiss, Xavier Michalet, Univ. of California, Los Angeles (USA) [10500-4]

Scanning FCS and multi-species STED microscopy for diffusion studies in membranes, Felix Koberling, Mariano Gonzalez Pisfil, Rhys Dowler, Marcelle Koenig, Benedikt Kraemer, Paja Reisch, Matthias Patting, PicoQuant GmbH (Germany) [10500-5]

Fast subunit rotation in single FoF1-ATP synthases monitored by smFRET in an ABEL trap, Maria Dienerowitz, Thomas Heitkamp, Michael Börsch, Universitätsklinikum Jena (Germany) [10500-6]

Hexagonal SPAD arrays for image scanning microscopy using pixel reassignment, Ivan Michel Antolović, Technische Univ. Delft (Netherlands); Claudio Bruschini, Samuel Burri, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Ron A. Hoebe, Academisch Medisch Centrum (Netherlands); Edoardo Charbon, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10500-7]

Measuring intragranular mucin viscosity in human bronchial epithelial cells with cystic fibrosis, Hung Doan, Zygmunt Gryczynski, Texas Christian Univ. (USA); Rafal Fudala, Ignacy Gryczynski, Univ. of North Texas Health Science Ctr. at Fort Worth (USA); Emmanuelle Brochiero, Ryszard Grygorczyk, Univ. de Montréal (Canada); Jonathan Rebik, Texas Christian Univ. (USA); Julian Borejdo, Sebastian Requena, Univ. of North Texas Health Science Ctr. at Fort Worth (USA); Sergei Dzyuba, Marlius Castillo, Texas Christian Univ. (USA); Olga Ponomarchuk, Univ. de Montréal (Canada); Zhangatay Nurekeyev, Texas Christian Univ. (USA) [10500-8]

Lunch/Exhibition Break Sat 12:20 pm to 1:50 pm

SESSION 3 SAT 1:50 PM TO 3:10 PM

Nanoscopy or Super-resolution Fluorescence Imaging I

Session Chair: **Felix Koberling**, PicoQuant GmbH (Germany)

High-throughput localization microscopy, Christopher J. Rowlands, Clemens Kaminski, Univ. of Cambridge (United Kingdom) [10500-9]

Three-dimensional, polarization-sensitive, spectroscopic photon localization microscopy for parallel single-molecules imaging and tracking, Biqin Dong, Brian T. Soetikno, Xiangfan Chen, Vadim Backman, Cheng Sun, Hao F. Zhang, Northwestern Univ. (USA) [10500-10]

Quantitative performance evaluation of a back-illuminated sCMOS camera with 95% QE for super-resolution localization microscopy, Zhenli Huang, Yujie Wang, Lingxi Zhao, Wuhan National Lab. for Optoelectronics (China) [10500-11]

Measuring 3D molecular orientation and rotational mobility using a Tri-spot point spread function, Oumeng Zhang, Tianben Ding, Jin Lu, Hesam Mazidi, Matthew D. Lew, Washington Univ. in St. Louis (USA) [10500-12]

SESSION 4 SAT 3:40 PM TO 5:20 PM

**Nanoscopy or Super-resolution
Fluorescence Imaging II**

Session Chair: **Zygmunt K. Gryczynski**,
Univ. of North Texas Health Science Ctr. at Fort Worth (USA),
Texas Christian Univ. at Fort Worth (USA)

A simple and low-cost structured illumination microscopy using a pico-projector, Baturay Ozgurur, Sabanci Univ. (Turkey) and Medipol Univ. (Turkey); M. Fatih Toy, Medipol Univ. (Turkey) [10500-13]

Characterization and improvement of highly inclined optical sheet microscopy, Tiziano Vignolini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Valentina Curcio, Univ. degli Studi di Milano (Italy) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Lucia Gardini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Marco Capitanio, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy) [10500-14]

A robust statistical estimation (RoSE) algorithm jointly recovers the 3D location and intensity of single molecules accurately and precisely, Hesam Mazidi, Arye Nehorai, Matthew D. Lew, Washington Univ. in St. Louis (USA) [10500-15]

Signal photon count estimation in single molecule localization microscopy, Sjoerd Stallinga, Rasmus Thorsen, Bernd Rieger, Technische Univ. Delft (Netherlands) [10500-16]

Two-dimensional single-pixel superresolution imaging by conjugate-domain computed tomography, Keith A. Wernsing, Jeffrey J. Field, Colorado State Univ. (USA); Jeff Squier, Colorado School of Mines (USA); Randy A. Bartels, Colorado State Univ. (USA) [10500-17]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina and Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 9:30 AM TO 10:30 AM

**Nanoscopy or Super-resolution
Fluorescence Imaging III**

Session Chair: **Zygmunt K. Gryczynski**,
Univ. of North Texas Health Science Ctr. at Fort Worth (USA),
Texas Christian Univ. at Fort Worth (USA)

Multi-pulse based approach to study dynamics of molecular assemblies with subwavelength resolution, Zhanatay Nurekeyev, Hung Doan, Zygmunt Gryczynski, Texas Christian Univ. (USA); Rafal Fudala, Ignacy Gryczynski, Julian Borejdo, Dorota Stankowska, Univ. of North Texas Health Science Ctr. at Fort Worth (USA); Sergei Dzyuba, Texas Christian Univ. (USA) [10500-18]

Unrestricted superresolution imaging in scattering tissues with spatial frequency modulated imaging, Jeffrey J. Field, Patrick Stockton, Randy A. Bartels, Colorado State Univ. (USA) [10500-19]

Broadband excitation-emission Fourier-transform spectroscopy of single molecules at ambient conditions, Antonio Perri, Politecnico di Milano (Italy); Erling Thyryhaug, Technische Univ. Wien (Austria); Stefan Krause, Univ. of Copenhagen (Denmark); Fabrizio Preda, Politecnico di Milano (Italy); Jürgen Hauer, Technische Univ. Wien (Austria); Giulio Cerullo, Politecnico di Milano (Italy); Tom Vosch, Univ. of Copenhagen (Denmark); Dario Polli, Politecnico di Milano (Italy) [10500-20]

SESSION 6 SUN 11:00 AM TO 12:40 PM

**Biological Applications of
SM Spectroscopy and Imaging**

Session Chair: **Felix Koberling**, PicoQuant GmbH (Germany)

Single cell genomics: when stochasticity meets precision (Keynote Presentation), Xiaoliang S. Xie, Chongyi Chen, Dong Xing, Longzhi Tan, Alec Chapman, David F. Lee, Harvard Univ. (USA) [10500-21]

Interferometric scattering (iSCAT) microscopy: studies of biological membrane dynamics, Francesco Reina, Silvia Galiani, Dilip Shrestha, Erdinc Sezgin, Christoffer Lagerholm, Philipp Kukura, Christian Eggeling, Univ. of Oxford (United Kingdom) [10500-22]

Tilted light sheet microscopy with 3D point spread functions for single-molecule super-resolution imaging in mammalian cells, Anna-Karin Gustavsson, Petar N. Petrov, Maurice Y. Lee, Yoav Shechtman, W. E. Moerner, Stanford Univ. (USA) [10500-23]

Identifying and correcting pixel locking errors with the SPIFF algorithm, Yuval Yifat, The James Franck Institute (USA); Yihan Lin, Peking Univ. (China); Nishant Sule, Norbert F. Scherer, The James Franck Institute (USA) [10500-24]

Lunch/Exhibition Break Sun 12:40 pm to 2:10 pm

SESSION 7 SUN 2:10 PM TO 3:30 PM

**Nanoscopy or Super-resolution
Fluorescence Imaging IV**

Session Chair: **Rainer Erdmann**, PicoQuant GmbH (Germany)

MINIFLUX nanoscopy: Superresolution post Nobel (Keynote Presentation), Stefan W. Hell, Max-Planck-Institut für Biophysikalische Chemie (Germany) and Max-Planck-Institut für Medizinische Forschung (Germany) [10500-25]

Microsphere-assisted microscopy: Contribution to the understanding of label-free super-resolution, Sylvain Lecler, Stéphane Perrin, Audrey Leong-Hoi, Paul Montgomery, ICube (France) [10500-26]

Superresolution fluorescence imaging by pump-probe microscopy using sequential transition process, Fumihiko Dake, Naoki Fukutake, Seri Hayashi, Yusuke Taki, Nikon Corp. (Japan) [10500-27]

CONFERENCE 10500

AWARD PRESENTATION 3:30 PM TO 3:35 PM

PicoQuant Young Investigator Award Presentation

AWARD SPONSOR:



SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BIOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Multi-species diffusion studies in membranes utilizing scanning FCS and super-resolution microscopy, Mariano Gonzalez Pisfil, Marcelle Koenig, Benedikt Kraemer, Paja Reisch, Felix Koberling, Matthias Patting, Uwe Ortmann, PicoQuant GmbH (Germany); Andreas Herrmann, Humboldt-Univ. zu Berlin (Germany); Rainer Erdmann, PicoQuant GmbH (Germany) [10500-28]

Ultrafast single molecule technique for the study of force dependent kinetics and conformational changes of actin-protein interaction involved in mechanotransduction, Marios Sergides, Claudia Arbore, Francesco Saverio Pavone, Marco Capitanio, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy). [10500-29]

The effects of background noise on spectral analysis in spectroscopic photon localization microscopy, Ki-Hee Song, Biqin Dong, Cheng Sun, Hao F. Zhang, Northwestern Univ. (USA) [10500-30]

Diagram method for resolution limit calculation in laser microscopy, Naoki Fukutake, Nikon Corp. (Japan) [10500-31]

Fast two-snapshot structured illumination for temporal focusing microscopy with enhanced axial resolution, Yunlong Meng, Wei Lin, Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China). . . . [10500-32]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

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The banner features a background image of a biological cell with green and purple fluorescence. The text is overlaid on a red and white background.

CONFERENCE 10501

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10501

Optical Diagnostics and Sensing XVIII: Toward Point-of-Care Diagnostics

Conference Chair: **Gerard L. Coté**, Texas A&M Univ. (USA)

Program Committee: **Zane A. Arp**, GlaxoSmithKline (USA); **Brent D. Cameron**, The Univ. of Toledo (USA); **Werner Gellermann**, The Univ. of Utah (USA); **H. Michael Heise**, Univ. of Applied Sciences of South-Westphalia, Iserlohn (Germany); **Jürgen M. Lademann**, Charité Universitätsmedizin Berlin (Germany); **Kristen C. Maitland**, Texas A&M Univ. (USA); **Michael J. McShane**, Texas A&M Univ. (USA); **Kenith E. Meissner**, Swansea Univ. (United Kingdom); **Timothy J. Muldoon**, Univ. of Arkansas (USA); **Aydogan Ozcan**, Univ. of California, Los Angeles (USA); **Babak Shadgan**, The Univ. of British Columbia (Canada); **Kexin Xu**, Tianjin Univ. (China); **Shaoqun Zeng**, Britton Chance Ctr. for Biomedical Photonics (China)

Conference Cosponsor:  **Cobolt**
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MONDAY 29 JANUARY

SESSION 1 MON 8:20 AM TO 10:00 AM

Surface Enhanced Raman Spectroscopy and Nanoparticles

Session Chair: **Michael J. McShane**, Texas A&M Univ. (USA)

Development of an optical fiber SERS microprobe for minimally invasive sensing applications, Md Abdullah Al Mamun, Saulius Juodkazis, Swinburne Univ. of Technology (Australia); Anita Mahadevan-Jansen, Vanderbilt Univ. (USA); Paul R. Stoddart, Swinburne Univ. of Technology (Australia) . . [10501-1]

Nanoengineered capsules for selective SERS analysis of biological samples, Yilhwon You, Monika Schechinger, Andrea K. Locke, Gerard L. Coté, Mike McShane, Texas A&M Univ. (USA) [10501-2]

Development of a free-solution SERS-based assay for point-of-care oral cancer biomarker detection using DNA-conjugated gold nanoparticles, Sungyub Han, Luke A. Oaks, Andrea K. Locke, Texas A&M Univ. (USA); Yi-Shing Lisa Cheng, Texas A&M Univ. College of Dentistry (USA); Gerard L. Coté, Texas A&M Univ. (USA) [10501-3]

Development of a paper-based vertical flow SERRS assay for citrulline detection using aptamer-conjugated gold nanoparticles, Andrea K. Locke, Nicolaas E. P. Deutz, Gerard L. Coté, Texas A&M Univ. (USA) [10501-4]

Highly sensitive paper-based immunoassay using photothermal laser speckle imaging, Seungri Song, Yonsei Univ. (Korea, Republic of); Seoyeon Choi, MIRIMEDIX (Korea, Republic of); Su-Ho Ryu, Soochaeol Kim, Yonsei Univ. (Korea, Republic of); Tongwha Kim, Univ. of Toronto (Canada); Chulmin Joo, Yonsei Univ. (Korea, Republic of) [10501-5]

SESSION 2 MON 10:30 AM TO 11:50 AM

Optical Monitoring of Glucose and Other Biomarkers

Session Chair: **Brent D. Cameron**, The Univ. of Toledo (USA)

Creation of a portable measuring system for a competitive binding glucose biosensor, Lydia Colvin, Kristen Means, Melissa Grunlan, Texas A&M Univ. (USA) [10501-6]

Computational circular dichroism estimation for point-of-care diagnostics via vortex half-wave retarders, Shahid A. Haider, Megan Y. Tran, Alexander Wong, Univ. of Waterloo (Canada) [10501-7]

Backscattered quantum cascade laser spectroscopy for in vivo glucose monitoring, Alexandra Werth, Sofia Inglessis, Grant Schultheis, Princeton Univ. (USA); Sabbir Liakat, Princeton Identity (USA); Claire Gmachl, Princeton Univ. (USA) [10501-8]

Evaluation and benchmarking of an EC-QCL-based mid-infrared spectrometer for monitoring metabolic blood parameters in critical care units, Markus Grafen, Ruhr-Univ. Bochum (Germany); Sven Delbeck, Fachhochschule Südwestfalen (Germany); Hendrik Busch, Ruhr-Univ. Bochum (Germany); Herbert M. Heise, Fachhochschule Südwestfalen (Germany) [10501-9]

Lunch Break Mon 11:50 am to 1:20 pm

SESSION 3 MON 1:20 PM TO 3:00 PM

Point of Care Biosensing Approaches

Session Chair: **Gerard L. Coté**, Texas A&M Univ. (USA)

Portable photothermal optical sensor for chemical-free hemoglobin assay, Joon Ho Lee, Soochaeol Kim, Jun-Ho Choi, Ui-Han Kim, Jong-Seok Lee, Yonsei Univ. (Korea, Republic of); Jaewoo Song, Yonsei Univ. College of Medicine (Korea, Republic of); Chulmin Joo, Yonsei Univ. (Korea, Republic of) [10501-10]

Phase sensitive diffraction sensor for high sensitivity refractive index measurement, Nityanand Kumawat, New York Univ. Abu Dhabi (United Arab Emirates); Manoj Varma, Ctr. for Nano Science and Engineering (CeNSE) (India); Sunil Kumar, New York Univ. Abu Dhabi (United Arab Emirates) [10501-11]

Extraction of spectral features from acridine orange stained leukocytes to improve monocyte detection for point-of-care blood analysis, Amy J. Powless, Timothy J. Muldoon, Univ. of Arkansas (USA) [10501-12]

Optimized computational imaging methods for small-target sensing in lens-free holographic microscopy, Zhen Xiong, Isaiah Engle, Jacob Garan, Jeffrey E. Melzer, Euan McLeod, The Univ. of Arizona (USA) [10501-13]

Toward noninvasive detection and monitoring of malaria with broadband diffuse optical spectroscopy, Chris Campbell, Univ. of Notre Dame (USA); Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA); Thomas D. O'Sullivan, Univ. of Notre Dame (USA) [10501-14]



CONFERENCE 10501

SESSION 4..... MON 3:30 PM TO 4:50 PM

Optical Imaging for Point of Care and Field Applications

Session Chair: **Kristen C. Maitland**, Texas A&M Univ. (USA)

Image-based non-contact monitoring of skin texture changed by piloerection for emotion estimation, Mihiro Uchida, Norimichi Tsumura, Rina Akaho, Chiba Univ. (Japan); Keiko Ogawa-Ochiai, Kanazawa Univ. Hospital (Japan) [10501-15]

Measuring the arterial-induced skin vibration by geometrical moiré fringe, Shih-Yung Chiu, Chun-Hsiung Wang, National Taiwan Univ. (Taiwan); Shu-Sheng Lee, National Taiwan Ocean Univ. (Taiwan); Yu-Hsiang Hsu, Chih-Kung Lee, National Taiwan Univ. (Taiwan) [10501-16]

Hyperspectral fluorescence imaging for the non-contact identification of bodily fluids at the crime scene, Leah S. Wilk, Maurice Aalders, Academisch Medisch Centrum (Netherlands) [10501-17]

Differential color space analysis for investigating nutrient content in a pureed food dilution-flavor matrix: a step toward objective malnutrition risk assessment, Kaylen J. Pfisterer, Robert Amelard, Alexander Wong, Univ. of Waterloo (Canada) [10501-18]

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:00 AM TO 10:00 AM

Near Infrared Sensing and Monitoring In Vivo

Session Chair: **Babak Shadgan**, The Univ. of British Columbia (Canada)

Development of chair-side evaluation system of swallowing discomfort of denture wearers, Keisuke Matsumoto, Yumie Ono, Meiji Univ. (Japan); Katsushi Tamaki, Ryuhei Ikuta, Kanako Kataoka, Kanagawa Dental College (Japan) [10501-19]

Optical monitoring of spinal cord subcellular damage after acute spinal cord injury, Babak Shadgan, Neda Manouchehri, Kitty So, Katelyn Shortt, Femke Streijger, The Univ. of British Columbia (Canada) and International Collaboration On Repair Discoveries (Canada); Andrew Macnab, The Univ. of British Columbia (Canada); Brian Kwon, The Univ. of British Columbia (Canada) and International Collaboration On Repair Discoveries (Canada) [10501-20]

In vivo near infrared (NIRS) sensor attachment using fibrin bioadhesive, Roberto Pagano, Andrew Macnab, Guy Dumont, The Univ. of British Columbia (Canada); Brian Kwon, Babak Shadgan, The Univ. of British Columbia (Canada) and International Collaboration On Repair Discoveries (Canada) [10501-21]

Noninvasive optical diagnosis of low back pain with the aid of Chinese cupping procedure, Nanxi Li, Yu Su, Ting Li, Univ. of Electronic Science and Technology of China (China) [10501-22]

A novel wearable technology for estimation of muscle oxygen saturation and lactate threshold power in exercising muscle, Parisa Farzam, Zachary Starkweather, Maria Angela Franceschini, Harvard Medical School (USA) and Massachusetts General Hospital (USA) and Athinoula A. Martinos Ctr. for Biomedical Imaging (USA) [10501-23]

In-vivo quantitative measurement of tissue oxygen saturation of human webbing using a transmission type continuous-wave near infrared spectroscopy, Aizimu Tuerxun, Makoto Adachi, Chiba Univ. (Japan); Kazuya Nakano, Takashi Ohnishi, Toshiya Nakaguchi, Ctr. for Frontier Medical Engineering, Chiba Univ. (Japan); Nozomi Takahashi, Graduate School of Medicine, Chiba Univ. (Japan); Taka-aki Nakada, Shigeto Oda, Chiba Univ. (Japan); Hideaki Haneishi, Ctr. for Frontier Medical Engineering, Chiba Univ. (Japan) [10501-24]

SESSION 6..... TUE 10:30 AM TO 11:50 AM

Imaging Photoplethysmography and Remote Physiological Sensing I

Session Chairs: **Ethan B. Blackford**, Ball Aerospace & Technologies Corp. (USA); **Daniel J. McDuff**, Microsoft (USA); **Justin R. Estepp**, Air Force Research Lab. (USA)

A fast and efficient method for remote imaging photoplethysmography based on a tissue model, Daniel J. McDuff, Microsoft Research (USA); Ethan B. Blackford, Ball Aerospace & Technologies Corp. (USA); Justin R. Estepp, Air Force Research Lab. (USA); Izumi Nishidate, Tokyo Univ. of Agriculture and Technology (USA) [10501-25]

Multi-task convolutional neural network for localised photoplethysmographic imaging, Sitthichok Chaichulee, Mauricio Villarroel, João Jorge, Carlos Arteta, Kenny McCormick, Andrew Zisserman, Lionel Tarassenko, Univ. of Oxford (United Kingdom) [10501-26]

CameraHRV: Robust measurement of heart rate variability using a camera, Amruta Pai, Ashok Veeraraghavan, Ashutosh Sabharwal, Rice Univ. (USA) [10501-27]

Optimal ROI selection for the non-contact heart rate and peripheral oxygen saturation estimation of pre-term infants in the neonatal intensive care unit, Mauricio Villarroel, João Jorge, Sitthichok Chaichulee, Kenny McCormick, Lionel Tarassenko, Univ. of Oxford (United Kingdom) [10501-28]

Lunch/Exhibition Break Tue 11:50 am to 1:20 pm

SESSION 7..... TUE 1:20 PM TO 3:00 PM

Imaging Photoplethysmography and Remote Physiological Sensing II

Session Chairs: **Daniel J. McDuff**, Microsoft (USA); **Justin R. Estepp**, Air Force Research Lab. (USA); **Ethan B. Blackford**, Ball Aerospace & Technologies Corp. (USA)

Video based non-contact vital sign monitoring of heart rate and respiration rate, the influence of skin tone and light conditions, John H. G. M. Klaessens, Roos Visser, Albert van der Veen, Vrije Univ. Medical Ctr. (Netherlands); Jacob R. Bauer, Norwegian Univ. of Science and Technology (Norway); Rudolf M. Verdaasdonk, Vrije Univ. Medical Ctr. (Netherlands) [10501-29]

PulseCam: Quantifying sensitivity of camera-based blood perfusion imaging system, Mayank Kumar, Ashok Veeraraghavan, Ashutosh Sabharwal, Rice Univ. (USA) [10501-30]

Simultaneous measurement of arterial and venous oxygen saturation using a camera, Mark van Gastel, Hangbing Liang, Sander Stuijk, Technische Univ. Eindhoven (Netherlands); Gerard de Haan, Technische Univ. Eindhoven (Netherlands) and Philips Research (Netherlands) [10501-31]

Spatio-temporal analysis of blood perfusion by imaging photoplethysmography, Sebastian Zaunseder, Alexander Trumpp, Hannes Ernst, Michael Förster, Hagen Malberg, TU Dresden (Germany) [10501-32]

Measurements of pulse transit time using visible and near-infrared imaging photoplethysmography, Ethan B. Blackford, Ball Aerospace & Technologies Corp. (USA); Justin R. Estepp, Air Force Research Lab. (USA); Daniel J. McDuff, Microsoft Research (USA) [10501-33]

SESSION 8 TUE 3:30 PM TO 5:10 PM

Imaging Photoplethysmography and Remote Physiological Sensing III

Session Chairs: **Justin R. Estep**, Air Force Research Lab. (USA); **Ethan B. Blackford**, Ball Aerospace & Technologies Corp. (USA); **Daniel J. McDuff**, Microsoft (USA)

Noncontact sphygmomanometer based on pulse-wave transit time between the face and hand, Kazuya Nakano, Takashi Ohnishi, Ctr. for Frontier Medical Engineering, Chiba Univ. (Japan); Izumi Nishidate, Tokyo Univ. of Agriculture and Technology (Japan); Hideaki Haneishi, Ctr. for Frontier Medical Engineering, Chiba Univ. (Japan) [10501-34]

Evaluation of arterial oxygen saturation using RGB camera-based remote photoplethysmography, Izumi Nishidate, Tokyo Univ. of Agriculture and Technology (Japan); Kazuya Nakano, Ctr. for Frontier Medical Engineering, Chiba Univ. (Japan); Daniel J. McDuff, Microsoft Research (USA) and MIT Media Lab. (USA); Kyuichi Niizeki, Yamagata Univ. (Japan); Yoshihisa Aizu, Muroran Institute of Technology (Japan); Hideaki Haneishi, Ctr. for Frontier Medical Engineering, Chiba Univ. (Japan) [10501-35]

Data fusion for improved camera-based detection of respiration in neonates, João Jorge, Mauricio Villarreal, Sitthichok Chaichulee, Kenny McCormick, Univ. of Oxford (United Kingdom) [10501-36]

Non-contact assessment of obstructive sleep apnea cardiovascular biomarkers using photoplethysmography imaging, Robert Amelard, Kaylen J. Pfisterer, David A. Clausi, Alexander Wong, Univ. of Waterloo (Canada) [10501-37]

Near-continuous non-contact cardiac pulse monitoring in a neonatal intensive care unit in near darkness, Mark van Gastel, Technische Univ. Eindhoven (Netherlands); Benoit Balmaekers, Philips Research (Netherlands); Sidarto Bambang Oetomo, Technische Univ. Eindhoven (Netherlands) and Máxima Medisch Centrum (Netherlands); Wim Verkruysse, Philips Research (Netherlands) [10501-38]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the BIOS/LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

A multiplexed electronic architecture for multi-wavelength illumination opto-electronic patch sensor to effectively monitor heart rate and oxygen saturation, Sijung Hu, Loughborough Univ. (United Kingdom); Liangwen Yan, Shanghai Univ. (China); Samah Alharbi, Panagiotis Blanos, Loughborough Univ. (United Kingdom) [10501-39]

Simultaneous estimation of transcutaneous bilirubin, hemoglobin, and melanin based on diffuse reflectance spectroscopy, Izumi Nishidate, Wares M. Abdul, Mizuki Ohtsu, Tokyo Univ. of Agriculture and Technology (Japan); Kazuya Nakano, Hideaki Haneishi, Ctr. for Frontier Medical Engineering, Chiba Univ. (Japan) [10501-40]

Remote spectral measurements of the blood volume pulse with applications for imaging photoplethysmography, Ethan B. Blackford, Ball Aerospace & Technologies Corp. (USA); Justin R. Estep, Air Force Research Lab. (USA); Daniel J. McDuff, Microsoft Research (USA) . [10501-41]

Exploitation of automated methods for capillary refill time estimation in dogs, Blaž Cugmas, Janis Spigulis, Univ. of Latvia (Latvia) [10501-42]

Single gold nanoparticle based optical biosensor, Xingyi Ma, Sang Jun Sim, Korea Univ. (Korea, Republic of) [10501-43]

Proximal design for a multimodality endoscope with multiphoton microscopy, optical coherence microscopy and visual modalities, Kelli Kiekens, Jennifer Barton, The Univ. of Arizona (USA) [10501-44]

An adaptive threshold algorithm using z-score statistical dispersion for efficient heart rate detection in noisy photo-plethysmography signals, Gurpreet Singh, Betty Zhao, Malini Olivo, Singapore Bioimaging Consortium (Singapore) [10501-45]

Development of real-time and quantitative monitoring of thrombus formation in an extracorporeal centrifugal blood pump, Daisuke Sakota, National Institute of Advanced Industrial Science and Technology (Japan); Tatsuki Fujiwara, Katsuhiko Ohuchi, Tokyo Medical and Dental Univ. (Japan); Katsuyuki Kuwana, Senko Medical Instrument Mfg. Co., Ltd. (Japan); Hiroyuki Yamazaki, Optoquest Co., Ltd. (Japan); Ryo Kosaka, Osamu Maruyama, National Institute of Advanced Industrial Science and Technology (Japan) [10501-46]

Interconnecting wearable devices with nano-biosensing implants through optical wireless communications, Pedram Johari, Josep M. Jornet, Univ. at Buffalo (USA) [10501-47]

Integrated photonic Al₂O₃/SiO₂ waveguide for ultra-violet spectroscopy, Elham Heidari, The Univ. of Texas at Austin (USA); Xiaochuan Xu, Naimei Tang, Omega Optics, Inc. (USA); Ray T. Chen, The Univ. of Texas at Austin (USA) [10501-48]

Photodynamic diagnostics of stress-induced gastrointestinal neoplasia in laboratory animals using 5-aminolevulinic acid and Al-phthalocyanine, Ekaterina G. Borisova, Institute of Electronics, Bulgarian Academy of Sciences (Bulgaria) and Saratov State Univ. (Russian Federation); Oxana Semyachkina-Glushkovskaya, Nikita Navolokin, Ilana Agranovich, Alexander Khorovodov, Natalia Shushunova, Anastasiya Bodrova, Saratov State Univ. (Russian Federation); Vanya Mantareva, Ivan Angelov, Institute of Organic Chemistry with the Ctr. of Phytochemistry (Bulgaria); Ivan Fedosov, Saratov State Univ. (Bulgaria); Anton Namykin, Saratov State Univ. (Russian Federation); Arkady Abdurashitov, Saratov State Univ. (Bulgaria); Latchezar Avramov, Institute of Electronics, Bulgarian Academy of Sciences (Bulgaria) [10501-49]

A wearable multi-wavelength photoplethysmography platform for continuous and accurate cardiovascular monitoring, Ni Zhao, Jing Liu, Xiaorong Ding, Yuan-Ting Zhang, The Chinese Univ. of Hong Kong (Hong Kong, China) [10501-50]

Assessing mitochondria by combined laser induced fluorescence and photoacoustic spectroscopy measurements: a preliminary study, Chandavalli Ramappa Raghushaker, Subhash Chandra, Satyamoorthy Kapraettu, Kirshna Kishore Mahato, Manipal Univ. (India) [10501-51]

Optical detection of HIV-1 infected cells via integration of optical tweezers and luminescence spectroscopy, Masixole Y. Lugongolo, Saturnin Ombinda-Lemboumba, CSIR National Laser Ctr. (South Africa); Malik Maaza, Univ. of South Africa (South Africa); Patience Mthunzi-Kufa, CSIR National Laser Ctr. (South Africa) [10501-52]

Oblique back illumination for microscopy of mononuclear blood cells in stored cord blood bags, Victor Omojola, Georgia Institute of Technology (USA); Francisco Robles, Georgia Institute of Technology (USA) and Emory Univ. (USA) [10501-53]

Evaluation of the polymerization shrinkage of experimental flowable composite resins through optical coherence tomography, Vanda S. M. Carneiro, Univ. Federal de Pernambuco (Brazil) and Ctr. Univ. Tabosa de Almeida (Brazil); Cláudia C. B. O. Mota, Ctr. Univ. Tabosa de Almeida (Brazil) and Univ. Federal de Pernambuco (Brazil); Alex F. Souza, Ctr. Univ. Tabosa de Almeida (Brazil); Marlus R. R. Cajazeira, Univ. Federal Fluminense (Brazil); Marley E. M. M. Gerbi, Anderson S. L. Gomes, Univ. Federal de Pernambuco (Brazil) [10501-54]

Degree of conversion of bulk fill composite resins according to the light-curing unit: a Fourier transform infrared spectroscopy analysis, Cláudia C. B. O. Mota, Ctr. Univ. Tabosa de Almeida (Brazil) and Univ. Federal de Pernambuco (Brazil); Luana O. Fernandes, Univ. Federal de Pernambuco (Brazil); Cássio A. Lima, Denise M. Zzell, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Anderson S. L. Gomes, Univ. Federal de Pernambuco (Brazil) [10501-55]

Diffraction-based BioCD biosensor for point-of-care diagnostics, Honggu Choi, Chun-Li Chang, Cagri Savran, David Nolte, Purdue Univ. (USA) [10501-56]

Efficacy of hidden Markov model over support vector machine on multiclass classification of healthy and cancerous cervical tissues, Sabyasachi Mukhopadhyay, Indian Institute of Science Education and Research Kolkata (India); Indrajit Kurmi, Sawon Pratiher, Asima Pradhan, Indian Institute of Technology Kanpur (India); Nirmalya Ghosh, Prasanta K. Panigrahi, Indian Institute of Science Education and Research Kolkata (India) [10501-57]

Remote temperature sensing using upconversion nanoparticle-based smart substrate, Zachary Coker, Texas A&M Univ. (USA); Kassie Marble, Tarleton State Univ. (USA); Masfer Alkahtani, Vladislav Yakovlev, Texas A&M Univ. (USA) [10501-58]

CONFERENCE 10502

Saturday–Monday 27–29 January 2018 • Proceedings of SPIE Vol. 10502

Adaptive Optics and Wavefront Control for Biological Systems IV

Conference Chairs: **Thomas G. Bifano**, Boston Univ. (USA); **Joel Kubby**, Univ. of California, Santa Cruz (USA); **Sylvain Gigan**, Lab. Kastler Brossel (France)

Program Committee: **Jacopo Bertolotti**, Univ. of Exeter (United Kingdom); **Martin J. Booth**, Univ. of Oxford (United Kingdom); **Wonshik Choi**, Korea Univ. (Korea, Republic of); **Meng Cui**, Purdue Univ. (USA); **John M. Girkin**, Durham Univ. (United Kingdom); **Na Ji**, Univ. of California, Berkeley (USA); **Benjamin Judkewitz**, Charité Universitätsmedizin Berlin (Germany); **Ori Katz**, The Hebrew Univ. of Jerusalem (Israel); **Peter A. Kner**, The Univ. of Georgia (USA); **Pablo Loza-Alvarez**, ICFO - Institut de Ciències Fotòniques (Spain); **Allard P. Mosk**, Utrecht Univ. (Netherlands); **Rafael Piestun**, Univ. of Colorado at Boulder (USA); **Laura Waller**, Univ. of California, Berkeley (USA); **Monika Ritsch-Marte**, Medizinische Univ. Innsbruck (Austria)

SATURDAY 27 JANUARY

SESSION 1..... SAT 8:30 AM TO 9:50 AM

Wavefront Shaping Devices: Deformable Mirrors, Spatial Light Modulators

Session Chair: **Thomas G. Bifano**, Boston Univ. (USA)

Adaptive micro endoscopy using liquid crystal lenses with segmented electrodes, Tigran Galstian, Louis Bégel, Arutyun Bagramyan, Ctr. d'Optique, Photonique et Laser (Canada) [10502-1]

Rapid and highly integrated FPGA-based Shack-Hartmann wavefront sensor for adaptive optics system, Yi-Pin Chen, Chia-Yuan Chang, National Cheng Kung Univ. (Taiwan); Shean-Jen Chen, National Chiao Tung Univ. (Taiwan)..... [10502-2]

Advanced SLMs for microscopy, Anna M. Linnenberger, Meadowlark Optics, Inc. (USA) [10502-3]

Fast optimization wavefront shaping with acousto-optic deflectors, Baptiste Blochet, Walther Akemann, Benjamin Mathieu, Sylvain Gigan, Laurent Bourdieu, Ecole Normale Supérieure (France) [10502-4]

SESSION 2..... SAT 10:20 AM TO 12:00 PM

AO for Microscopy and Optical Coherence Tomography I

Session Chair: **Martin J. Booth**, Univ. of Oxford (United Kingdom)

Sensorless adaptive optics for isoSTED nanoscopy (Invited Paper), Jacopo Antonello, Univ. of Oxford (United Kingdom); Xiang Hao, Yale Univ. (USA); Edward Allgeyer, Univ. of Cambridge (United Kingdom); Joerg Bewersdorf, Yale Univ. (USA); Jens Rittscher, Martin Booth, Univ. of Oxford (United Kingdom) [10502-5]

Label-free and high-resolution optical imaging within thick scattering media by the simultaneous suppression of scattering and aberration, Yongwoo Kwon, Sungsam Kang, Pilsung Kang, Seungwon Jeong, Taeseok D. Yang, Jin Hee Hong, Moonseok Kim, Kyung-Deok Song, Institute for Basic Science (Korea, Republic of); Jin Hyoung Park, Asan Medical Ctr. (Korea, Republic of); Jun Ho Lee, Pohang Univ. of Science and Technology (Korea, Republic of); Myoung Joon Kim, Asan Medical Ctr. (Korea, Republic of); Ki Hean Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Wonshik Choi, Institute for Basic Science (Korea, Republic of) [10502-6]

Active beam shaping to optimize in vivo opto-genetic cell ablation, John Girkin, Durham Univ. (United Kingdom); Charlotte Buckley, The Univ. of Edinburgh (United Kingdom); Mariana Carvalho, Laura Young, Durham Univ. (United Kingdom); Sebastien Rider, John Mullins, The Univ. of Edinburgh (United Kingdom) [10502-7]

Robust adaptive optics systems for retinal imaging (Invited Paper), Stephen A. Burns, Indiana Univ. (USA); Alberto de Castro, Lucie Sawides, Indiana Univ. (USA) and Consejo Superior de Investigaciones Científicas (Spain); Kaitlyn Sapoznik, Indiana Univ. (USA) [10502-8]

Lunch/Exhibition Break Sat 12:00 pm to 1:30 pm

SESSION 3..... SAT 1:30 PM TO 3:30 PM

AO for Microscopy and Optical Coherence Tomography II

Session Chair: **John Girkin**, Durham Univ. (United Kingdom)

Large-field-of-view imaging by multi-pupil adaptive optics (Invited Paper), Lingjie Kong, Tsinghua Univ. (China); Yifeng Zhou, Meng Cui, Purdue Univ. (USA) [10502-9]

A scene-based Shack-Hartmann wavefront sensor for light-sheet microscopy, Peter Kner, Keelan Lawrence, Yang Liu, The Univ. of Georgia (USA); Savannah Dale, Clemson Univ. (USA); Rebecca Ball, Ariel J. VanLeuven, The Univ. of Georgia (USA); Andrew Sornborger, Univ. of California, Davis (USA) [10502-10]

An easy-to-use, robust, adaptive optics module for spinning-disk microscopy, providing reduced phototoxicity and optimized experimental reproducibility, Fabrice Harms, Imagine Optic SA (France) [10502-11]

Aberration measurement using computational adaptive optics OCT, Fredrick A. South, Yuan-Zhi Liu, Andrew J. Bower, Yang Xu, P. Scott Carney, Stephen A. Boppart, Univ. of Illinois (USA) [10502-12]

Conjugate adaptive optics with remote focusing in multiphoton microscopy (Invited Paper), Xiaodong Tao, Tuwin Lam, Univ. of California, Santa Cruz (USA); Bingzhao Zhu, Zhejiang Univ. (China); Qinggele Li, Marc Reining, Joel Kubby, Univ. of California, Santa Cruz (USA) [10502-13]

SESSION 4..... SAT 4:00 PM TO 5:40 PM

AO for Microscopy and Optical Coherence Tomography III

Session Chair: **Peter Kner**, The Univ. of Georgia (USA)

An add-on adaptive optical module for laser scanning microscopy (Invited Paper), Ichun Anderson Chen, Wenzhi Sun, Yajie Liang, Daniel Milkie, Howard Hughes Medical Institute (USA); Thomas Bifano, Boston Univ. (USA); Na Ji, Howard Hughes Medical Institute (USA) [10502-14]

Image-based adaptive optics compared to wavefront sensing methods for retinal imaging, Daniel J. Wahl, Simon Fraser Univ. (Canada); Pengfei Zhang, Univ. of California, Davis (USA); Yifan Jian, Simon Fraser Univ. (Canada); Stefano Bonora, CNR-IFN Padova (Italy); Robert J. Zawadzki, Univ. of California, Davis (USA); Marinko V. Sarunic, Simon Fraser Univ. (Canada) [10502-15]

Variable-conjugation plane adaptive optics microscope for deep-tissue bioimaging, Liubov Amitonova, Gerwin Osnabrugge, Tom Knop, Ivo M. Vellekoop, Univ. Twente (Netherlands) [10502-16]

Ultra high-speed variable focus optics for novel applications in advanced imaging (Invited Paper), Craig B. Arnold, Princeton Univ. (USA) [10502-17]

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BIOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:00 AM TO 10:00 AM

Focusing Light Through Scattering Tissues: Optimization, Transmission Matrix I

Session Chair: **Sylvain Gigan**, Lab. Kastler Brossel (France)

Focusing of light energy inside a scattering medium by controlling the time-gated multiple light scattering (*Invited Paper*), Ye-Ryoung Lee, Seungwon Jeong, Sungsam Kang, Wonjun Choi, Jin Hee Hong, Institute for Basic Science (Korea, Republic of) and Korea Univ. (Korea, Republic of); Jin-Sung Park, Korea Univ. (Korea, Republic of); Yong-Sik Lim, Konkuk Univ. (Korea, Republic of); Hong-Gyu Park, Korea Univ. (Korea, Republic of); Wonshik Choi, Institute for Basic Science (Korea, Republic of) and Korea Univ. (Korea, Republic of) [10502-18]

Focusing light through scattering media by polarization modulation based generalized digital optical phase conjugation, Jiamiao Yang, Yuecheng Shen, California Institute of Technology (USA) and Washington Univ. in St. Louis (USA); Yan Liu, Washington Univ. in St. Louis (USA); Ashton S. Hemphill, California Institute of Technology (USA) and Washington Univ. in St. Louis (USA); Lihong V. Wang, California Institute of Technology (USA) [10502-19]

High-speed single-shot optical focusing through dynamic turbid media, Ashton S. Hemphill, Washington Univ. in St. Louis (USA) and California Institute of Technology (USA); Yuecheng Shen, Yan Liu, Lihong V. Wang, California Institute of Technology (USA) [10502-20]

Swiftly moving focus points and forming shapes through the scattering media, The Vinh Tran, Cuong Dang, Nanyang Technological Univ. (Singapore); Sujit Kumar Sahoo, National Univ. of Singapore (Singapore); Dongliang Tang, Nanyang Technological Univ. (Singapore) [10502-21]

Perfect transmission and focusing in disordered media (*Invited Paper*), Andre Brandstötter, Technische Univ. Wien (Austria); Konstantinos Makris, Univ. of Crete (Greece); Philipp Ambichl, Technische Univ. Wien (Austria); Ziad Musslimani, Florida State Univ. (USA); Stefan Rotter, Technische Univ. Wien (Austria); Ulrich Kuhl, Julian Böhm, Univ. Côte d'Azur (France) and Ctr. National de la Recherche Scientifique (France) and Lab. de Physique de la Matière Condensée (France) [10502-22]

SESSION 6 SUN 10:30 AM TO 12:30 PM

Focusing Light Through Scattering Tissues: Optimization, Transmission Matrix II

Session Chair: **Rafael Piestun**, Univ. of Colorado Boulder (USA)

Wavefront shaping in the low-photon limit (*Invited Paper*), Mooseok Jang, Korea Univ. (Korea, Republic of); Changhui Yang, California Institute of Technology (USA); Ivo M. Vellekoop, Univ. Twente (Netherlands) . . . [10502-23]

Wave-front shaping to correct intraocular scattering, Pablo Artal, Augusto Arias, Enrique Fernández, Lab. de Óptica Univ. de Murcia (Spain) [10502-24]

Finite difference time domain modeling of wavefront aberrations in bone using second harmonic generation microscopy, Kayvan F. Tehrani, The Univ. of Georgia (USA); Sendy Phang, The Univ. of Nottingham (United Kingdom); Peter Kner, The Univ. of Georgia (USA); Ana Vukovic, The Univ. of Nottingham (United Kingdom); Luke J. Mortensen, The Univ. of Georgia (USA) [10502-25]

Temporal recompression of an ultrashort pulse of light with a broadband transmission matrix, Mickael Mounaix, Lab. Kastler Brossel (France); Hilton B. de Aguiar, Ecole Normale Supérieure (France); Sylvain Gigan, Lab. Kastler Brossel (France) [10502-26]

Correlation-enhanced control of wave focusing in disordered media (*Invited Paper*), A. Douglas Stone, Chiawei Hsu, Seng-Fatt Liew, Yale Univ. (USA); Arthur Goetschy, Institut Langevin (France) and Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (France); Hui Cao, Yale Univ. (USA) [10502-27]

Lunch/Exhibition Break Sun 12:30 pm to 1:50 pm

SESSION 7 SUN 1:50 PM TO 3:30 PM

Computational Optical Imaging Techniques

Session Chair: **Na Ji**, Univ. of California, Berkeley (USA)

Multi-colour wavefront holographic shaping for advanced microscopy (*Invited Paper*), Monika Ritsch-Marte, Alexander Jesacher, Medizinische Univ. Innsbruck (Austria) [10502-28]

Transverse localization of transmission Eigenchannels, Hasan Yilmaz, Chia Wei Hsu, Yale Univ. (USA); Alexey Yamilov, Missouri Univ. of Science and Technology (USA); Hui Cao, Yale Univ. (USA) [10502-30]

Imaging through scattering media by Fourier filtering and single-pixel detection, Yessenia Jauregui-Sánchez, Pere Clemente, Enrique Tajahuerce, Jesús Lancis, Univ. Jaume I (Spain) [10502-31]

Deep body imaging with computational diffuse optical imaging (*Invited Paper*), Daniele Faccio, Alessandro Bocolini, Jonathan Leach, Francesco Tonolini, Audrey Repetti, Zhouye Chen, Yves Wiaux, Heriot-Watt Univ. (United Kingdom); Robert Henderson, The Univ. of Edinburgh (United Kingdom) [10502-32]

SESSION 8 SUN 4:00 PM TO 5:00 PM

Applications of Time-Reversal in Biological Imaging, Optical Phase Conjugation

Session Chair: **Changhui Yang**, California Institute of Technology (USA)

Scattering reflection matrix approach to ultra-deep imaging through biological media, Laura Cobus, Institut Langevin (France); Amaury Badon, Boston Univ. (USA); Dayan Li, Geoffroy Lerosey, Claude Boccara, Mathias Fink, Alexandre Aubry, Institut Langevin (France) [10502-33]

Applying sub-Nyquist sampling in optical time-reversal-based wavefront shaping to boost targeted light transport through opaque scattering media, Yuecheng Shen, Yan Liu, California Institute of Technology (USA); Cheng Ma, Washington Univ. in St. Louis (USA); Lihong V. Wang, California Institute of Technology (USA) [10502-34]

Wavefront engineering in living tissue using time-reversed ultrasonically encoded (TRUE) focusing for deep-tissue optogenetic modulation, Joshua Brake, Haowen Ruan, Yan Liu, Changhui Yang, California Institute of Technology (USA) [10502-35]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10502

MONDAY 29 JANUARY

SESSION 9 MON 8:00 AM TO 10:10 AM

Shaped Beams for Light Sheet and Structured Illumination Microscopy

Session Chair: **Monika Ritsch-Marte**,
Medizinische Univ. Innsbruck (Austria)

Adaptive optics improves multiphoton super-resolution imaging (*Invited Paper*), Wei Zheng, Shenzhen Institutes of Advanced Technology (China); Yicong Wu, National Institute of Biomedical Imaging and Bioengineering (USA); Peter Winter, National Institute of Biomedical Imaging and Bioengineering (USA); Hari Shroff, National Institute of Biomedical Imaging and Bioengineering (USA) [10502-36]

Hybrid adaptive and computational light-sheet fluorescence microscopy, Dean Wilding, Paolo Pozzi, Technische Univ. Delft (Netherlands); Oleg Soloviev, Gleb Vdovin, Technische Univ. Delft (Netherlands) and Flexible Optical B.V. (Netherlands) and ITMO Univ. (Russian Federation); Michel Verhaegen, Technische Univ. Delft (Netherlands) [10502-37]

SCAPE microscopy for high-speed 3D imaging of living tissues (*Invited Paper*), Elizabeth M. Hillman, Venkatakaushik Voleti, Wenze Li, Kripa Patel, Hang Yu, Pubudu T. Galwaduge, Citlali Perez-Campos, Columbia Univ. (USA) [10502-38]

Removal of back-reflection noise at ultrathin imaging probes by the single-core illumination and wide-field detection, Changhyeong Yoon, Munkyu Kang, Jin Hee Hong, Institute for Basic Science (Korea, Republic of) and Korea Univ. (Korea, Republic of); Taeseok D. Yang, Korea Univ. (Korea, Republic of); Jingchao Xing, Hongki Yoo, Hanyang Univ. (Korea, Republic of); Youngwoon Choi, Korea Univ. (Korea, Republic of); Wonshik Choi, Institute for Basic Science (Korea, Republic of) and Korea Univ. (Korea, Republic of) [10502-39]

Two-photon holographic imaging and optogenetics of neural circuits (*Invited Paper*), Weijian Yang, Rafael Yuste, Columbia Univ. (USA) . . [10502-40]

SESSION 10 MON 10:40 AM TO 12:00 PM

Channel Demixing for Endoscopy/Fibers I

Session Chair: **Tomáš Čížmár**, Univ. of Dundee (United Kingdom)

Wave-front shaping for nonlinear dynamics control (*Invited Paper*), Omer Tzang, Univ. of Colorado Boulder (USA); Antonio M. Caravaca-Aguirre, Univ. of Colorado (USA); Kelvin H. Wagner, Rafael Piestun, Univ. of Colorado Boulder (USA) [10502-41]

Holographic endoscope based on coherent fiber bundles and adaptive optics, Robert Kuszmierz, Dirk Schubert, Nektarios Koukourakis, Jürgen Czarske, TU Dresden (Germany) [10502-42]

Spatio-temporal volumetric light shaping for two-photon optogenetics (*Invited Paper*), Dimitrii Tanese, Nicolò Accanto, Clément Molinier, Emiliano Ronzitti, Univ. Paris Descartes (France); Zachary L. Newman, Univ. of California, Berkeley (USA); Claire Wyart, L'Institut du Cerveau et de la Moelle épinière (France); Ehud Y. Isacoff, Univ. of California, Berkeley (USA) and Lawrence Berkeley National Lab. (USA); Eirini Papagiakoumou, Valentina Emiliani, Univ. Paris Descartes (France) [10502-43]

Lunch Break Mon 12:00 pm to 1:00 pm

SESSION 11 MON 1:00 PM TO 2:30 PM

Channel Demixing for Endoscopy/Fibers II

Session Chair: **Kayvan F. Tehrani**, The Univ. of Georgia (USA)

What is hiding in the transmission matrix of multimode fibres (*Invited Paper*), Tomáš Čížmár, Tomas Tyc, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic) [10502-44]

2photon lensless endoscopy with multicore fibers, Esben R. Andresen, Univ. des Sciences et Technologies de Lille (France); Siddharth Sivankutty, Viktor Tsvirkun, Institut Fresnel (France); Géraud Bouwmans, Univ. des Sciences et Technologies de Lille (France); Hervé Rigneault, Institut Fresnel (France) [10502-45]

Wavefront shaping for ultrashort pulse delivery through optical fibers for imaging and ablation, Eirini Kakkava, Donald B. Conkey, Nicholas Stasio, Thomas Lanvin, Damien Loterie, Edgar Morales Delgado, Christophe Moser, Demetri Psaltis, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10502-46]

Predicting the transmission matrix of graded index media, Dirk E. Boonzajer Flaes, Vrije Univ. Amsterdam (Netherlands); Jan Stopka, Masaryk Univ. (Czech Republic); Sergey Turtaev, Univ. of Dundee (United Kingdom); Stefan Witte, Vrije Univ. Amsterdam (Netherlands) and Advanced Research Ctr. for Nanolithography (Netherlands); Johannes de Boer, Vrije Univ. Amsterdam (Netherlands); Tom Tyc, Masaryk Univ. (Czech Republic); Tomáš Čížmár, Univ. of Dundee (United Kingdom) [10502-47]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Beam-synchronous wavefront characterization for kHz-Laser at ELI beamlines, Jean-Baptiste Accary, Ctr. National de la Recherche Scientifique (France); Birgit Ploetzener, Vojtech Gaman, ELI Beamlines (Czech Republic) [10502-48]

Tunable Bessel beam generation via binarization of aberrated phase axicon, Su-Ho Ryu, Chulmin Joo, Yonsei Univ. (Korea, Republic of) [10502-49]

Single-shot computational fluorescence microscopy in thick scattering tissue with image priors, Julie Chang, Gordon Wetzstein, Stanford Univ. (USA) [10502-50]

Practical guidelines for implementing adaptive optics in fluorescence microscopy, Dean Wilding, Paolo Pozzi, Technische Univ. Delft (Netherlands); Oleg Soloviev, Gleb Vdovin, Technische Univ. Delft (Netherlands) and Flexible Optical B.V. (Netherlands) and ITMO Univ. (Russian Federation); Michel Verhaegen, Technische Univ. Delft (Netherlands) [10502-51]

Ultra-deep depth-resolved imaging in scattering media by combining reflection matrix measurement with Bessel beam based optical coherence tomography, Qiang Yang, Yusi Miao, Tiancheng Huo, Zhongping Chen, Univ. of California, Irvine (USA) [10502-52]

High quality adaptive optics zoom with adaptive lenses, Martino Quintavalla, CNR-IFN Padova (Italy); Freddie Santiago, Sergio Restaino, U.S. Naval Research Lab. (USA); Stefano Bonora, CNR-IFN Padova (Italy) [10502-53]

Comparison of the performance of wavefront modulators, Martino Quintavalla, CNR-IFN Padova (Italy); Jacopo Mocci, Univ. degli Studi di Verona (Italy); Paolo Pozzi, Michelle Verhaegen, Technische Univ. Delft (Netherlands); Marinko V. Sarunic, Simon Fraser Univ. (Canada); Robert J. Zawadzki, Pengfei Zhang, Univ. of California, Davis (USA); Riccardo Muradore, Univ. degli Studi di Verona (Italy); Stefano Bonora, CNR-IFN Padova (Italy) [10502-54]

Removing image distortions by spatio-temporal optical coherence manipulation, Dawid Borycki, Maciej Nowakowski, Institute of Physical Chemistry of the Polish Academy of Sciences (Poland); Maciej Szkulmowski, Nicolaus Copernicus Univ. (Poland); Patrycjusz Stremplewski, Michal Hamkalo, Maciej Wojtkowski, Institute of Physical Chemistry of the Polish Academy of Sciences (Poland) [10502-55]

Near-infrared sub-millisecond phase conjugation through biological tissue, Chengmingyue Li, California Institute of Technology (USA); Cheng Ma, Tsinghua Univ. (China); Xiao Xu, Washington Univ. in St. Louis (USA); Puxiang Lai, The Hong Kong Polytechnic Univ. (China); Lihong V. Wang, California Institute of Technology (USA) [10502-56]

Prospects of using high-speed micro electric drives in optical tomography systems, Vladimir L. Kodkin, South Ural State Univ. (Russian Federation) [10502-57]

CONFERENCE 10503

Sunday–Tuesday 28–30 January 2018 • Proceedings of SPIE Vol. 10503

Quantitative Phase Imaging IV

Conference Chairs: **Gabriel Popescu**, Univ. of Illinois at Urbana-Champaign (USA); **YongKeun Park**, KAIST (Korea, Republic of)

Program Committee: **George Barbastathis**, Massachusetts Institute of Technology (USA); **Pietro Ferraro**, Istituto di Scienze applicata e Sistemi Intelligenti (Italy); **Liang Gao**, Univ. of Illinois at Urbana-Champaign (USA); **Elena Holden**, Executive Strategic Advisory, Biotech and IVD (USA); **Björn Kemper**, Westfälische Wilhelms-Universität Münster (Germany); **Myung K. Kim**, Univ. of South Florida (USA); **Theo Lasser**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jerome Mertz**, Boston Univ. (USA); **Aydogan Ozcan**, Univ. of California, Los Angeles (USA); **Demetri Psaltis**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Colin James Richard Sheppard**, Istituto Italiano di Tecnologia (Italy); **Peter T. C. So**, Massachusetts Institute of Technology (USA); **Laura Waller**, Univ. of California, Berkeley (USA); **Changhuei Yang**, California Institute of Technology (USA)

SUNDAY 28 JANUARY

INTRODUCTION BY CONFERENCE CHAIRS. 8:20 AM TO 8:30 AM

SESSION 1. SUN 8:30 AM TO 10:00 AM

QPI Methodologies I

Session Chair: **Gabriel Popescu**,
Univ. of Illinois at Urbana-Champaign (USA)

Is phase measurement necessary for incoherent holographic 3D imaging? (*Invited Paper*), Joseph Rosen, Ben-Gurion Univ. of the Negev (Israel) [10503-1]

Exploiting optical phase conjugation for reference-free single-point holographic imaging, Seungwoo Shin, KyeoReh Lee, YoonSeok Baek, YongKeun Park, KAIST (Korea, Republic of) [10503-4]

A single optical element upgrade on commercial microscopes to enable digital holography, Muhammed Fatih Toy, Medipol Univ. (Turkey) . . . [10503-3]

Longitudinal spatial coherence gated high-resolution tomography and quantitative phase microscopy of biological cells and tissues with uniform illumination and low phase noise, Dalip S. Mehta, Azeem Ahmad, Veena Singh, Ankit Butola, Vishesh Kumar Dubey, Indian Institute of Technology Delhi (India) [10503-65]

SESSION 2. SUN 10:30 AM TO 12:15 PM

Cellular Biomechanics and Applications

Joint Session with Conferences 10496 and 10503

Session Chairs: **Kirill V. Larin**, Univ. of Houston (USA);
YongKeun Park, KAIST (Korea, Republic of);
Gabriel Popescu, Univ. of Illinois at Urbana-Champaign (USA);
David D. Sampson, The Univ. of Western Australia (Australia)

The mechanics and mechanisms of tumor cell extravasation (*Keynote Presentation*), Roger Kamm, Massachusetts Institute of Technology (USA) [10496-32]

High definition wave front sensor for quantitative phase imaging, Anaïs Saintoyant, Benoit Wattellier, Antoine Federici, Sherazade Aknoun, PHASICS S.A. (France) [10503-89]

Long-term imaging of cellular forces with high precision, Nils M. Kronenberg, Philipp Liehm, Elena Dalaka, Andrew T. Meek, Malte C. Gather, Univ. of St. Andrews (United Kingdom) [10496-33]

Coherent imaging microscopy for biomedical diagnostics at lab on chip scale (*Invited Paper*), Pietro Ferraro, Istituto di Scienze applicata e Sistemi Intelligenti (Italy) [10503-6]

Lunch/Exhibition Break Sun 12:15 pm to 1:30 pm

SESSION 3. SUN 1:30 PM TO 3:00 PM

QPI Methodologies II

Session Chair: **Changhuei Yang**,
California Institute of Technology (USA)

High-resolution mapping of optical path difference with using orientation-independent differential interference contrast microscope (*Invited Paper*), Michael Shribak, Marine Biological Lab. (USA); Shalin Mehta, Chan Zuckerberg Biohub (USA); Thomas Rhines, Scott Trinkle, Patrick J. La Rivière, The Univ. of Chicago (USA) [10503-7]

Interferometric mapping of material properties using thermal perturbation, Tong Ling, Georges Goetz, Yijun Jiang, Tushar Gupta, Daniel Palanker, Stanford Univ. (USA) [10503-8]

Compressed quantitative phase imaging using multiplexing of off-axis digital holograms and its applications, Natan T. Shaked, Tel Aviv Univ. (Israel) [10503-10]

Multiple depth multiplexing in off-axis low-coherence interferometric imaging, Lauren Wolbromsky, Natan T. Shaked, Tel Aviv Univ. (Israel) [10503-9]

SESSION 4. SUN 3:30 PM TO 5:40 PM

QPI Methodologies III

Session Chair: **YongKeun Park**, KAIST (Korea, Republic of)

Investigation of depth-sectioning in broad-band dynamic speckle-field interferometric microscopy, Sungsam Kang, Renjie Zhou, Zahid Yaqoob, Peter T. C. So, Massachusetts Institute of Technology (USA) [10503-11]

A portable quantitative phase microscope, Renjie Zhou, The Chinese Univ. of Hong Kong (Hong Kong, China) and Massachusetts Institute of Technology (USA); Di Jin, Zahid Yaqoob, Peter So, Massachusetts Institute of Technology (USA) [10503-12]

Adaptive optics for high sensitivity phase microscopy, Thomas Juffmann, Andres de los Rios Sommer, Sylvain Gigan, Lab. Kastler Brossel (France); Mark Kasevich, Brannon B. Klopfer, Stanford Univ. (USA); Stefan Nimmrichter, Ctr. for Quantum Technologies (Singapore) [10503-13]

Reflection gradient light interference microscopy (epi-GLIM) for label-free imaging of bulk specimens, Mikhail E. Kandel, Catherine Best-Popescu, Gabriel Popescu, Univ. of Illinois (USA) [10503-14]

Single-exposure multiplexing of phase and fluorescence in biological samples, Yoav N. Niygata, Gyanendra Singh, Natan T. Shaked, Tel Aviv Univ. (Israel) [10503-90]

Shaping the light for the investigation of depth-extended scattering media (*Invited Paper*), Wolfgang Osten, Karsten Frenner, Giancarlo Pedrini, Alok Kumar Singh, Johannes Schindler, Institut für Technische Optik (Germany); Mitsuo Takeda, Utsunomiya Univ. Ctr. for Optical Research & Education (Japan) [10503-15]

BIOS SUNDAY PLENARY SESSION. SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Göttingen
2014 Nobel Laureate in Chemistry

See page 7 for details

CONFERENCE 10503

MONDAY 29 JANUARY

SESSION 5..... MON 8:00 AM TO 10:10 AM

QPI Algorithms and Image Processing

Session Chair: **Laura Waller**, Univ. of California, Berkeley (USA)

PSTD simulation of propagating light through scattering medium with specific amplitude and phase, Snow H. Tseng, National Taiwan Univ. (Taiwan)..... [10503-16]

Twin image elimination in holography based on energy conservation and sparse constrain, Liangcai Cao, Zhang Wenhui, Guofan Jin, Tsinghua Univ. (China); David Brady, Duke Univ. (USA)..... [10503-17]

Deep learning based holographic image reconstruction and phase recovery, Yair Rivenson, Yibo Zhang, Harun Günaydin, Da Teng, Aydogan Ozcan, Univ. of California, Los Angeles (USA)..... [10503-18]

A robust holographic autofocus criterion based on edge sparsity, Yibo Zhang, Hongda Wang, Yichen Wu, Miu Tamamitsu, Aydogan Ozcan, Univ. of California, Los Angeles (USA)..... [10503-19]

Artificial intelligence and quantitative phase imaging, YongKeun Park, YoungJu Jo, KAIST (Korea, Republic of)..... [10503-20]

Biogenic gas vesicles as contrast agents for quantitative phase imaging (Invited Paper), Jay L. Nadeau, California Institute of Technology (USA); Justin Lee, California Institute of Technology (USA) and Univ. of California, Los Angeles (USA); Arash Farhadi, Gabrielle Ho, Raymond Bourdeau, California Institute of Technology (USA)..... [10503-21]

SESSION 6..... MON 10:40 AM TO 12:30 PM

QPI Methodologies IV

Session Chair: **YongKeun Park**, KAIST (Korea, Republic of)

Confocal reflectance quantitative phase microscopy for measuring cellular and nuclear biomechanics, Vijay Raj Singh, Zahid Yaqoob, Peter So, Massachusetts Institute of Technology (USA)..... [10503-22]

Synthetic holographic tomography by a low-coherence scanning optical cavity, Andrea Di Donato, Marco Farina, Univ. Politecnica delle Marche (Italy)..... [10503-23]

Simultaneous measurement of tomography and topography with point scanning Fourier domain optical coherence tomography, Susobhan Das, Chih Hao Liu, Manmohan Singh, Univ. of Houston (USA); Michael D. Twa, The Univ. of Alabama (USA); Kirill V. Larin, Univ. of Houston (USA) and National Research Tomsk State Univ. (Russian Federation)..... [10503-24]

Retrieval of phase and scattering imaging from incoherent x-ray propagation with phase-space representation, Ziling Wu, Yunhui Zhu, Virginia Polytechnic Institute and State Univ. (USA)..... [10503-25]

Phase retrieval algorithms and their applications (Invited Paper), Ashok Veeraraghavan, Richard G. Baraniuk, Rice Univ. (USA); Oliver Cossairt, Northwestern Univ. (USA); Christopher A. Metzler, Rice Univ. (USA) [10503-26]

Lunch Break Mon 12:30 pm to 1:30 pm

SESSION 7..... MON 1:30 PM TO 3:15 PM

Entrepreneurial Session I

Session Chairs: **Gabriel Popescu**, Univ. of Illinois at Urbana-Champaign (USA);

Elena Holden, Executive Strategic Advisory, Biotech and IVD (USA)

Focus, resolution and clarity: important in optics, important in business (Keynote Presentation), Richard M. Levenson, Univ. of California, Davis (USA)..... [10503-27]

Label-free kinetic cell imaging; a new approach for cellular phenotypic assay, Tomohiro Hayakawa, Sony Imaging Products & Solutions, Inc. (Japan)..... [10503-28]

Phi Optics: From image to knowledge, Catalin Chiritescu, Phi Optics, Inc. (USA)..... [10503-29]

SESSION 8..... MON 3:45 PM TO 4:45 PM

Entrepreneurial Session II

Session Chairs: **Gabriel Popescu**, Univ. of Illinois at Urbana-Champaign (USA); **Elena Holden**, Executive Strategic Advisory, Biotech and IVD (USA)

The evolution of phase holographic imaging (PHI) from a research idea to publicly traded company, Peter J. Egelberg, Phase Holographic Imaging AB (Sweden)..... [10503-30]

Correlative approaches in commercial quantitative phase microscopy, YongKeun Park, KAIST (Korea, Republic of)..... [10503-31]

Taking laser research results to quantitative phase imaging, Benoit Wattellier, Marie-Begoña Lebrun, PHASICS S.A. (France)..... [10503-32]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

4Pi optical diffraction tomography, SangYun Lee, YongKeun Park, KAIST (Korea, Republic of)..... [10503-2]

Three-dimensional correlative microscopy combining optical diffraction tomography and 3D deconvolution fluorescence microscopy, Kyoohyun Kim, Wei Sun Park, KAIST (Korea, Republic of); Sangchan Na, Sangbum Kim, Taehong Kim, Tomocube, Inc. (Korea, Republic of); Seungwoo Shin, Won Do Heo, KAIST (Korea, Republic of); YongKeun Park, KAIST (Korea, Republic of) and Tomocube, Inc. (Korea, Republic of)..... [10503-5]

Single-shot quantitative polarization microscopy, Baoliang Ge, Renjie Zhou, Massachusetts Institute of Technology (USA); Yu Takiguchi, Hamamatsu Photonics K.K. (Japan); Zahid Yaqoob, Peter So, Massachusetts Institute of Technology (USA)..... [10503-53]

Influence of substrate stiffness on melanoma cell behaviour characterized by dispersion-relation phase spectroscopy, Michael Fanous, Gabriel Popescu, Kristopher Kilian, Yanfen Li, Univ. of Illinois (USA)..... [10503-54]

Quantitative phase imaging of platelets in patients with chronic renal failure treated with hemodialysis, Irina Vasilenko, Elizaveta Vlasova, Vladislav Metelin, Moscow State Textile Univ. (Russian Federation) and The M. Vladimirovsky Moscow Regional Research and Clinical Institute (Russian Federation); Andrey Vatazin, The M. Vladimirovsky Moscow Regional Research and Clinical Institute (Russian Federation)..... [10503-55]

Quantitative phase imaging characterization of tumor-associated blood vessel formation on a chip, Peng Guo, Jing Huang, Marsha Moses, Boston Children's Hospital (USA)..... [10503-56]

Distinguishing cancer cell phenotypes using telecentric digital holographic microscopy and machine learning, Van Lam, Thanh Nguyen, George Nehmetallah, Byung Min Chung, Christopher Raub, The Catholic Univ. of America (USA)..... [10503-57]

Phase contrast imaging from defocused images, Ondrej Mandula, Cédric Allier, Lionel Herve, CEA Grenoble (France); Eric Denarier, Anne Fourest-Lieuvin, Univ. Grenoble Alpes (France); Sophie Morales, CEA Grenoble (France)..... [10503-58]

Dynamic quantitative analysis of adherent cell culture by means of lens-free video microscopy, Cédric Allier, Romaric Vincent, Fabrice P. Navarro, Mathilde Menneteau, CEA-LETI (France) and Univ. Grenoble Alpes (France); Lamy Ghenim, INSERM (France) and Univ. Grenoble Alpes (France); Xavier Gidrol, Univ. Grenoble Alpes (France) and INSERM (France); Thomas Bordy, Olivier Cioni, Lionel Hervé, CEA-LETI (France) and Univ. Grenoble Alpes (France); Sabine Bardin, Michel Bornens, Institut Curie (France); Yves Usson, Univ. Grenoble Alpes (France); Sophie Morales, CEA-LETI (France) and Univ. Grenoble Alpes (France)..... [10503-59]

Visualizing mechanical stresses in live cells with a combined quantitative phase and FRET imaging platform, Will J. Eldridge, Jawad Hoballah, Adam Wax, Duke Univ. (USA)..... [10503-60]

Advantages of learning tomography assessed using Mie theory, JooWon Lim, Alexandre Goy, Morteza H. Shoreh, Michael Unser, Demetri Psaltis, Ecole Polytechnique Fédérale de Lausanne (Switzerland)..... [10503-61]

- Transparent and vibration-free full-field low-coherent quantitative phase microscope**, Toyohiko Yamauchi, Hidenao Yamada, Kentaro Goto, Yukio Ueda, Hamamatsu Photonics K.K. (Japan) [10503-62]
- Speckle-free and halo-free incoherent Mach-Zehnder quantitative-phase-imaging module as a replacement of objective lens of conventional inverted microscope**, Toyohiko Yamauchi, Hidenao Yamada, Yukio Ueda, Hamamatsu Photonics K.K. (Japan) [10503-63]
- Investigation of Inflammatory response of macrophages using structured illumination microscopy and quantitative phase microscopy**, Vishesh Dubey, Indian Institute of Technology Delhi (India); Rajwinder Singh, Deanna L. Wolfson, UiT The Arctic Univ. of Norway (Norway); Azeem Ahmad, Indian Institute of Technology Delhi (India); Purusotam Basnet, UiT The Arctic Univ. of Norway (Norway); Ganesh Acharya, Karolinska Univ. Hospital (Sweden); Dalip Singh Mehta, Indian Institute of Technology Delhi (India); Balpreet Singh Ahluwalia, UiT The Arctic Univ. of Norway (Norway) . [10503-64]
- Quantitative monitoring of trapped biological cells under the influence of evanescent field**, Azeem Ahmad, Indian Institute of Technology Delhi (India); Balpreet Singh Ahluwalia, UiT The Arctic Univ. of Norway (Norway); Dalip Singh Mehta, Indian Institute of Technology Delhi (India) [10503-66]
- Solving the refractive index: thickness ambiguity in quantitative phase imaging of primary neurons in culture with low-cost custom-made 3D-printed perfusion chamber**, Erik Bélanger, Sébastien A. Lévesque, Émile Rioux-Pellerin, Valérie Watters, Vincent Roy, Alyson Bernatchez, Gabriel Anctil, Anne-Sophie Poulin-Girard, Pierre Marquet, Institut Univ. en Santé Mentale de Québec (Canada) [10503-67]
- Characteristic representation and identification method of blood cells based on quantitative phase imaging**, Yawei Wang, Zhaohao Tao Sr., Yuanyan Xu, Hao Han, Jingye Liu, Menyuan Shang, Zhidu Xin, Ying Ji, Jiangsu Univ. (China) [10503-68]
- Tomographic cell type classifiers for label-free sorting of lymphocytes**, YoungJu Jo, Jonghee Yoon, YongKeun Park, KAIST (Korea, Republic of) [10503-69]
- HoloConvNet: A deep learning framework for holographic screening of anthrax spores**, YoungJu Jo, JaeHwang Jung, YongKeun Park, KAIST (Korea, Republic of) [10503-70]
- Label-free quantification of lipids inside individual microalgae using optical diffraction tomography**, JaeHwang Jung, KAIST (Korea, Republic of); Han-byeol Kim, Seong-Joo Hong, INHA Univ. (Korea, Republic of); Geon Kim, Moosung Lee, Seungwoo Shin, SangYun Lee, KAIST (Korea, Republic of); Dong-Jin Kim, Nelson Mandela African Institute of Science and Technology (Tanzania, United Republic of); Choul-Gyun Lee, INHA Univ. (Korea, Republic of); YongKeun Park, KAIST (Korea, Republic of) . . [10503-71]
- Full characterization of monochromatic light in a single shot**, KyeoReh Lee, YongKeun Park, KAIST (Korea, Republic of) [10503-72]
- Condenser-free optical diffraction tomography using axicon optics**, Moosung Lee, YongKeun Park, KAIST (Korea, Republic of) [10503-73]
- Discrete algebraic reconstruction technique for optical diffraction tomography**, Moosung Lee, Seungwoo Shin, YongKeun Park, KAIST (Korea, Republic of) [10503-74]
- Refractive index tomography reconstruction of thick objects using dual wavelength unwrapping method**, Juntaek Oh, KAIST (Korea, Republic of) [10503-75]
- Quantitative analysis of three-dimensional temperature distribution by measuring refractive index**, Juntaek Oh, KAIST (Korea, Republic of) [10503-76]
- Generalization of image deconvolution process for distortion-free holographic imaging**, SangYun Lee, KyeoReh Lee, Seungwoo Shin, YongKeun Park, KAIST (Korea, Republic of) [10503-77]
- The investigation of corrosion behavior of electrodeposited Co-Fe alloys surface with phase and 3D reconstruction of image using TIE and TPE**, Thanthanat Srisuwan, Jakkapol Visessamit, Prathan Buranasiri, King Mongkut's Institute of Technology Ladkrabang (Thailand) [10503-78]
- Generation of depth-selectivity for reflection phase microscopy by accumulation of interferograms**, Min Gyu Hyeon, Taeseok D. Yang, Beop-Min Kim, Youngwoon Choi, Korea Univ. (Korea, Republic of) . [10503-79]
- High-speed image reconstruction using a transmission matrix for aberration correction**, Kwanjun Park, Hyung-Jin Kim, Taeseok D. Yang, Taedong Kong, Beop-Min Kim, Youngwoon Choi, Korea Univ. (Korea, Republic of) [10503-80]
- Disorder strength calculation for label-free diagnosis of tissue biopsies using quantitative phase imaging**, Masanori Takabayashi, Kyushu Institute of Technology (Japan) and Univ. of Illinois (USA); Hassaan Majeed, Univ. of Illinois (USA); Andre Kajdacsy-Balla, Univ. of Illinois at Chicago (USA); Gabriel Popescu, Univ. of Illinois (USA) [10503-81]
- High throughput calculation of local spatial autocorrelation length for label-free diagnosis of tissue biopsy**, Masanori Takabayashi, Kyushu Institute of Technology (Japan) and Univ. of Illinois (USA); Hassaan Majeed, Univ. of Illinois (USA); Andre Kajdacsy-Balla, Univ. of Illinois at Chicago (USA); Gabriel Popescu, Univ. of Illinois (USA) [10503-82]
- Deep learning mitosis detection from phase-space microscopy**, Justin Lee, George Barbastathis, Massachusetts Institute of Technology (USA) [10503-83]
- Quantitative phase microscopy using deep neural networks**, Shuai Li, Ayan Sinha, Justin Lee, George Barbastathis, Massachusetts Institute of Technology (USA) [10503-84]
- Phase shifting white light interferometry using colour CCD for optical metrology and bio-imaging applications**, Paul Kumar Upputuri, Manojit Pramanik, Nanyang Technological Univ. (Singapore) [10503-85]
- Large field of view quantitative phase imaging of induced pluripotent stem cells and optical pathlength reference materials**, Edward Kwee, Alexander W. Peterson, Michael Halter, Jeffrey Stinson, Michael Majurski, Joe Chalfoun, Peter Bajcsy, John Elliott, National Institute of Standards and Technology (USA) [10503-86]
- Applications of quantitative time lapse holographic imaging to the development of complex pharmaceutical nano formulations**, Ed Luther, Northeastern Univ. (USA); Livia P. Mendes, Jiayi Pan, Daniel F. Costa, Can Sarasozen, Vladimir P. Torchilin, Ctr. for Pharmaceutical Biotechnology and Nanomedicine, Northeastern Univ. (USA) [10503-87]
- Common-path digital holographic microscopy based on a beam displacer unit**, Jianglei Di, Jiwei Zhang, Yu Song, Kaiqiang Wang, Jianlin Zhao, Northwestern Polytechnical Univ. (China) [10503-88]
- Automated high resolution full-field spatial coherence tomography for quantitative phase imaging of human red blood cells**, Neeru Singla, Vishal Srivastava, Thapar Institute of Engineering and Technology Univ. (India); Azeem Ahmad, Indian Institute of Technology Delhi (India) [10503-91]
- Single-pixel diffraction-phase microscopic imaging combined with photon counting**, Kyuki Shibuya, Hiroyuki Araki, Shinya Adachi, Tetsuo Iwata, Tokushima Univ. (Japan) [10503-92]
- Simultaneous fluorescence and quantitative phase microscopy with single-pixel detectors**, Yang Liu, Jinli Suo, Yuanlong Zhang, Qionghai Dai, Tsinghua Univ. (China) [10503-93]
- Quantitative breast cancer screening using spatial light interference microscopy (SLIM)**, Hassaan Majeed, Tan Nguyen, Mikhail Kandel, Univ. of Illinois (USA); Andre Kajdacsy-Balla, Univ. of Illinois at Chicago (USA); Gabriel Popescu, Univ. of Illinois (USA) [10503-95]
- Spatial light modulator calibration for phase shifting interferometry using a color camera**, Mikhail E. Kandel, Gabriel Popescu, Univ. of Illinois (USA) [10503-96]
- Real-time halo correction in common-path QPI**, Mikhail E. Kandel, Michael Fanous, Catherine Best-Popescu, Gabriel Popescu, Univ. of Illinois (USA) [10503-97]
- Imaging collagen properties in the uterosacral ligaments of women with pelvic organ prolapse using spatial light interference microscopy (SLIM)**, Chenfei Hu, Melissa Santi, Oluwatobi Adelaja, William Kobak, Univ. of Illinois (USA); Andre Kajdacsy-Balla, Univ. of Illinois at Chicago (USA); Gabriel Popescu, Univ. of Illinois (USA) [10503-98]
- Localized optogenetic stimulation and label-free imaging of neuronal cell activation**, Chenfei Hu, Richard Sam, Martha U. Gillette, Parijat Sengupta, Gabriel Popescu, Univ. of Illinois (USA) [10503-99]
- Phase sensitivity of off-axis interferometry**, Yizheng Zhu, Shichao Chen, Virginia Polytechnic Institute and State Univ. (USA) [10503-100]
- Quantitative phase imaging for enhanced assessment of optomechanical cancer cell properties**, Lena Kastl, Steffi Ketelhut, Jürgen Schneckener, Björn Kemper, Westfälische Wilhelms-Universität Münster (Germany) [10503-101]
- Subwavelength resolution Fourier ptychography with hemispherical digital condensers**, An Pan, Xi'an Institute of Optics and Precision Mechanics, CAS (China); Maosen Li, Xidian Univ. (China); Yan Zhang, Meiling Zhou, Ming Lei, Baoli Yao, Xi'an Institute of Optics and Precision Mechanics, CAS (China) [10503-102]

CONFERENCE 10503

Effective numerical aperture and the coherence of a light source in lens-free holography, Hee-Jung Lee, Jongwoo Kim, Philjun Jeon, Dugyoung Kim, Yonsei Univ. (Korea, Republic of) [10503-103]

Off-axis Fresnel incoherent correlation holography with a wedge plate, Philjun Jeon, Heejung Lee, Jongwu Kim, Dugyoung Kim, Yonsei Univ. (Korea, Republic of) [10503-104]

A non-iterative twin image elimination method with two in-line digital holograms, Jongwu Kim, Heejung Lee, Philjun Jeon, Dugyoung Kim, Yonsei Univ. (Korea, Republic of) [10503-105]

Diagnostic applications of photo-thermal optical coherence tomography at 1210 nm, Nitesh Katta, Austin B. McElroy, Kevin C. Choy, Thomas E. Milner, The Univ. of Texas at Austin (USA) [10503-106]

Quantitative phase imaging using a programmable wavefront sensor, Fernando Soldevila, Univ. Jaume I (Spain); Vicente Durán, Univ. Grenoble Alpes (France); Pere Clemente, Enrique Tajahuerce, Jesús Lancis, Univ. Jaume I (Spain) [10503-107]

Optical and electrical mapping of live cell response to AC excitation using quantitative phase and optical waveguide assays, Cristina Polonschii, Mihaela Gheorghiu, The International Ctr. of Biodynamics (Romania); Hassaan Majeed, Univ. of Illinois at Urbana-Champaign (USA); Sorin David, Dumitru Bratu, The International Ctr. of Biodynamics (Romania); Gabriel Popescu, Univ. of Illinois at Urbana-Champaign (USA); Eugen Gheorghiu, The International Ctr. of Biodynamics (Romania) [10503-108]

TUESDAY 30 JANUARY

SESSION 9 **TUE 8:00 AM TO 10:10 AM**

QPI of Cells and Tissues

Session Chair: **Aydogan Ozcan**,
Univ. of California, Los Angeles (USA)

Refractive index tomography of myelinating glial cells, Muhammed Fatih Toy, Bilal Kerman, Medipol Univ. (Turkey) [10503-34]

Safety and efficacy of Regadenoson in myocardial perfusion imaging stress tests: A review, Ambereen Ahmed, A&M Assorted Therapy, LLC (USA) [10503-35]

Quantification of rare and dynamic mammalian cell state transitions with digital holographic cytometry, Robert Judson, Univ. of California, San Francisco (USA); Miroslav Hejna, Univ. of Illinois (USA); Aparna Jorapur, Univ. of California, San Francisco (USA); Jun S. Song, Univ. of Illinois (USA) [10503-36]

Multi-spectral digital holographic microscopy for enhanced quantitative phase imaging of living cells, Björn Kemper, Steffi Ketelhut, Westfälische Wilhelms-Univ. Münster (Germany) [10503-37]

High resolution and high speed noninvasive living-cell imaging with ring-scanning total internal reflection (RTIR) illumination, Qiulan Liu, Cuifang Kuang, Xu Liu, Zhejiang Univ. (China) [10503-38]

Interferometric spectroscopy of scattered light for the quantification of nanoscale structure of chromatin (Invited Paper), Vadim Backman, Northwestern Univ. (USA) [10503-39]

SESSION 10 **TUE 10:40 AM TO 12:30 PM**

QPI Methodologies VI

Session Chair: **Björn Kemper**,
Westfälische Wilhelms-Univ. Münster (Germany)

Speckle-free inherently-phased synthetic aperture microscopy with coherent illumination, Remy Tumber, Coherent Data Engines, Inc. (USA) [10503-40]

Single-pixel quantitative phase in both forward and back-scattering geometries, Patrick A. Stockton, Colorado State Univ. (USA); Nathan Worts, Clare Lanaghans, Colorado School of Mines (USA); Jeff Field, Colorado State Univ. (USA); Jeff Squier, Colorado School of Mines (USA); Randy Bartels, Colorado State Univ. (USA) [10503-41]

Ultraviolet hyperspectral interferometric microscopy, Ashkan Ojaghi, Francisco Robles, Georgia Institute of Technology (USA) and Emory Univ. (USA) [10503-42]

Surface plasmon holographic microscopy for near-field refractive index detection and thin film mapping, Jianlin Zhao, Northwestern Polytechnical Univ. (China) [10503-43]

Real and synthetic holographic phase contrast imaging (Invited Paper), Monika Ritsch-Marte, Medizinische Univ. Innsbruck (Austria) [10503-44]

Lunch/Exhibition Break Tue 12:30 pm to 2:00 pm

SESSION 11 **TUE 2:00 PM TO 3:20 PM**

QPI Clinical Applications I

Session Chair: **Pietro Ferraro**,
Istituto di Scienze applicata e Sistemi Intelligenti (Italy)

Multimodal quantitative phase digital holographic microscopy to identify disease-specific cell phenotypes, Pierre P. Marquet, Institut Univ. en Santé Mentale de Québec (Canada); Pascal Jourdain, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Erik Bélanger, Institut Univ. en Santé Mentale de Québec (Canada); Kaspar Rothenfusser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Sara Mattar, Jean-Michel Mugnes, Ana-Sofia Correia, Sébastien A. Lévesque, Martin Roy, Institut Univ. en Santé Mentale de Québec (Canada); Christian Depeursinge, Pierre J. Magistretti, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10503-45]

Study on phase characteristics of leukocytes and theirs edge detection, Yuanyuan Xu, Jiangsu Univ. (China) [10503-46]

Full-sequence tomographic microscopy for investigating the CAR immunological response, Moosung Lee, YoungHo Lee, Chan Hyuk Kim, YongKeun Park, KAIST (Korea, Republic of) [10503-47]

Dynamic 3D (4D)-live cell imaging of cell membrane damage induced by near infrared photoimmunotherapy using a quantitative phase microscopy (QPM), Hisataka Kobayashi, National Cancer Institute (USA) [10503-48]

SESSION 12 **TUE 3:50 PM TO 5:40 PM**

QPI Clinical Applications II

Session Chair: **Gabriel Popescu**,
Univ. of Illinois at Urbana-Champaign (USA)

Digital holographic microscopy for toxicity testing and cell culture quality control (Invited Paper), Björn Kemper, Westfälische Wilhelms-Univ. Münster (Germany) [10503-49]

Sperm selection under quantitative phase microscopy using disposable microfluidics, Natan T. Shaked, Pinkie Jacob Eravuchira, Simcha K. Mirsky, Itay Barnea, Mattan Levi, Michal Balberg, Tel Aviv Univ. (Israel) [10503-50]

The potential of wide-field quantitative phase microscopy for multi-scale histopathology, Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of) [10503-51]

Investigating live cell in label-free manner: multimodal and multi-wavelength imager, Rishikesh Pandey, Univ. of Connecticut School of Medicine (USA); Renjie Zhou, Massachusetts Institute of Technology (USA); Tulio Valdez, Univ. of Connecticut School of Medicine (USA) [10503-52]

Simultaneous amplitude and phase tissue slide scanner for breast histopathology, Hassaan Majeed, Mikhail Kandel, Univ. of Illinois (USA); Andre Kajdacsy-Balla, Univ. of Illinois at Chicago (USA); Gabriel Popescu, Univ. of Illinois (USA) [10503-94]

CONFERENCE 10504

Sunday 28 January 2018 • Proceedings of SPIE Vol. 10504

Biophysics, Biology and Biophotonics III: the Crossroads

Conference Chairs: **Adam Wax**, Duke Univ. (USA); **Vadim Backman**, Northwestern Univ. (USA)

Program Committee: **Nada N. Boustany**, Rutgers, The State Univ. of New Jersey (USA); **Kishan Dholakia**, Univ. of St. Andrews (United Kingdom); **Jochen R. Guck**, Technische Univ. Dresden (Germany); **Elizabeth M. Hillman**, Columbia Univ. (USA); **Roger D. Kamm**, Massachusetts Institute of Technology (USA); **Miles J. Padgett**, Univ. of Glasgow (United Kingdom); **Igal Szeleifer**, Northwestern Univ. (USA); **Bruce J. Tromberg**, Beckman Laser Institute and Medical Clinic (USA); **David A. Weitz**, Harvard Univ. (USA)

SUNDAY 28 JANUARY

SESSION 1 SUN 8:30 AM TO 10:00 AM

New Technologies in Biology and Biophysics

Session Chair: **Adam Wax**, Duke Univ. (USA)

Development of enabling phase-sensitive x-ray imaging technologies for pre-clinical science (*Invited Paper*), Mark A. Anastasio, Washington Univ. in St. Louis (USA) [10504-1]

Non-invasive monitoring of enzyme activity in single cells using NAD(P)H fluorescence lifetime imaging, Joe T. Sharick, Vanderbilt Univ. (USA) and Morgridge Institute for Research (USA); Peter F. Favreau, Amani A. Gillette, Morgridge Institute for Research (USA); Sophia M. Sdao, Matthew J. Merrins, Univ. of Wisconsin-Madison (USA); Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA) [10504-2]

Widefield micro-optical probe and computer simulation enables new insights into vascular pressure sensing and signaling, John Girkin, Christopher D. Saunter, Durham Univ. (United Kingdom); Calum Wilson, John McCarron, Univ. of Strathclyde (United Kingdom) [10504-3]

Cell division is coupled to the optical redox ratio, Rupsa Datta, Morgridge Institute for Research (USA); Zhaoqi Li, Allison Lau, Matthew Vander Heiden, The David H. Koch Institute for Integrative Cancer Research (USA); Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA) [10504-4]

SESSION 2 SUN 10:30 AM TO 12:20 PM

Superresolution and the Imaging of the Genome

Session Chair: **Mark A. Anastasio**, Washington Univ. in St. Louis (USA)

Kinetics of lipid metabolism in cancer cells (*Invited Paper*), Eric O. Potma, Jue Hou, Elliot Botvinick, Bruce J. Tromberg, Univ. of California, Irvine (USA) [10504-5]

Chromatin structure quantification from super-resolution intrinsic fluorescence imaging, Yue Li, Biqin Dong, Adam Eshein, Graham Spicer, Wenli Wu, Luay M. Almassalha, Rongrong Liu, The-Quyen Nguyen, John E. Chandler, Cheng Sun, Hao F. Zhang, Vadim Backman, Northwestern Univ. (USA) [10504-6]

Identifying single DNA molecules with super-resolution microscopy to map the microbiome, Arno Bouwens, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and KU Leuven (Belgium); Jochem Deen, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Raffaele Vitale, Doortje Borrenberghs, Adrien Descloux, KU Leuven (Belgium); Kristin Grussmayer, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Cyril Ruckebusch, Univ. des Sciences et Technologies de Lille (France); Aleksandra Radenovic, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Johan Hofkens, KU Leuven (Belgium); Dimitri Van De Ville, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Kris Janssen, KU Leuven (Belgium) [10504-7]

Detection and identification of amino acids in a complex compound solutions with femtosecond laser-induced breakdown spectroscopy, Yuriy Markushin, Hacene Boukari, Delaware State Univ. (USA); Poopalasingam Sivakumar, Southern Illinois Univ. Carbondale (USA); Noureddine Melikechi, Univ. of Massachusetts Lowell (USA) [10504-8]

Lens-free common path OCT probe for quantification of optical scattering properties, Jeremy D. Rogers, Ryan C. Niemeier, Sevde Etoz, Chris Brace, Univ. of Wisconsin-Madison (USA) [10504-9]

Lunch/Exhibition Break Sun 12:20 pm to 1:50 pm

SESSION 3 SUN 1:50 PM TO 3:30 PM

New Technologies in Medical Diagnostics

Session Chair: **Vadim Backman**, Northwestern Univ. (USA)

Holographic cytology for imaging red blood cells in flow (*Invited Paper*), Adam Wax, Han Sang Park, Duke Univ. (USA) [10504-10]

Multiphoton microscopy for deep brain imaging (*Invited Paper*), Chris Xu, Cornell Univ. (USA) [10504-11]

Label-free in vitro prostate cancer cell detection via photonic-crystal biosensor, Frank DeLuna, The Univ. of Texas at San Antonio (USA); XiaoFei Ding, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Ismael Sagredo, Gilbert Bustamante, The Univ. of Texas at San Antonio (USA); Lu-Zhe Sun, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Jing Yong Ye, The Univ. of Texas at San Antonio (USA) [10504-12]

Guided mode resonance imaging: A novel sensing technique to study bacterial biofilm antibiotic resistance, Yue Wang, Christopher P. Reardon, Nicholas Read, Thomas F. Krauss, Univ. of York (United Kingdom) [10504-13]

SESSION 4 SUN 4:00 PM TO 6:10 PM

Imaging Cellular and Molecular Dynamics and Biomechanics

Session Chair: **Jeremy D. Rogers**, Univ. of Wisconsin-Madison (USA)

3D tissue Doppler spectroscopy of intracellular dynamics: biophysics and applications (*Invited Paper*), David D. Nolte, Zhe Li, Honggu Choi, Purdue Univ. (USA); Hao Sun, Google (USA); John Turek, Purdue Univ. (USA) [10504-14]

Label-free Fourier filtered dark-field imaging to quantify subcellular dynamics, Mohammad Naser, Rene S. Schloss, Nada N. Boustany, Rutgers, The State Univ. of New Jersey (USA) [10504-15]

Diffusion of fluorescent poly(vinyl-alcohol) linear chains in semi-dilute poly(vinyl-alcohol) polymeric solutions, Hacene Boukari, Delaware State Univ. (USA); Ralph Nossal, Dan Sackett, National Institutes of Health (USA) [10504-16]

Multi-parametric OCT to simultaneously measure intracellular motility and ECM nanostructure of 3D mammary organoid cultures, Richard L. Blackmon, Elon Univ. (USA); Xiao Yu, ChromoLogic, LLC (USA); Ashley M. Fuller, The Univ. of North Carolina at Chapel Hill (USA); Brian S. Chapman, Joseph B. Tracy, North Carolina State Univ. (USA); Melissa A. Troester, Amy L. Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) [10504-17]

Dual scale biomechanics of extracellular matrix proteins probed by Brillouin scattering and quasistatic tensile testing, Ryan S. Edginton, Ellen M. Green, Peter Winlove, Univ. of Exeter (United Kingdom); Daniele Fioretto, Univ. degli Studi di Perugia (Italy); Francesca Palombo, Univ. of Exeter (United Kingdom) [10504-18]

Biomechanical properties of cells revealed by shear flow assays in an in-house microfluidic chamber and quantitative phase digital holographic microscopy, Erik Bélangier, Philippe Bilodeau, Émile Rioux-Pellerin, Pierre Marquet, Institut Univ. en Santé Mentale de Québec (Canada) [10504-19]

CONFERENCE 10504

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Machine learning based analysis of human prostate cancer cell lines of different metastatic ability using native fluorescence spectroscopy with selective excitation wavelength. Jiangpeng Xue, China Pharmaceutical Univ. (China); Yang Pu, MicroPhotoAcoustics, Inc. (USA); Jason Smith, Southern Connecticut State Univ. (USA); Xin Gao, LaGuardia Community College (USA); Binlin Wu, Southern Connecticut State Univ. (USA). [10504-20]

Time-zoomable FRET spectroscopy with a 512 x16 SPAD line sensor, Ahmet T. Erdogan, Gareth O. S. Williams, Neil Finlayson, Andrea Usai, Nikola Krstajić, Robert K. Henderson, The Univ. of Edinburgh (United Kingdom) [10504-21]

Impact of presowing laser irradiation on germination and sowing qualities of coniferous seeds, Alexey Iakovlev, Andrey Mak, ITMO Univ. (Russian Federation); Anastasia Durova, ITMO Univ. (Russian Federation) and Saint Petersburg State Forest Technical Univ. (Russian Federation). [10504-22]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details



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CONFERENCE 10505

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10505

High-Speed Biomedical Imaging and Spectroscopy III: Toward Big Data Instrumentation and Management

Conference Chairs: **Kevin K. Tsia**, The Univ. of Hong Kong (Hong Kong, China); **Keisuke Goda**, The Univ. of Tokyo (Japan)

Conference Co-Chairs: **Yasuyuki Ozeki**, The Univ. of Tokyo (Japan); **Bahram Jalali**, Univ. of California, Los Angeles (USA); **Edmund Y. Lam**, The Univ. of Hong Kong (Hong Kong, China); **Kenneth Y. Wong**, The Univ. of Hong Kong (Hong Kong, China)

Program Committee: **Steven G. Adie**, Cornell Univ. (USA); **Mohammad Hossein Asghari**, Univ. of California, Los Angeles (USA); **Hongwei Chen**, Tsinghua Univ. (China); **Pei-Yu Eric Chiou**, Univ. of California, Los Angeles (USA); **Shi-Wei Chu**, National Taiwan Univ. (Taiwan); **Qionghai Dai**, Tsinghua Univ. (China); **Mark Foster**, Johns Hopkins Univ. (USA); **Katsumasa Fujita**, Osaka Univ. (Japan); **Liang Gao**, Univ. of Illinois at Urbana-Champaign (USA); **Chulhong Kim**, Pohang Univ. of Science and Technology (Korea, Republic of); **Thomas Klein**, Optores GmbH (Germany); **Tzu-Ming Liu**, Univ. of Macau (Macao, China); **Yu-Hwa Lo**, Univ. of California, San Diego (USA); **Hideharu Mikami**, The Univ. of Tokyo (Japan); **YongKeun Park**, KAIST (Korea, Republic of); **Adrian Podoleanu**, Univ. of Kent (United Kingdom); **Dario Polli**, Politecnico di Milano (Italy); **Eric O. Potma**, Univ. of California, Irvine (USA); **Peter T. C. So**, Massachusetts Institute of Technology (USA); **Lei Tian**, Boston Univ. (USA); **Laura Waller**, Univ. of California, Berkeley (USA); **Chao Wang**, Univ. of Kent (United Kingdom); **Lihong V. Wang**, California Institute of Technology (USA); **Takeshi Yasui**, The Univ. of Tokushima (Japan); **Tomokazu Yoshida**, Sysmex Corp. (Japan); **Zeev Zalevsky**, Bar-Ilan Univ. (Israel)

Conference Cosponsor: **HAMAMATSU**
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MONDAY 29 JANUARY

SESSION 1 MON 8:30 AM TO 10:00 AM

Computational Imaging

Session Chair: **Kevin K. Tsia**,
The Univ. of Hong Kong (Hong Kong, China)

Fourier ptychography for parallel microscopy (*Invited Paper*),
Changhuei Yang, California Institute of Technology (USA) [10505-1]

Trillion-frame-per-second compressed ultrafast photography,
Jinyang Liang, Institut National de la Recherche Scientifique (Canada) and
California Institute of Technology (USA); Liren Zhu, Lihong V. Wang,
California Institute of Technology (USA) [10505-2]

Compressive spectral optical coherence tomography, Xin Yuan,
Nokia Bell Labs (USA); Yangyang Sun, Univ. of Central Florida (USA);
Xuan Liu, New Jersey Institute of Technology (USA) [10505-3]

Compressive temporal focusing microscopy, Milad Alemohammad,
Jaewook Shin, Jasper R. Stroud, Mark A. Foster, Johns Hopkins
Univ. (USA) [10505-4]

SESSION 2 MON 10:30 AM TO 12:00 PM

High-Throughput Imaging: Instrumentation and Analytics I

Session Chair: **Mark A. Foster**, Johns Hopkins Univ. (USA)

**Multiplexing acquisition with spectral interleaving optical coherence
tomography** (*Invited Paper*), Audrey K. Bowden, Stanford Univ.
(USA) [10505-5]

100 Mfps image sensor for biological applications, Takeharu Goji Etch,
Kazuhiro Shimonomura, Quang A. Nguyen, Ritsumeikan Univ. (Japan); Kosei
Takehara, Kindai Univ. (Japan); Yoshinari Kamakura, Osaka Univ. (Japan); Paul
Goetschalckx, Luc Haspelslagh, Piet De Moor, IMEC (Belgium); Vu Truong Son
Dao, International Univ. (Viet Nam); Dzung H. Nguyen, Hanoi Univ. of Science
and Technology (Viet Nam); Naoki Hayashi, Yo Mitsui, ASTRODESIGN, Inc.
(Japan); Hideo Inumaru, CREF, Inc. (Japan) [10505-6]

High-resolution multispectral imaging using a photodiode, Liheng Bian,
Jinli Suo, Feng Chen, Qionghai Dai, Tsinghua Univ. (China) [10505-7]

**Video-rate confocal phase imaging by use of scan-less dual comb
microscopy**, Takahiko Mizuno, Eiji Hase, Takeo Minamikawa,
Tokushima Univ. (Japan); Hirotosugu Yamamoto, Utsunomiya Univ. (Japan);
Takeshi Yasui, Tokushima Univ. (Japan) [10505-8]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 3 MON 1:30 PM TO 3:00 PM

High-Throughput Imaging: Instrumentation and Analytics II

Session Chair: **Bennett L. Ibey**, Air Force Research Lab. (USA)

**Development and application of high-speed super-resolution and
single-molecule imaging for cell biology studies** (*Invited Paper*),
Yasushi Okada, RIKEN Quantitative Biology Ctr. (Japan) [10505-9]

High-speed particle tracking in microscopy using SPAD image sensors,
Istvan Gyongy, The Univ. of Edinburgh (United Kingdom); Amy Davies, Heriot-
Watt Univ. (United Kingdom); Neale A. W. Dutton, STMicroelectronics (R&D)
Ltd. (United Kingdom); Colin Rickman, Rory Duncan, Heriot-Watt Univ. (United
Kingdom); Robert Henderson, The Univ. of Edinburgh (United Kingdom);
Paul Dalgarno, Heriot-Watt Univ. (United Kingdom) [10505-10]

**Machine-learning-assisted optofluidic time-stretch microscopy for
drug discovery and medical diagnostics**, Cheng Lei, Hirofumi Kobayashi,
Yiyue Jiang, The Univ. of Tokyo (Japan); Yi Wu, Carnegie Mellon Univ. (USA);
Baoshan Guo, Atsushi Yasumoto, Takuro Ito, Yutaka Yatomi, Yasuyuki Ozeki,
Keisuke Goda, The Univ. of Tokyo (Japan) [10505-11]

**Label-free multi-class classification of phytoplankton based on
quantitative phase time-stretch imaging**, Queenie Tsz Kwan K. Lai, Kelvin
C. M. Lee, Kenneth K. Y. Wong, Kevin K. Tsia, The Univ. of Hong Kong (Hong
Kong, China) [10505-19]

SESSION 3 MON 3:30 PM TO 5:30 PM

High-Throughput Imaging: Instrumentation and Analytics III

Session Chair: **Edmund Y. Lam**,
The Univ. of Hong Kong (Hong Kong, China)

**Pushing the envelope in biological imaging with dual-view light sheet
fluorescence microscopy** (*Invited Paper*), Yicong Wu, Evan Ardiel,
Ryan Christensen, Hari Shroff, National Institute of Biomedical Imaging and
Bioengineering (USA) [10505-13]

**Light sheet microscopy revolutionizes dynamic multi-dimensional light
microscopy of three-dimensional specimens** (*Invited Paper*),
Ernst Hans Karl Stelzer, Johann Wolfgang Goethe-Univ. Frankfurt am Main
(Germany) [10505-14]

**High-throughput fluorescence imaging flow cytometry with light-sheet
excitation and machine learning**, Hideharu Mikami, Taichi Miura,
Yasuyuki Ozeki, The Univ. of Tokyo (Japan); Keisuke Goda, The Univ. of Tokyo
(Japan) and Univ. of California, Los Angeles (USA) and Japan Science and
Technology Agency (Japan) [10505-15]

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Adapting high speed and nonlinear optical systems to measure rapid changes in plasma membrane structure and potential, Bennett L. Ibey, Joel Bixler, Caleb C. Roth, Hope T. Beier, Air Force Research Lab. (USA) [10505-16]

Multi-channel imaging cytometry with a single detector, Sarah Locknar, John Barton, Omega Optical, Inc. (USA); Mark Entwistle, Princeton Lightwave, Inc. (USA); Gary Carver, Robert Johnson, Omega Optical, Inc. (USA) [10505-17]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Dual-comb single-pixel imaging in both amplitude and phase, Kyuki Shibuya, Takeo Minamikawa, Tokushima Univ. (Japan) and ERATO MINOSHIMA Intelligent Optical Synthesizer, Japan Science Engineering Co., Ltd. (Japan); Yasuhiro Mizutani, Osaka Univ. (Japan) and ERATO MINOSHIMA Intelligent Optical Synthesizer, Japan Science Engineering Co., Ltd. (Japan); Hirotsugu Yamamoto, Utsunomiya Univ. (Japan) and ERATO MINOSHIMA Intelligent Optical Synthesizer, Japan Science Engineering Co., Ltd. (Japan); Takeshi Yasui, Tetsuo Iwata, Tokushima Univ. (Japan) and ERATO MINOSHIMA Intelligent Optical Synthesizer, Japan Science Engineering Co., Ltd. (Japan) [10505-34]

Hybrid adaptive optics for high-throughput volumetric optical coherence microscopy, Siyang Liu, Jeffrey A. Mulligan, Steven G. Adie, Cornell Univ. (USA) [10505-35]

End-to-end learning for digital hologram reconstruction, Zhimin Xu, SharpSight Ltd. (Hong Kong, China); Si Zuo, Aalto Univ. (Finland); Edmund Y. Lam, The Univ. of Hong Kong (Hong Kong, China) [10505-36]

Direct digitizer to GPU DMA transfer for high speed customizable OCT processing, Romain Deterre, Étienne De Montigny, Muneeb Khalid, Alazar Technologies, Inc. (Canada) [10505-37]

A two-stage framework for DIC image denoising and Gabor based GLCM feature extraction for pre-cancer diagnosis, Sawon Pratiher, Indian Institute of Technology Kanpur (India); Sabyasachi Mukhopadhyay, Indian Institute of Science Education and Research Kolkata (India); Asima Pradhan, Indian Institute of Technology Kanpur (India); Nirmalya Ghosh, Prasanta K. Panigrahi, Indian Institute of Science Education and Research Kolkata (India) [10505-38]

Plasma plume expansion dynamics in nanosecond Nd:YAG laser osteotome, Hamed Abbasi, Georg Rauter, Univ. Basel (Switzerland); Raphael Guzman, Univ. Hospital Basel (Switzerland); Philippe C. Cattin, Azhar Zam, Univ. Basel (Switzerland) [10505-39]

Application of fast skyline computation algorithm to serendipitous searching problems, Kenichi Koizumi, Kei Hiraki, Mary Inaba, The Univ. of Tokyo (Japan) [10505-40]

Highly-sensitive and large-dynamic diffuse optical tomography system for breast tumor detection, Wenwen Du, Limin Zhang, Guoyan Yin, Yanqi Zhang, Huijuan Zhao, Feng Gao, Tianjin Univ. (China) [10505-41]

Augmenting fully convolutional networks with transformer modules to enhance retinal health assessments, Henry Leopold, John Zelek, Vasudevan Lakshminarayanan, Univ. of Waterloo (Canada) [10505-42]

Stochastic HKMDHE: An multi-objective contrast enhancement algorithm, Sawon Pratiher, Indian Institute of Technology Kanpur (India); Sabyasachi Mukhopadhyay, Indian Institute of Science Education and Research Kolkata (India); Srideep Maity, Indian Institute of Engineering Science and Technology, Shibpur (India); Prasanta K. Panigrahi, Indian Institute of Science Education and Research Kolkata (India) [10505-43]

Evaluation of a high framerate multi-exposure laser speckle contrast imaging setup, Martin Hultman, Linköping Univ. (Sweden); Ingemar Fredriksson, Linköping Univ. (Sweden) and Perimed AB (Sweden); Marcus Larsson, Tomas Strömberg, Linköping Univ. (Sweden) [10505-44]

TUESDAY 30 JANUARY

SESSION 5 TUE 8:30 AM TO 10:00 AM

High-throughput Imaging: Applications

Session Chair: **Liang Gao**, Univ. of Illinois at Urbana-Champaign (USA)

Fluorescence lifetime imaging for real-time augmented reality in cancer surgery (*Invited Paper*), Laura Marcu, Univ. of California, Davis (USA) [10505-18]

Deep convolutional neural network for single-cell image analysis, Edmund Y. Lam, Nan Meng, Hayden K. H. So, The Univ. of Hong Kong (Hong Kong, China) [10505-12]

Accurate classification of microalgal cells by frequency-division-multiplexed confocal imaging flow cytometry, Hideharu Mikami, Jeffrey Harmon, Yasuyuki Ozeki, The Univ. of Tokyo (Japan); Keisuke Goda, The Univ. of Tokyo (Japan) and Univ. of California, Los Angeles (USA) and Japan Science and Technology Agency (Japan) [10505-20]

Label-free cell-cycle analysis by high-throughput quantitative phase time-stretch imaging flow cytometry, Aaron Mok, Kelvin C. M. Lee, Kenneth K. Y. Wong, Kevin K. Tsia, The Univ. of Hong Kong (Hong Kong, China) [10505-21]

SESSION 6 TUE 10:30 AM TO 11:40 AM

High-speed Nonlinear Imaging I

Session Chair: **Kotaro Hiramatsu**, The Univ. of Tokyo (Japan)

Stimulated Raman scattering microscopy and spectroscopy with a rapidly scanning optical delay line (*Invited Paper*), Minbiao Ji, Fudan Univ. (China) [10505-22]

Multicolor stimulated Raman imaging of live microalgal cells using fast wavelength-switched laser pulses, Yuta Suzuki, Koya Kobayashi, Dinghuan Deng, Yoshifumi Wakisaka, Keisuke Goda, Yasuyuki Ozeki, The Univ. of Tokyo (Japan) [10505-23]

In-line balanced detection stimulated Raman scattering microscopy from a compact fiber-format laser source, Dario Polli, Francesco Crisafi, Vikas Kumar, Giulio Cerullo, Politecnico di Milano (Italy) [10505-24]

Lunch/Exhibition Break Tue 11:40 am to 1:30 pm

SESSION 7 TUE 1:30 PM TO 3:00 PM

High-speed Nonlinear Imaging II

Session Chair: **Dario Polli**, Politecnico di Milano (Italy)

Multimodal nonlinear optical microscopy imaging and Raman spectroscopy for label-free digital pathology (*Invited Paper*), Zhiwei Huang, National Univ. of Singapore (Singapore) [10505-25]

High-speed broadband Fourier-transform CARS microscopy, Kotaro Hiramatsu, Kinegawa Ryo, Kazuki Hashimoto, Venkata R. Badarla, Takuro Ideguchi, Keisuke Goda, The Univ. of Tokyo (Japan) [10505-26]

High-speed nonlinear FACED microscopy with multiplexed time-gated photon counting, Jianglai Wu, Queenie Tsz Kwan Lai, Wenwei Yan, Kenneth K. Y. Wong, Kevin K. Tsia, The Univ. of Hong Kong (Hong Kong, China) [10505-27]

Acceleration of Raman imaging rate by multi-line illumination, Kentaro Mochizuki, Shunsuke Maeda, Taeho Lee, Osaka Univ. (Japan); Nicholas I. Smith, Immunology Frontier Research Ctr., Osaka Univ. (Japan); Katsumasa Fujita, Osaka Univ. (Japan) [10505-28]

SESSION 8.....TUE 3:30 PM TO 5:30 PM

High-throughput In Vivo Imaging

Session Chair: **Cheng Lei**, The Univ. of Tokyo (Japan)

4K/8K CMOS-based, broad-view, high-resolution, and ultra-rapid in vivo imaging analysis (*Invited Paper*), Satoshi Nishimura, The Ctr. for Molecular Medicine, Jichi Medical Univ. (Japan)[10505-29]

High throughput 3D microscopy for in vivo fluorescence imaging (*Invited Paper*), Meng Cui, Purdue Univ. (USA)[10505-30]

Highly integrated label-free multiphoton nonlinear optical microspectroscopy imaging system for biomolecular imaging, Jang Hyuk Lee, Jose Rico-Jimenez, Univ. of Illinois (USA); Aneesh Alex, GlaxoSmithKline (USA); Eric J. Chaney, Ronit Barkalifa, Haohua Tu, Marina Marjanovic, Univ. of Illinois (USA); Zane A. Arp, GlaxoSmithKline (USA); Stephen A. Boppart, Univ. of Illinois (USA)[10505-31]

Video-rate hyperspectral two-photon fluorescence microscopy for in vivo imaging, Fengyuan Deng, Changqin Ding, Jerald C. Martin, Nicole M. Scarborough, Zhengtian Song, Gregory S. Eakins, Garth J. Simpson, Purdue Univ. (USA)[10505-32]

Two dimensional microcirculation mapping with real time spatial frequency domain imaging, Xinlin Chen, Weihao Lin, Bixin Zeng, Wenzhou Medical Univ. (China); Min Xu, Fairfield Univ. (USA); XiuWei Zhu, Wenzhou Medical Univ. (China)[10505-33]

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Sunday 28 January 10:00 am to 5:00 pm

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- Molecular imaging
- Nano/biophotonics
- Biosensors
- Spectroscopic imaging
- Microscopy

CONFERENCE 10506

Tuesday–Wednesday 30–31 January 2018 • Proceedings of SPIE Vol. 10506

Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XV

Conference Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA); **Dan V. Nicolau**, McGill Univ. (Canada); **Dror Fixler**, Bar-Ilan Univ. (Israel)

Program Committee: **Vasily N. Astratov**, The Univ. of North Carolina at Charlotte (USA); **Monica Cotta**, Univ. Estadual de Campinas (Brazil); **Henry Hess**, Columbia Univ. (USA); **Sung Jin Kim**, Univ. of Miami (USA); **James F. Leary**, Purdue Univ. (USA); **Brian D. MacCraith**, Dublin City Univ. (Ireland); **Paras N. Prasad**, Univ. at Buffalo (USA); **Sebastian Wachsmann-Hogiu**, Univ. of California, Davis (USA); **Sharon M. Weiss**, Vanderbilt Univ. (USA)

Conference Cosponsor: **Prizmatix**

TUESDAY 30 JANUARY

TUESDAY PLENARY SESSION TUE 10:30 AM TO 11:30 AM

Nano/Biophotonics Plenary Session

Shaped Light for BioNanophotonics: a new chapter in imaging

Kishan Dholakia, Univ. of St. Andrews (United Kingdom)

Lunch/Exhibition Break Tue 11:30 am to 1:00 pm

SESSION 1 TUE 1:00 PM TO 3:30 PM

Nanoscale Imaging I

Session Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA);
Dan V. Nicolau, McGill Univ. (Canada);
Dror Fixler V, Bar-Ilan Univ. (Israel)

Breast cancer early detection via tracking of skin back-scattered secondary speckle patterns (*Invited Paper*), Aviya Bennett, Talia Sirkis, Yevgeny Beiderman, Sergey Agdarov, Yafim Beiderman, Zeev Zalevsky, Bar-Ilan Univ. (Israel) [10506-1]

Temporal depth imaging, Moti Fridman, Bar-Ilan Univ. (Israel) [10506-2]

Temporal super resolution based on phase retrieval algorithm, Moti Fridman, Hamootal Duadi, Bar-Ilan Univ. (Israel) [10506-3]

Evaluating cell death process with the M-mode scan of optical coherence tomography, Shuai Chen, Yulu He, Cheng-Che Hsieh, Wei-Hsiang Hua, Meng-Chun Low, Yu-Hsuan Tsai, Cheng-Jin Cai, National Taiwan Univ. (Taiwan); Meng-Tsan Tsai, Chang Gung Univ. (Taiwan); Hsiang-Chieh Lee, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) [10506-4]

Polymer conjugations of graphene quantum dots based materials for two-photon imaging, Wen-Shuo Kuo, National Cheng Kung Univ. (Taiwan) [10506-5]

Diagnosis of osteoarthritis by Hough transform, Sabyasachi Mukhopadhyay, Indian Institute of Science Education and Research Kolkata (India); Nilanjan Poria, Rajanya Chakraborty, Cognizant Technology Solutions (India); Sawon Pratiher, Indian Institute of Technology Kanpur (India); Prasanta K. Panigrahi, Indian Institute of Science Education and Research Kolkata (India) [10506-6]

High contrast wide-field evanescent wave illuminated sub-diffraction imaging, Chenlei Pang, Xiaowei Liu II, Minghua Zhuge III, Liu Xu IV, Qing Yang V, Zhejiang Univ. (China) [10506-7]

SESSION 2 TUE 4:00 PM TO 5:50 PM

Multifunctional Nanoparticles

Session Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA);
Dan V. Nicolau, McGill Univ. (Canada);
Dror Fixler V, Bar-Ilan Univ. (Israel)

State-of-the-art and future cytometric developments for highest multiplexed biomarker analysis in single cell biology: an overview (*Invited Paper*), Attila Tárnok, Univ. Leipzig (Germany) [10506-8]

Diffusion reflection technique for diagnosis of atherosclerosis in mice using gold nanorods, Ruchira Chakraborty, Bar-Ilan Univ. (Israel); Rinat Ankri, Institute of Nanotechnology and Advanced Materials, Bar-Ilan Univ. (Israel); Dorit Leshem-Lev, Eli I. Lev, Edith Hochhauser, The Felsenstein Medical Research Ctr., Tel Aviv Univ. (Israel); Menachem Motiei, Dror Fixler V, Institute of Nanotechnology and Advanced Materials, Bar-Ilan Univ. (Israel) [10506-9]

Near infrared spatial frequency domain fluorescence imaging of tumor phantoms containing erythrocyte-derived optical nanoplatforms, Joshua M. Burns, Bahman Anvari, Univ. of California, Riverside (USA) [10506-10]

Design of multifunctional nanoparticles for combined in-vivo imaging and advanced drug delivery (*Invited Paper*), James F. Leary, Aurora Life Technologies, LLC (USA) [10506-11]

Gold nanostars for imaging and optoporation: plasmonic and photothermal properties, Olga Bibikova, art photonics GmbH (Germany) and Research-Educational Institute of Optics and Biophotonics, Saratov State Univ. (Russian Federation) and Univ. of Oulu (Finland); Georgy Akchurin Jr., Research-Educational Institute of Optics and Biophotonics, Saratov State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation); Alexey Popov, Univ. of Oulu (Finland) and Tomsk State Univ. (Russian Federation) and ITMO Univ. (Russian Federation); Sergey Zarkov, Institute of Precision Mechanics and Control (Russian Federation); Ilya Skovorodkin, Biocenter Oulu, Univ. of Oulu (Finland) and InfoTech Oulu, Univ. of Oulu (Finland); Garif Akchurin, Alexander Yakunin, Yuri Avetisyan, Research-Educational Institute of Optics and Biophotonics, Saratov State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation); Vladimir Bogatyrev, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russian Federation); Matti Kinnunen, Univ. of Oulu (Finland); Nikolai Khlebtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russian Federation) and Saratov State Univ. (Russian Federation); Seppo Vainio, Biocenter Oulu, Univ. of Oulu (Finland) and InfoTech Oulu, Univ. of Oulu (Finland); Igor Meglinski, Univ. of Oulu (Finland) and Tomsk State Univ. (Russian Federation) and ITMO Univ. (Russian Federation); Valery V. Tuchin, Research-Educational Institute of Optics and Biophotonics, Saratov State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation) and Tomsk State Univ. (Russian Federation) [10506-12]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the BIOS/LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Optical trapping and measurement of a single cell using capacitance sensors (*Invited Paper*), Tae Young Kang, Meenkyo Seo, Heesang Ahn, Seonhee Hwang, Junha Choi, Kyujung Kim, Pusan National Univ. (Korea, Republic of) [10506-34]

The flower-like nanostructure based, Heesang Ahn, Hyerin Song, Kyujung Kim, Pusan National Univ. (Korea, Republic of) [10506-35]

Ultrasensitive colocalization detection based on plasmonic nanolithography with molecular-overlapped optical near-fields, Hongki Lee, Donghyun Kim, Kiheung Kim, Yonsei Univ. (Korea, Republic of); Dong-Ha Kim, Ewha Womans Univ. (Korea, Republic of); Yun-Feng Xiao, Peking Univ. (China); Wonju Lee, Yonsei Univ. (Korea, Republic of); Kyungwha Chung, Ewha Womans Univ. (Korea, Republic of); Youngjin Oh, Samsung Display Co., Ltd. (Korea, Republic of); Taehwang Son, Yonsei Univ. (Korea, Republic of) [10506-36]

The theory behind the full scattering profile, Idit Feder, Hamootal Duadi, Dror Fixler V, Bar-Ilan Univ. (Israel) [10506-37]

Full scattering profile of tissues with elliptical cross sections, Hamootal Duadi, Idit Feder, Dror Fixler V, Bar-Ilan Univ. (Israel) [10506-38]

The effect of nanoparticle size on theranostic systems: the optimal particle size for imaging is not necessarily optimal for drug delivery (*Invited Paper*), Tamar Dreifuss, Oshra Betzer, Eran Barnoy, Menachem Motiei, Rachela Popovtzer, Bar-Ilan Univ. (Israel) [10506-39]

All-in-one theranostic nanoagent for head and neck cancer treatment, Tamar Dreifuss, Bar-Ilan Univ. (Israel); Erez S. Davidi, Kaplan Medical Ctr. (Israel); Menachem Motiei, Eran Barnoy, Bar-Ilan Univ. (Israel); Aron Popovtzer, Rabin Medical Ctr. (Israel); Rachela Popovtzer, Bar-Ilan Univ. (Israel) [10506-40]

Multifunctional gold nanoparticles for diagnosis of Alzheimer's disease, Renana Opochninsky, Menachem Motiei, Michal Richman, Bar-Ilan Univ. (Israel); Yuval Nash, Tel Aviv Univ. (Israel); Oshra Betzer, Eran Barnoy, Bar-Ilan Univ. (Israel); Dan Frenkel, Tel Aviv Univ. (Israel); Shai Rahimpour, Rachela Popovtzer, Bar-Ilan Univ. (Israel) [10506-41]

Comparison of temperature sensing of the luminescent upconversion and ZnCdS nanoparticles, Irina Yu Yanina, Elena K. Volkova, Saratov State Univ. (Russian Federation) and Tomsk State Univ. (Russian Federation); Elena Sagaidachnaya, Julia G. Konyukhova, Saratov State Univ. (Russian Federation); Vyacheslav I. Kochubey, Valery V. Tuchin, Saratov State Univ. (Russian Federation) and Tomsk State Univ. (Russian Federation) . . [10506-42]

Gold nanoparticles for non-invasive cell tracking (*Invited Paper*), Rinat Meir, Oshra Betzer, Katerina Shamalov, Eran Barnoy, Menachem Motiei, Cyrille J. Cohen, Rachela Popovtzer, Bar-Ilan Univ. (Israel) [10506-43]

Labeling and tracking exosomes within the brain using gold nanoparticles, Oshra Betzer, Institute of Nanotechnology and Advanced Materials, Bar-Ilan Univ. (Israel) and The Leslie and Susan Gonda Multidisciplinary Brain Research Ctr., Bar-Ilan Univ. (Israel); Nisim Perets, Ariel Angel, The Felsenstein Medical Research Ctr., Tel Aviv Univ. (Israel); Menachem Motiei, Eran Barnoy, Institute of Nanotechnology and Advanced Materials, Bar-Ilan Univ. (Israel); Daniel Offen, Sackler School of Medicine, Tel Aviv Univ. (Israel); Rachela Popovtzer, Institute of Nanotechnology and Advanced Materials, Bar-Ilan Univ. (Israel) [10506-44]

Frequency domain fluorescence lifetime imaging microscopy system for detecting inflammatory cells, Gilad Yahav, Bar-Ilan Univ. (Israel); Sivan Gershanov, Genomic Bioinformatics Lab., Ariel Univ. (Israel) and The Krieger Eye Research Lab., Felsenstein Medical Research Ctr. (Israel); Mali Salmon-Divon III, Genomic Bioinformatics Lab., Ariel Univ. (Israel); Haim Ben-Zvi, Rabin Medical Ctr. (Israel); Nitza Goldenberg-Cohen V, Sackler School of Medicine, Tel Aviv Univ. (Israel) and Bnai Zion Medical Ctr. (Israel); Dror Fixler V, Bar-Ilan Univ. (Israel) [10506-45]

Survival analysis of single protein adsorption kinetics, Megan Armstrong, Henry Hess, Columbia Univ. (USA) [10506-46]

Tissues viability and blood flow sensing based on a new nanophotonics method (*Invited Paper*), Inbar Yariv, Dror Fixler V, Hamootal Duadi, Menachem Motiei, Bar-Ilan Univ. (Israel); Menashe Haddad, Sackler School of Medicine, Tel-Aviv Univ. (Israel) and Mayanei Hayeshua Medical Ctr. (Israel) . . [10506-47]

Dark-field microscopic study of the interactions between gold/silver nanoparticles and giant unilamellar vesicles, Qi Lu, Anupama Bhat, Tiana Cooks, Delaware State Univ. (USA) [10506-48]

WEDNESDAY 31 JANUARY

SESSION 3 WED 8:00 AM TO 10:30 AM

Nanoscale Imaging II

Session Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA); **Dan V. Nicolau**, McGill Univ. (Canada); **Dror Fixler V**, Bar-Ilan Univ. (Israel)

Estimating gold nanoparticle distribution in cell cultures (*Invited Paper*), Dvir Yelin, Technion-Israel Institute of Technology (Israel) [10506-13]

High spatial precision nano-imaging of polarization-sensitive plasmonic particles, Yunbo Liu, Somin E. Lee, Yipei Wang, Univ. of Michigan (USA) [10506-14]

Preparation and bioapplication of electrospun carbon dots-silica composite nanofibers, Zheng Xie, Technical Institute of Physics and Chemistry (China) [10506-15]

Label free imaging below the diffraction resolution limit with nano-sensitivity, Sergey A. Alexandrov, James McGrath, National Univ. of Ireland, Galway (Ireland); Colin Sheppard, Istituto Italiano di Tecnologia (Italy); Francesca Boccafroschi, Univ. degli Studi del Piemonte Orientale Amedeo Avogadro (Italy); Cinzia Giannini, Teresa Sibillano, Istituto di Cristallografia, Consiglio Nazionale delle Ricerche (Italy); Hrebesh Subhash, Colgate-Palmolive Co. (USA); Josh Hogan, Compact Imaging, Inc. (USA); Martin Leahy, National Univ. of Ireland, Galway (Ireland) [10506-16]

nano-FTIR - infrared imaging and spectroscopy at 10 nanometer spatial resolution, Max Eisele, neaspec GmbH (Germany) [10506-17]

Direct optical imaging of nanoscale internal organization of polymer films, Swathi Suran, Manoj Varma, Indian Institute of Science (India) [10506-18]

Ultra-sensitive fluorescent imaging-biosensing using biological photonic crystals, Kenny Squire, Xianming Kong, Bo Wu, Paul LeDuff, Gregory Rorrer, Alan X. Wang, Oregon State Univ. (USA) [10506-19]

SESSION 4 WED 11:00 AM TO 12:20 PM

Application of Nanostructured Sensors and Bionanodevices

Session Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA); **Dan V. Nicolau**, McGill Univ. (Canada); **Dror Fixler V**, Bar-Ilan Univ. (Israel)

A label-free biofluid analysis utilizing SERS-active nanoparticles and substrates, Maciej S. Wróbel, Gdansk Univ. of Technology (Poland) and Johns Hopkins Univ. (USA); Soumik Siddhanta, Zufang Huang, Johns Hopkins Univ. (USA); Janusz Smulko, Gdansk Univ. of Technology (Poland); Ishan Barman, Johns Hopkins Univ. (USA) [10506-20]

Ultra-sensitive non-contact fiber optic displacement sensor based on near-field specklegram, Fu Feng, Wang Chen, Wei Lin, Dihan Chen, Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China) [10506-21]

Mechanisms of propulsion and steering of microscale transporters powered by motor proteins, Takahiro Nitta, Gifu Univ. (Japan) . . [10506-22]

Enhancement of integrated photonic biosensing by magnetic controlled nano-particles, Nicola Peserico, Parikshit Patrim Sharma, Alessia Belloni, Politecnico di Milano (Italy); Francesco Damin, Marcella Chiari, Istituto di Chimica del Riconoscimento Molecolare, Consiglio Nazionale delle Ricerche (Italy); Riccardo Bertacco, Andrea Melloni, Politecnico di Milano (Italy) [10506-23]

Lunch/Exhibition Break Wed 12:20 pm to 2:00 pm

CONFERENCE 10506

SESSION 5. WED 2:00 PM TO 3:00 PM

Nanospectroscopy

Session Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA);
Dan V. Nicolau, McGill Univ. (Canada);
Dror Fixler V, Bar-Ilan Univ. (Israel)

Nanoscale light confinement and fluorescence excitation using plasmonic metal nanostructures, Hongki Lee, Donghyun Kim, Yonsei Univ. (Korea, Republic of) [10506-24]

Angular dependence of bulk fluorescence noise in supercritical angle fluorescence, Finub James Shirley, IMEC (Belgium) and KU Leuven (Belgium); Pieter Neutens, Rita Vos, IMEC (Belgium); Md. Mahmud-UI-Hasan, Niels Verellen, Pol Van Dorpe, IMEC (Belgium) and KU Leuven (Belgium) [10506-25]

Microlasers for dynamic refractive index sensing within live cells, Marcel Schubert, Isla R. M. Barnard, Klara Volckaert, Lewis Woolfson, Markus Karl, Simon J. Powis, Malte C. Gather, Univ. of St. Andrews (United Kingdom) [10506-26]

SESSION 6. WED 3:30 PM TO 6:00 PM

Nanostructures for Biomedical Sensors

Session Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA);
Dan V. Nicolau, McGill Univ. (Canada);
Dror Fixler V, Bar-Ilan Univ. (Israel)

A bio-inspired design of live cell biosensors (*Invited Paper*), Alzbeta Marcek Chorvatova, Tibor Teplicky, International Laser Ctr. (Slovakia) and Univ. of SS Cyril and Methodius (Slovakia); Dusan Chorvat Jr., International Laser Ctr. (Slovakia) [10506-27]

Colorimetric monitoring of nanoscale actuation in DNA-templated plasmonic nanostructures, Elise Gayet, Laurent Lermusiaux, Institut Langevin (France); Gaetan Bellot, Institut de Génomique Fonctionnelle (France) and Ctr. National de la Recherche Scientifique (France) and INSERM (France); Sébastien Bidault, Institut Langevin (France) [10506-28]

Computational study for optimization of a plasmon FET as a molecular biosensor, Mark Ciappesoni, Seongman Cho, Sung Jin Kim, Univ. of Miami (USA) [10506-29]

Novel plasmonic polarimeter for biomedical imaging applications, Alec Cheney, Univ. at Buffalo (USA); Borui Chen, Univ at Buffalo (USA); Tim Thomay, Alexander N. Cartwright, Univ. at Buffalo (USA) [10506-30]

Integrated bio-photonics to revolutionize health care enabled through the European pilot lines PIX4life and PIXAPP (*Keynote Presentation*), Hilde Jans, IMEC (Belgium); Peter O'Brien, Tyndall National Institute (Ireland); Iñigo Artundo, VLC Photonics (Spain); Romano Hoofman, IMEC (Belgium); Douwe Geuzebroek, Lionix International (Netherlands); Pieter Dumon, Luceda Photonics (Belgium); Marcel van der Vliet, Phoenix Software (Netherlands); Jeremy Witzens, RWTH Aachen Univ. (Germany); Eric Bourguignon, TOPTICA Photonics AG (Germany); Pol Van Dorpe, Liesbet Lagae, IMEC (Belgium) [10506-31]

Implementing biological logic gates using gold nanoparticles conjugated to fluorophores, Eran Barnoy, Rachela Popovtzer, Dror Fixler V, Bar-Ilan Univ. (Israel) [10506-32]

Integrated metasurface photonics for miniature flow cytometry, Niels Verellen, Dries Vercausse, Veronique Rochus, Bert Du Bois, Alexandra Dusa, Sarp Kerman, Md. Mahmud-UI-Hasan, Pol Van Dorpe, Xavier Rottenberg, Liesbet Lagae, IMEC (Belgium) [10506-33]


CONFERENCE 10507

Saturday–Monday 27–29 January 2018 • Proceedings of SPIE Vol. 10507

Colloidal Nanoparticles for Biomedical Applications XIII

Conference Chairs: **Marek Osiriński**, The Univ. of New Mexico (USA); **Wolfgang J. Parak**, Philipps-Univ. Marburg (Germany); **Xing-Jie Liang**, National Ctr. for Nanoscience and Technology of China (China)

Program Committee: **Ramón Alvarez-Puebla**, Univ. de Vigo (Spain); **Jacob M. Berlin**, City of Hope Beckman Research Institute (USA); **James B. Delehanty III**, U.S. Naval Research Lab. (USA); **Pablo del Pino**, Univ. De Santiago de Compostela (Spain); **Niko Hildebrandt**, Institut d'Électronique Fondamentale (France); **Jennifer A. Hollingsworth**, Los Alamos National Lab. (USA); **Antonios G. Kanaras**, Univ. of Southampton (United Kingdom); **Hedi Mattoussi**, The Florida State Univ. (USA); **Igor Medintz**, U.S. Naval Research Lab. (USA); **Jay L. Nadeau**, McGill Univ. (Canada); **Kelly L. Nash**, The Univ. of Texas at San Antonio (USA); **Thomas Pons**, Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (France); **Francisco Raymo**, Univ. of Miami (USA); **Ute Resch-Genger**, Bundesanstalt für Materialforschung und -prüfung (Germany); **Subramanian Tamil Selvan**, A*STAR Institute of Materials Research and Engineering (Singapore); **Konstantin V. Sokolov**, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); **Claudia Tortiglione**, Istituto di Scienze Applicate e Sistemi Intelligenti "E.Caianello" (Italy); **Chih-Chung Yang**, National Taiwan Univ. (Taiwan); **Junjie Zhu**, Nanjing Univ. (China)

Conference Cosponsor: 

SATURDAY 27 JANUARY

WELCOME REMARKS 8:55 AM TO 9:00 AM

Conference Chairs: **Marek Osiriński**, The Univ. of New Mexico (USA); **Wolfgang J. Parak**, Philipps-Univ. Marburg (Germany); **Xing-Jie Liang**, National Ctr. for Nanoscience and Technology of China (China)

SESSION 1 SAT 9:00 AM TO 10:20 AM

Synthesis and Characterization of Nanoparticles

Session Chair: **Antonios G. Kanaras**, Univ. of Southampton (United Kingdom)

Effect of particle architecture, dopant concentration, and excitation power density on the luminescence efficiency of upconversion nanocrystals, Ute Resch-Genger, Bundesanstalt für Materialforschung und -prüfung (Germany) [10507-1]

Synthesis and characterization of colloidal ZnTe nanoparticles, Gavin Gonzales, Gema Alas, Jane Q. Nguyen, Alejandro Sandoval III, Ryan Guidice, Christina Minetos, Nikita Jaiswal, Victoria Sandoval, The Univ. of New Mexico (USA); Sergei A. Ivanov, Los Alamos National Lab. (USA); Gennady A. Smolakov, The Univ. of New Mexico (USA); Dale L. Huber, Sandia National Labs. (USA); Marek Osinski, The Univ. of New Mexico (USA) [10507-2]

Highly-sensitive thermal imaging for the characterization of single nano-particles, Antoine Federici, PHASICS S.A. (France); Hadrien Robert, PHASICS S.A. (France) and Institut Fresnel (France); Kahina Meziane, PHASICS S.A. (France) and Univ. Paris-Saclay (France); Serge Monneret, Guillaume Baffou, Institut Fresnel (France); Benoit Wattellier, PHASICS S.A. (France) [10507-3]

Photoluminescence properties of the Co and Ni co-doped CdS/ZnS core/shell nanoparticles, Nadeem Sabir, Government College Univ. Faisalabad (Pakistan) [10507-4]

SESSION 2 SAT 10:50 AM TO 12:00 PM

Plasmonic Nanoparticles

Session Chair: **Chih-Chung Yang**, National Taiwan Univ. (Taiwan)

A new paradigm for gold nanostars: Synthesis, characterization, modeling, and biomedical applications (*Invited Paper*), Laura Fabris, Manjari Bhamidipati, Kholud Dardir, Ted V. Tsoulos, Supriya Atta, Rutgers, The State Univ. of New Jersey (USA) [10507-5]

Plasmonic photothermal therapy with functionalized gold nanoparticles on individual cells, Alf B. Mews, Univ. Hamburg (Germany); Philip Withoef, Univ. of Hamburg (Germany); Lisa Prisner, Christian Strelow, Tobias Kipp, Univ. Hamburg (Germany) [10507-6]

Chalcogenides nanocrystals as multifunctional platforms for imaging and therapeutic applications, Tommaso Avellini, Teresa Pellegrino, Istituto Italiano di Tecnologia (Italy) [10507-7]

Lunch/Exhibition Break Sat 12:00 pm to 1:50 pm

SESSION 3 SAT 1:50 PM TO 3:10 PM

Nano-Bio Complexes and Assemblies

Session Chair: **Wolfgang J. Parak**, Philipps-Univ. Marburg (Germany)

Probing kinetic enhancement of β -galactosidase-nanoparticle complexes, Joyce C. Breger, Anthony P. Malanoski, Carl W. Brown III, Jeffrey R. Deschamps, Kimhiro Susumu, Eunkeu Oh, George P. Anderson, Scott A. Walper, Igor L. Medintz, U.S. Naval Research Lab. (USA) ... [10507-8]

Advanced probes for multiplexed intracellular biomarker detection and drug delivery, Maria-Eleni Kyriazi, Univ. of Southampton (United Kingdom); Afaf H. El-Sagheer, Univ. of Oxford (United Kingdom); Peter Lackie, Univ. of Southampton (United Kingdom); Tom Brown, Univ. of Oxford (United Kingdom); Antonios G. Kanaras, Otto L. Muskens, Univ. of Southampton (United Kingdom) [10507-9]

Fabrication and characterization of thermo-responsive gold nanorod assemblies, Gilbert Bustamante, Katherine Carrizales, Frank DeLuna, Nicolas Large, Jing Yong Ye, The Univ. of Texas at San Antonio (USA) [10507-10]

Nano-bio assemblies for artificial light harvesting systems, Amitava Patra, Indian Association for the Cultivation of Science (India) [10507-11]

SESSION 4 SAT 3:40 PM TO 4:40 PM

Nanoparticle-Cell Interactions

Session Chair: **James B. Delehanty**, U.S. Naval Research Lab. (USA)

Quantitative particle-cell interaction: some basic physicochemical pitfalls, Wolfgang J. Parak, Univ. Hamburg (Germany) and Shanghai Jiao Tong Univ. (China) [10507-12]

Genotoxicity screening of nanoparticles using the fluorometric γ -H2AX assay and automated microscopic detection, Marc Wegmann, Bundesanstalt für Materialforschung und -prüfung (Germany); Tobias Jochum, CAN GmbH (Germany); Mandy Hannemann, Valentina Somma, MEDIPAN GMBH (Germany); Katrin Hoffmann, Bundesanstalt für Materialforschung und -prüfung (Germany); Jan Niehaus, CAN GmbH (Germany); Dirk Roggenbuck, MEDIPAN GMBH (Germany); Ute Resch-Genger, Bundesanstalt für Materialforschung und -prüfung (Germany) [10507-13]

Remote enzyme activation using gold coated magnetite as antennae for radio frequency fields, Christian Collins, Christopher J. Ackerson, Colorado State Univ. (USA) [10507-14]

CONFERENCE 10507

BIOS SATURDAY HOT TOPICS SESSION 7:00 PM TO 9:05 PM

BiOS Hot Topics

Welcome and Opening Remarks: **James Fujimoto**, Massachusetts Institute of Technology (USA) and **R. Rox Anderson**, Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine (USA)

Presentation of the SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biophotonics and Biomedical Optics

Presentation of 2017 Britton Chance Biomedical Optics Award

Hot Topics Facilitator: **Sergio Fantini**, Tufts Univ. (USA)

Hot Topics Presenters: **Brian Wilson**, Univ. of Toronto. (Canada); **Katarina** and **Sune Svanberg**, Lund Univ. (Sweden) and South China Normal Univ. (China); **Keisuke Goda**, Univ. of California/Los Angeles. (USA) and Univ. of Tokyo (Japan); **Julia Walther**, Technical Univ. Dresden (Germany); **Irene Georgakoudi**, Tufts Univ. (USA); **Hillel Adesnik**, Univ. of California/Berkeley (USA); **Qingming Luo**, Britton Chance Ctr. for Biomedical Photonics, Huazhong Univ. of Science and Technology (China); **Turgut Durduran**, ICFO - Institut de Ciències Fotòniques (Spain)

See page 6 for details.

SUNDAY 28 JANUARY

SESSION 5 SUN 8:50 AM TO 10:00 AM

Biomedical Applications of Magnetic Nanoparticles

Session Chair: **Hedi Mattoussi**, Florida State Univ. (USA)

Short, long term fate and biodegradation of IONPs in vivo (*Invited Paper*), Grazyna Stepien, Maria Moros, Lucia Gutierrez, Raluca Fratila, Julian Pardo, Jesus Martinez de la Fuente, Univ. de Zaragoza (Spain) [10507-15]

Magnetic wires for active micro-rheology and biophysics applications, Jean-François Berret, Univ. Paris 7-Diderot (France) [10507-16]

Effects of iron-oxide nanoparticles on compound biofilms of streptococcus gordonii and fusobacterium nucleatum, Jane Q. Nguyen, Gema Alas, Gavin Gonzales, Christina Minetos, Nikita Jaiswal, Victoria Sandoval, Alejandro Sandoval III, The Univ. of New Mexico (USA); Sergei A. Ivanov, Los Alamos National Lab. (USA); Gennady A. Smolyakov, The Univ. of New Mexico (USA); Dale L. Huber, Sandia National Labs. (USA); Marek Osinski, The Univ. of New Mexico (USA) [10507-17]

SESSION 6 SUN 10:30 AM TO 11:30 AM

SERS Sensing with Nanoparticles

Session Chair: **Alf B. Mews**, Univ. Hamburg (Germany)

Highly sensitive identification of opioids with SERS using colloidal gold nanoclusters, Vladimir Turzhitsky, Lei Zhang, Gary L. Horowitz, Edward Vitkin, Umar Khan, Yuri Zakharov, Le Qiu, Irving Itzkan, Lev T. Perelman, Harvard Univ. (USA) [10507-18]

Surface-enhanced Raman scattering (SERS) classification of K-Ras point mutations, Luca Guerrini, Univ. Rovira i Virgili (Spain) [10507-19]

Fabrication of continuous and isolated 3D plasmonic micro-structured super-crystals arrays for SERS sensing, Nicolas Pazos Perez, Ramón Alvarez-Puebla, Univ. Rovira i Virgili (Spain) [10507-20]

Lunch/Exhibition Break Sun 11:30 am to 2:00 pm

SESSION 7 SUN 2:00 PM TO 3:00 PM

Drug Delivery and Larvicidal Applications of Nanoparticles

Session Chair: **Junjie Zhu**, Nanjing Univ. (China)

Nanoparticle bioconjugate for controlled cellular delivery of doxorubicin, Ajmeeta Sangtani, U.S. Naval Research Lab. (USA); Eleonara Petryayeva, Miao Wu, The Univ. of British Columbia (Canada); Kimihiro Susumu, Eunkeu Oh, Alan L. Huston, Guillermo Lasarte-Aragónés, Igor L. Medintz, U.S. Naval Research Lab. (USA); Russ Algar, The Univ. of British Columbia (Canada); James B. Delehanty, U.S. Naval Research Lab. (USA) [10507-21]

Monitoring of nanoparticle degradation using holographic on-chip microscopy for drug delivery applications, Aniruddha Ray, Shuoran Li, Tatiana Segura, Aydogan Ozcan, Univ. of California, Los Angeles (USA) [10507-22]

Exploiting silver nanoparticles with PMAA against aedes aegypti larvae development: potential larvicidal activity, Mariana T. Carvalho, Gisele S. de Santana, Audrey N. de Andrade, Univ. Federal de Pernambuco (Brazil); Amanda Cabral, Maria Alice V. de Melo-Santos, Ctr. de Pesquisa Aggeu Magalhães (Brazil); Anderson S. L. Gomes, Univ. Federal de Pernambuco (Brazil) [10507-23]

SESSION 8 SUN 3:30 PM TO 5:10 PM

Biofunctionalization and Cellular Uptake of Nanoparticles

Session Chair: **Ute Resch-Genger**,

Bundesanstalt für Materialforschung und -prüfung (Germany)

Bright and compact macromolecular probes for bioimaging applications, Francisco Raymo, Univ. of Miami (USA) [10507-24]

Characterization of the ligand structure and stoichiometry on quantum dots and gold nanocrystals using NMR spectroscopy, Hedi Mattoussi, Chengqi Zhang, Goutam Palui, Naiqian Zhan, Florida State Univ. (USA) [10507-25]

Anti-microbial peptide facilitated cytosolic delivery of metallic gold nanomaterials, Anshika Kapur, Florida State Univ. (USA); Wentao Wang, Ocean NanoTech (USA); Juan Diaz Hernandez, Florida State Univ. (USA); Scott Medina, The Pennsylvania State Univ. (USA); Joel P. Schneider, National Cancer Institute (USA); Hedi Mattoussi, Florida State Univ. (USA) [10507-26]

Evaluations of cell uptake capabilities of gold nanoparticle and photosensitizer in a cell spheroid, Po-Hao Tseng, Meng Chun Low, Wei-Hsiang Hua, Jian-He Yu, Yulu He, Jen-Hung Hsiao, Yu-Hsuan Tsai, Cheng-Jin Cai, Cheng-Che Hsieh, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) [10507-27]

Conducting polymers nanoparticles for optical control of cell metabolism and animal behavior, Maria Rosa Antognazza, Istituto Italiano di Tecnologia (Italy) [10507-28]

SUNDAY POSTER SESSION SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Biodistribution and toxicology of gold nanoparticle loaded macrophage for drug delivery system: in vivo study, Sung Hun Kang, Seok Jin Hong, Il seok Park, Yong Bok Kim, Seok Min Hong, Heejin Kim, Sung Kyun Kim, Hallym Univ. Dongtan Sacred Heart Hospital (Korea, Republic of) [10507-43]

Silver nanoparticles as optical clearing agent enhancers to improve caries diagnostic by optical coherence tomography, Vanda S. M. Carneiro, Cláudia C.B. O. Mota, Univ. Federal de Pernambuco (Brazil) and Ctr. Univ. Tabosa de Almeida (Brazil); Alex F. Souza, Evair J. Silva, Ctr. Univ. Tabosa de Almeida (Brazil); Andréa F. Silva, Marleny E. M. M. Gerbi, Anderson S. L. Gomes, Univ. Federal de Pernambuco (Brazil) [10507-44]

Potential of nano-silver fluoride for tooth enamel caries prevention, Amitis V. C. Silva, Univ. Federal de Pernambuco (Brazil); Cláudia C.B. O. Mota, Ctr. Univ. Tabosa de Almeida (Brazil) and Univ. Federal de Pernambuco (Brazil); Emery C.C. C. Lins, Joás A. Teixeira, Anderson S. L. Gomes, Aronita Rosenblatt, Univ. Federal de Pernambuco (Brazil) [10507-45]

BIOS SUNDAY PLENARY SESSION SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel
Stefan W. Hell, Max Planck Institute Gottingen
 2014 Nobel Laureate in Chemistry
See page 7 for details

MONDAY 29 JANUARY

SESSION 9 MON 9:10 AM TO 10:00 AM

Molecular Detection with Nanoparticles

Session Chair: **Francisco Raymo**, Univ. of Miami (USA)

Colloidal nanoparticles for detection of biomolecules (*Invited Paper*), Antonios G. Kanaras, Univ. of Southampton (United Kingdom) [10507-29]

Quantum dot-based FRET systems for RNA-catalyzed dengue virus detection, Oleksandr Zavoiura, Bundesanstalt für Materialforschung und -prüfung (Germany) and Humboldt-Univ. zu Berlin (Germany); Ute Resch-Genger, Bundesanstalt für Materialforschung und -prüfung (Germany); Oliver Seitz, Humboldt-Univ. zu Berlin (Germany) [10507-30]

SESSION 10 MON 10:30 AM TO 12:00 PM

Applications of Nanoparticles in Cancer Theranostics I

Session Chair: **Jacob M. Berlin**, City of Hope Beckman Research Institute (USA)

Nanocarriers for precise cancer diagnosis and treatment (*Invited Paper*), Junjie Zhu, Nanjing Univ. (China) [10507-31]

Cancer nanomedicine: gold nanoparticle mediated combined cancer therapy, Celina Yang, Ryerson Univ. (Canada); Devika B. Chithrani, Univ. of Victoria (Canada) [10507-32]

Combined photothermo-chemotherapy using gold nanoshells on drug-loaded micelles for colorectal cancer treatment, Shin-Yu Lee, Ming-Jium Shieh, National Taiwan Univ. (Taiwan) [10507-33]

Effects of Au nanoring and photosensitizer exocytosis from cancer cells on their damage efficiency through photodynamic and photothermal processes, Yulu He, Jian-He Yu, Jen-Hung Hsiao, Po-Hao Tseng, Wei-Hsiang Hua, Meng Chun Low, Yu-Hsuan Tsai, Cheng-Jin Cai, Cheng-Che Hsieh, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan); Zhenxi Zhang, Xi'an Jiaotong Univ. (China) [10507-34]

Lunch Break Mon 12:00 pm to 1:40 pm

SESSION 11 MON 1:40 PM TO 3:00 PM

Applications of Nanoparticles in Cancer Theranostics II

Session Chair: **Allison M. Dennis**, Boston Univ. (USA)

Fluorescent nanoparticles for targeted detection of ovarian tumors for enhanced surgery, Jacob M. Berlin, City of Hope Beckman Research Institute (USA) [10507-35]

Zinc phthalocyanine (ZnPC)-loaded liquid crystal nanoparticles for photodynamic therapy, Okhil K. Nag, James B. Delehanty, Jawad Naciri, U.S. Naval Research Lab. (USA) [10507-36]

Fusogenic microbubble-porphysome conjugates as a novel dual-modality ultrasound/photoacoustic theranostic agent, Pradyumna Kedariseti, Jihane Mriouah, Robert J. Paproski, John Lewis, Roger J. Zemp, Univ. of Alberta (Canada) [10507-37]

Enhancement of physico-chemical properties of the hydrophobic anticancer molecule following nanoencapsulation, Sharad Gupta, Anshu Kumari, Amit Kumar, Indian Institute of Technology Indore (India) [10507-38]

SESSION 12 MON 3:30 PM TO 5:00 PM

NP Applications in Biosensing and Bioimaging

Session Chair: **Devika B. Chithrani**, Univ. of Victoria (Canada)

Nanoscale rotational motions in live cells revealed by five-dimensional single particle tracking (*Invited Paper*), Ning Fang, Kuangcai Chen, Xiaodong Cheng, Georgia State Univ. (USA) [10507-39]

Cadmium-free semiconductor quantum shells for multiplexed tissue-depth imaging, Allison M. Dennis, Alexander M. Saeboe, Joshua C. Kays, Boston Univ. (USA) [10507-40]

Accurate temperature control of single nanoparticles using plasmonic spectroscopy, Xueqin Chen, Zixuan Chen, Junjie Zhu, Nanjing Univ. (China) [10507-41]

Fluorescence lifetime imaging of cells with bound and internalized fluorescent gold nanoclusters, Marina Mutas, Christian Strelow, Tobias Kipp, Alf B. Mews, Univ. Hamburg (Germany) [10507-42]

AWARD CEREMONY 5:00 PM TO 5:15 PM

Ocean Optics Young Investigator Award Ceremony

Conference Chairs : **Marek Osirński**, The Univ. of New Mexico (USA), **Wolfgang J. Parak**, Philipps-Univ. Marburg (Germany), **Xing-Jie Liang**, National Ctr. for Nanoscience and Technology of China (China)

AWARD SPONSOR



CONCLUDING REMARKS 5:15 PM TO 5:20 PM

Conference Chairs : **Marek Osirński**, The Univ. of New Mexico (USA), **Wolfgang J. Parak**, Philipps-Univ. Marburg (Germany), **Xing-Jie Liang**, National Ctr. for Nanoscience and Technology of China (China)

TUESDAY 30 JANUARY

TUESDAY PLENARY SESSION TUE 10:30 AM TO 11:30 AM

Nano/Biophotonics Plenary Session

Shaped Light for BioNanophotonics: a new chapter in imaging

Kishan Dholakia, Univ. of St. Andrews (United Kingdom)

CONFERENCE 10508

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10508

Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications X

Conference Chairs: **Samuel Achilefu**, Washington Univ. School of Medicine in St. Louis (USA); **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA)

Program Committee: **Mingfeng Bai**, Vanderbilt Univ. Medical Ctr. (USA); **Mikhail Y. Berezin**, Washington Univ. School of Medicine in St. Louis (USA); **Richard B. Dorshow**, MediBeacon, LLC (USA); **Hisataka Kobayashi**, National Cancer Institute (USA); **Ashok Kumar Mishra**, Indian Institute of Technology Madras (India); **Gabor Patonay**, Georgia State Univ. (USA); **Attila Tarnok**, Univ. Leipzig (Germany); **Yasuteru Urano**, The Univ. of Tokyo (Japan)

MONDAY 29 JANUARY

SESSION 1..... MON 8:20 AM TO 10:20 AM

Theranostics and NIR Fluorescence Imaging Strategies

Session Chair: **Samuel Achilefu**,
Washington Univ. School of Medicine in St. Louis (USA)

Near infrared photoimmunotherapy for cancer: progresses on pre-clinical and clinical studies (*Invited Paper*), Hisataka Kobayashi, National Cancer Institute (USA) [10508-1]

Clinically translatable nanotheranostic platform for peripheral nerve regeneration: design with the outcome in mind, Jelena M. Janjic, Duquesne Univ. (USA); Vijay S. Gorantla, Wake Forest School of Medicine (USA) [10508-7]

Cyanine near-IR uncaging chemistry: discovery and applications, Roger Nani, Alexander Gorka, Tsuyoshi Yamamoto, Tadanobu Nagaya, Hisataka Kobayashi, Martin Schnermann, National Cancer Institute (USA) [10508-2]

Dual-radiolabeled nanoparticle probes for depth-independent in vivo imaging of enzyme activation, Kvar Black, Washington Univ. School of Medicine in St. Louis (USA); Mingzhou Zhou, Washington Univ. School of Medicine in St. Louis (USA); Pinaki Sarder, Univ. of Buffalo (USA); Maryna Kuchuk, Amal Y. Al-Yasiri, Univ. of Missouri (USA); Sean P. Gunsten, Washington Univ. School of Medicine in St. Louis (USA); Kexian Liang, Washington Univ. School of Medicine in St. Louis (USA); Heather M. Hennkens, Univ. of Missouri (USA); Walter J. Akers, Richard Laforest, Washington Univ. School of Medicine in St. Louis (USA); Steven L. Brody, Washington Univ. School of Medicine in St. Louis (USA); Cathy S. Cutler, Univ. of Missouri (USA); Samuel Achilefu, Washington Univ. School of Medicine in St. Louis (USA) [10508-22]

NIR fluorophores for medicine and the life sciences: inspiration from nature (*Invited Paper*), Jonathan S. Lindsey, Rui Liu, Gongfang Hu, Masahiko Taniguchi, North Carolina State Univ. (USA) [10508-26]

SESSION 2..... MON 10:40 AM TO 12:30 PM

Molecular and Physiological Imaging Strategies and Probes

Session Chair: **Mikhail Y. Berezin**,
Washington Univ. School of Medicine in St. Louis (USA)

Studying inflammation with optical probes (*Invited Paper*), Mikhail Y. Berezin, Washington Univ. School of Medicine in St. Louis (USA) [10508-24]

Hemodynamic mapping of optogenetically-defined, effective connectivity provides insights into the brain's structure-function relationship (*Invited Paper*), Adam Q. Bauer, Andrew Kraft, Grant Baxter, Patrick Wright, Matthew Reisman, Annie Bice, Jasmine Park, Michael Bruchas, Abraham Snyder, Jin-Moo Lee, Joseph Culver, Washington Univ. School of Medicine in St. Louis (USA) [10508-23]

Role of linker in cyclic RGD-conjugates on its binding efficiency with $\alpha v \beta 3$ integrin receptors, Partha Karmakar, Baogang Xu, Washington Univ. School of Medicine in St. Louis (USA); Kostiantyn Ziabrev, Elizabeth Delassus, Samuel Achilefu, Washington Univ. School of Medicine in St. Louis (USA) [10508-25]

Time-gated background-free imaging of temperature (*Invited Paper*), Sergei A. Vinogradov, Tatiana V. Esipova, Univ. of Pennsylvania (USA) [10508-8]

Lunch Break Mon 12:30 pm to 1:30 pm

SESSION 3..... MON 1:30 PM TO 3:30 PM

Nano Materials for Biomedical and Imaging Applications I

Joint Session with Conferences 10508 and 10547

Session Chairs: **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA); **Philip R. Hemmer**, Texas A&M Univ. (USA)

Intraneuronal transport abnormalities revealed by optically active photostable nanoparticle tracking (*Invited Paper*), François Treussart, Ecole Normale Supérieure de Paris-Saclay (France) [10547-1]

Delivery of nanoparticles inside the cytosol of live cells for the monitoring of cellular processes (*Invited Paper*), Xizhen Lian, Alfredo Erazo-Oliveras, Hong-Cai Zhou, Jean-Philippe Pellois, Texas A&M Univ. (USA) [10547-2]

Fluorescent multi-dye copolymerized silica nanoparticles for bioanalytical applications (*Invited Paper*), Gabor Patonay, Gala Chapman, Maged M. Henary, Walid Abdelwahab, Georgia State Univ. (USA) [10508-9]

Surface-coated fluorescent nanodiamonds for biomedical applications (*Invited Paper*), Shingo Sotoma, Feng-Jen Hsieh, Yen-Wei Chen, Jason Chen, Kartika Wardhani, Pei-Chang Tsai, Huan-Cheng Chang, Academia Sinica (Taiwan) [10547-3]

SESSION 4..... MON 4:00 PM TO 5:40 PM

Nano Materials for Biomedical and Imaging Applications II

Joint Session with Conferences 10508 and 10547

Session Chairs: **Philip R. Hemmer**, Texas A&M Univ. (USA);
Ramesh Raghavachari, U.S. Food and Drug Administration (USA)

The clinical translation of nanodiamonds (*Invited Paper*), Dean Ho, University of California, Los Angeles (USA) [10547-4]

A pinch of sugar does the trick: Addressing the stability conundrum of fluorescent quantum clusters for cellular imaging, Soumik Siddhanta, Santosh K. Paidi, Ishan Barman, Johns Hopkins Univ. (USA) [10508-10]

Theranostic GNR@Ag nanoparticles for photoacoustic imaging and therapy of bacterial infections, Taeho Kim, Qiangzhe Zhang, Liangfang Zhang, Jesse Jokerst, Univ. of California, San Diego (USA) [10508-11]

Developing nanodiamond-based hybrid quantum sensors (*Invited Paper*), Quan Li, Ting Zhang, Xi Feng, Ning Wang, Gangqin Liu, Wenghang Leong, Chufeng Liu, Renbao Liu, The Chinese Univ. of Hong Kong (Hong Kong, China) [10547-5]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

Conference attendees are invited to attend the BIOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

The deflection of a carbon composite carbon nanotube / graphene using molecular dynamics simulation, Anna Kolesnikova, Irina Kirillova, Leonid Kossovich, Saratov State Univ. (Russian Federation) [10508-13]

Mechanical properties of oxygen-doped porous carbon nanostructures, Anna Kolesnikova, Saratov State Univ. (Russian Federation) [10508-14]

Control method conductive properties ZnS quantum dots, Anna Kolesnikova, Evgeniy Glukhovskoy, Saratov State Univ. (Russian Federation) [10508-15]

Pillared graphene on the basis of zigzag carbon nanotubes for adsorption in medicine: mechanical properties, Margarita Mazepa, Anna Kolesnikova, Saratov State Univ. (Russian Federation) [10508-16]

Dual mode of fluorescent imaging for cellular microviscosity, Wenhui Pan, Ying He, Wanjun Gong, Bhowmira Rathore, Liwei Liu, Zhigang Yang, Junle Qu, Shenzhen Univ. (China) [10508-17]

Perspectives of graphene-nucleotide complexes for the development of new bioelectronics devices, Olga E. Glukhova, Dmitriy S. Shmygin, Saratov State Univ. (Russian Federation) [10508-18]

In silico study of liposome transport across biomembranes, Olga E. Glukhova, Artyom A. Zyktin, Saratov State Univ. (Russian Federation) [10508-19]

Investigation of the mechanism for penetration of low density lipoprotein into the arterial wall, Olga E. Glukhova, Artyom A. Zyktin, Saratov State Univ. (Russian Federation) [10508-20]

Conversion of fluorescence spectra from wavelength to wavenumber: the λ -squared correction and Förster energy transfer calculations, Jonathan S. Lindsey, Masahiko Taniguchi, North Carolina State Univ. (USA) [10508-27]

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:30 AM TO 10:20 AM

Nano Materials for Biomedical and Imaging Applications III

Joint Session with Conferences 10508 and 10547

Session Chairs: **Philip R. Hemmer**, Texas A&M Univ. (USA);
Ramesh Raghavachari, U.S. Food and Drug Administration (USA)

Nanodiamond-enhanced MRI: towards multimodality imaging of nanodiamond (*Invited Paper*), David Waddington, The University of Sydney (Australia); Mathieu Sarraacanie, Martinos Center for Biomedical Imaging, Massachusetts General Hospital (USA); Huijiang Zhang, Harvard University (USA); Najat Salameh, Martinos Center for Biomedical Imaging, Massachusetts General Hospital (USA); David Glenn, Harvard University (USA); Ewa rej, Torsten Gaebel, Thomas Boele, The University of Sydney (Australia); Ronald Walsworth, Harvard University (USA); David Reilly, The University of Sydney (Australia); Matthew Rosen, Martinos Center for Biomedical Imaging (USA) [10547-6]

Spin magnetic resonance spectroscopy from billions of molecules to single molecule (*Invited Paper*), Jiangfeng Du, Univ of Science and Technology of China (China) [10547-7]

Heterogeneous polymer-based nanoparticles for phototheranostics, Tymish Y. Ohulchanskyy, Shenzhen Univ. (China) [10508-12]

NV nanodiamond for cellular biosensing: formation by CVD techniques (*Invited Paper*), Milos Nesladek, Univ Hasselt (Belgium) [10547-8]

TUESDAY PLENARY SESSION TUE 10:30 AM TO 11:30 AM

Nano/Biophotonics Plenary Session
Shaped Light for BioNanophotonics: a new chapter in imaging
Kishan Dholakia, Univ. of St. Andrews (United Kingdom)

Lunch and Exhibition Break Tue 11:30 am to 1:30 pm

SESSION 6..... TUE 1:30 PM TO 3:10 PM

Nanoimaging Platforms

Session Chair: **Hisataka Kobayashi**, National Cancer Institute (USA)

Contrast enhancement of pump-probe optical coherence tomography (PP-OCT) based molecular imaging using methylene blue loaded PLGA particles, Jorge Palma-Chavez, Wihan Kim, Brian E. Applegate, Phapanin P. Charoenphol, Javier A. Jo, Texas A&M Univ. (USA) [10508-3]

Tunable ultrasmall visible-to-extended near-infrared emitting silver sulfide quantum dots and applications in cancer detection and imaging, Rui Tang, Baogang Xu, Duanwen Shen, Washington Univ. in St. Louis (USA); Gail Sudlow, Washington Univ. School of Medicine in St. Louis (USA); Achilefu Samuel, Washington Univ. in St. Louis (USA) [10508-21]

Toxicological evaluation of Cd-based fluorescent nano-probes by means of in vivo studies, Patricia M. A. Farias, Univ. Federal de Pernambuco (Brazil); Lan Ma-Hock, Robert Landsiedel, Bennard van Ravenzwaay, BASF SE (Germany) [10508-6]

Peptidomimetic-based prostate-specific membrane antigen (PSMA) targeted fluorescent magnetic nanoparticles and surface enhanced Raman scattering (SERS) nanoparticles for liquid biopsy applications, Pradyumna Kedariseti, Robert J. Paproski, Vincent R. Bouvet, Wei Shi, Cody N. Bergman, Jennifer Dufour, John D. Lewis, Frank Wuest, Roger J. Zemp, Univ. of Alberta (Canada) [10508-5]

Specific melanoma antigen radiomics of tumors with photoacoustic imaging (S.M.A.R.T. PAI) of melanoma, Preethi Sriranga, Juri Gelovani, Mohammadreza Nasirivanaki, Wayne State Univ. (USA) [10508-4]

CONFERENCE 10509

Monday 29 January 2018 • Proceedings of SPIE Vol. 10509

Plasmonics in Biology and Medicine XV

Conference Chairs: **Tuan Vo-Dinh**, Fitzpatrick Institute For Photonics, Duke Univ. (USA); **Joseph R. Lakowicz**, Univ. of Maryland School of Medicine (USA)

Conference Co-Chairs: **Ho-Pui A. Ho**, The Chinese Univ. of Hong Kong (Hong Kong, China); **Krishanu Ray**, Univ. of Maryland School of Medicine (USA)

Program Committee: **A. Claude Boccara**, Ecole Supérieure de Physique et de Chimie Industrielles (France); **Michael T. Canva**, Lab. Charles Fabry (France); **Volker Deckert**, Institut für Photonische Technologien e.V. (Germany); **Bruce S. Dunn**, Univ. of California, Los Angeles (USA); **Christopher D. Geddes**, Univ. of Maryland, Baltimore (USA); **Zygmunt Karol Gryczynski**, Univ. of North Texas Health Science Ctr. at Fort Worth (USA); **Naomi J. Halas**, Rice Univ. (USA); **Jiri Homola**, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); **Laura Maria Lechuga**, Catalan Institute of Nanoscience and Nanotechnology (ICN2) (Spain); **Boris Mizaikoff**, Univ. Ulm (Germany); **Shuming Nie**, Emory Univ. (USA); **Wei-Chuan Shih**, Univ. of Houston (USA); **Weihong Tan**, Univ. of Florida (USA); **Andrew Taton**, Univ. of Minnesota, Twin Cities (USA); **Richard P. Van Duyne**, Northwestern Univ. (USA); **Jeffrey I. Zink**, Univ. of California, Los Angeles (USA)

MONDAY 29 JANUARY

SESSION 1..... MON 8:40 AM TO 10:00 AM

Bioanalytical Raman and SERS

Session Chair: **Ho-Pui Ho**,

The Chinese Univ. of Hong Kong (Hong Kong, China)

Surface enhanced Raman spectroscopy for malaria diagnosis and intradermal measurements (*Invited Paper*), Quan Liu, Keren Chen, Jian Ju, Clement Yuen, Aoli Xiong, Peter Preiser, Nanyang Technological Univ. (Singapore) [10509-1]

Shifted excitation Raman difference spectroscopy: from diode lasers to in situ applications (*Invited Paper*), Martin Maiwald, Bernd Sumpf, Ferdinand-Braun-Institut (Germany) [10509-2]

A highly uniform and sensitive SERS sensor consisted of hole-sphere nanogaps, Jongmin Lee, Chanwoo Hong, Samir Adhikari, Yeongsoon Jeong, Ilsun Yoon, Donghan Lee, Chungnam National Univ. (Korea, Republic of) [10509-3]

SESSION 2..... MON 10:30 AM TO 11:50 AM

Plasmonic Based Imaging

Session Chair: **Tuan Vo-Dinh**,

Fitzpatrick Institute For Photonics, Duke Univ. (USA)

Mass measurements of focal adhesions in single cells using high resolution surface plasmon resonance microscopy, Alexander W. Peterson, Michael Halter, Alessandro Tona, Anne L. Plant, John T. Elliott, National Institute of Standards and Technology (USA) [10509-4]

Quantitative image analysis of angle scanning label-free surface plasmon resonance microscopy, Taehwang Son, Changhun Lee, Donghyun Kim, Yonsei Univ. (Korea, Republic of) [10509-5]

Exploring plasmonic coupling as a stimuli responsive contrast mechanism in multiphoton microscopy, Marica B. Ericson, Jeemol James, Hanna Thomsen, Göteborgs Univ. (Sweden); Vladimir Kirejev, Chalmers Univ. of Technology (Sweden); Daniel Aili, Linköping Univ. (Sweden); Antonio Vargas-Berenguel, Univ. de Almería (Spain) [10509-6]

High-speed nano-polarimetry for real-time plasmonic bio-imaging, Yipei Wang, Yunbo Liu, Xintao Zhao, Somin E. Lee, Univ. of Michigan (USA) [10509-7]

Lunch Break Mon 11:50 am to 1:20 pm

SESSION 3..... MON 1:20 PM TO 3:00 PM

Advanced Techniques in Plasmonics

Session Chair: **Ho-Pui Ho**,

The Chinese Univ. of Hong Kong (Hong Kong, China)

Multifunctional nanocluster composed of gold nanorod and upconversion nanoparticle for simultaneous imaging and treatment, Suehyun K. Cho, Univ. of Colorado Boulder (USA); Lih-Jen Su, Thomas W. Flaig, Univ. of Colorado Denver (USA); Wounjhang Park, Univ. of Colorado Boulder (USA) [10509-8]

Revealing local origin of surface-enhanced circular dichroism, SeokJae Yoo, Seojoo Lee, Q-Han Park, Korea Univ. (Korea, Republic of) [10509-9]

Plasmonic optoporation for intracellular recording of primary neurons activity, Francesco Tantussi, Michele Dipalo, Hayder Amin, Laura Lovato, Fabio Moia, Gabriele C. Messina, Valeria Caprettini, Andrea Cerea, Luca Berdondini, Francesco De Angelis, Istituto Italiano di Tecnologia (Italy) [10509-10]

Size-dependent thresholds for melting and nanobubble generation using pulsed-laser irradiated gold nanoparticles, Andrew M. Fales, William C. Vogt, Keith A. Wear, Joshua Pfefer, Ilko K. Ilev, U.S. Food and Drug Administration (USA) [10509-11]

Various shaped nanoscale patterns by spacer layer thickness control on plasmonic lithography, Taeyeon Kim, Heesang Ahn, Hyerin Song, Kyujung Kim, Pusan National Univ. (Korea, Republic of) [10509-12]

SESSION 4..... MON 3:30 PM TO 6:30 PM

Plasmonics, Sensing and Bioanalytical Applications

Session Chair: **Martin Maiwald**, Ferdinand-Braun-Institut (Germany)

Optofluidic nanoplasmonic biosensor for label-free live cell analysis in real time, Xiaokang Li, Maria Soler Aznar, Alexander Belushkin, Filiz Yesilköy, Hatice Altug, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10509-13]

Towards the plasmonic nanopore for single molecule analysis, Seong Soo Choi, Sun Moon Univ. (Korea, Republic of); Myoung Jin Park, Korea Military Academy (Korea, Republic of); Sae-Joong Oh, Chul Hee Han, Sun Moon Univ. (Korea, Republic of); Doo Jae Park, Hallym Univ. (Korea, Republic of); Yong-Sang Kim, Sungkyunkwan Univ. (Korea, Republic of); Soo Bong Choi, Incheon National Univ. (Korea, Republic of) [10509-14]

Surface plasmon resonance based ring resonator for biosensing applications, Lokendra Singh, Santosh Kumar, DIT Univ. (India) ... [10509-15]

Dielectric cladding on gold nanorod for efficient detection of biomolecules, Zunaid Omair, Univ. of California, Berkeley (USA); Muhammad Anisuzzaman Talukder, Bangladesh Univ. of Engineering and Technology (Bangladesh) [10509-16]

Towards a point-of-care nanoplasmonic biosensor for rapid and multiplexed detection of pathogenic infections, Maria Soler Aznar, Xiaokang Li, Alexander Belushkin, Filiz Yesilköy, Hatice Altug, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10509-17]

Surface plasmon resonance based fiber optic sensor for the detection of triacylglycerides utilizing Ag/ZnO nanorods/lipase enzyme, Anjali Baliyan, Univ. of Delhi South Campus (India); Sruthi P. Usha, Banshi D. Gupta, Indian Institute of Technology Delhi (India); Enakshi Khular Sharma, Univ. of Delhi South Campus (India) [10509-18]

Metallic nanostructure arrays based coupling effects on high-Q tunable whispering gallery modes, Seunghun Lee, Kyujung Kim, Tae Young Kang, Soojung Kim, Heesang Ahn, Taeyeon Kim, Pusan National Univ. (Korea, Republic of). [10509-19]

Plasmonic extra-ordinary transmission: testing the maintenance of optical frequency and phase via a frequency comb, Young-Jin Kim, Byung Jae Chun, Nanyang Technological Univ. (Singapore); Seungchul Kim, Pusan National Univ. (Korea, Republic of). [10509-20]

Nanoscale thickness modulation of gap layer by biomolecules between metallic nanostructures for plasmonic resonance shifts, Hyerin Song, Heesang Ahn, Won-Geun Kim, Jin-Woo Oh, Kyujung Kim, Pusan National Univ. (Korea, Republic of). [10509-21]

MONDAY POSTER SESSION MON 5:30 PM TO 7:30 PM

Posters-Monday

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Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Extraordinary optical transmission sensor based on subwavelength hole array for detection of human serum albumin, Yeji Lee, Hyerin Song, Heesang Ahn, Taerim Yoon, Pusan National Univ. (Korea, Republic of); Jong-ryul Choi, Daegu-Gyeongbuk Medical Innovation Foundation (Korea, Republic of); Kyujung Kim, Pusan National Univ. (Korea, Republic of). [10509-22]

Optimization of SiO₂ nanopillars array capped Au nanoparticles for extreme light localization in imaging cells, Soojung Kim, Hyerin Song, Tae Young Kang, Heesang Ahn, Kyujung Kim, Pusan National Univ. (Korea, Republic of). [10509-23]

Long range capturing and delivery of water dispersed nanoparticles for high resolution detection, Francesco Tantussi, Gabriele C. Messina, Laura Lovato, Rosario Capozza, Michele Dipalo, Francesco De Angelis, Istituto Italiano di Tecnologia (Italy) [10509-24]

TUESDAY 30 JANUARY

TUESDAY PLENARY SESSION TUE 10:30 AM TO 11:30 AM

Nano/Biophotonics Plenary Session

Shaped Light for BioNanophotonics: a new chapter in imaging

Kishan Dholakia, Univ. of St. Andrews (United Kingdom)

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Saturday-Sunday

BIOS EXPO

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Sunday 28 January 10:00 am to 5:00 pm

BIOS Expo, the world's largest biomedical optics and biophotonics exhibition, starts the Photonics West week. Find the latest technologies from more than 200 companies supplying biomedical research and healthcare solutions.

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- Biomedical optics components
- Instrumentation
- Lasers used in research, diagnostics, and therapeutics
- Molecular imaging
- Nano/biophotonics
- Biosensors
- Spectroscopic imaging
- Microscopy

CONFERENCE 10510

Sunday–Monday 28–29 January 2018 • Proceedings of SPIE Vol. 10510

Frontiers in Biological Detection: From Nanosensors to Systems X

Conference Chairs: **Amos Danielli**, Bar-Ilan Univ. (Israel); **Benjamin L. Miller**, Univ. of Rochester Medical Ctr. (USA); **Sharon M. Weiss**, Vanderbilt Univ. (USA)

Program Committee: **Xudong Fan**, Univ. of Michigan (USA); **Jason A. Guicheteau**, U.S. Army Edgewood Chemical Biological Ctr. (USA); **Laura Maria Lechuga**, Catalan Institute of Nanoscience and Nanotechnology (ICN2) (Spain); **Michael J. Sailor**, Univ. of California, San Diego (USA); **Oliver G. Schmidt**, Leibniz-Institut für Festkörper- und Werkstofforschung Dresden (Germany); **Christopher C. Striemer**, Adarza BioSystems, Inc. (USA)

SUNDAY 28 JANUARY

SESSION 1.....SUN 1:30 PM TO 3:20 PM

Resonators and Interferometry

Session Chair: **Benjamin L. Miller**,
Univ. of Rochester Medical Ctr. (USA)

Enhancing the sensitivity of slow light MZI biosensors through multi-hole defects, Kun Qin, Yiliang Zhao, Shuren Hu, Sharon M. Weiss, Vanderbilt Univ. (USA) [10510-1]

Label-free detection of protein biomolecules secreted from a heart-on-a-chip model for drug cardiotoxicity evaluation, Frank DeLuna, The Univ. of Texas at San Antonio (USA); Yu Shrike Zhang, Brigham and Women's Hospital (USA) and Massachusetts Institute of Technology (USA) and Harvard Univ. (USA); Gilbert Bustamante, Le Li, Mathew Lauderdale, The Univ. of Texas at San Antonio (USA); Mehmet R. Dokmeci, Ali Khademhosseini, Brigham and Women's Hospital (USA) and Massachusetts Institute of Technology (USA) and Harvard Univ. (USA); Jing Yong Ye, The Univ. of Texas at San Antonio (USA) [10510-2]

Facile detection of toxic ingredients in seafood using biologically enabled photonic crystal materials, Xianming Kong, Kenny Squire, Alan X. Wang, Oregon State Univ. (USA) [10510-3]

Silicon photonic biochemical sensor on chip based on balanced Mach-Zehnder interferometry and phase-generated-carrier demodulation, Yisbel E. Marin, Scuola Superiore Sant'Anna (Italy); Veronica Toccafondo, Consorzio Nazionale Interuniversitario per le Telecomunicazioni (Italy); Philippe Velha, Scuola Superiore Sant'Anna (Italy); Simona Scarano, Univ. degli Studi di Firenze (Italy); Stefano Tirelli, Alessandro Nottola, Scuola Superiore Sant'Anna (Italy) and Consorzio Nazionale Interuniversitario per le Telecomunicazioni (Italy); Yoon Jeong, Hyun P. Jeon, KIST Europe Forschungsgesellschaft mbH (Germany); Maria E. Minunni, Univ. degli Studi di Firenze (Italy); Fabrizio Di Pasquale, Claudio J. Oton, Scuola Superiore Sant'Anna (Italy) [10510-4]

Whispering-gallery-mode resonators: from a novel sensing mechanism to a wireless sensing system (*Invited Paper*), Weijian Chen, Washington Univ. in St Louis (USA); Xiangyi Xu, Washington Univ in St Louis (USA); Guangming Zhao, Xuefeng Jiang, Washington Univ. in St Louis (USA); Yihang Li, Washington Univ. in St. Louis (USA); Lan Yang, Washington Univ. in St Louis (USA) [10510-5]

SESSION 2..... SUN 3:50 PM TO 5:40 PM

Magnetic Sensing and New Platforms

Session Chair: **Sharon M. Weiss**, Vanderbilt Univ. (USA)

Applications of nano-magnetism to biosensing (*Invited Paper*), Paolo Vavassori, CIC nanoGUNE (Spain) [10510-6]

Highly sensitive detection of biomarkers using magnetic modulation biosensing: an improvement over flow cytometry, Jasenka Verburg, Orr Hadass, Jennifer L. Wilsey, MagBiosense, Inc. (USA); Amos Danielli, MagBiosense, Inc. (USA) [10510-7]

Highly sensitive and specific NS1-based Zika serology test using a magnetic modulation biosensing system, Yehudit Michelson, Bar-Ilan Univ. (Israel) [10510-8]

A non-invasive system to assess tissue temperature distribution, Reza Monazami, Sahar Jahani, Dieter Manstien, Massachusetts General Hospital (USA) [10510-9]

A novel single-tube approach for in vitro diagnostics using diatomaceous earth and optical sensor, Yong Shin, Univ. of Ulsan (Korea, Republic of); Tae Yoon Lee, Chungnam National Univ. (Korea, Republic of) [10510-10]

SUNDAY POSTER SESSION..... SUN 5:30 PM TO 7:00 PM

Posters-Sunday

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

A digital protein microarray for hepatitis B detection, Fulya Ekiz Kanik, Nese Lortlar Ünlü, Derin D. Sevenler, M. Selim Ünlü, Boston Univ. (USA) [10510-27]

Pupil function optimization for improved visibility of weakly-scattering nanoparticles in wide-field interferometric microscopy, Celalettin Yurdakul, Oguzhan Avci, M. Selim Ünlü, Boston Univ. (USA) [10510-28]

BIOS SUNDAY PLENARY SESSION.....SUN 7:00 PM TO 8:00 PM

Super-resolution post-Nobel

Stefan W. Hell, Max Planck Institute Gottingen
2014 Nobel Laureate in Chemistry

See page 7 for details

MONDAY 29 JANUARY

SESSION 3..... MON 8:30 AM TO 10:00 AM

Integrated Photonics I

Session Chair: **Amos Danielli**, Bar-Ilan Univ. (Israel)

Investigation of ultrahigh sensitivity in GalnAsP nanolaser biosensor, Yoshito Saijo, Takumi Watanabe, Yu Hasegawa, Yoshiaki Nishijima, Toshihiko Baba, Yokohama National Univ. (Japan) [10510-11]

Multi-layer integrated photonics from ultraviolet to infrared, Jeremy Sage, Suraj Bramhavar, John Chiaverini, Paul W. Juodawlkis, Dave Kharas, William Loh, Cheryl Sorace-Agaskar, MIT Lincoln Lab. (USA) [10510-12]

Folded subwavelength grating ring resonator for sensing probability enhancement, Ching-Wen Chang, National Sun Yat-sen Univ. (Taiwan); Hai Yan, The Univ. of Texas at Austin (USA); Xiaochuan Xu, Naimei Tang, Swapnajt Chakravarty, Omega Optics, Inc. (USA); Li-Wei Tu, National Sun Yat-sen Univ. (Taiwan); Ray T. Chen, The Univ. of Texas at Austin (USA) and Omega Optics, Inc. (USA) [10510-13]

Silicon photonic Raman spectrometer and integrated microfluidics for detection of liquid- and vapor-phase analytes (Invited Paper), Carl D. Meinhart, Univ. of California, Santa Barbara (USA) [10510-14]

SESSION 4..... MON 10:30 AM TO 12:00 PM

Integrated Photonics II

Session Chair: **Benjamin L. Miller**, Univ. of Rochester Medical Ctr. (USA)

The guided-mode resonance biosensor: Principles, technology, and implementation (Invited Paper), Robert Magnusson, Kyu Jin Lee, The Univ. of Texas at Arlington (USA); Brett R. Wenner, Jeffery W. Allen, Monica S. Allen, Air Force Research Lab. (USA); Susanne Gimlin, Debra W. Weidanz, Resonant Sensors Inc. (USA) [10510-15]

High value photonic gas sensors: from biomimetics to bioinspiration (Invited Paper), Radislav A. Potyrailo, GE Global Research (USA) . . . [10510-16]

Waveguide-enhanced Raman spectroscopy of chemical warfare agent simulants (Invited Paper), Todd H. Stievater, Nathan F. Tyndall, Dmitry A. Kozak, R.A. McGill, U.S. Naval Research Lab. (USA); Scott A. Holmstrom, The Univ. of Tulsa (USA); Kee Koo, Sotera Defense Solutions, Inc. (USA) [10510-17]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 5..... MON 1:30 PM TO 3:00 PM

Novel Imaging Tools for Biodetection

Session Chair: **Sharon M. Weiss**, Vanderbilt Univ. (USA)

Reconstruction in wide-field interferometric microscopy for imaging weakly scattering biological nanoparticles with super-resolution (Invited Paper), Oguzhan Avci, Celalettin Yurdakul, Derin D. Sevenler, Fulya E. Kanik, Alex C. Matlock, Lei Tian, M. Selim Ünlü, Boston Univ. (USA) [10510-18]

Lens-free microscopy of cerebrospinal fluid for the laboratory diagnosis of meningitis, Cédric Allier, CEA-LETI (France); Robin Delacroix, Aix-Marseille Univ. (France); Sophie Morel, Lionel Hervé, Thomas Bordy, Pierre Blandin, Jean-Marc Dinten, CEA-LETI (France); Michel Drancourt, Aix-Marseille Univ. (France) [10510-19]

Optical coherence tomography applied for investigation of colloidal flow, Dan P. Popescu, National Research Council Canada (Canada) [10510-20]

Photonically driven DNA nanomachine with hybrid functions towards cell measurement, Yusuke Ogura, Takahiro Nishimura, Kenji Yamada, Jun Tanida, Osaka Univ. (Japan) [10510-21]

SESSION 6..... MON 3:30 PM TO 5:10 PM

Plasmonics and other New Biodetection Platforms

Session Chair: **Amos Danielli**, Bar-Ilan Univ. (Israel)

Plasmon assisted enhanced biosensor using a bio-hybrid polymer nanoparticle, Do-hyeong Kim, Seokho Kim, Dong Hyuk Park, INHA Univ. (Korea, Republic of); Bo-Hyun Kim, DGIST (Korea, Republic of) . . . [10510-22]

Controlling the shapes and sizes of metallic nanoantennas for detection of biological molecules using hybridization phase of plasmon resonances and photonic lattice modes, Rithvik Gutha, Christina M. Sharp, Waylin J. Wing, Seyed M. Sadeghi, The Univ. of Alabama in Huntsville (USA) [10510-23]

Laser-assisted patterning of double-sided adhesive tapes for optofluidic biochip integration, Alethea V. Zamora Gomez, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Sebastian Marx, Technische Univ. Berlin (Germany); Norbert Arndt-Staufenbiel, Christian Janeczka, George Havlik, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Marco Queisser, Technische Univ. Berlin (Germany); Henning Schröder, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) [10510-24]

Physically transient distributed feedback lasers for eco-friendly and highly efficient chemosensors, Kyungtaek Min, Muhammad Umar, Sunghwan Kim, Ajou Univ. (Korea, Republic of) . . . [10510-25]

Graphene-based nano/micro structures leading to innovative bio/chemical sensors at RISE Acreo, Qin Wang, Mikael Karlsson, Wei Zhao, Elsa DeGeer, Olof Öberg, Ingemar Petermann, Per Björk, Björn Samel, RISE Acreo AB (Sweden); Carl Strandqvist, Louise Elmlund, Simon Dunne, Swedish National Forensic Ctr. (Sweden) [10510-26]

TUESDAY 30 JANUARY

TUESDAY PLENARY SESSION TUE 10:30 AM TO 11:30 AM

Nano/Biophotonics Plenary Session
Shaped Light for BioNanophotonics: a new chapter in imaging
Kishan Dholakia, Univ. of St. Andrews (United Kingdom)

SPIE. PHOTONICS WEST LASE

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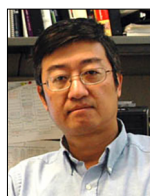


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Ltd. (Japan)

Mark S. Zediker, NUBURU, Inc. (USA)

LASE Contents

Laser Sources

Program Chairs: **Kunihiko Washio**, Paradigm Laser Research Ltd. (Japan);
John Ballato, Clemson Univ. (USA)

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Nonlinear Optics and Beam Guiding

Program Chairs: **Vladimir Ilchenko**, OEwaves, Inc. (USA);
Paul O. Leisher, Rose-Hulman Institute of Technology (USA)

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Micro/Nano Applications

Program Chairs: **Henry Helvajian**, The Aerospace Corp. (USA);
Guido Hennig, Daetwyler Graphics AG (Switzerland)

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10521	Synthesis and Photonics of Nanoscale Materials XV (Dubowski, Kabashin, Cao, Geohegan)	225
10522	Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII (Herman, Meunier, Osellame)	227
10523	Laser 3D Manufacturing V (Gu, Helvajian, Piqué, Dunskey, Liu)	231

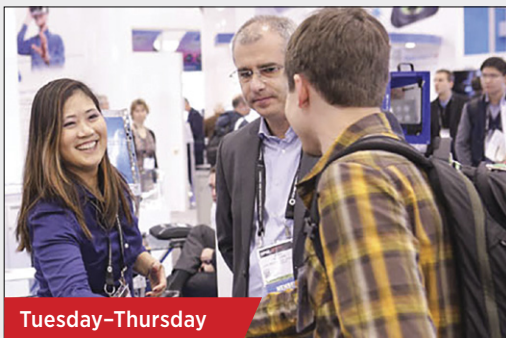
Macro Applications

Program Chairs: **Bo Gu**, Bos Photonics (USA);
Stefan Kaierle, Laser Zentrum Hannover e.V. (Germany)

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Tuesday-Thursday

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Wednesday 31 January 10:00 am to 5:00 pm


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- IR sources and detectors
- Electronic imaging components
- Optical coatings
- Lenses and filters
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- Metrology tools

LASE DAILY EVENT SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	
BIOS EXPO 10:00 am to 5:00 pm			PHOTONICS WEST EXHIBITION 10:00 am to 5:00 pm			
			LASE Interactive Poster Session 6:00 to 8:00 pm, p.13	LASE Plenary Session 10:20 am to 12:30 pm, p.13	10:00 am to 4:00 pm	
			TECHNICAL EVENT Laser Communications 7:30 to 9:00 pm, p.14			
Laser Sources			Program Chairs: Kunihiko Washio , Paradigm Laser Research Ltd. (Japan); John Ballato , Clemson Univ. (USA)			
		10511 Solid State Lasers XXVII: Technology and Devices (Clarkson, Shori) p.190				
		10512 Fiber Lasers XV: Technology and Systems (Hartl, Carter) p.195				
			10513 Components and Packaging for Laser Systems IV (Glebov, Leisher) p.210			
		10514 High-Power Diode Laser Technology XVI (Zediker) p.204				
		10515 Vertical External Cavity Surface Emitting Lasers (VECSELs) VIII (Chilla) p.206				
Nonlinear Optics and Beam Guiding			Program Chairs: Vladimir Ilchenko , OEwaves, Inc. (USA); Paul O. Leisher , Rose-Hulman Institute of Technology (USA)			
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		10517 Real-time Measurements, Rogue Phenomena, and Single-Shot Applications III (Jalali, Solli, Steinmeyer) p.212				
		10518 Laser Resonators, Microresonators, and Beam Control XX (Kudryashov, Paxton, Ilchenko, Aschke) p.214				
Micro/Nano Applications			Program Chairs: Henry Helvajian , The Aerospace Corp. (USA); Guido Hennig , Daetwyler Graphics AG (Switzerland)			
		10519 Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XXIII (Neuenschwander, Grigoropoulos, Makimura, Račiukaitis) p.218				
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		10524 Free-Space Laser Communication and Atmospheric Propagation XXX (Hemmati, Boroson) p.235	10525 High-Power Laser Materials Processing: Applications, Diagnostics, and Systems VII (Kaierle, Heinemann) p.238			

LASE 2018 BEST PAPER AWARDS

BEST STUDENT PAPER COMPETITION

Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications (Conf. 10522)

Monday 29 January

COMPETITION · 5:00 to 6:00 pm

JUDGING and AWARD CEREMONY · 6:00 to 6:15 pm

We are pleased to announce that cash prizes and plaques will be awarded to the best student presentations in this conference (1st, 2nd, and 3rd place; both poster and oral papers considered). Papers submitted by graduate and undergraduate students are eligible.

In order to ensure a fair evaluation, the conference chairs and the program committee will judge the students during a special student competition session held during the conference. Here the students present a brief 5-minute summary of their original talk or poster presented at the conference. Candidates for the award need to be the presenting author, a full-time student, and must have conducted the majority of the research presented in the paper.

Following the student competition, the judges will meet and decide on the top three students. Winners will be announced during the award ceremony.

AWARD SPONSORS:



BEST STUDENT PAPER COMPETITION

Vertical External Cavity Surface Emitting Lasers (VECSELs) (Conf. 10515)

Tuesday 30 January

AWARD CEREMONY · 12:00 to 12:05 pm

Qualifying manuscripts will be received prior to the conference. Throughout the conference, qualifying student oral presentations will be evaluated. Student presentations will be judged based on scientific merit, impact, clarity of the presentation, and manuscript.

AWARD SPONSOR:



BEST STUDENT PAPER COMPETITION

Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) (Conf. 10519)

Wednesday 31 January

AWARD CEREMONY · 5:50 to 6:00 pm

A cash prize will be awarded to the best student oral and poster presentation in this conference.

Throughout the conference, qualifying student presentations will be evaluated by the conference committee, and the results will be announced during the award ceremony on Thursday. Student presentations will be judged based on scientific merit of the work, and clarity of the presentation.

While the award is not judged by the manuscript, a manuscript must be submitted.

AWARD SPONSORS:



BEST STUDENT ORAL PAPER COMPETITION

Fiber Lasers: Technology and Systems (Conf. 10512)

Thursday 1 February

AWARD CEREMONY · 4:50 to 5:00 pm

We are pleased to announce that a cash prize will be awarded to the best student oral presentation in this conference.

Throughout the conference, qualifying student oral presentations will be evaluated by the conference committee, and the results will be announced in this session. Student presentations will be judged based on scientific merit of the work, and clarity of the presentation. While the award is not judged by the manuscript, a manuscript must be submitted.

To be eligible for consideration, the student must be the first author on an accepted paper, and must make the oral presentation.

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CONFERENCE 10511

Monday–Thursday 29–1 February 2018 • Proceedings of SPIE Vol. 10511

Solid State Lasers XXVII: Technology and Devices

Conference Chairs: **W. Andrew Clarkson**, Univ. of Southampton (United Kingdom); **Ramesh K. Shori**, SPAWAR Systems Ctr. (USA)

Program Committee: **Patrick A. Berry**, Air Force Research Lab. (USA); **Marc Eichhorn**, Institut Franco-Allemand de Recherches de Saint-Louis (France); **Dennis G. Harris**, MIT Lincoln Lab. (USA); **Norman Hodgson**, Coherent, Inc. (USA); **Helena Jelínková**, Czech Technical Univ. in Prague (Czech Republic); **Christian Kränkel**, Univ. Hamburg (Germany); **Jacob I. Mackenzie**, Univ. of Southampton (United Kingdom); **Markus Pollnau**, KTH Royal Institute of Technology (Sweden); **Narasimha S. Prasad**, NASA Langley Research Ctr. (USA); **Bojan Resan**, Lumentum (Switzerland), Univ. of Applied Sciences and Arts Northwestern (Switzerland); **Deyuan Shen**, Fudan Univ. (China)

MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:00 AM

Eye Safe and Mid-IR Lasers I

Session Chair: **Ramesh K. Shori**, SPAWAR Systems Ctr. Pacific (USA)

Efficient 2- μm Tm:YAP Q-switched and CW lasers, Alan Hays, Brian J. Cole, Vernon King, Lew Goldberg, U.S. Army RDECOM CERDEC NVESD (USA) [10511-1]

2-micron Lasing in Tm:Lu₂O₃ ceramic: initial operation, John Vetrovec, David M. Filgas, Carey A. Smith, Drew A. Copeland, Amardeep S. Litt, Aqwest, LLC (USA); Eldridge Briscoe, Ernestina Schirmer, General Atomics Aeronautical Systems, Inc. (USA) [10511-2]

Efficient 2-micron Ho lasers based on fluoride crystal hosts, Bradley DeShano, KBRwyle (USA); Gary Cook, Air Force Research Lab. (USA); Thomas R. Harris, Azimuth Corp. (USA) [10511-3]

2.1- μm Q-switched Ho:YAG laser intra-cavity pumped by a 2- μm VECSEL, Marcel Rattunde, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Karsten Scholle, LISA Laser Products OHG (Germany); Peter Holl, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Samir Lamrini, LISA Laser Products OHG (Germany); Steffen Adler, Elke Diwo-Emmer, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Peter Fuhrberg, LISA Laser Products OHG (Germany) [10511-4]

Simulation of gain buildups in solid state regenerative amplifiers for 2-micron emitting lasers, Ramon Springer, Johannes Heberle, Ilya Alexeev, Christoph Pflaum, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) [10511-5]

2.097 μm Cth:YAG flashlamp pumped high energy high efficiency laser operation (patent pending), Dan Bar-Joseph, Marysol Technologies, Inc. (USA) [10511-6]

SESSION 2 MON 10:30 AM TO 12:30 PM

Eye Safe and Mid-IR Lasers II

Session Chair: **Ramesh K. Shori**, SPAWAR Systems Ctr. Pacific (USA)

Graphene-multilayer-saturable-absorber-based passively mode-locked Ho-doped fiber front-end for seeding of a 1-J/1-kW Ho:YAG cryogenically cooled thin-disk laser system, Jitka Černohorská, HiLASE Ctr. (Czech Republic), Czech Technical Univ. in Prague (Czech Republic); Martin Smrž, Michael Písařík, Reza Amani, HiLASE Ctr. (Czech Republic); Michal Jelínek, Czech Technical Univ. in Prague (Czech Republic); Pavel Peterka, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); Akira Endo, Tomáš Mocek, HiLASE Ctr. (Czech Republic) [10511-7]

Ultrashort pulse CPA-free Ho:YLF linear amplifier, Moritz Hinkelmann, Dieter Wandt, Laser Zentrum Hannover e.V. (Germany); Uwe Morgner, Leibniz Univ. Hannover (Germany) and Laser Zentrum Hannover e.V. (Germany); Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) [10511-8]

Passive Q-switching of femtosecond-laser-written Tm:KLu(WO₄)₂ waveguide lasers by graphene and MoS₂ saturable absorbers, Valentin P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Esrom Kifle, Xavier Mateos Ferre, Univ. Rovira i Virgili (Spain); Javier Rodríguez Vázquez de Aldana, Univ. de Salamanca (Spain); Airán Ródenas, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Pavel A. Loiko, ITMO Univ. (Russian Federation); Hao Hai Yu, Huaijin Zhang, Yanxue Chen, Shandong Univ. (China); Magdalena Aguiló, Francesc Díaz, Univ. Rovira i Virgili (Spain); Uwe Griebner, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) [10511-9]

Tm:GdVO₄ microchip laser Q-switched by a Sb₂Te₃ topological insulator, Valentin P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Pavel A. Loiko, ITMO Univ. (Russian Federation); Jakub Boguslawski, Wrocław Univ. of Science and Technology (Poland); Josep Maria Serres, Esrom Kifle, Univ. Rovira i Virgili (Spain); Maciej Kowalczyk, Wrocław Univ. of Science and Technology (Poland); Xavier Mateos Ferre, Univ. Rovira i Virgili (Spain); Jaroslaw Sotor, Wrocław Univ. of Science and Technology (Poland); Rafał Zybała, Warsaw Univ. of Technology (Poland); Krzysztof Mars, Andrzej Mikuła, AGH Univ. of Science and Technology (Poland); Magdalena Aguiló, Francesc Díaz, Univ. Rovira i Virgili (Spain); Uwe Griebner, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) [10511-10]

Q-switched Lasing Lines of Er:YAIO₃, Kristen Rogers, Consultant (USA); Ramesh K. Shori, Univ. of California, Los Angeles (USA) [10511-11]

Advanced laser architectures for high power eyesafe illuminators, Chris DePriest, Nadia Baranova, Bhabana Pati, Ken Stebbins, Ilya Bystryak, Michael Rayno, Kevin Ezzo, Q-Peak, Inc. (USA) [10511-12]

Lunch Break Mon 12:30 pm to 1:50 pm

SESSION 3 MON 1:50 PM TO 3:30 PM

Eye Safe and Mid-IR Lasers III

Session Chair: **Ramesh K. Shori**, SPAWAR Systems Ctr. Pacific (USA)

Generation of tunable high-repetition rate middle infrared transform-limited picosecond pulses, Vladislav V. Yakovlev, Texas A&M Univ. (USA) [10511-13]

Fiber coupled three micron pulsed laser source for CFRP laser treatment, Sebastian Nyga, Fraunhofer-Institut für Lasertechnik (Germany); David Blass, Technische Univ. Braunschweig (Germany); Veronika Katzy, Clean-Lasersysteme GmbH (Germany); Thomas Westphalen, Bernd Jungbluth, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) [10511-14]

High efficiency compact mid-IR sources, Brian J. Cole, Lew Goldberg, Steve Chinn, U.S. Army RDECOM CERDEC NVESD (USA); Kevin T. Zawilski, Leonard A. Pomeranz, Peter G. Schunemann, John C. McCarthy, BAE Systems (USA); F. Kenneth Hopkins, Air Force Research Lab. (USA) [10511-15]

Modeling re-absorption and nonradiative energy transfer in multi-level laser systems, Jonathan W. Evans, Air Force Research Lab. (USA); Thomas R. Harris, Azimuth Corp. (USA) [10511-16]

High-energy diode side-pumped Er:YLF laser generating 100 mJ @ 100 Hz, Manuel Messner, Arne Heinrich, Clemens Hagen, Pantec Engineering AG (Liechtenstein) [10511-17]

SESSION 4..... MON 4:00 PM TO 5:40 PM

Disk Lasers

Session Chair: **Dennis G. Harris**, MIT Lincoln Lab. (USA)

kW picosecond thin-disk regenerative amplifier, Knut Michel, Christoph Wandt, Sandro Klingebiel, Marcel Schultze, Stephan Prinz, Catherine Y. Teisset, Sebastian P. Stark, Christian Grebing, Matthias Häfner, Robert Bessing, Tobias Herzig, TRUMPF Scientific Lasers GmbH + Co., KG (Germany); Aleksander Budnicki, Dirk H. Sutter, TRUMPF Laser GmbH (Germany); Thomas Metzger, TRUMPF Scientific Lasers GmbH + Co., KG (Germany) [10511-18]

New generation of compact high power disk lasers, Stefanie Feuchtenbeiner, Sebastian Zaske, TRUMPF Laser- und Systemtechnik GmbH (Germany); Sven-Silvius Schad, TRUMPF Laser GmbH (Germany); Tina Gottwald, Vincent Kuhn, TRUMPF Laser GmbH (Germany); Sören Kumkar, TRUMPF Laser GmbH (Germany); Alexander Killi, TRUMPF Laser GmbH (Germany) [10511-19]

TruMicro 7380: advancements in high-power UV nanosecond disk lasers, Florian Kanal, Max Kahmann, TRUMPF Laser- und Systemtechnik GmbH (Germany); Veit Angrick, Montasser Bouzid, Wolfgang Schüle, Christian Stolzenburg, TRUMPF Laser GmbH (Germany) [10511-20]

Generation of 1-J bursts with picosecond pulses from Perla B thin-disk laser system, Michal Chyla, HiLASE Ctr. (Czech Republic); Siva S. Nagisetty, Patricie Severová, Huang Zhou, HiLASE Ctr. (Czech Republic) and Czech Technical Univ. in Prague (Czech Republic); Martin Smrž, Akira Endo, Tomáš Mocek, HiLASE Ctr. (Czech Republic) [10511-21]

Lasing performance of an edge-pumped ceramic Yb:YAG disk laser with a tailored spatial gain profile, John Vetrovec, Drew A. Copeland, Amardeep S. Litt, David M. Filgas, Aqwest, LLC (USA); Eldridge Briscoe, General Atomics Aeronautical Systems, Inc. (USA) [10511-22]

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:00 AM TO 10:10 AM

Pulsed Lasers I

Session Chair: **W. Andrew Clarkson**, Optoelectronics Research Ctr. (United Kingdom)

Power balance on a multibeam laser, Sid Sampat, The Univ. of Texas at Dallas (USA); John H. Kelly, Tanya Z Kosc, Amy Rigatti, Joseph Kwiatkowski, William R. Donaldson, Mark Romanofsky, Leon J. Waxer, Richard Dean, Robert Moshier, Univ. of Rochester (USA) [10511-23]

Improvement of temporal pulse shape of Q-switched laser using new injection technique based on multiple-frequency seeder, Jean-François Gleyze, Laurent Lamaignère, Jacques Luce, Odile Bonville, Roger Courchinoux, Denis Penninckx, Nadja Roquin, Commissariat à l'Énergie Atomique (France) [10511-24]

Sub-nanosecond lasers for cosmetics and dermatology, Aleksandr A. Tarasov, Hong Chu, Laseroptek (Korea, Republic of) . [10511-25]

Highly compact nanosecond pulsed single frequency fiber amplifier with tapered active fiber for SBS mitigation, Enkeleda Balliu, Magnus Engholm, Mid Sweden Univ. (Sweden); Ruben Freytag, Nyfors Teknologi AB (Sweden); Gunnar Elgcróna, Håkan Karlsson, Cobolt AB (Sweden) [10511-26]

100J-level nanosecond pulsed Yb:YAG cryo-cooled DPSSL amplifier (Invited Paper), Jodie Smith, Thomas J. Butcher, Paul D. Mason, Klaus G. Ertel, P. Jonathan Phillips, Saumyabrata Banerjee, Mariastefania De Vido, Oleg V. Chekhlov, STFC Rutherford Appleton Lab. (United Kingdom); Martin Divoký, Jan Pilar, Martin Hanus, HiLASE Ctr. (Czech Republic); Waseem Shaikh, Chris Hooker, STFC Rutherford Appleton Lab. (United Kingdom); Antonio Lucianetti, HiLASE Ctr. (Czech Republic); Cristina Hernandez-Gomez, STFC Rutherford Appleton Lab. (United Kingdom); Tomáš Mocek, HiLASE Ctr. (Czech Republic); Chris B. Edwards, John L. Collier, STFC Rutherford Appleton Lab. (United Kingdom) . [10511-27]

Dual-wavelength Nd:CaLnAlO₄ lasers at 1.365 and 1.390 μ m, Pavel A. Loiko, ITMO Univ. (Belarus); Josep Maria Serres, Xavier Mateos Ferre, Univ. Rovira i Virgili (Spain); Xiaodong Xu, Jianguo Normal Univ. (China); Jun Xu, Tongji Univ. (China); Uwe Griebner, Valentin P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Magdalena Aguiló, Francesc Diaz, Univ. Rovira i Virgili (Spain); Arkady Major, Univ. of Manitoba (Canada) [10511-28]

SESSION 6..... TUE 10:40 AM TO 12:10 PM

Pulsed Lasers II

Session Chair: **W. Andrew Clarkson**, Optoelectronics Research Ctr. (United Kingdom)

Development of high-energy and high repetition rate compact pulse laser system for inspection of tunnel concrete, Hajime Okada, Noboru Hasegawa, Katsuhiko Mikami, Toshiyuki Kitamura, Shuji Kondo, Masaharu Nishikino, Tetsuya Kawachi, National Institutes for Quantum and Radiological Science and Technology (Japan) [10511-29]

Fluoride crystals for inertial confinement fusion laser drivers, Jean-Paul Goossens, Commissariat à l'Énergie Atomique (France) . [10511-30]

Pump-dependent brilliance limitations and thermal issues for designing thulium-doped crystalline amplifiers, Alain Jolly, Sebastien Vidal, Johan Bouillet, ALPhANOV (France) [10511-31]

Hybrid fiber/bulk waveguide laser emitting multi-MW peak-power ns pulses at 1030 and 1550-nm wavelength (Invited Paper), Fabio Di Teodoro, Raytheon Co. (USA) [10511-32]

Lunch/Exhibition Break Tue 12:10 pm to 2:00 pm

SESSION 7..... TUE 2:00 PM TO 3:00 PM

Pulsed Lasers III

Session Chair: **Gary Cook**, Air Force Research Lab. (USA)

Characterization of Bivoj / DiPOLE 100: HiLASE 100-J / 10-Hz diode pumped solid state laser, Jan Pilar, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Paul D. Mason, Central Laser Facility, STFC Rutherford Appleton Lab. (United Kingdom); Martin Divoký, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Klaus G. Ertel, Central Laser Facility, STFC Rutherford Appleton Lab. (United Kingdom); Martin Hanus, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Thomas J. Butcher, Saumyabrata Banerjee, P. Jonathan Phillips, Jodie Smith, Mariastefania De Vido, Central Laser Facility, STFC Rutherford Appleton Lab. (United Kingdom); Antonio Lucianetti, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Cristina Hernandez-Gomez, Chris B. Edwards, John L. Collier, Central Laser Facility, STFC Rutherford Appleton Lab. (United Kingdom); Tomáš Mocek, Institute of Physics of the ASCR, v.v.i. (Czech Republic) [10511-33]

A developmental perspective on high power laser facility technology for ICF, Jianqiang Zhu, Dean Liu, Cheng Liu, Yangshuai Li, Mingying Sun, Zhiyuan Ren, Zhigang Liu, Bingyan Wang, Yanli Zhang, Zhaoyang Jiao, Lei Ren, Guowen Zhang, Tao Feng, Shanghai Institute of Optics and Fine Mechanics (China) [10511-34]

2- μ m Cr²⁺: CdSe passively Q-switched laser, Encai Ji, Qiang Liu, Mingming Nie, Tsinghua Univ. (China) [10511-35]

SESSION 8..... TUE 3:30 PM TO 5:50 PM

UV-VIS Lasers

Session Chair: **Helena Jelínková**, Czech Technical Univ. in Prague (Czech Republic)

Scaling the average power of 1066-nm end-pumped c-cut Nd:YVO₄ laser for sodium lidar development project, Oleg A. Konoplev, Science Systems and Applications, Inc. (USA); Anthony W. Yu, Steven X. Li, Michael A. Krainak, Yingxin Bai, Molly E. Fahey, Wenqian R. Huang, Diego Janches, NASA Goddard Space Flight Ctr. (USA) [10511-36]

Visible Praseodymium doped fluorozirconate chip laser, Champak Khurmi, George Y. Chen, Tanya M. Monro, David G. Lancaster, Univ. of South Australia (Australia) [10511-37]

Near-IR and blue emission from frequency conversion of a Q-switched Tm:YAP laser operating near 1.94 μ m, Brian J. Cole, Steve Chinn, Lew Goldberg, U.S. Army RDECOM CERDEC NVESD (USA) [10511-38]

Control of pulse duration and shape in a 400-W Q-switched 532-nm laser, Simon P. Chard, Timothy S. McComb, Ying Chen, Michael Barty, Young K. Kwon, Andritz Powerlase, Ltd. (United Kingdom) [10511-39]

High energy ultrafast NIR / DUV burst-mode laser for the European XFEL electron injector, Hongwei Chu, Lutz Winkelmann, Deutsches Elektronen-Synchrotron (Germany); Maik Frede, neoLASE GmbH (Germany); Ingmar Hartl, Deutsches Elektronen-Synchrotron (Germany) [10511-40]

CONFERENCE 10511

Optimization of second harmonic generation in high power femtosecond Yb lasers, Ji Won Kim, Dong Joon Kim, Eunji Park, Hanyang Univ. (Korea, Republic of); Duchang Heo, Guang-Hoon Kim, Korea Electrotechnology Research Institute (Korea, Republic of); Hoon Jeong, Korea Institute of Industrial Technology (Korea, Republic of) [10511-41]

Improvement of Pr:CALGO crystal quality for promising visible laser application, Zhitai Jia, Jian Zhang, Xutang Tao, Shandong Univ. (China) [10511-42]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Burst-mode-operated hybrid fiber-bulk amplifier system with arbitrary burst envelope, Mingming Nie, Xuezhe Cao, Qiang Liu, Tsinghua Univ. (China) [10511-66]

Dual-wavelength operation of a continuous-wave Alexandrite laser, Shirin Ghanbari, Arkady Major, Univ. of Manitoba (Canada) [10511-67]

Passively mode-locked Nd:YVO₄ laser operating at 1073 nm and 1085 nm, Tanant Waritanant, Arkady Major, Univ. of Manitoba (Canada) [10511-68]

Dual-wavelength Yb:CALGO laser with 1.31-THz frequency offset, Sujith Manjooran, Univ. of Manitoba (Canada); Pavel A. Loiko, ITMO Univ. (Russian Federation); Arkady Major, Univ. of Manitoba (Canada) [10511-69]

The improvement of signal-to-noise ratio for wave diagnostics based on phase retrieval in high power laser systems, Xingchen Pan, Hua Tao, Xiaoliang He, Cheng Liu, Jianqiang Zhu, Shanghai Institute of Optics and Fine Mechanics (China) [10511-70]

Temperature influence on spectroscopic properties and 2.7- μ m lasing of Er:YAP crystal, Richard Švejkar, Jan Šulc, Michal Němec, Helena Jelínková, Czech Technical Univ. in Prague (Czech Republic); Karel Nejezchleb, CRYTUR spol s.r.o. (Czech Republic); Miroslav Šech, Czech Technical Univ. in Prague (Czech Republic) [10511-71]

Temperature influence on spectroscopic and lasing properties of blue laser diode pumped Alexandrite crystal, Martin Fibrich, Jan Šulc, David Vyhřídál M.D., Helena Jelínková, Miroslav Šech, Czech Technical Univ. in Prague (Czech Republic) [10511-72]

Optical sampling by orthogonal polarization femtosecond laser, Haitao Fan, Tsinghua Univ. (China) and Daheng New Epoch Technology, Inc. (China); Yi Zhang, Siyi Yao, Daheng New Epoch Technology, Inc. (China); Wei Lu, Tsinghua Univ. (China); Xiaohong Yang, Daheng New Epoch Technology, Inc. (China) [10511-73]

Resonantly diode-pumped eye-safe Er:YAG laser with fiber-shape crystal, Michal Němec, Jan Šulc, Kryštof Hlinomaz, Helena Jelínková, Czech Technical Univ. in Prague (Czech Republic); Karel Nejezchleb, CRYTUR spol s.r.o. (Czech Republic); Miroslav Čech, Czech Technical Univ. in Prague (Czech Republic) [10511-74]

Thermo-optical properties of Alexandrite laser crystal, Pavel A. Loiko, ITMO Univ. (Russian Federation); Shirin Ghanbari, Univ. of Manitoba (Canada); Vladimir Matrosov, Science & Production Co. Solix Ltd. (Belarus); Konstantin V. Yumashev, Belarusian National Technical Univ. (Belarus); Arkady Major, Univ. of Manitoba (Canada) [10511-75]

Spectroscopy and lasing of Tm:SrMoO₄ crystal near 1.5, 1.9, and 2.3- μ m under 793-nm excitation, Jan Šulc, Richard Švejkar, Michal Němec, Czech Technical Univ. in Prague (Czech Republic); Maxim E. Doroshenko, A. M. Prokhorov General Physics Institute of the Russian Academy of Sciences (Russian Federation); Helena Jelínková, Czech Technical Univ. in Prague (Czech Republic); Lyudmila I. Ivleva, Elizaveta E. Dunayeva, Veronika G. Ivanova, A. M. Prokhorov General Physics Institute of the Russian Academy of Sciences (Russian Federation) [10511-76]

Optimized side-pumping configurations for the development of a Ce:LiCAF terawatt ultraviolet amplifier, Marilou Cadatal-Raduban, Massey Univ. Albany (New Zealand); Minh Hong Pham, Vietnam Academy of Science and Technology (Viet Nam); Jacque Lynn Gabayno, Osaka Univ. (Japan) and Mapúa Univ. (Philippines); Kohei Yamanoi, Melvin John F. Empizo, Toshihiko Shimizu, Nobuhiko Sarukura, Osaka Univ. (Japan); Akira Yoshikawa, Tohoku Univ. (Japan); Tsuguo Fukuda, Fukuda Crystal Lab. (Japan). [10511-77]

Low-cost multimode diode pumped Tm:YAG, Tm:LuAG and Tm:YLF lasers, Ersen Beyatli, Recep Tayyip Erdoğan Üniv. (Turkey) [10511-78]

Fe:Zn_{0.6}Mn_{0.4}Se laser at cryogenic up to room temperature generating in the 5 to 5.7- μ m region, Helena Jelínková, Czech Technical Univ. in Prague (Czech Republic); Maxim E. Doroshenko, A. M. Prokhorov General Physics Institute of the Russian Academy of Sciences (Russian Federation); Jan Šulc, Michal Jelinek, Michal Němec, David Vyhřídál, Czech Technical Univ. in Prague (Czech Republic); Vjatcheslav V. Osiko, A. M. Prokhorov General Physics Institute of the Russian Academy of Sciences (Russian Federation); Nazar O. Kovalenko, Andriy S. Gerasimenko, Institute for Single Crystals (Ukraine) [10511-79]

Narrow linewidth 780-nm distributed feedback lasers for cold atom quantum technology, Anwer Saeed, Ying Ding, Univ. of Glasgow (United Kingdom); Gary Terrett, Brendan Casey, Kelvin Nanotechnology Ltd. (United Kingdom); Nils Hempler, Craig J. Hamilton, Graeme P. A. Malcom, Gareth T. Maker, M Squared Lasers Ltd. (United Kingdom); Marc Sorel, Douglas J. Paul, Univ. of Glasgow (United Kingdom) [10511-80]

Efficient Er:Ti:LiNbO₃ ridge waveguide lasers, Dominik Brüske, Sergiy Suntsov, Christian E. Rüter, Detlef Kip, Helmut-Schmidt Univ. (Germany) [10511-81]

Broadband IBS coatings for sub-50-fs pulse generation from ultrafast thin-disk lasers, Valentin Wittwer, Martin Hoffmann, Clément Paradis, Norbert Modsching, Maxim Gaponenko, François Labaye, Univ. de Neuchâtel (Switzerland) [10511-82]

Semiconductor-based narrow-line and high-brilliance 193-nm laser system for industrial applications, Dmitrijs Opalevs, Matthias Scholz, Christian Gilfert, TOPTICA Photonics AG (Germany); L. J. Liu, Xiao Yang Wang, Beijing Ctr. for Crystal Research and Development (China); Andreas Vetter, Karlsruher Institut für Technologie (Germany) and SUSS MicroOptics SA (Switzerland); Raoul Kirner, SUSS MicroOptics SA (Switzerland); Toralf Scharf, Karlsruher Institut für Technologie (Switzerland); Wilfried Noell, SUSS MicroOptics SA (Switzerland); Carsten Rockstuhl, Karlsruher Institut für Technologie (Germany); Ru Kang Li, Chuangtian Chen, Beijing Ctr. for Crystal Research and Development (China); Reinhard Voelkel, SUSS MicroOptics SA (Switzerland); Patrick Leisching, TOPTICA Photonics AG (Germany) [10511-83]

Laser spectroscopy of highly doped NV centers in diamond, Shova Subedi, Jeremy Peppers, Sergey B. Mirov, Vladimir V. Federov, Dmitry V. Martyshkin, The Univ. of Alabama at Birmingham (USA); Linbo Shao, Marko Loncar, Harvard School of Engineering and Applied Sciences (USA) [10511-84]

High power diode pumped solid state (DPSS) laser systems active media robust modeling and analysis, Tamer M. Kashif, MRTC (Egypt) [10511-85]

Enhancement of thermal blooming effect on free space propagation of high power CW laser beam, Tamer M. Kashif, MRTC (Egypt) [10511-86]

Low defect ion beam deposition (IBD) optical coatings for laser facets, Sandeep Kohli, Ralf H. Erz, Jason M. George, Rijju Singhal, Veeco Instruments Inc. (USA) [10511-87]

High-frequency strontium vapor laser for biomedical applications, Artemy Hovorostovsky, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [10511-88]

GHz Yb:KYW oscillators in time-resolved spectroscopy, Changxiu Li, Univ. Konstanz (Germany) [10511-89]

Imaging and emission spectroscopy of a novel micro-hollow cathode discharge array; a candidate discharge for rare gas laser development, Ben Eshel, Christopher A. Rice, Glen P. Perram, Air Force Institute of Technology (USA) [10511-90]

Excitation of higher lying energy states in a potassium DPAL, AJ Wallerstein, Glen P. Perram, Christopher A. Rice, Air Force Institute of Technology (USA); Greg A. Pitz, Eric Guild, Donald Stalnakier, Air Force Research Lab. (USA) [10511-92]

Excited argon production in micro-hollow cathode discharge arrays for use as potential rare gas laser sources, Richard Peterson, Ben Eshel, Christopher A. Rice, Glen P. Perram, Air Force Institute of Technology (USA) [10511-93]

Investigation on gas medium parameters for an ArF excimer laser through orthogonal experimental design, Xingliang Song, Pengfei Sha, Yuanyuan Fan, Yi Zhou, Jiangshan Zhao, Academy of Opto-Electronics, CAS (China) [10511-94]

Experimental and theoretical studies of the diode pumped alkali lasers, Boris D. Barmashenko, Ilya Auslender, Eyal Yacoby, Karol Waichman, Salman Rosenwaks, Ben-Gurion Univ. of the Negev (Israel) [10511-95]

CW 3 μ m lasing via two-photon pumping in cesium vapor with a 1W source, Glen P. Perram, Christopher A. Rice, Nathan D. Haluska, Air Force Institute of Technology (USA) [10511-96]

Time resolved fluorescence spectroscopy of xenon atoms in high pressure plasma, Carl Sanderson, The Univ. of Alabama (USA); Amanda B. Clark, U.S. Army Space and Missile Defense Command (USA); Jiande Han, Michael C. Heaven, Emory Univ. (USA); Brett H. Hokr, U.S. Army Space and Missile Defense Command (USA) [10511-97]

Effects of pump intensity on the four level Cs XPAL with different rare gas partners, Andrey Mironov, Univ. of Illinois at Urbana-Champaign (USA); David L. Carroll, CU Aerospace LLC (USA); J. Gary Eden, Univ. of Illinois at Urbana-Champaign (USA) [10511-98]

WEDNESDAY 31 JANUARY

SESSION 9 WED 8:00 AM TO 10:10 AM

Ultrafast Lasers

Session Chair: **Narasimha S. Prasad**, NASA Langley Research Ctr. (USA)

Low repetition rate operation of a femtosecond Yb:CALGO laser, Sujith Manjooran, Arkady Major, Biomedical Photonics (Canada) . . . [10511-43]

InP/InGaP quantum-dot SESAM mode-locked Alexandrite laser, Shirin Ghanbari, Univ. of Manitoba (Canada); Ksenia A. Fedorova, Aston Univ. (United Kingdom); Andrey B. Krysa, The Univ. of Sheffield (United Kingdom); Edik U. Rafailov, Aston Univ. (United Kingdom); Arkady Major, Univ. of Manitoba (Canada) [10511-44]

Ultrafast laser inscribed mid-infrared waveguide lasers (*Invited Paper*), Ajoy Kumar Kar, Heriot-Watt Univ. (United Kingdom) [10511-45]

Relativistic-intensity near-single-cycle laser system at 1 kHz, Frederik Böhle D.D.S., Ecole Nationale Supérieure de Techniques Avancées (France); Andreas Blumenstein, Laser-Lab. Göttingen e.V. (Germany); Maïmouna Bocoum, Aline Vernier, Magali Lozano, Jean-Philippe Rousseau, Aurélie Jullien D.D.S., Dominykas Gustas, Diego Guénot, Jérôme Faure, Ecole Nationale Supérieure de Techniques Avancées (France); Máté Kovács, ELI-HU Nonprofit Kft. (Hungary); Martin Kretschmar, Leibniz Univ. Hannover (Germany); Peter Simon, Laser-Lab. Göttingen e.V. (Germany); Uwe Morgner, Leibniz Univ. Hannover (Germany); Tamás Nagy, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Rodrigo López-Martens, Ecole Nationale Supérieure de Techniques Avancées (France) [10511-46]

High power green lasers for gamma source, Magali Durand, Pierre Sevillano, Olivier Alexaline, Damien Sangla, Alexis Casanova, Adrien Aubourg, Abdelhak Saci, Antoine Courjaud, Amplitude Systèmes (France) [10511-47]

Sub-100as residual timing jitter from turn-key diode-pumped solid state mode-locked lasers based on ytterbium, Alexis Casanova, Benoit Trophème, Antoine Courjaud, Amplitude Systèmes (France); Giorgio Santarelli, Univ. Bordeaux 1 (France) [10511-48]

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and Reinhard Poprawe, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)]
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 1:40 pm

SESSION 10 WED 1:40 PM TO 3:00 PM

Airborne and Space Qualified Lasers

Session Chair: **Narasimha S. Prasad**, NASA Langley Research Ctr. (USA)

Laser system development for gravitational-wave interferometry in space, Kenji Numata, Anthony W. Yu, Jordan B. Camp, Michael A. Krainak, NASA Goddard Space Flight Ctr. (USA) [10511-49]

Progress on laser technology for proposed space-based sodium lidar, Michael A. Krainak, Anthony W. Yu, Steven X. Li, NASA Goddard Space Flight Ctr. (USA); Yingxin Bai, NASA Langley Research Ctr. (USA); Kenji Numata, Jeffrey R. Chen, Molly E. Fahey, NASA Goddard Space Flight Ctr. (USA); Wenqian R. Huang, Massachusetts Institute of Technology (USA); Oleg A. Konoplev, Sigma Space Corp. (USA); Diego Janches, NASA Goddard Space Flight Ctr. (USA); Chester S. Gardner, Univ. of Illinois at Urbana-Champaign (USA); Graham R. Allan, Sigma Space Corp. (USA) [10511-50]

A novel conductively-cooled, high energy, narrow linewidth, tripled-pulsed Ho:Tm:YLF laser transmitter for space-based remote sensing of carbon dioxide, Upendra N. Singh, Mulugeta Petros, Tamer F. Refaat, NASA Langley Research Ctr. (USA) [10511-51]

Robust DPSS lasers for LIDAR applications, Ryan Feeler, Christopher Briggs, Wade Collins, George J. Doster, Faming Xu, Northrop Grumman Cutting Edge Optronics (USA) [10511-52]

SESSION 11 WED 3:30 PM TO 5:50 PM

Novel Laser Concepts

Session Chair: **Dennis G. Harris**, MIT Lincoln Lab. (USA)

Progress on Raman laser for sodium resonance fluorescence lidar, Steven X. Li, Anthony Yu, Michael A. Krainak, Yingxin Bai, NASA Goddard Space Flight Ctr. (USA); Oleg A. Konoplev, Science Systems and Applications, Inc. (USA); Kenji Numata, Molly E. Fahey, Wenqian R. Huang, NASA Goddard Space Flight Ctr. (USA) [10511-53]

Thermally guided ytterbium-doped fiber-rod laser, Callum R. Smith, Thomas Jefferson-Brain, Optoelectronics Research Ctr. (United Kingdom); Nikita Simakov, Alexander V. Hemming, Defence Science and Technology Group (Australia); W. Andrew Clarkson, Optoelectronics Research Ctr. (United Kingdom) [10511-54]

LED-pumped Alexandrite laser oscillator and amplifier, Pierre Pichon, Lab. Charles Fabry, Institut d'Optique (France); Jean-Philippe Blanchot, EFFILUX (France); François Balembois, Frédéric Druon, Patrick Georges, Lab. Charles Fabry, Institut d'Optique (France) [10511-55]

High-power single-pass pumped diamond Raman oscillator, Matthias Heinzig, Till Walbaum, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Ondrej Kitzler, Richard P. Mildren, Macquarie Univ. (Australia); Thomas Schreiber, Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10511-56]

Compact bidirectional ring laser amplifier with twin pulses, Tiancheng Yu, Fan Gao, Baoxing Xiong, Xiang Zhang, Xiao Yuan, Soochow Univ. (China) [10511-57]

Cylindrical vector beams through amplifiers, Hend Sroor, Univ. of the Witwatersrand, Johannesburg (South Africa); Nyameko Lisa, Igor Litvin, Darryl Naidoo, CSIR National Laser Ctr. (South Africa); Andrew Forbes, Univ. of the Witwatersrand, Johannesburg (South Africa) [10511-58]

How to harvest efficient laser from solar light, Changming Zhao, Zhe Guan, Haiyang Zhang, Beijing Institute of Technology (China) . . [10511-59]

LASE

CONFERENCE 10511

THURSDAY 1 FEBRUARY

SESSION 12..... THU 8:00 AM TO 10:00 AM

Laser Material and Characterization

Session Chair: **Jacob I. Mackenzie**,
Univ. of Southampton (United Kingdom)

Optical spectroscopy of cobalt-doped cadmium telluride, Eric J. Turner, Air Force Research Lab. (USA) and KBRwyle (USA); Jonathan W. Evans, Air Force Research Lab. (USA); Thomas R. Harris, Air Force Research Lab. (USA) and Azimuth Corp. (USA) [10511-60]

Growth of rare-earth doped single crystal yttrium aluminum garnet fibers using laser heated pedestal growth technique, Subhabrata Bera, Craig D. Nie, James A. Harrington, Rutgers, The State Univ. of New Jersey (USA) [10511-61]

Laser performance and modeling of RE³⁺:YAG double-clad crystalline fiber waveguides, Da Li, Huai-Chuan Lee, Helmuth E. Meissner, Onyx Optics Inc. (USA) [10511-62]

Grain growth and abnormal Fe diffusion in polycrystalline ZnS at elevated temperatures and pressures, Ozarfar Gafarov, Vladimir V. Fedorov, Sergey B. Mirov, The Univ. of Alabama at Birmingham (USA) [10511-63]

Quasi-three level Nd:YLF fundamental and Raman laser operating under 872-nm and 880-nm direct diode pumping, Niklaus U. Wetter, Allan Berezcki, João P. F. Paes, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10511-64]

Laser material Nd:Lu:CaF₂ characterization for amplification application at 1053 nm, Diane Stoffel, Sébastien Montant, Jean-Paul Goossens, Commissariat à l'Énergie Atomique (France); Simone Normani, Alain Braud, Jean-Louis Doualan, Patrice Camy, Ctr. de Recherche sur les Ions, les Matériaux et la Photonique (France) and Commissariat à l'Énergie Atomique (France) [10511-65]

CONFERENCE 10512

Monday–Thursday 29–1 February 2018 • Proceedings of SPIE Vol. 10512

Fiber Lasers XV: Technology and Systems

Conference Chair: **Ingmar Hartl**, Deutsches Elektronen-Synchrotron (Germany)

Conference Co-Chair: **Adrian L. Carter**, Nufern (USA)

Program Committee: **Thomas Tangaard Alkeskjold**, NKT Photonics A/S (Denmark); **Liang Dong**, Ctr. for Optical Materials Science + Engineering Technologies (USA); **Fabio Di Teodoro**, Raytheon Co. (USA); **Mark Dubinskii**, U.S. Army Research Lab. (USA); **Clifford Headley III**, OFS Fitel LLC (USA); **Stuart D. Jackson**, Macquarie Univ. (Australia); **Cesar Jauregui-Misas**, Friedrich-Schiller-Univ. Jena (Germany); **Peter F. Moulton**, MIT Lincoln Lab. (USA); **Martin H. Muendel**, Lumentum (USA); **Craig A. Robin**, Lockheed Martin Aculight (USA); **Lawrence Shah**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **L. Brandon Shaw**, U.S. Naval Research Lab. (USA); **Wei Shi**, Tianjin Univ. (China); **Akira Shirakawa**, The Univ. of Electro-Communications (Japan); **Paul Steinvurzel**, The Aerospace Corp. (USA); **Ji Wang**, Corning Incorporated (USA); **Pu Wang**, Beijing Univ. of Technology (China); **Lihmei Yang**, Laser-Femto (USA); **Yoann Zaouter**, Amplitude Systèmes (France); **Michalis N. Zervas**, Optoelectronics Research Ctr. (United Kingdom)

Conference Cosponsors:



MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:10 AM

Mode Instabilities in High Power Fiber Lasers I

Session Chair: **Peter F. Moulton**, MIT Lincoln Lab. (USA)

Photonic Lantern kW-class amplifier (*Invited Paper*), Juan C. Montoya, MIT Lincoln Lab. (USA) [10512-1]

TMI-threshold investigations of low NA Yb-doped single mode fibers, Franz Beier, Friedrich Möller, Johannes Nold, Bettina Sattler, Stefan Kuhn, Christian Hupel, Sigrun Hein, Andreas Liem, Nicoletta Haarlammert, Thomas Schreiber, Ramona Eberhardt, Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10512-2]

Towards the control of the modal energy transfer in transverse mode instabilities, Christoph Stihler, Cesar Jauregui-Misas, Friedrich-Schiller-Univ. Jena (Germany); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10512-3]

Power scaling limits in high power fiber amplifiers due to transverse mode instability, thermal lensing, and fiber mechanical reliability, Michalis N. Zervas, Optoelectronics Research Ctr., Univ. of Southampton (United Kingdom) [10512-4]

Experimental investigation of the transverse modal instabilities onset in high power fully aperiodic-large-pitch fiber lasers, Marie-Alicia Malleville, Aurélien Benoit, Romain Dauliat, Baptiste M. Leconte, Dia Darwich, Remi Du Jeu, Raphaël Jamier, XLIM Institut de Recherche (France); Kay Schuster, Leibniz-Institut für Photonische Technologien e.V. (Germany) [10512-5]

Transverse mode instabilities in burst operation of high-power fiber laser systems, Cesar Jauregui-Misas, Christoph Stihler, Friedrich-Schiller-Univ. Jena (Germany); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10512-6]

SESSION 2 MON 10:40 AM TO 12:20 PM

Coherent Combining of Fiber Lasers

Session Chair: **Cesar Jauregui-Misas**, Friedrich-Schiller-Univ. Jena (Germany)

1.8-kW 16-channel ultrafast fiber laser system (*Invited Paper*), Michael Müller, Friedrich-Schiller-Univ. Jena (Germany); Arno Klenke, Helmholtz Institute Jena (Germany); Henning Stark, Joachim Buldt, Thomas Gottschall, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany); Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany) [10512-7]

Near-complete stored energy extraction from fiber amplifiers in ultrashort <10mJ energy pulses using coherent pulse stacking amplification (*Invited Paper*), Hanzhang Pei, John Ruppe, Siyun Chen, Morteza Sheikhsofia, John Nees, Univ. of Michigan (USA); Yawei Yang, Russell Wilcox, Wim Leemans, Lawrence Berkeley National Lab. (USA); Almantas Galvanauskas, Univ. of Michigan (USA) [10512-8]

Scalable coherent beam combination of femtosecond pulses using a diffractive optic pair, Tong Zhou, Tyler Sano, Dar Dahlen, Russell Wilcox, Lawrence Berkeley National Lab. (USA) [10512-9]

Towards coherent combination of 61-fiber amplifiers, Anke Heilmann, Ecole Polytechnique (France); Jérémy Le Dortz, Thales Research & Technology (France); Séverine Bellanger, Louis Danialt, Ihsan Fsaifes, Ecole Polytechnique (France); Marie Antier, Thales Optronique S.A.S. (France); Jérôme Bourderionnet, Christian Larat, Eric Lallier, Arnaud Brignon, Thales Research & Technology (France); Christophe Simon-Boisson, Thales Optronique S.A.S. (France); Jean-Christophe Chantelpoup, Ecole Polytechnique (France) [10512-10]

Lunch Break Mon 12:20 pm to 1:50 pm

CONFERENCE 10512

SESSION 3..... MON 1:50 PM TO 3:20 PM

kW Fiber Lasers

Session Chair: **Adrian L. Carter**, Nufern (USA)

5-kW single stage all-fiber Yb-doped single-mode fiber laser for high speed and high aspect ratio processings with Galvano scanner (*Invited Paper*), Shinya Ikoma, Keisuke Uchiyama, Yuya Takubo, Masahiro Kashiwagi, Kensuke Shima, Daiichiro Tanaka, Fujikura Ltd. (Japan)..... [10512-11]

Kilo-Watt high-power Yb fiber laser at 1117 nm, Venkatapuram Sudarshanam, Kazi S. Abedin, Jeffrey W. Nicholson, Clifford E. Headley, David J. DiGiovanni, OFS Fitel, LLC (USA)..... [10512-12]

Up to 2.5-kW on non-PM fiber and 2.0-kW linear polarized on PM fiber narrow linewidth CW diffraction-limited fiber amplifiers in all-fiber format, Nikolai Platonov, IPG Photonics Corp. (USA)..... [10512-13]

Narrowband transverse-modal-instability (TMI)-free Yb-doped fiber amplifiers for directed energy applications, Manoj Kanskar, Jim Zhang, Joona Kaponen, nLIGHT Corp. (USA); Ossi Kimmelmä, Ville Aallos, nLIGHT Corp., Lohja (Finland); I-Ning Hu, Almantas Galvanauskas, Univ. of Michigan (USA)..... [10512-14]

SESSION 4..... MON 3:50 PM TO 5:30 PM

Narrow Linewidth Fiber Lasers

Session Chair: **L. Brandon Shaw**, U.S. Naval Research Lab. (USA)

High power narrow linewidth fiber amplifier at 1018 nm, Gonzalo Palma-Vega, Till Walbaum, Matthias Heinzig, Stefan Kuhn, Christian Hupel, Gerrit Feldkamp, Thomas Schreiber, Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany)..... [10512-15]

Single-mode 220-W output power at 1018-nm ytterbium fiber laser, Fanting Kong, Guancheng Gu, Thomas W. Hawkins, Ctr. for Optical Materials Science and Engineering Technologies (USA); Maxwell Jones, Nufern (USA); Joshua Parsons, Monica T. Kalichevsky-Dong, Liang Dong, Ctr. for Optical Materials Science and Engineering Technologies (USA)..... [10512-16]

Recent progress on monolithic fiber amplifiers for next generation of gravitational wave detectors, Felix Wellmann, Phillip Booker, Sven Hochheim, Michael Steinke, Peter Wessels, Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany)..... [10512-17]

Ultra-narrow-linewidth Brillouin/erbium fiber laser, Mo Chen, Chenyu Wang, Jianfei Wang, Hong Luo, Zhou Meng, National Univ. of Defense Technology (China)..... [10512-18]

Single-frequency and single-mode fiber amplifier at 1.5- μ m core-pumped at 1018 nm, Omar de Varona Ortega, Michael Steinke, Dietmar Kracht, Jörg Neumann, Peter Wessels, Laser Zentrum Hannover e.V. (Germany)..... [10512-19]

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:00 AM TO 10:20 AM

Thulium-doped Fiber Lasers

Session Chair: **Lawrence Shah**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Thulium doped all-fiber amplifiers beyond 2.1 μ m (*Invited Paper*), Brian M. Anderson, Angel Flores, Jacob Grosek, Iyad Dajani, Air Force Research Lab. (USA)..... [10512-20]

Highly doped and highly efficient Tm doped fiber laser (*Invited Paper*), Richard Tumminelli, Vincent Petit, Adrian Carter, Coherent/Nufern (USA); Alexander Hemming, Nikita Simakov, John Haub, Defence Science and Technology Group (Australia)..... [10512-21]

Toward kW-level average power from a Thulium-doped fiber laser, Christian Gaida, Martin Gebhardt, Friedrich-Schiller-Univ. Jena (Germany); Fabian Stutzki, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Cesar Jauregui-Misas, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)..... [10512-22]

All-fiber linearly polarized high power 2- μ m single mode Tm-fiber laser for plastic processing and Ho-laser pumping applications, Karsten Scholle, Michael Schaefer, Samir Lamrini, Peter Fuhrberg, LISA Laser Products OHG (Germany); Mateusz Wysmolek, Michael Steinke, Jörg Neumann, Laser Zentrum Hannover e.V. (Germany)..... [10512-23]

Experimental investigation on varying spectral bandwidth when amplifying a pulsed superfluorescent 2- μ m source in Tm: fiber, Alex M. Sincore, Justin Cook, Joshua D. Bradford, Nathan Bodnar, Martin C. Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)..... [10512-24]

20-W 1950-nm tandem hybrid single and double clad TDFA, Clément Romano, Robert E. Tench, Jean-Marc Delavaux, Cybel LLC (USA)..... [10512-25]

SESSION 6..... TUE 10:50 AM TO 12:20 PM

Mid-IR Fiber Lasers

Session Chair: **Mark Dubinskii**, U.S. Army Research Lab. (USA)

Nanojoule 100-fs pulse at 3 μ m generated from a fully fusion-spliced fiber laser (*Invited Paper*), Sébastien Février, Hugo Delahaye, Mathieu Jossent, Geoffroy Granger, XLIM Institut de Recherche (France)..... [10512-26]

Towards diode-pumped mid-infrared praseodymium-ytterbium-doped fluoride fiber lasers, Robert I. Woodward, Stuart D. Jackson, Darren D. Hudson, Macquarie Univ. (Australia)..... [10512-27]

Q-switched dual-wavelength pumped 3.5- μ m erbium-doped mid-infrared fiber laser, Ori Henderson-Sapir, Nathaniel Bawden, The Univ. of Adelaide (Australia); Hiraku Matsukuma, Osaka Univ. (Japan); Elizaveta Klantsataya, The Univ. of Adelaide (Australia); Shigeki Tokita, Osaka Univ. (Japan)..... [10512-28]

Near infrared pumped full gain bandwidth tunable 3 micron dysprosium fiber laser, Matthew R. Majewski, Robert I. Woodward, Stuart D. Jackson, Macquarie Univ. (Australia)..... [10512-29]

Lunch/Exhibition Break..... Tue 12:20 pm to 1:50 pm

SESSION 7..... TUE 1:50 PM TO 3:20 PM

Ultrafast Fiber Lasers I

Session Chair: **Yoann Zaouter**, Amplitude Systèmes (France)

Nonlinear pulse compression stage delivering 43-W few-cycle pulses with GW peak-power at 2- μ m wavelength (*Invited Paper*), Martin Gebhardt, Christian Gaida, Fabian Stutzki, Friedrich-Schiller-Univ. Jena (Germany); Jose Enrique Antonio-Lopez, Axel Schülzgen, Rodrigo Amezcua-Correa, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany)..... [10512-30]

Temporal contrast enhancement of a femtosecond fiber CPA system by filtering of SPM broadened spectra, Joachim Buldt, Michael Müller, Friedrich-Schiller-Univ. Jena (Germany); Robert Klas, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany); Tino Eidam, Active Fiber Systems GmbH (Germany); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)..... [10512-31]

Photonic crystal fiber technology for compact fiber-delivered high-power ultrafast fiber lasers, Marco Triches, Mattia Michieletto, Mette M. Johansen, Christian Jakobsen, Anders S. Olesen, Sidsel R. Papior, Torben Kristensen, Johannes Weirich, Thomas T. Alkeskjold, NKT Photonics A/S (Denmark)..... [10512-32]

Nonlinear compression for generation of high energy ultrashort pulses using an Yb-doped large mode area tapered fiber, Vincent Roy, Louis Desbiens, Mathieu Boivin, Claude Paré, Bruno Labranche, Pierre Laperle, Yves Taillon, INO (Canada)..... [10512-33]

SESSION 8 TUE 3:50 PM TO 5:50 PM

Ultrafast Fiber Lasers II

Session Chair: **Lihmei Yang**, Laser-Femto (USA)

Generation of few cycle pulses from a bandwidth-optimized high energy Yb-doped fiber amplifier for application to XUV generation, Loïc Lavenu, Institut d'Optique Graduate School (France) and Amplitude Systèmes (France); Michele Natile, Amplitude Technologies (France) and Commissariat à l'Énergie Atomique (France); Florent Guichard, Amplitude Systèmes (France); Aura Ines Gonzalez, Amplitude Technologies (France); Yoann Zaouter, Amplitude Systèmes (France); Thierry Ruchon, CEA-IRAMIS (France); Marc Hanna, Lab. Charles Fabry (France); Eric P. Mottay, Amplitude Systèmes (France); Patrick Georges, Lab. Charles Fabry (France) . . [10512-34]

13-MW 140-fs pulses from a gain-switched diode seeded fiber amplifier, Logan Wright, Walter Fu, Frank W. Wise, Cornell Univ. (USA) [10512-35]

Compact 1 mJ fiber MOPA for space-based laser-ablation resonant ionization mass spectrometry (LARIMS), Xiaodong Mu, William R. Crain Jr., Can Q. Nguyen, Pavel Ionov, Paul Steinvurzel, Yaniv Dotan, Petras Karuza, William T. Lotshaw, Todd S. Rose, Steven M. Beck, The Aerospace Corp. (USA); Scott F. Anderson, Southwest Research Institute (USA). [10512-36]

Photonic crystal fiber technology for high-performance all-fiber monolithic ultrafast fiber amplifiers, Sidsel R. Papior, Johannes Weirich, Mette M. Johansen, Christian Jakobsen, Mattia Michieletto, Marco Trichesi, Torben Kristensen, Anders S. Olesen, Christian Petersen, Thomas V. Andersen, Martin D. Maack, Thomas T. Alkeskjold, NKT Photonics A/S (Denmark) [10512-37]

Complete characterization of ultrafast pulses of an Yb-doped fiber amplifier via dispersion scans after compression in a grism compressor, Paul Reppen, Laser Zentrum Hannover e.V. (Germany); Ayhan Tajalli, Leibniz Univ. Hannover (Germany); Dieter Wandt, Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany); Uwe Morgner, Leibniz Univ. Hannover (Germany). [10512-38]

Picosecond 1064-nm fiber laser with tunable pulse width and low timing jitter, Wenyan Tian, Q-Peak, Inc. (USA); Shukui Zhang, Thomas Jefferson National Accelerator Facility (USA) [10512-39]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Watt-level single-frequency tunable neodymium MOPA fiber laser operating at 915-937 nm, Sergio Rota-Rodrigo, Univ. Pública de Navarra (Spain); Benoît Gouhier, Lab. Photonique, Numérique et Nanosciences (France); Mathieu Laroche, Council of Scientific and Industrial Research (France) and ENSICAEN (France) and Ctr. National de la Recherche Scientifique (France); Jian Zhao, Benjamin Canuel, Andrea Bertoldi, Philippe Bouyer, Lab. Photonique, Numérique et Nanosciences (France); Nicholas Traynor, Azur Light Systems (France); Benoît Cadier, Thierry Robin, iXBlue SAS (France); Giorgio Santarelli, Lab. Photonique, Numérique et Nanosciences (France). [10512-73]

Polarization-maintaining narrow-linewidth Yb-doped fiber amplifier through PRBS phase modulation, Changsu Jun, Bong-Ahn Yu, Woojin Shin, Yeung Lak Lee, Gwangju Institute of Science and Technology (Korea, Republic of); Minwan Jung, Young Seok Yoon, Youngho Park, Hanwha Systems Co., Ltd. (Korea, Republic of) [10512-74]

Versatile monolithic 2-micron laser systems, Mateusz Wyszomolka, Michael Steinke, Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany). [10512-75]

Dual line CW fiber laser module based on FBG combination, Kazuma Dobashi, Masayuki Hoshi, Junji Hirohashi, Satoshi Makio, Oxide Corp. (Japan) [10512-76]

Dynamic behavior of pump light radiation induced photo-bleaching behavior of bac-si in bismuth/erbium co-doped optical fiber, Mingjie Ding, Yanhua Luo, Gang-Ding Peng, The Univ. of New South Wales (Australia) [10512-77]

Dispersion control of active mode locking laser cavity to improve FBG sensor interrogation, Gyeong Hun Kim, Se Jin Park, Chang Hyun Park, Chang-Seok Kim, Hwi Don Lee, Pusan National Univ. (Korea, Republic of). [10512-78]

Design of an amplifier model accounting for thermal effect in fully aperiodic large pitch fibers, Carlo Molardi, Federica Poli, Univ. degli Studi di Parma (Italy); Romain Dauliat, Univ. de Limoges (France) and Ctr. National de la Recherche Scientifique (France) and XLIM Institut de Recherche (France); Baptiste Laconte, Dia Darwich, Remi Du Jeu, Marie-Alicia Malleville, Raphaël Jamier, Univ. de Limoges (France); Katia Tragni, Annamaria Cucinotta, Stefano Selleri, Univ. degli Studi di Parma (Italy) [10512-79]

Performance and simulation of a 2-µm TDFA using a 1567-nm shared pump source, Robert E. Tench, Cybel LLC (USA); Clément Romano, Cybel LLC (USA) and Télécom ParisTech (France); Jean-Marc Delavaux, Cybel LLC (USA) [10512-80]

200-W single frequency laser based on short active double clad tapered fiber, Christophe Pierre, ALPhANOV (France); Germain Guiraud, Azur Light Systems (France); Jean-Paul Yehouessi, ALPhANOV (France); Giorgio Santarelli, Lab. Photonique, Numérique et Nanosciences (France); Johan Boulet, ALPhANOV (France); Nicholas Traynor, Azur Light Systems (France). [10512-81]

Dual-wavelength noise-like pulse generation in passively mode-locked all-fiber laser based on MMI effect, Wei Shi, Guannan Shi, Shijie Fu, Quan Sheng, Jianquan Yao, Tianjin Univ. (China) [10512-82]

Switchable and tunable dual-wavelength Er-doped fiber ring laser with single-frequency lasing wavelengths, Haiwei Zhang, Wei Shi, Xiaolei Bai, Quan Sheng, Jianquan Yao, Tianjin Univ. (China) [10512-83]

Narrow line width dual wavelength random laser, Heba A. Shawk, Hussein E. Kotb, National Telecommunication Institute (Egypt); Daa Khalil, Ain Shams Univ. (Egypt) [10512-84]

Nanosecond pulse generation from actively Q-switched thulium-doped fiber laser using a high-speed optical switch, Joonhoi Koo, Woojin Shin, Gwangju Institute of Science and Technology (Korea, Republic of) . [10512-85]

Fiber laser for application in phase sensitive optical time domain reflectometry, Vasily V. Spirin, Ctr. de Investigación Científica y de Educación Superior de Ensenada B.C. (Mexico); José Luis Bueno Escobedo, Ctr. de Investigación en Materiales Avanzados, S.C. (Mexico); Dmitry Korobko, Igor Zolotovskiy, Ulyanovsk State Univ. (Russian Federation); Cesar López-Mercado, Patrice Mégret, Andrei A. Fotiadi, Univ. de Mons (Belgium). [10512-86]

Direct amplification to millijoule level of a nanosecond passively Q-switched Yb:YAG microchip laser at 1030 nm in an Yb-doped rod-type fiber amplifier, Loïc Deyra, ALPhANOV (France); Marie-Alicia Malleville, XLIM Institut de Recherche (France) and Eolite Systems (France); William Renard, Eolite Lasers (France); Paul-Henri Ploger, Horus Laser S.A.S. (France); Johan Boulet, ALPhANOV (France) [10512-87]

Influence of seed power and gain fiber temperature on output linewidth in single -frequency Er³⁺/Yb³⁺ co-doped fiber amplifier, Wei Shi, Xiaolei Bai, Haiwei Zhang, Shijie Fu, Quan Sheng, Jianquan Yao, Tianjin Univ. (China) [10512-88]

Theoretical study of Raman fiber laser and random fiber laser, Wei Shi, Zhaoxin Xie, Shijie Fu, Quan Sheng, Jianquan Yao, Tianjin Univ. (China) [10512-89]

800-W 30m-J monolithic nanosecond pulsed fiber laser based on incoherent beam combination, Wei Shi, Tianjin Univ. (China); Qiang Fang, Liang Qi, Xiangjie Meng, Haixin Xu, HFB Photonics, Inc. (China) . . . [10512-90]

Understanding complexity in the mode-locked fiber lasers, Huai Wei, Beijing Jiaotong Univ. (China); Bin Li, Communication Univ. of China (China); Wei Shi, Tianjin Univ. (China); Xiushan Zhu, College of Optical Sciences, The Univ. of Arizona (USA) and NP Photonics (USA); Robert A. Norwood, College of Optical Sciences, The Univ. of Arizona (USA); Nasser N. Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA) and NP Photonics (USA) [10512-91]

Fiber laser platform for highest flexibility and reliability in industrial femtosecond micromachining: TruMicro Series 2000, Florian Kanal, Max Kahmann, TRUMPF Laser- und Systemtechnik GmbH (Germany); Chuong Tan, Holger Diekamp, Florian Jansen, Raphael Scelle, Aleksander Budnicki, Dirk Sutter, TRUMPF Laser GmbH (Germany) [10512-92]

2-KW class monolithic high power fiber laser combined with oscillator and amplifier, Qiang Shu, Chao Guo, Chengyu Li, Yu Liu, Pengfei Zhao, Xuan Tang, Honghuan Lin, Jianjun Wang, Feng Jing, Research Ctr. of Laser Fusion, China Academy of Engineering Physics (China) [10512-93]

High-power femtosecond pulse propagation in a tapered large-mode-area optical fiber, Alexey A. Sysoliatin, A. M. Prokhorov General Physics Institute of the Russian Academy of Sciences (Russian Federation); Gyanendra Kumar, Mohd Rehan, Vipul Rastogi, Indian Institute of Technology Roorkee (India) [10512-94]

LASE

CONFERENCE 10512

Thulium doped fiber laser with controlled spectral performance, Jan Tarka, Grzegorz Soboń, Jaroslaw Z. Sotor, Wroclaw Univ. of Science and Technology (Poland) [10512-95]

Pump absorption in coiled and twisted double-clad hexagonal fiber: Effect of launching conditions and core location, Romain Dalidet, Institut Non Linéaire de Nice Sophia Antipolis (France); Pavel Peterka, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); Valérie Doya, Univ. Côte d'Azur (France); Jan Aubrecht, Pavel Koška, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic) [10512-96]

High power narrow bandwidth fiber amplifier with a FBG-based seed, Jiping Hao, Nianjiang Chen, Hong Zhao, Dongsheng Jiang, North China Research Institute of Electro-optics (China) [10512-97]

Novel multi-wavelength fiber laser and architecture, Jeffrey J. Perkins, Logan Chieffo, Kevin Wall, Michael Rayno, Q-Peak, Inc. (USA) [10512-98]

In-fiber modal interferometer based on multimode and double cladding fiber segments for tunable fiber laser applications, Patricia Prieto-Cortés, Univ. Autónoma de Nuevo León (Mexico); Ricardo I. Álvarez-Tamayo, Consejo Nacional de Ciencia y Tecnología (Mexico) and Univ. Autónoma de Nuevo León (Mexico); Manuel Durán-Sánchez, Consejo Nacional de Ciencia y Tecnología (Mexico) and Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Arturo A. Castillo-Guzmán, Guillermo Salceda-Delgado, Univ. Autónoma de Nuevo León (Mexico); Baldemar Ibarra-Escamilla, Evgeny A. Kuzin, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Antonio Barcelata-Pinzón, Univ. Tecnológica de Puebla (Mexico); Romeo Selvas-Aguilar, Univ. Autónoma de Nuevo León (Mexico) [10512-99]

1-kW monolithic narrow linewidth linear-polarized fiber laser at 1030 nm, Qiang Fang, Yang Xu, Xuelong Cui, Bowen Hou, HFB Photonics, Inc. (China); Wei Shi, Tianjin Univ. (China) [10512-100]

All-fiber passively Q-switched thulium-doped fiber laser based on a holmium-doped fiber saturable absorber, Manuel Durán-Sánchez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Ricardo I. Álvarez-Tamayo, Univ. Autónoma de Nuevo León (Mexico); Berenice Posada-Ramírez, Jared Alaniz-Baylón, Edgar Bravo-Huerta, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Hector Santiago-Hernández, Marco V. Hernández-Arriaga, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Miguel Bello-Jiménez, Instituto de Investigación en Comunicación Óptica (Mexico); Baldemar Ibarra-Escamilla, Evgeny A. Kuzin, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . [10512-101]

All-polarization maintaining erbium fiber laser based on carbon nanowalls saturable absorber, Shintaro Kurata, IHI Corp. (Japan) [10512-102]

Serviceable launch elements for high power fiber laser arrays, Donald Sipes Jr., Jason D. Tafoya, Daniel S. Schulz, Optical Engines, Inc. (USA) [10512-103]

Leaky channelfiber design for large mode area high power application at 1 micron, Chang Hyun Jung, HyungSu Cho, Long Cui, Taihan Fiberoptics Co., Ltd. (Korea, Republic of); Nandam Ashok, WooJin Shin, Gwangju Institute of Science and Technology (Korea, Republic of); ChiHwan Ouh, Taihan Fiberoptics Co., Ltd. (Korea, Republic of) [10512-104]

Experimental investigation of the onset of modulation instability as a precursor for the stimulated Brillouin scattering in Yb-doped fiber amplifiers, Yusuf Panbiharwala Jr., Aditi Ghosh, Indian Institute of Technology Madras (India); Johan Nilsson, Optoelectronics Research Ctr., Univ. of Southampton (United Kingdom); Deepa Venkitesh, Balaji Srinivasan, Indian Institute of Technology Madras (India) [10512-105]

Experimental study on initial conditions for multi-pulse generation in a full polarization-controlled passively mode-locked Er-fiber laser, Hector Santiago-Hernández, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Yazmin Bracamontes-Rodríguez, Centro de Investigaciones en Óptica, A.C. (Mexico); Baldemar Ibarra-Escamilla, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Manuel Durán-Sánchez, Consejo Nacional de Ciencia y Tecnología (Mexico); Georgina Beltrán-Pérez, Benemérita Univ. Autónoma de Puebla (Mexico); Olivier J. M. Pottiez, Centro de Investigaciones en Óptica, A.C. (Mexico); Iván Armas-Rivera, Benemérita Univ. Autónoma de Puebla (Mexico); Luis Alberto L. A. Rodríguez-Morales, Marco V. Hernández-Arriaga, Evgeny A. Kuzin, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) [10512-106]

WEDNESDAY 31 JANUARY

SESSION 9 WED 8:00 AM TO 9:50 AM

Pulsed Fiber Lasers

Session Chair: **Stuart D. Jackson**, Macquarie Univ. (Australia)

Pulsed fibre laser with spatial and temporal control (*Invited Paper*), Paulo J. Almeida, SPI Lasers UK Ltd. (United Kingdom); Philip M. Gorman, QinetiQ Ltd. (United Kingdom); Jaclyn S. Chan, Natasha T. Vukovic, Optoelectronics Research Ctr., Univ. of Southampton (United Kingdom); Christophe A. Codemard, SPI Lasers UK Ltd. (United Kingdom); Michalis N. Zervas, Optoelectronics Research Ctr., Univ. of Southampton (United Kingdom) [10512-40]

Cladding-pumped 70-kW-peak-power 2-ns-pulse Er-doped fiber amplifier, Maxim M. Khudyakov, Moscow Institute of Physics and Technology (Russian Federation) and Fiber Optics Research Ctr., Russian Academy of Sciences (Russian Federation); Mikhail M. Bubnov, Andrey K. Senatorov, Fiber Optics Research Ctr. of the Russian Academy of Sciences (Russian Federation); Denis S. Lipatov, Institute of Chemistry of High-Purity Substances of the Russian Academy of Sciences (Russian Federation); Andrey A. Rybaltovsky, Oleg V. Butov, Kotel'nikov Institute of Radio Engineering and Electronics of Russian Academy of Sciences (Russian Federation); Mikhail E. Likhachev, Fiber Optics Research Ctr. of the Russian Academy of Sciences (Russian Federation) [10512-41]

Fully integrated Q-switch for commercial high-power resonator with solitary XLMA-fiber, Robert Lange, Charley Bachert, Georg Rehm, Holger Weber, Rouven Luxen, Harry Enns, Matthias Schenk, Stefan Hosdorf, Sören Marfels, Michael Bay, Arnd Kösters, Volker Krause, Laserline GmbH (Germany); Oliver Fitzau, Martin Giesberts, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) [10512-42]

Directly q-switched high power resonator based on XLMA-fibers, Martin Giesberts, Oliver Fitzau, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany); Robert Lange, Charley Bachert, Volker Krause, Laserline GmbH (Germany) [10512-43]

High-energy 100-ns single-frequency all-fiber laser at 1064 nm, Wei Shi, Shijie Fu, Zhao Tang, Chaodu Shi, Xiaolei Bai, Quan Sheng, Tianjin Univ. (China); Arturo Chavez-Pirson, Univ. of Arizona (USA); Nasser N. Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA); Jianquan Yao, Tianjin Univ. (China) [10512-44]

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and **Reinhart Poprawe**, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)]
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 2:00 pm

SESSION 10..... WED 2:00 PM TO 3:20 PM

Mode-locked Fiber Oscillators

Session Chair: **Ingmar Hartl**,
Deutsches Elektronen-Synchrotron (Germany)

Stretched-pulse Ho-doped fiber laser mode-locked by graphene based saturable absorber, Maria Pawliszewska, Wroclaw Univ. of Science and Technology (Poland); Iwona Pasternak, Aleksandra Przewloka, Institute of Electronic Materials Technology (Poland); Jaroslaw Z. Sotor, Wroclaw Univ. of Science and Technology (Poland) [10512-45]

Mamyshev fiber oscillators: environmental stability and record performance, Zhanwei Liu, Pavel Sidorenko, Zachary M. Ziegler, Logan Wright, Frank W. Wise, Cornell Univ. (USA) [10512-46]

Self-optimizing additive pulse mode-locked fiber laser: Wavelength tuning and selective operation in continuous-wave or mode-locked regime, Manuel Ryser, Christoph Bacher, Christoph Lätt, Alexander Heidt, Philippe Raisin, Thomas Feurer, Valerio Romano, Univ. Bern (Switzerland) [10512-47]

Indirect active mode locking wavelength tunable laser based on cross gain modulation, Se Jin Park, Gyeong Hun Kim, Chang-Seok Kim, Pusan National Univ. (Korea, Republic of) [10512-48]

SESSION 11..... WED 3:50 PM TO 5:30 PM

High-power Fiber Lasers

Session Chair: **Akira Shirakawa**,
The Univ. of Electro-Communications (Japan)

Cladding pumped Yb-doped HOM power amplifier with high gain, Kazi S. Abedin, Raja Ahmad, Anthony M. DeSantolo, Jeffrey W. Nicholson, Paul S. Westbrook, Clifford E. Headley, David J. DiGiovanni, OFS Fitel, LLC (USA) [10512-49]

Explanation of stimulated Raman scattering in high power fiber systems, Victor Bock, Andreas Liem, Thomas Schreiber, Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10512-50]

Demonstration of passively cooled high-power Yb fiber amplifier, Joshua D. Bradford, Justin Cook, Lawrence Shah, Martin C. Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) [10512-51]

Laser beam quality improvement of REPUSIL-based rod amplifier with local short adiabatic taper, Yuan Zhu, Leibniz-Institut für Photonische Technologien e.V. (Germany) [10512-52]

Mitigation of stimulated Raman scattering in high power fiber lasers using transmission gratings, Maximilian Heck, Ria G. Krämer, Daniel Richter, Thorsten A. Goebel, Christian Matzdorf, Friedrich-Schiller-Univ. Jena (Germany); Victor Bock, Andreas Liem, Thomas Schreiber, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10512-53]

THURSDAY 1 FEBRUARY

SESSION 12..... THU 8:00 AM TO 10:00 AM

Novel Techniques in Fiber Lasers

Session Chair: **Michalis N. Zervas**,
Optoelectronics Research Ctr. (United Kingdom)

Solar-pumped fiber laser with transverse-excitation geometry, Taizo Masuda, Toyota Motor Corp. (Japan); Mitsuhiro Iyoda, Yuta Yasumatus, Masamori Endo, Tokai Univ. (Japan) [10512-54]

Self-annealed femtosecond written fiber Bragg gratings in ytterbium doped fibers for high power lasers withstanding up to 2-kW laser output power, Ria G. Krämer, Friedrich-Schiller-Univ. Jena (Germany); Victor Bock, Andreas Liem, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Wilko Middents, Christian Matzdorf, Maximilian Heck, Thorsten A. Goebel, Daniel Richter, Friedrich-Schiller-Univ. Jena (Germany); Thomas Schreiber, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10512-55]

Self-injection linear polarization locking of a fiber laser, Christoph Bacher, Alexander Heidt, Univ. Bern (Switzerland); Valerio Romano, Univ. Bern (Switzerland) and Berner Fachhochschule Technik und Informatik (Switzerland); Manuel Ryser, Univ. Bern (Switzerland) [10512-56]

Vernier effect-based multiplication of the Sagnac beating frequency in RLG, George A. Adib, Yasser M. Sabry, Daa Khalil, Ain Shams Univ. (Egypt) [10512-57]

Novel techniques for stabilizing fiber laser frequency combs, Kutan Gürel, Valentin J. Wittwer, Sargis Hakobyan, Nayara Jornod, Stéphane Schilt, Thomas Südmeyer, Univ. de Neuchâtel (Switzerland) [10512-58]

Toward power scaling in an acetylene mid-infrared hollow-core optical fiber gas laser: effects of pressure, fiber length, and pump power, H. W. Kushan Weerasinghe, Neda Dadashzadeh, Manasadevi P. Thirugnanasambandam, Kansas State Univ. (USA); Benoît Debord, Matthieu Chafer, Frédéric Gérôme, Fetah Benabid, XLIM Institut de Recherche (France); Kristan L. Corwin, Brian R. Washburn, Kansas State Univ. (USA) [10512-59]

SESSION 13..... THU 10:30 AM TO 12:10 PM

Novel Fiber Designs and their Applications

Session Chair: **Liang Dong**,
Ctr. for Optical Materials Science and Engineering Technologies (USA)

10-W single-mode Nd³⁺ fiber laser at 1428 nm, Victor Khitrov, Jay W. Dawson, Leily S. Kiani, Paul H. Pax, Derrek R. Drachenberg, Michael J. Messerly, Robert P. Crist, Nick Schenkel, Matt Cook, Lawrence Livermore National Lab. (USA) [10512-60]

Polarization-maintaining performance of large effective area, higher order modes fiber in a coiled configuration, Raja Ahmad, Jeffrey W. Nicholson, Kazi S. Abedin, Paul S. Westbrook, Clifford E. Headley, Patrick W. Wisk, Eric M. Monberg, Man F. Yan, David J. DiGiovanni, OFS Fitel, LLC (USA) [10512-61]

Monolithic diffraction-limited 976-nm laser based on saddle-shaped photodarkening-free Yb-doped fiber, Svetlana S. Aleshkina, Fiber Optics Research Ctr. of the Russian Academy of Sciences (Russian Federation); Denis S. Lipatov, Institute of Chemistry of High-Purity Substances of the Russian Academy of Sciences (Russian Federation); Andrei E. Levchenko, Oleg I. Medvedkov, Konstantin K. Bobkov, Mikhail M. Bubnov, Fiber Optics Research Ctr. of the Russian Academy of Sciences (Russian Federation); Alexei N. Gur'yanov, Institute of Chemistry of High-Purity Substances of the Russian Academy of Sciences (Russian Federation); Mikhail E. Likhachev, Fiber Optics Research Ctr. of the Russian Academy of Sciences (Russian Federation) [10512-62]

Theoretical and experimental study of bent fully aperiodic large-pitch fibers for enhancing the high-order modes delocalization, Remi Du Jeu, Romain Dauliat, Dia Darwich, Aurélien Benoît, Baptiste M. Leconte, Marie-Alicia Malleville, Raphaël Jamier, XLIM Institut de Recherche (France); Kay Schuster, Leibniz-Institut für Photonische Technologien e.V. (Germany); Philippe Roy, XLIM Institut de Recherche (France) [10512-63]

Ultra-large mode area single frequency anisotropic MOPA with double clad Yb-doped tapered fiber, Valery Filippov, Andrei Fedotov, Ampliconix Oy (Finland); Regina Gumenyuk, Tampere Univ. of Technology (Finland); Oleg V. Butov, Yuri Chamorovskii, Konstantin Golant, Kotel'nikov Institute of Radio Engineering and Electronics of Russian Academy of Sciences (Russian Federation); Maxim Odnoblyudov, Saint-Petersburg State Polytechnical Univ. (Russian Federation); Teppo Noronen, Ampliconix Oy (Finland) [10512-64]

Lunch/Exhibition Break Thu 12:10 pm to 1:40 pm

CONFERENCE 10512

SESSION 14 **THU 1:40 PM TO 3:00 PM**

Raman and Nonlinear Fiber Lasers

Session Chair: **Clifford E. Headley III**, OFS Fitel, LLC (USA)

Raman based power combining and wavelength conversion of high power ytterbium fiber lasers, Santosh Aparanji, V. Balaswamy, S. Arun, V.R. Supradeepa, Indian Institute of Science (India). [10512-65]

Diode-pumped all-fiber Raman lasers with high beam quality, Sergey A. Babin, Ekaterina A. Zlobina, Sergey I. Kablukov, Alexey A. Wolf, Ilya N. Nemov, Alexandr V. Dostovalov, Institute of Automation and Electrometry (Russian Federation); Valentin A. Tyrtshnyy, Daniil V. Myasnikov, IRE-Polus Co. (Russian Federation). [10512-66]

Simple modules for high efficiency conversion of standard ytterbium doped fiber lasers into octave spanning continuous-wave supercontinuum sources, Arun S., Vishal Choudhury, V. Balaswamy, V.R. Supradeepa, Indian Institute of Science (India). [10512-67]

High average power pulsed multi-mode Raman fiber laser in Graded index fiber, Patrick Roumayah, Joshua D. Bradford, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Lawrence Shah, Luminar Technologies, Inc. (USA); Martin C. Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA). [10512-68]

SESSION 15 **THU 3:30 PM TO 4:50 PM**

Mode Instabilities in High Power Fiber Lasers II

Session Chair: **Thomas Tanggaard Alkeskjold**, NKT Photonics A/S (Denmark)

Effects of perturbation relative phase on transverse mode instability gain, Michalis N. Zervas, Optoelectronics Research Ctr., Univ. of Southampton (United Kingdom) [10512-69]

Three fiber designs for mitigating thermal mode instability in high power fiber amplifiers, Jordan P. Leidner, John R. Marciante, The Institute of Optics, Univ. of Rochester (USA). [10512-70]

Finite element BPM fiber modal instability modeling, Benjamin G. Ward, U.S. Air Force Academy (USA). [10512-71]

Laser linewidth dependence to the transverse mode instability (TMI) nonlinear gain in kW-class fiber amplifiers, Marc D. Mermelstein, MDM Optics, LLC (USA). [10512-72]

BEST STUDENT PAPER AWARD CEREMONY . . . 4:50 PM TO 5:00 PM

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CONFERENCE 10513

Tuesday–Thursday 30–1 February 2018 • Proceedings of SPIE Vol. 10513

Components and Packaging for Laser Systems IV

Conference Chairs: **Alexei L. Glebov**, OptiGrate Corp. (USA); **Paul O. Leisher**, Lawrence Livermore National Lab. (USA)

Program Committee: **Igor Anisimov**, Air Force Research Lab. (USA); **Jens Biesenbach**, DILAS Diodenlaser GmbH (Germany); **Gunnar Böttger**, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Kristian J. Buchwald**, Ibsen Photonics A/S (Denmark); **Joseph L. Dallas**, Avo Photonics, Inc. (USA); **Allen M. Earmann**, SA Photonics (USA); **Martin Forrer**, FISBA AG (Switzerland); **Manoj Kanskar**, nLIGHT Corp. (USA); **Alexander V. Laskin**, AdlOptica Optical Systems GmbH (Germany); **Xingsheng Liu**, Xi'an Institute of Optics and Precision Mechanics (China); **Christian V. Poulsen**, NKT Photonics Inc. (USA); **Mark A. Stephen**, NASA Goddard Space Flight Ctr. (USA); **Takunori Taira**, Institute for Molecular Science (Japan); **Torsten Vahrenkamp**, ficonTEC Service GmbH (Germany); **Alexander Yusim**, IPG Photonics Corp. (USA); **Chung-En Zah**, Focuslight Technologies, Inc. (China); **Arnaud Zoubir**, ALPhANOV (France)

TUESDAY 30 JANUARY

SESSION 1 TUE 1:15 PM TO 3:00 PM

Pulsed Laser Components and Packaging

Session Chair: **Alexander Yusim**, IPG Photonics Corp. (USA)

Pulse compression gratings for high average power petawatt-class lasers (*Invited Paper*), David A. Alessi, Hoang T. Nguyen, Jerald Britten, Emily Sistrunk, Michael Aasen, Paul Rosso, Thomas Spinka, Lawrence Livermore National Lab. (USA) [10513-1]

Laser system modeling with fast physical optics, Frank Wyrowski, Site Zhang, Friedrich-Schiller-Univ. Jena (Germany); Christian Hellmann, Wyrowski Photonics UG (Germany) [10513-2]

Inhibited-coupling HC-PCF based beam-delivery-system for high power green industrial lasers, Matthieu Chafer, Fetah Benabid, Alexandre Gorse, Benoit Beaudou, Quentin Lekiefs, GLOphotonics (France); Benoit Debord, Frédéric Gérôme, XLIM Institut de Recherche (France) [10513-3]

2- μ m wavelength-range low-loss inhibited-coupling hollow core-PCF, Martin Maurel, Matthieu Chafer, Frédéric Delahaye, Foued Amrani, XLIM Institut de Recherche (France); Benoit Debord, Frédéric Gérôme, Fetah Benabid, XLIM Institut de Recherche (France) and GLOphotonics (France) [10513-4]

Pushing the boundaries of high power lasers: Low loss, large area CVD diamond, Benjamin J. Wickham, Richard S. Balmer, Andrew M. Bennett, Stefan Olsson Robbie, Frank Schoofs, Element Six Ltd. (United Kingdom) [10513-5]

SESSION 2 TUE 3:30 PM TO 5:15 PM

Advanced Laser Packaging Solutions

Session Chair: **Christian V. Poulsen**, NKT Photonics A/S (Denmark)

Engineering and characterization of nonclassical sources of light (*Invited Paper*), Sergey V. Polyakov, National Institute of Standards and Technology (USA) [10513-6]

Fiber-based laser MOPA transmitter packaging for space environment, Mark Stephen, Anthony W. Yu, NASA Goddard Space Flight Ctr. (USA); Jeffrey W. Nicholson, OFS Fitel, LLC (USA); Anand Hariharan, OFS (USA) [10513-7]

Intensity noise properties of compact laser device based on miniaturized MOPA system for spectroscopic applications, Stefan Baumgärtner, Sven Juhl, Dmitrijs Opalevs, TOPTICA Photonics AG (Germany); Alexander Sahn, Julian Hofmann, Ferdinand-Braun-Institut (Germany); Patrick Leisching, TOPTICA Photonics AG (Germany); Katrin Paschke, Ferdinand-Braun-Institut (Germany) [10513-8]

Opto-electronic packaging of fiber-coupled systems, Sven Mahnkopf, Tom Haslett, Apurva Jain, Avo Photonics, Inc. (USA) [10513-9]

Robust adhesive precision bonding of laser optics III, Tobias Müller, Fraunhofer-Institut für Produktionstechnologie IPT (Germany) [10513-10]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Multiple wavelength diode laser bar stack for solid state laser pumping without temperature control, Dong Hou, Focuslight Technologies, Inc. (China) [10513-47]

Reliability analysis of laser-induced damage test data using Weibull statistics, Nathan Carlie, Chris Cook, Joel Bagwell, Edmund Optics Inc. (USA) [10513-48]

Integrated IoT technology in industrial lasers for the improved user experience, Jianwu Ding, Jinhui Liu, GW Laser Technology LLC (China) [10513-49]

Predicting fiber refractive index from a measured preform index profile, Pauli Kiiveri, Joonas J. Koponen, Juha Harra, Steffen Novotny, Hannu Husu, Heikki Ihalainen, Teemu Kokki, Ville Aallos, Ossi Kimmelma, Jijo Paul, nLIGHT Corp., Lohja (Finland) [10513-50]

New approach for high strength, low loss splicing between silica and ZBLAN fibers, Robin Carbonnier, AFL (USA) [10513-51]

Mid-infrared performance of single mode chalcogenide fibers, Justin Cook, Alex Sincore, Felix Tan, Ahmed El Halawany, Anthony Riggins, Lawrence Shah, Ayman Abouraddy, Martin C. Richardson, Kenneth L. Schepler, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) [10513-52]

Measurement methods to build up the digital optical twin, Marcell Prochnau, Martin Holters, RWTH Aachen Univ. (Germany); Jochen Stollenwerk, Peter Loosen, RWTH Aachen Univ. (Germany) and Fraunhofer-Institut für Lasertechnik (Germany) [10513-53]

Exploring the effect of nested capillaries on core-cladding mode resonances in hollow-core anti-resonant fibers, Laurent Provino, Thierry Taunay, Photonics Bretagne (France) [10513-54]

Trapezoidal diffraction grating beam splitters in single crystal diamond, Marcell Kiss, Teodoro Graziosi, Niels Quack, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10513-55]

Optimized birefringent filter design for multi-wavelength operation of Yb-ion lasers, Md. Anisur Rahman Reza, Christopher Dyck, Sujith Manjooran, Univ. of Manitoba (Canada); Pavel Loiko, ITMO Univ. (Russian Federation); Arkady Major, Univ. of Manitoba (Canada) [10513-56]

The research on the design and performance of 7x1 pump combiners, Wei Shi, Yang Cao, Shijie Fu, Quan Sheng, Xiaolei Bai, Haiwei Zhang, Jianquan Yao, Tianjin Univ. (China) [10513-57]

Fabrication of longitudinally arbitrary shaped fiber tapers, Johannes Nold, Marco Plötner, Steffen Böhme, Bettina Sattler, Oliver de Vries, Thomas Schreiber, Ramona Eberhardt, Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10513-58]

Spectrally resolved broadband frequency response characterization of photodetectors using continuous-wave supercontinuum sources, Vishal Choudhury, K.P. Nagarjun, Roopa Prakash, V.R. Supradeepa, Indian Institute of Science (India) [10513-59]



CONFERENCE 10513

Fabrication of versatile cladding light strippers and fiber end-caps with CO₂ laser radiation, Michael Steinke, Thomas Theeg, Mateusz Wyszomolka, Christoph Ottenhues, Tony Pulzer, Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) [10513-60]

All fiber cladding mode stripper with uniform heat distribution and high cladding light loss manufactured by CO₂ laser ablation, Mohamed Amine Jebali, AFL (USA) [10513-61]

Study on the near-field non-linearity (SMILE) in high power diode laser array, Hongyou Zhang, Focuslight Technologies, Inc. (China) [10513-62]

Aperiodic photonic crystal spatial filters, Darius Gailevicius, Vytautas Purlys, Martynas Peckus, Roaldas Gadonas, Vilnius Univ. (Lithuania); Kestutis Staliunas, Univ. Politècnica de Catalunya (Spain) and Institució Catalana de Recerca i Estudis Avançats (Spain) [10513-63]

WEDNESDAY 31 JANUARY

SESSION 3 WED 8:05 AM TO 9:50 AM

Laser Optics and Optical Assembly

Session Chair: **Martin Forrer**, FISBA AG (Switzerland)

Micro optical components: Key factor for demanding applications (*Invited Paper*), Stefan Hambücker, INGENERIC GmbH (Germany) . . [10513-11]

Modular platform for optics assembly: High-precision dispensing, Sebastian Haag, Tobias Müller, Andreas Beleke, AIXEMTEC GmbH (Germany) [10513-12]

High precision and fully automated assembly of a miniaturized VCSEL-based structured light unit, Simon Kibben, Andreas Hopfmüller, Moritz Seyfried, Torsten Vahrenkamp, ficonTEC Service GmbH (Germany) [10513-13]

Beam shaping optics to enhance performance of interferometry techniques in grating manufacture, Alexander V. Laskin, AdlOptica Optical Systems GmbH (Germany) [10513-14]

Compact DFB laser modules with integrated isolator at 935 nm, Matthias Reggentin, Hendrick Thiem, Georgios Tsianos, Mirosława Malach, Jens Hofmann, Michael Kneier, Lutz Richter, eagleyard Photonics GmbH (Germany) [10513-15]

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and **Reinhart Poprawe**, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition. Wed 12:30 pm to 1:45 pm

SESSION 4 WED 1:45 PM TO 3:30 PM

Laser Diode Packaging I

Session Chair: **Paul O. Leisher**, Lawrence Livermore National Lab. (USA)

Fully utilizing high power diode lasers by synergizing diode laser light source and beam shaping micro-optics (*Invited Paper*), Yingmin Fan, Chung-En Zah, Jingwei Wang, Lei Cai, Focuslight Technologies, Inc. (China); Thomas Mitra, Dirk Hauschild, LIMO Lissotschenko Mikroskopie GmbH (Germany); Xingsheng Liu, Focuslight Technologies, Inc. (China) . . [10513-16]

Modular high power diode lasers with flexible 3D multiplexing arrangement optimized for automated manufacturing, Tobias P. Könnig, DILAS Diodenlaser GmbH (Germany) [10513-17]

New generation of tunable narrowband laser diode systems for SEOP and DPAL, Aleksandr I. Ryasnyanskiy, Lawrence Chase, Oleksiy Mokhun, Vadim Smirnov, Alexei L. Glebov, OptiGrate Corp. (USA) [10513-18]

Scalable pump beam arrangement for diode pumped alkali laser, Masamori Endo, Tokai Univ. (Japan); Ryuji Nagaoka, Hiroki Nagaoka, Toru Nagai, Fumio Wani, Kawasaki Heavy Industries, Ltd. (Japan) . . [10513-19]

Alkali-resistant window materials for use in diode pumped alkali laser systems, Aaron Fletcher, David B. Turner, Steven B. Fairchild, Air Force Research Lab. (USA); Christopher A. Rice, Air Force Institute of Technology (USA) [10513-20]

SESSION 5 WED 4:00 PM TO 6:00 PM

Laser Diode Packaging II

Session Chair: **Alexei L. Glebov**, OptiGrate Corp. (USA)

Novel packaging for CW and QCW diode laser modules for operation with high power and duty cycles, Wilhelm Fassbender, Jens Lotz, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany) [10513-21]

Reliable operation of high power diode pumps in laser systems with back-irradiance, Matthew C. Boisselle, David L. Pope, Mike Runkel, Lawrence Livermore National Lab. (USA); Chen Li, Kevin P. Pipe, Univ. of Michigan (USA); Robert Walker, Devin Crawford, Jason Helmrich, Prabhu Thiagarajan, Lasertel, Inc. (USA); Robert J. Deri, Paul O. Leisher, Lawrence Livermore National Lab. (USA) [10513-22]

High temperature semiconductor diode laser pumps for high energy laser applications, Jenna Campbell, Freedom Photonics, LLC (USA); Tadej Semenic, Teledyne Scientific Co. (USA); Keith Guinn, Paul O. Leisher, Freedom Photonics, LLC (USA); Avijit Bhunia, Teledyne Scientific Co. (USA); Milan Mashanovitch, Daniel Renner, Freedom Photonics, LLC (USA) [10513-23]

Impact of absorption in fast axis collimation lenses, Pascal Wuest, Reinhard Sperger, Andreas Kunz, Martin Forrer, FISBA AG (Switzerland) [10513-24]

High power vertical stacked and horizontal arrayed diode laser bar development based on insulation micro-channel cooling (IMCC) and hard solder bonding technology, Boxue Wang, Haoyu Zhang, Yangtao Jia, Weifeng Wang, Shiyin Jia, Focuslight Technologies, Inc. (China) . . [10513-25]

Curing-in-the-loop strategy for multidimensional-shrinkage compensation in active alignment FAC assembly, Daniel Zontar, Tobias Müller, Sebastian Sauer, Christoph Baum, Christian Brecher, Fraunhofer-Institut für Produktionstechnologie IPT (Germany) [10513-26]

THURSDAY 1 FEBRUARY

SESSION 6 THU 8:15 AM TO 10:00 AM

High Power/Energy Laser Components and Packaging I

Session Chair: **Manoj Kanskar**, nLIGHT Corp. (USA)

Next-generation industrial fiber lasers enabled by high-performance components (*Invited Paper*), Dahv A. Kliner, nLIGHT Corp. (USA) . . [10513-27]

A low cost hermetic packaging for high power industry fiber lasers, Jianwu Ding, Jinhui Liu, GW Laser Technology LLC (China) [10513-28]

Measurement and removal of cladding light in high power fiber systems, Till Walbaum, Andreas Liem, Thomas Schreiber, Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) [10513-29]

Un-cooled pump combiners for fiber laser and amplifier systems, Lalitkumar Bansal, Robert Sienkowski, Christopher Neale, Joel D. Mann, Clifford E. Headley, OFS Fitel, LLC (USA) [10513-30]

Optical limiters with enhanced dynamic range, Rodion Kononchuk, The Univ. of Texas at San Antonio (USA); Nicholaos Limberopoulos, Igor Anisimov, Ilya Vitebskiy, Air Force Research Lab. (USA); Andrey Chabanov, The Univ. of Texas at San Antonio (USA) [10513-31]

SESSION 7 THU 10:30 AM TO 12:15 PM

High Power/Energy Laser Components and Packaging II

Session Chair: **Joseph L. Dallas**, Avo Photonics, Inc. (USA)

ICESat-2 laser amplifier Nd:YVO₄ crystal mounting design, analysis and test (*Invited Paper*), Nicholas Sawruk, Patrick M. Burns, Ryan E. Edwards, Viatcheslav Litvinovitch, Nigel Martin, Greg Witt, Elias Fakhoury, John Iskander, Mark S. Pronko, Fibertek, Inc. (USA); Elisavet Troupaki, Michael Bay, Charles C. He, Liqin L. Wang, John F. Cavanaugh, NASA Goddard Space Flight Ctr. (USA); Jonathan A. Salem, NASA Glenn Research Ctr. (USA); Babak Farrokhi, NASA Goddard Space Flight Ctr. (USA) . [10513-32]

New method approach to estimate the thermal volume flow deposited within the crystal over laser pumping, Alexandre Godin, ALPhANOV (France); Abdelhak Saci, Amplitude Systèmes (France); Loïc Deyra, ALPhANOV (France); Antoine Courjaud, Amplitude Systèmes (France); Johan Bouillet, ALPhANOV (France); Bastien Gavory, Amplitude Systèmes (France) [10513-33]

Two-step recording of visible holographic elements in photo-thermo-refractive glass, Fedor M. Kompan, Ivan Divliansky, Univ. of Central Florida (USA); Vadim Smirnov, OptiGrate Corp. (USA); Leonid B. Glebov, Univ. of Central Florida (USA) and OptiGrate Corp. (USA) [10513-34]

Band-stop angular filtering with hump volume Bragg gratings in photothermorefractive glass, Xin Wang, Fan Gao, Baoxing Xiong, Xiang Zhang, Xiao Yuan, Soochow Univ. (China) [10513-35]

Continuous and pulsed laser high power beam combiner for additive manufacturing applications, Marta Bassignana, Alessio Califano, Francesco Pescarmona, Andrea Braglia, OPI Photonics s.r.l. (Italy); Guido Perrone, Politecnico di Torino (Italy) [10513-36]

Lunch/Exhibition Break Thu 12:15 pm to 1:30 pm

SESSION 8 THU 1:30 PM TO 3:15 PM

High Power/Energy Laser Components and Packaging III

Session Chair: **Chung-En Zah**, Focuslight Technologies, Inc. (China)

Novel high-density packaging of solid state diode pumped eye-safe laser for LIBS (*Invited Paper*), Kim E. Bares, Justin Torgerson, Patrick Maine, Steve Patterson, Quantel USA (USA) [10513-37]

Distributed face cooling modules for tiny integrated lasers, Takunori Taira, Institute for Molecular Science (Japan) [10513-38]

Beam transforming phase masks in PTR glass by using digital micromirror device, Duc-Quy Nguyen, Zachary J. Labossiere, Fedor M. Kompan, Ivan Divliansky, David Guacaneme, Univ. of Central Florida (USA); Leonid B. Glebov, Univ. of Central Florida (USA) and OptiGrate Corp. (USA) [10513-39]

Laser damage testing of silica windows with hydrophobic antireflective surfaces, Lynda E. Busse, Jesse A. Frantz, Darryl A. Boyd, Woohong (Rick) Kim, Brandon Shaw, U.S. Naval Research Lab. (USA); Ishwar D. Aggarwal, Sotera Defense Solutions, Inc. (USA); Jas S. Sanghera, U.S. Naval Research Lab. (USA) [10513-40]

Laser-induced damage threshold of Yb:YAG crystals at stretched 150-ps pulses, Maria Jose Milla Rodrigo, Roman Diaz, Loïc Deyra, ALPhANOV (France); Damien Sangla, Magali Durand, Pierre Sevillano, Antoine Courjaud, Amplitude Systèmes (France); Johan Bouillet, ALPhANOV (France) . [10513-41]

SESSION 9 THU 3:45 PM TO 5:25 PM

High Power/Energy Laser Components and Packaging IV

Session Chair: **Torsten Vahrenkamp**, ficonTEC Service GmbH (Germany)

Lasers with intra-cavity phase elements, Alkan Gulsels, Russell M. Kurtz, Gabriel Islas, Luminit LLC (USA); Igor Anisimov, Air Force Research Lab. (USA) [10513-42]

Progress in high duty cycle, highly efficient fiber coupled 940-nm pump modules for high-energy class solid state lasers, René Platz, Bernd Eppich, Juliane Rieprich, Arnim Ginolas, Sabrina Kreutzmann, Steffen Knigge, Götz Erbert, Paul A. Crump, Ferdinand-Braun-Institut (Germany) . . [10513-43]

Polarizing Gires-Tournois etalon as intracavity frequency selective element in high-power lasers, Karsten R. F. Schuhmann, ETH Zurich (Switzerland) [10513-44]

High precision six-axis laser lens alignment using an industrial robot, Joern Seyer, Moritz Seyfried, Oliver Buse, Torsten Vahrenkamp, ficonTEC Service GmbH (Germany) [10513-45]

High efficiency pump combiner fabricated by CO₂ laser splicing system, Gongwen Zhu, AFL (USA) [10513-46]

LASE

CONFERENCE 10514

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10514

High-Power Diode Laser Technology XVI

Conference Chair: **Mark S. Zediker**, NUBURU, Inc. (USA)

Program Committee: **Friedrich G. Bachmann**, FriBa LaserNet (Germany); **Stefan W. Heinemann**, TRUMPF Photonics (USA); **Volker Krause**, Laserline GmbH (Germany); **Robert Martinsen**, nLIGHT Corp. (USA); **Erik P. Zucker**, Lumentum (USA)

MONDAY 29 JANUARY

SESSION 1 MON 8:20 AM TO 11:30 AM

New High Power Wavelengths

Session Chair: **Erik Zucker**, Lumentum (USA)

Blue 450-nm high power semiconductor continuous wave laser bars exceeding rollover output power of 80 W (*Invited Paper*), Harald König, Alfred Lell, Muhammad Ali, Bernhard Stojetz, Christoph Eichler, Matthias Peter, Andreas Löffler, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany); Markus Baumann, Anne Balck, Jörg Malchus, Volker Krause, Laserline GmbH (Germany) [10514-1]

500-W blue fiber-coupled diode-laser emitting at 450 nm, Anne Balck, Markus Baumann, Jörg Malchus, Rony V. Chacko, Sören Marfels, Ulrich Witte, Deepak Dinakaran, Sörn Ocylok, Matthias Weinbach, Charley Bachert, Arnd Kösters, Volker Krause, Laserline GmbH (Germany); Harald König, Alfred Lell, Bernhard Stojetz, Andreas Löffler, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany) [10514-2]

Recent progress of 638-nm high-power broad area laser diodes in Mitsubishi Electric, Kyosuke Kuramoto, Shinji Abe, Motoharu Miyashita, Takehiro Nishida, Tetsuya Yagi, Mitsubishi Electric Corp. (Japan) . . . [10514-3]

Next generation DIRCM for 2.1-2.3 micron wavelength based on direct-diode GaSb technology, Edgaras Dvinelis, Greta Naujokaite, Mindaugas Greibus, Augustinas Trinkunas, Kristijonas Vizbaras, Augustinas Vizbaras, Brolis Semiconductors UAB (Lithuania) [10514-4]

Development of high intensity blue diode laser system for materials processing (*Invited Paper*), Masahiro Tsukamoto, Shinichiro Masuno, Yuji Sato, Ritsuko Higashino, Osaka Univ. (Japan); Koji Tojo, Shonan Shimadzu Co., Ltd. (Japan); Keita Asuka, Nichia Corp. (Japan)..... [10514-5]

Blue laser diode (450 nm) system for welding copper, Matthew J. Silva Sa, Mathew Finuf, Robert Fritz, James Tucker, Jean Michel Pelaprat, Mark S. Zediker, NUBURU, Inc. (USA)..... [10514-6]

Visible high power fiber coupled diode lasers, Bernd Köhler, Simon Drows, Michael Stoiber, Sascha Dürsch, Heiko Kissel, Tobias Könnig, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany); Harald König, Alfred Lell, Bernhard Stojetz, Andreas Löffler, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany) [10514-7]

Lunch Break Mon 11:30 am to 1:00 pm

SESSION 2 MON 1:00 PM TO 3:00 PM

High Power Diode Laser Technology I

Session Chair: **Stefan W. Heinemann**, TRUMPF Photonics (USA)

Forward development of high power diode lasers, Stephan G. Strohmaier, Götz Erbert, Arne Meissner-Schenk, Matthias Lommel, Christian Carstens, TRUMPF Laser GmbH (Germany); Berthold Schmidt, Hagen Zimer, TRUMPF Photonics (USA); Matthias Karow, Martin Wilkens, Thorben Kaul, Paul Crump, Ferdinand-Braun-Institut (Germany) [10514-8]

Extreme triple asymmetric (ETAS) epitaxial designs for increased efficiency at high powers in 9xx-nm diode lasers, Thorben Kaul, Leibniz Institut für Höchstfrequenztechnik (Germany); Götz Erbert, André Maassdorf, Dominik Martin, Paul Crump, Ferdinand-Braun-Institut (Germany) [10514-9]

High polarization purity operation of 99% in 9xx-nm broad stripe laser diodes, Rintaro Morohashi, Fujikura Ltd. (Japan); Yuji Yamagata, OPTOENERGY Inc. (Japan); Yoshikazu Kaifuchi, Fujikura Ltd. (Japan); Katsuhisa Tada, OPTOENERGY Inc. (Japan); Ryozaaburo Nogawa, Fujikura Ltd. (Japan); Yumi Yamada, OPTOENERGY Inc. (Japan); Masayuki Yamaguchi, Fujikura Ltd. (Japan) [10514-10]

Simulation of high-power laser diode with improved heat sinking structure using epitaxial liftoff technique, Younghyun Kim, Yunsu Sung, Jung-Tack Yang, Woo-Young Choi, Yonsei Univ. (Korea, Republic of) [10514-11]

Development of highly efficient laser bars emitting around 1060 nm for pulsed applications, Agnieszka Pietrzak, JENOPTIK Diode Lab GmbH (Germany); Jens Meusel, JENOPTIK Optical Systems GmbH (Germany); Martin Zorn, Ralf Huelsewede, Juergen Sebastian, JENOPTIK Diode Lab GmbH (Germany) [10514-12]

970-nm ridge waveguide diode laser bars for high power DWBC systems, Martin Wilkens, Hans Wenzel, Andrea Knigge, Paul Crump, André Maassdorf, Jörg Fricke, Peter Ressel, Ferdinand-Braun-Institut (Germany); Stephan G. Strohmaier, Berthold Schmidt, TRUMPF GmbH & Co. KG (Germany) [10514-13]

SESSION 3 MON 3:30 PM TO 4:50 PM

High Power Diode Laser Technology II

Session Chair: **Robert Martinsen**, nLIGHT Corp. (USA)

Diode lasers optimized in brightness for fiber laser pumping, Marc T. Kelemen, Jürgen Gilly, DILAS Semiconductor Business Unit (Germany); Patrick Friedmann, DILAS Diodenlaser GmbH (Germany); Sascha Hilzensauer, DILAS Semiconductor Business Unit (Germany); Lukas Ogradowski, DILAS Diodenlaser GmbH (Germany)..... [10514-14]

Next generation diode lasers with enhanced brightness, Alexander Killi, Simon Rauch, Lukas Irmiler, Julian Rikels, Steffen Ried, TRUMPF Laser GmbH (Germany); Hagen Zimer, TRUMPF Photonics (USA); Evangelos Papastathopoulos, TRUMPF Laser GmbH (Germany) . . . [10514-15]

Advancements of ultra-high peak power laser diode arrays, John Goings, Prabhu Thiagarajan, Devin Crawford, Steve Smith, Brian Caliva, Lasertel, Inc. (USA)..... [10514-16]

Advances in infrared high power lasers for long term operation, Martin Müller, Sebastian Hein, Fabian Eigenmann, Christian Lauer, Harald König, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany) [10514-17]

TUESDAY 30 JANUARY

SESSION 4.....TUE 8:00 AM TO 10:20 AM

High Power Fiber Coupled Sources

Session Chair: **Volker Krause**, Laserline GmbH (Germany)

High-power fiber-coupled pump lasers for fiber lasers, Yohei Kasai, Takuya Aizawa, Daiichiro Tanaka, Fujikura Ltd. (Japan) [10514-18]

Efficient pump module coupling >1kW from a low-SWaP detachable fiber, Mehmet Dogan, Richard H. Chin, Stephen Fulghum, Jonah H. Jacob, Science Research Lab., Inc. (USA) [10514-19]

Improvement in reduced-mode (REM) diodes enable 300 W from 105- μ m 0.15-NA fiber-coupled modules, Manoj Kanskar, Ling Bao, Zhigang Chen, David Dawson, Weimin Dong, Mike Grimshaw, Xing Guan, David M. Hemenway, Robert Martinsen, Wolfram Urbanek, Shiguo Zhang, Mark DeVito, nLIGHT Corp. (USA) [10514-20]

120-W NA0.15 fiber coupled LD module with 125- μ m clad / NA-0.22 fiber by spatial coupling method, Yuta Ishige, Eisaku Kaji, Etsuji Katayama, Yutaka Ohki, Furukawa Electric Co., Ltd. (Japan); Gábor Gajdásy, András Cserteg, Furukawa Electric Institute of Technology Ltd. (Hungary) [10514-21]

High brightness KW-class direct diode laser, Dan Xu, Zhijie Guo, Di Ma, Tujia Zhang, Weirong Guo, Baohua Wang, Lei Xu, Xiaohua Chen, BWT Beijing Ltd. (China) [10514-22]

Ultracompact hermetic laser diode modules for harsh environment, Yves Candela, Guillaume Canat, Soizic Rouxel, Michaël Verdun, Frédéric Nicolas, Sylvain Bordais, Marc Le Flohic, Keopsys SA (France) [10514-23]

Continued advances in high brightness fiber-coupled laser modules for efficient pumping of fiber and solid state lasers, David M. Hemenway, Zhigang Chen, Wolfram Urbanek, David Dawson, Ling Bao, Manoj Kanskar, Mark DeVito, Robert Martinsen, nLIGHT Corp. (USA) [10514-24]

SESSION 5.....TUE 10:50 AM TO 11:50 AM

Wavelength Stabilized Devices I

Session Chair: **Friedrich G. Bachmann**, FriBa LaserNet (Germany)

Wavelength stabilized high pulse power laser diodes for automotive LIDAR, Andrea Knigge, Andreas Klehr, Hans Wenzel, Anissa Zeghuzi, Jörg Fricke, André Maassdorf, Arnim Liero, Ferdinand-Braun-Institut (Germany) [10514-25]

Spectral narrowing and stabilization of 10-W broad-area laser with fiber pump delivery system, Jose C. Perez, Jordan P. Leidner, John R. Marciante, Univ. of Rochester (USA) [10514-26]

Auto-locking waveguide amplifier system for lidar and magnetometric applications, Alexander Pouliot, Hermina C. Beica, Adam Carew, Andrew Vorozcovs, Gehrig Carlse, Anantharaman Kuamarakrishnan, York Univ. (Canada) [10514-27]

Lunch/Exhibition Break Tue 11:50 am to 1:20 pm

SESSION 6.....TUE 1:20 PM TO 3:00 PM

Wavelength Stabilized Devices II

Session Chair: **Friedrich G. Bachmann**, FriBa LaserNet (Germany)

Coherent combining of high brightness tapered lasers in master oscillator power amplifier configuration, Philipp Albrodt, Marc Hanna, Frédéric Moron, Lab. Charles Fabry (France); Jonathan Decker, Martin Winterfeldt, Gunnar Blume, Götz Erbert, Paul Crump, Ferdinand-Braun-Institut (Germany); Patrick Georges, Gaëlle Lucas-Leclin, Lab. Charles Fabry (France) [10514-28]

Improvements to tapered semiconductor MOPA laser design and testing, James A. Beil, Lisa Shimomoto, Rebecca B. Swertfeger, Stephen M. Misak, Rose-Hulman Institute of Technology (USA); Jenna Campbell, Jeremy Thomas, Daniel Renner, Milan Mashanovitch, Paul O. Leisher, Freedom Photonics, LLC (USA); Richard W. Liptak, Rose-Hulman Institute of Technology (USA) [10514-29]

Wavelength stabilized DBR high power diode laser using EBL optical confining grating technology, Roberto Paoletti, Simone Codato, Claudio Coriasso, Paola Gotta, Giancarlo Meneghini, Giuliana Morello, Pier De Melchiorre, Ezio Riva, Marzia Rosso, Alessandro Stano, Maurizio Gattiglio, Prima Electro S.p.A. (Italy) [10514-30]

High-power and brightness laser diode modules using new DBR chips, Maria Azzena, Hao Yu, Politecnico di Torino (Italy); Giammarco Rossi, Andrea Braglia, OPI Photonics s.r.l. (Italy); Guido Perrone, Politecnico di Torino (Italy) [10514-31]

Distributed Bragg reflector tapered diode lasers emitting more than 10 W at 1154 nm, David Feise, Frank Bugge, Mathias Matalla, Andreas Thies, Peter Ressel, Gunnar Blume, Julian Hofmann, Katrin Paschke, Ferdinand-Braun-Institut (Germany) [10514-32]

SESSION 7.....TUE 3:30 PM TO 5:40 PM

High Performance Bar Technology

Session Chair: **Robert Martinsen**, nLIGHT Corp. (USA)

Advanced chip designs and novel cooling techniques for brightness scaling of industrial grade diode laser bars (*Invited Paper*), Stefan Heinemann, Stewart McDougall, Geunmin Ryu, Lee Zhao, Xiaohang Liu, Carlo Holy, Ching-Long Jiang, Prasanta Modak, Yihan Xiong, TRUMPF Photonics (USA); Stephan G. Strohmaier, TRUMPF Laser GmbH (Germany); Hagen Zimer, TRUMPF Photonics (USA) [10514-33]

High-resolution smile measurement and control of wavelength-locked QCW and CW laser diode bars, Etai Rosenkrantz, Dan Yanson, Genady Klumel, Moshe Blonder, Noam Rappaport, Ophir Peleg, SCD Semiconductor Devices (Israel) [10514-34]

Characterization of individualized assembly for BFL-compensated FAC on bottom tab modules, Daniel Zontar, Tobias Müller, Sebastian Sauer, Christoph Baum, Christian Brecher, Fraunhofer-Institut für Produktionstechnologie IPT (Germany) [10514-35]

Custom ceramic microchannel-cooled array for high-power fiber-coupled application, Jeremy Junghans, Ryan Feeler, Ed Stephens, Northrop Grumman Cutting Edge Optronics (USA) [10514-36]

Alternate cooling and use schemes for low SWaP fiber pump modules, David A. Irwin, Joseph Braker, Tina Guiney, Naji Barakat, DILAS Diode Laser, Inc. (USA); Chris Ebert, Nufern (USA) [10514-37]

Individualized FAC on bottom tab subassemblies to minimize adhesive gap between emitter and optics II, Sebastian Sauer, Tobias Müller, Daniel Zontar, Christoph Baum, Marvin Berger, Christian Brecher, Fraunhofer-Institut für Produktionstechnologie IPT (Germany) [10514-38]

TUESDAY POSTER SESSION.....TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Catastrophic optical bulk degradation in high-power single- and multi-mode InGaAs-AlGaAs strained QW lasers: Part II, Yongkun Sin, Zachary Mingley, Nathan Presser, Miles Brodie, Scott Sitzman, The Aerospace Corp. (USA) [10514-39]

High power line generating diode laser modules, Stephan Schneider, Ihab Kardosh, Volker Wirth, Thomas Mitra, Mikhail Ivanenko, LIMO Lissotschenko Mikropoptik GmbH (Germany) [10514-40]

High-power 1550-nm DBR laser diodes for LIDAR applications, Jukka Viheriälä, Antti T. Aho, Heikki Virtanen, Sanna Ranta, Mihail Dumitrescu, Mircea Guina, Tampere Univ. of Technology (Finland) [10514-41]

CONFERENCE 10515

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10515

Vertical External Cavity Surface Emitting Lasers (VECSELs) VIII

Conference Chair: **Juan L. Chilla**, Coherent, Inc. (USA)

Program Committee: **Arnaud Garnache**, Univ. Montpellier (France); **Mircea Guina**, Tampere Univ. of Technology (Finland); **Jennifer E. Hastie**, Univ. of Strathclyde (United Kingdom); **Michael Jetter**, Univ. Stuttgart (Germany); **Elyahou Kapon**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Ursula Keller**, ETH Zurich (Switzerland); **Walter Lubeigt**, M Squared Lasers Ltd. (United Kingdom); **Jerome V. Moloney**, College of Optical Sciences, The Univ. of Arizona (USA); **Wolfgang Stolz**, NAsP III/V GmbH (Germany); **Anne C. Tropper**, Univ. of Southampton (United Kingdom); **Keith G. Wilcox**, Univ. of Dundee (United Kingdom)

Conference Sponsor:  **COHERENT**

MONDAY 29 JANUARY

SESSION 1 MON 8:15 AM TO 10:00 AM

Numerical Simulation

Session Chair: **Ursula Keller**, ETH Zurich (Switzerland)

Influence of microscopic many-body scattering on the performance of ultrashort pulsed and CW multi-wavelength VECSEL lasing (*Invited Paper*), Isak Kilen, Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA); Stephan W. Koch, Philipps-Univ. Marburg (Germany); Jörg Hader, College of Optical Sciences, The Univ. of Arizona (USA) [10515-1]

Coherent pulse shaping in passively mode-locked semiconductor lasers (*Invited Paper*), Lina C. Jaurigue, Benjamin Lingnau, Technische Univ. Berlin (Germany); Soizic Terrien, Bernd Krauskopf, The Univ. of Auckland (New Zealand); Kathy Lüdge, Technische Univ. Berlin (Germany) [10515-2]

Dynamics of a micropillar laser with saturable absorber and delayed optical feedback (*Invited Paper*), Bernd Krauskopf, Soizic Terrien, Neil G. R. Broderick, The Univ. of Auckland (New Zealand); Sylvain Barbay, Ctr. de Nanosciences et de Nanotechnologies (France) [10515-3]

Pulse train control in an excitable micropillar laser with delayed optical feedback, Soizic Terrien, Bernd Krauskopf, Neil G. R. Broderick, The Univ. of Auckland (New Zealand) and The Univ. of Auckland (New Zealand); Louis Andréoli, Foued Selmi, Grégoire Beaudoin, Isabelle Sagnes, Sylvain Barbay, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud (France) and Univ. Paris-Saclay (France) [10515-4]

SESSION 2 MON 10:30 AM TO 12:00 PM

MECSEL

Session Chair: **Juan L. Chilla**, Coherent, Inc. (USA)

Recent developments with 1-micron membrane VECSELs (*Invited Paper*), Shamil Mirkhanov, Adrian H. Quarterman, Conor J. C. P. Smyth, Keith G. Wilcox, Univ. of Dundee (United Kingdom) [10515-5]

Towards direct emitting MECSELs in the yellow and red-orange spectral range, Hermann Kahle, Kostiantyn Nechay, Jussi-Pekka Penttinen, Jari Lyytikäinen, Mircea Guina, Tampere Univ. of Technology (Finland) [10515-6]

MECSELs and VECSELs for rubidium spectroscopy with direct emission around 780 nm, Hermann Kahle, Kostiantyn Nechay, Jussi-Pekka Penttinen, Antti Tukiainen, Sanna Ranta, Mircea Guina, Tampere Univ. of Technology (Finland) [10515-7]

VECSEL and MECSEL: high power, wavelength versatility and ultrashort pulses (*Invited Paper*), Roman Bek, Univ. Stuttgart (Germany); Hermann Kahle, Tampere Univ. of Technology (Finland); Michael Jetter, Peter Michler, Univ. Stuttgart (Germany) [10515-8]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 3 MON 1:30 PM TO 3:00 PM

Novel Architectures/New Wavelength

Session Chair: **Jerome V. Moloney**, College of Optical Sciences, The Univ. of Arizona (USA)

Large pulse-energy VECSELs (*Invited Paper*), Robert G. Bedford, Air Force Research Lab. (USA); Ricky D. Gibson Jr., Air Force Research Lab. (USA) and Univ. of Dayton Research Institute (USA); Joshua A. Myers, Air Force Research Lab. (USA) and KBRwyle (USA) [10515-9]

Spiking and pulse train dynamics in a neuromimetic micropillar laser (*Invited Paper*), Sylvain Barbay, Foued Selmi, Ctr. de Nanosciences et de Nanotechnologies (France); Soizic Terrien, The Univ. of Auckland (New Zealand); Louis Andréoli, Rémy Braive, Isabelle Sagnes, Grégoire Beaudoin, Ctr. de Nanosciences et de Nanotechnologies (France); Neil G. R. Broderick, Bernd Krauskopf, The Univ. of Auckland (New Zealand) [10515-10]

AlGaAs-based optically pumped semiconductor lasers, Yanbo Bai, Zuntu Xu, Yong Lin, Jeffrey Wisdom, Christian Scholz, Eli S. Weiss, Juan Chilla, Coherent, Inc. (USA) [10515-11]

Long wavelength GaSb-based VECSEL around 2.8- μ m emission wavelength with >1W CW output power, Marcel Rattunde, Peter Holl, Steffen Adler, Elke Diwo-Emmer, Rolf Aidam, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) [10515-12]

SESSION 4 MON 3:30 PM TO 4:45 PM

Mode-locked I

Session Chair: **Keith G. Wilcox**, Univ. of Dundee (United Kingdom)

Sub-300-fs semiconductor disk laser based on active quantum dots (*Invited Paper*), Cesare G. E. Alfieri, Dominik Waldburger, Jacob Nürnberg, Matthias Golling, Ursula Keller, ETH Zurich (Switzerland) [10515-13]

Dual frequency comb VECSEL with Laguerre-Gauss spatial gain filter, Jonathan R. C. Woods, Theo Chen Sverre, Edward A. Shaw, Vasilis Apostolopoulos, Univ. of Southampton (United Kingdom); Arnaud Garnache, Univ. Montpellier (France); Anne C. Tropper, Univ. of Southampton (United Kingdom) [10515-14]

Structure and cavity geometry optimization for ultrashort and high power pulse generation from a VECSEL, Alexandre Laurain, Robert Rockmore, Caleb W. Baker, Isak Kilen, College of Optical Sciences, The Univ. of Arizona (USA); Sathvikas Addamane, Ganesh Balakrishnan, The Univ. of New Mexico (USA); Jörg Hader, College of Optical Sciences, The Univ. of Arizona (USA); Antje R. Perez, Wolfgang Stolz, Stephan W. Koch, Philipps-Univ. Marburg (Germany); Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA) [10515-15]

Coherent beam combining of a colliding pulse modelocked VECSEL, Dominik Waldburger, ETH Zurich (Switzerland); Sandro M. Link, ETH Zurich (Switzerland); Cesare G. E. Alfieri, ETH Zurich (Switzerland); Matthias Golling, Ursula Keller, ETH Zurich (Switzerland) [10515-16]

SESSION 5 MON 4:45 PM TO 6:00 PM

Frequency Combs

Session Chair: **Michael Jetter**, Univ. Stuttgart (Germany)

Octave-spanning supercontinuum generated in silicon nitride waveguide directly from a SESAM-modelocked VECSEL (*Invited Paper*), Dominik Waldburger, Aline S. Mayer, Cesare G. E. Alfieri, ETH Zurich (Switzerland); Adrea R. Johnson, Columbia Univ. (USA) and Cornell Univ. (USA); Xingchen Ji, Columbia Univ. (USA) and Cornell Univ. (USA); Alexander Klenner, Yoshitomo Okawachi, Michal Lipson, Alexander L. Gaeta, Columbia Univ. (USA); Ursula Keller, ETH Zurich (Switzerland) [10515-17]

Carrier-envelope offset frequency stabilization of an ultrafast semiconductor laser, Nayara Jornod, Kutun Gürel, Valentin J. Wittwer, Pierre Brochard, Sargis Hakobyan, Stéphane Schilt, Univ. de Neuchâtel (Switzerland); Dominik Waldburger, Ursula Keller, ETH Zurich (Switzerland); Thomas Südmeyer, Univ. de Neuchâtel (Switzerland) [10515-18]

Femtosecond dual-comb MIXSEL at 1030 nm, Jacob Nürnberg, ETH Zurich (Switzerland); Cesare G. E. Alfieri, Sandro M. Link, ETH Zurich (Switzerland); Dominik Waldburger, ETH Zurich (Switzerland); Matthias Golling, Ursula Keller, ETH Zurich (Switzerland) [10515-19]

Supercontinuum generation and beatnote detection using ultrafast VECSEL seed oscillators, Robert Rockmore, Caleb W. Baker, Alexandre Laurain, Tsung-Han Wu, R. Jason Jones, Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA) [10515-20]

TUESDAY 30 JANUARY

SESSION 6 TUE 8:15 AM TO 10:00 AM

Single Frequency/Intracavity Conversion

Session Chair: **Mircea Guina**, Tampere Univ. of Technology (Finland)

New developments in THz-time domain spectroscopy involving ML-VECSELs (*Invited Paper*), Vasilis Apostolopoulos, Anne C. Tropper, Theo Chen Sverre, Jonathan R. C. Woods, Univ. of Southampton (United Kingdom) [10515-21]

OPS CW laser with 300 to 325-nm output, Matthias Roth, Coherent, Inc. (USA) [10515-22]

Towards compact and portable sub-kHz AlGaInP semiconductor disk lasers for cold atom experiments (*Invited Paper*), Paulo Hisao Moriya, Univ. of Strathclyde (United Kingdom) [10515-23]

Vibration-tolerant narrow-linewidth semiconductor disk laser using novel frequency-stabilisation schemes, Craig Hunter, Brynmor E. Jones, Peter Schlosser, Fraunhofer Ctr. for Applied Photonics (United Kingdom); Michael J. Strain, Univ. of Strathclyde (United Kingdom); Loyd J. McKnight, Fraunhofer Ctr. for Applied Photonics (United Kingdom) [10515-24]

Narrow linewidth VECSEL platform for AMO physics, Jussi-Pekka Penttinen, Tampere Univ. of Technology (Finland); Shaun C. Burd, National Institute of Standards and Technology (USA); Sanna Ranta, Tampere Univ. of Technology (Finland); David T. C. Allcock, National Institute of Standards and Technology (USA); Mika Mäki, Tampere Univ. of Technology (Finland); Dietrich Leibfried, National Institute of Standards and Technology (USA); Mircea Guina, Tampere Univ. of Technology (Finland) [10515-25]

SESSION 7 TUE 10:30 AM TO 12:00 PM

Mode-locked II

Session Chair: **Anne C. Tropper**, Univ. of Southampton (United Kingdom)

Commercial mode-locked vertical external cavity surface emitting lasers (*Invited Paper*), Robin Head, Walter Lubeigt, Bartłomiej Bialkowski, Jipeng Lin, Nils Hempler, Gareth T. Maker, Graeme P. A. Malcolm, M Squared Lasers Ltd. (United Kingdom) [10515-26]

Degradation mechanism of SESAMs under intense ultrashort pulses in modelocked VECSELs, Sadvhikas Addamane, Ganesh Balakrishnan, The Univ. of New Mexico (USA); Alexandre Laurain, Hsiu-Ting Chan, Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA) [10515-27]

Mode-locked VECSEL at 1.34 μm utilizing a GaSb-based SESAM (*Invited Paper*), Antti Härkönen, Soile Suomalainen, Antti Rantamäki, Tampere Univ. of Technology (Finland); Yicheng Wang, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Jari Nikkinen, Miki Tavast, Tomi Leinonen, Esa J. Saarinen, Jari Lyytikäinen, Tampere Univ. of Technology (Finland); Uwe Griebner, Günter Steinmeyer, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Mircea Guina, Tampere Univ. of Technology (Finland) [10515-28]

Tantalum pentoxide waveguides and microresonators for VECSEL based frequency combs, Theo Chen Sverre, Vasilis Apostolopoulos, Jonathan R. C. Woods, Edward A. Shaw, Ping Hua, James S. Wilkinson, Anne C. Tropper, Univ. of Southampton (United Kingdom) [10515-29]

BEST STUDENT PAPER AWARD CEREMONY . 12:00 PM TO 12:05 PM

Presented by Juan L. Chilla, Coherent, Inc. (USA)

Award Sponsor:



TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

750-nm direct emitting MECSELs and VECSELs towards isotope separation applications for nuclear medicine, Kostiantyn Nechay, Hermann Kahle, Jussi-Pekka Penttinen, Antti Tukiainen, Sanna Ranta, Mircea Guina, Tampere Univ. of Technology (Finland) [10515-30]

Concept of the CW GaN-based VECSEL, Adam K. Sokol, Lukasz Piskorski, Maciej Kuc, Michal Wasiaak, Robert P. Sarzala, Lodz Univ. of Technology (Poland) [10515-31]

Heat flow characterization in gain chip holders for high-efficiency AlGaInP VECSELs, Alexander Peschken, Institut für Halbleitertechnik und Funktionelle Grenzflächen (Germany) and SCoPE Research Ctr., Univ. Stuttgart (Germany) and Ctr. for Integrated Quantum Science and Technology, Univ. Stuttgart, Ulm Univ. (Germany); Hermann Kahle, Tampere Univ. of Technology (Finland); Roman Bek, Institut für Halbleitertechnik und Funktionelle Grenzflächen (Germany) and SCoPE Research Ctr., Univ. Stuttgart (Germany) and Ctr. for Integrated Quantum Science and Technology, Univ. Stuttgart, Ulm Univ. (Germany); Uwe Brauch, Marwan Abdou Ahmed, Univ. Stuttgart (Germany) and SCoPE Research Ctr., Univ. Stuttgart (Germany); Michael Jetter, Institut für Halbleitertechnik und Funktionelle Grenzflächen (Germany) and SCoPE Research Ctr., Univ. Stuttgart (Germany) and Ctr. for Integrated Quantum Science and Technology, Univ. Stuttgart, Ulm Univ. (Germany); Thomas Graf, Univ. Stuttgart (Germany) and SCoPE Research Ctr., Univ. Stuttgart (Germany); Peter Michler, Institut für Halbleitertechnik und Funktionelle Grenzflächen (Germany) and SCoPE Research Ctr., Univ. Stuttgart (Germany) and Ctr. for Integrated Quantum Science and Technology, Univ. Stuttgart, Ulm Univ. (Germany) [10515-32]

WEDNESDAY 31 JANUARY

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and **Reinhart Poprawe**, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

CONFERENCE 10516

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10516

Nonlinear Frequency Generation and Conversion: Materials and Devices XVII

Conference Chairs: **Konstantin L. Vodopyanov**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Kenneth L. Schepler**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Program Committee: **Darrell J. Armstrong**, Sandia National Labs. (USA); **Majid Ebrahim-Zadeh**, ICFO - Institut de Ciències Fotòniques (Spain); **Baldemar Ibarra-Escamilla**, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); **Rita D. Peterson**, Air Force Research Lab. (USA); **Peter G. Schunemann**, BAE Systems (USA); **Wei Shi**, Tianjin Univ. (China); **Michael Vasilyev**, The Univ. of Texas at Arlington (USA)

MONDAY 29 JANUARY

SESSION 1.....MON 8:00 AM TO 10:00 AM

Visible-UV Generation

Session Chair: **Konstantin L. Vodopyanov**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Improvement of conversion efficiency of DUV light generation at 221-nm using CLBO crystal, Hironori Igarashi, Gigaphoton Inc. (Japan); Zhigang Zhao, Hongwen Xuan, The Univ. of Tokyo (Japan); Chen Qu, Gigaphoton Inc. (Japan); Shinji Ito, Univ. of Tokyo (Japan); Yuki Tamaru, Mitsuru Tamiya, Taisuke Miura, Junichi Fujimoto, Hakaru Mizoguchi, Gigaphoton Inc. (Japan); Yohei Kobayashi, The Univ. of Tokyo (Japan)..... [10516-1]

Understanding frequency conversion and transport for the fifth harmonic probe laser on National Ignition Facility, Siddharth Patankar, Steven T. Yang, Steven J. Ross, John D. Moody, George F. Swadling, Al Erlandson, Andy Bayramian, David Barker, Philip S. Datte, Robert Acree, Michael R. Borden, Lawrence Livermore National Lab. (USA); Jake Bromage, Univ. of Rochester (USA)..... [10516-2]

Controlling nonlinear optical UV-visible light generation using ZnO dielectric antennas, Sween J. Butler, Univ. of North Texas (USA); Luca Carletti, Costantino De Angelis, Univ. degli Studi di Brescia (Italy); Klaus Thonke, Institute of Quantum Matter, Univ. Ulm (Germany); Arup Neogi, Univ. of North Texas (USA)..... [10516-3]

Diffraction-limited 577-nm true-yellow laser by frequency doubling of a tapered diode laser, Danny Noordegraaf, Mathias Christensen, Norlase ApS (Denmark); Anders K. Hansen, Technical Univ. of Denmark (Denmark); Thomas Buss, Norlase ApS (Denmark); Ole B. Jensen, Technical Univ. of Denmark (Denmark); Peter M. W. Skovgaard, Norlase ApS (Denmark)..... [10516-4]

Compact deep UV laser system at 222.5 nm by frequency doubling wavelength-stabilized emission of a micro-integrated high-power GaN diode laser module, Norman Ruhnke, André Müller, Martin Maiwald, Bernd Sumpf, Götz Erbert, Günther Tränkle, Ferdinand-Braun-Institut (Germany)..... [10516-5]

Efficient non-linear two-photon effects from the Cesium 6D manifold, Glen P. Perram, Nathan D. Haluska, Christopher A. Rice, Air Force Institute of Technology (USA)..... [10516-6]

SESSION 2.....MON 10:30 AM TO 12:10 PM

Frequency Combs and Supercontinuum Generation

Session Chair: **Kenneth L. Schepler**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Frequency comb generation in a continuously pumped optical parametric oscillator, Simona Mosca, Maria Parisi, Iolanda Ricciardi, Istituto Nazionale di Ottica (Italy); François Leo, Univ. Libre de Bruxelles (Belgium); Tobias Hansson, Univ. degli Studi di Brescia (Italy); Miro Erkintalo, The Univ. of Auckland (New Zealand); Pasquale Maddaloni, Paolo De Natale, Istituto Nazionale di Ottica (Italy); Stefan Wabnitz, Univ. degli Studi di Brescia (Italy) and Istituto Nazionale di Ottica (Italy); Maurizio De Rosa, Istituto Nazionale di Ottica (Italy)..... [10516-7]

Polarized supercontinuum generation from a birefringent photonic crystal fiber, Peiwen Kuan, Xia Li, Meisong Liao, Lili Hu, Shanghai Institute of Optics and Fine Mechanics (China)..... [10516-8]

Flat broadband supercontinuum generation in a short length of highly nonlinear fiber pumped by a femtosecond carbon-nanotube based passively mode-locked erbium-doped fiber laser, Sivasankara R. Yemini, WennJing Lai Sr., Alphones Arokiaswami, Ping Shum, Nanyang Technological Univ. (Singapore)..... [10516-9]

Convenient scheme for efficient generation of mid-infrared CEP-stabilized femtosecond pulses using 1030-nm source, Michal Nejbauer, Marcin Pastorczak, Warsaw Univ. (Poland); Tomasz Michal Kardas, Yuriy Stepanenko, Institute of Physical Chemistry, Polish Academy of Sciences (Poland); Czesław Radzewicz, Warsaw Univ. (Poland)..... [10516-10]

Cascaded Raman lasing in a PM phosphosilicate fiber with random distributed feedback, Ivan A. Lobach, Sergey A. Babin, Sergey I. Kablukov, Institute of Automation and Electrometry (Russian Federation)..... [10516-11]

SESSION 3.....MON 1:25 PM TO 3:25 PM

Microresonators and Optical Frequency Combs I

Joint Session with Conferences 10516 and 10518

Session Chair: **Andrey B. Matsko**, OEwaves, Inc. (USA)

Microwave and RF applications of optical micro-combs (Invited Paper), David J. Moss, Swinburne Univ. of Technology (Australia)..... [10518-10]

Dissipative Kerr solitons in optical microresonators (Invited Paper), Tobias J. Kippenberg, Ecole Polytechnique Fédérale de Lausanne (Switzerland)..... [10518-11]

Temporal cavity solitons in synchronously driven Fabry-Perot microresonators (Invited Paper), Tobias Herr, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); Ewelina Obrzud, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) and Univ. de Genève (Switzerland); Steve Lecomte, Victor Brasch, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland)..... [10518-12]

Advances on nonlinear phenomena in WGM resonators, Yanne K. K. Chembu, FEMTO-ST (France) and Georgia Tech-Lorraine (France)..... [10518-13]

Gallium phosphide microresonator frequency combs (Invited Paper), Simon Hönl, Katharina Schneider, IBM Research - Zürich (Switzerland); Miles Anderson, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Dalziel Wilson, IBM Research - Zürich (Switzerland); Tobias J. Kippenberg, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Paul Seidler, IBM Research - Zürich (Switzerland)..... [10518-14]

SESSION 4..... MON 3:55 PM TO 6:05 PM

Microresonators and Optical Frequency Combs II

Joint Session with Conferences 10516 and 10518

Session Chair: **Konstantin L. Vodopyanov**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Kerr-microresonator combs for low-noise frequency synthesis (*Invited Paper*), Scott Diddams, Scott Papp, National Institute of Standards and Technology (USA) [10516-12]

Dynamics and locking of switching waves in a normally dispersive fiber ring resonator, Bruno Garbin, Yadong Wang, Stuart G. Murdoch, Univ. of Auckland (New Zealand); Gian-Luca Oppo, Univ. of Strathclyde (United Kingdom); Stephane Coen, Miro Erkintalo, Univ. of Auckland (New Zealand) [10518-15]

Whispering gallery optical parametric oscillators for the mid-infrared spectral range (*Invited Paper*), Ingo Breunig, Kevin Hanka, Yuechen Jia, Univ. of Freiburg (Germany); Karsten Buse, Univ. of Freiburg (Germany) and Fraunhofer-Institut für Physikalische Messtechnik (Germany) [10516-13]

Saturable absorption by carbon nanotubes on silica microtoroids for stable mode-locking, Tsutaru Kumagai, Naoya Hirota, Katsuya Sato, Koki Namiki, Atsuhiko Hori, Hideyuki Maki, Takasumi Tanabe, Keio Univ. (Japan) [10518-16]

Wideband critically-coupled resonators, Clément Arlotti, Antoine Monmayrant, Olivier Gauthier-Lafaye, Napoléon Gutierrez, Arnaud Fernandez, Olivier Llopis, Stéphane Calvez, Lab. d'Analyse et d'Architecture des Systèmes (France) [10518-17]

Agile generation of microresonator-based frequency combs without pump detuning and local temperature controlling, Jing Wang, Tianjin Univ. (China); Lijuan Xu, Tianjin Univ. of Technology and Education (China); Yuhao Guo, Tianjin Univ. (China); Alan E. Willner, Univ. of Southern California (USA); Guifang Li, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Lin Zhang, Tianjin Univ. (China) [10518-18]

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:10 AM TO 10:00 AM

Nonlinear Optical Devices and Techniques

Session Chair: **Kenneth L. Schepler**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Frequency-shifted sources for terahertz-driven linear electron acceleration (*Invited Paper*), Michael Hemmer, Deutsches Elektronen-Synchrotron (Germany); Giovanni Cirmi, Deutsches Elektronen-Synchrotron (Germany) and The Hamburg Ctr. for Ultrafast Imaging (Germany); Koustuban Ravi, Deutsches Elektronen-Synchrotron (Germany) and Massachusetts Institute of Technology (USA); Frederike Ahr, Deutsches Elektronen-Synchrotron (Germany) and The Hamburg Ctr. for Ultrafast Imaging (Germany); Luis Zapata, Deutsches Elektronen-Synchrotron (Germany); Anne-Laure Calendron, Huseyin Cankaya, Deutsches Elektronen-Synchrotron (Germany) and The Hamburg Ctr. for Ultrafast Imaging (Germany); Spencer W. Jolly, Deutsches Elektronen-Synchrotron (Germany) and The Hamburg Ctr. for Ultrafast Imaging (Germany) and Institute of Physics of the ASCR, v.v.i. (Czech Republic); Hideki Ishizuki, Takunori Taira, Institute for Molecular Science (Japan); Nicholas Matlis, Deutsches Elektronen-Synchrotron (Germany) and The Hamburg Ctr. for Ultrafast Imaging (Germany); Andreas R. Maier, Univ. Hamburg (Germany); Franz X. Kaertner, Deutsches Elektronen-Synchrotron (Germany) and The Hamburg Ctr. for Ultrafast Imaging (Germany) and Massachusetts Institute of Technology (USA) [10516-14]

Synchronous dual-wavelength pulse generation in coaxial pumping scheme and its application in terahertz difference frequency generation, Yang Liu, Kai Zhong, Jialin Mei, Degang Xu, Jianquan Yao, Tianjin Univ. (China) [10516-15]

Robust difference frequency generation scheme tunable from 6 to 16 μ m circumventing spatial beam offset from angular phase-matching, Florian Mörz, Univ. Stuttgart (Germany); Tobias Steinle, ICFO - Institut de Ciències Fotòniques (Spain); Stefan Kedenburg, Heiko Linnenbank, Andy Steinmann, Harald Giessen, Univ. Stuttgart (Germany) [10516-16]

Tunable difference frequency generation of mid-wave infrared in strained silicon waveguides, Hai Yan, Univ. of Texas at Austin (USA); Swapnajit Chakravarty, Omega Optics, Inc. (USA); Ray T. Chen, Univ. of Texas at Austin (USA) and Omega Optics Inc. (USA) [10516-17]

Modelling noncollinear 3D pulse propagation, Tomasz Michal Kardas, Yuriy Stepanenko, Polish Academy of Sciences (Poland); Czeslaw Radzewicz, Institute of Experimental Physics, Univ. of Warsaw (Poland) [10516-18]

SESSION 6..... TUE 10:30 AM TO 11:50 AM

Supercontinuum Generation

Session Chair: **Konstantin L. Vodopyanov**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Visible supercontinuum generation from a tunable mid-infrared laser, Christopher B. Marble, Sean P. O'Connor, Dawson T. Nodurft, Vladislav V. Yakovlev, Texas A&M Univ. (USA); Andrew W. Wharmby, Air Force Research Lab. (USA) [10516-19]

Rainbow from nowhere, Dawson T. Nodurft, Christopher B. Marble, Sean P. O'Connor, Vladislav V. Yakovlev, Texas A&M Univ. (USA) . . . [10516-20]

Observation of a rainbow of visible colors in a near infrared cascaded Raman fiber laser and its novel application as a diagnostic tool for length resolved spectral analysis, Santosh Aparanji, V. Balaswamy, S. Arun, V.R. Supradeepa, Indian Institute of Science (India) [10516-21]

Mid-IR supercontinuum generation in a single-mode ZBLAN fiber pumped by a carbon-nanotube-based passively mode-locked erbium-doped femtosecond fiber laser, Sivasankara Rao R. Yemini, WennJing Lai Sr., Alphones Arokiaswami, Ping Shum, Nanyang Technological Univ. (Singapore) [10516-22]

Lunch/Exhibition Break Tue 11:50 am to 1:30 pm

SESSION 7..... TUE 1:30 PM TO 3:20 PM

New Concepts of Nonlinear Optics

Session Chair: **Kenneth L. Schepler**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Metrological-grade tunable coherent source in the mid-infrared for molecular precision spectroscopy (*Invited Paper*), Giacomo Insero, Istituto Nazionale di Ottica (Italy); Cecilia Clivati, Istituto Nazionale di Ricerca Metrologica (Italy); Davide D'Ambrosio, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Pablo Cancio Pastor, Istituto Nazionale di Ottica (Italy); Maurizio Verde, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Peter G. Schunemann, BAE Systems (USA); Jean-Jacques Zondy, Nazarbayev Univ. (Kazakhstan); Massimo Inguscio, Consiglio Nazionale delle Ricerche (Italy); Davide Calonico, Filippo Levi, Istituto Nazionale di Ricerca Metrologica (Italy); Paolo De Natale, Istituto Nazionale di Ottica (Italy); Gabriele Santambrogio, Istituto Nazionale di Ricerca Metrologica (Italy); Simone Borri, Istituto Nazionale di Ottica (Italy) [10516-23]

Photon generation and frequency conversion for temporal-mode multiplexing (*Invited Paper*), Colin J. McKinstrie, Huawei Technologies Co., Ltd. (USA) [10516-24]

Spatial-mode-selective quantum frequency conversion (*Invited Paper*), Young Bong Kwon, Lightwave Logic, Inc. (USA); Mohan Giribabu, Corning Optical Communication LLC (USA); Lu Li, TE Connectivity Subsea Communications (USA); Sarath Chandra Samudrala, Univ. of Massachusetts Amherst (USA); Carsten Langrock, Martin M. Fejer, Stanford Univ. (USA); Michael Vasilyev, The Univ. of Texas at Arlington (USA) [10516-25]

Pulse shaping of broadband Adiabatic SHG from a Ti:sapphire oscillator, Assaf Levanon III, Asaf Dahan, Achiya Nagler, Erga Lifshitz, Eyal Bachar, Michael Mrejen, Haim Suchowski, Tel Aviv Univ. (Israel) [10516-26]

SESSION 8..... TUE 3:50 PM TO 6:00 PM

New Nonlinear Materials

Session Chair: **Konstantin L. Vodopyanov**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Recent progress in heteroepitaxy of nonlinear optical materials for frequency conversion devices (*Invited Paper*), Vladimir L. Tassev, Shivashankar Vangala, Rita Peterson, Michael Snure, Air Force Research Lab. (USA) [10516-27]

Horizontal gradient freeze growth of wide band gap mid-infrared NLO crystals BaGa₄S₇ and BaGa₄Se₇, Peter G. Schunemann, Kevin T. Zawilski, BAE Systems (USA) [10516-28]

Advances in growth and power scaling of the nonlinear crystal CdSiP₂, Kevin T. Zawilski, Peter G. Schunemann, John C. McCarthy, Leonard A. Pomeranz, BAE Systems (USA) [10516-29]

CONFERENCE 10516

Difference frequency generation in orientation-patterned gallium phosphide, Junxiong Wei, ICFO - Institut de Ciències Fotòniques (Spain); Chaitanya Kumar Suddapalli, ICFO - Institut de Ciències Fotòniques (Spain) and Radiantis (Spain); Hanyu Ye, ICFO - Institut de Ciències Fotòniques (Spain); Peter G. Schunemann, BAE Systems (USA); Majid Ebrahim-Zadeh, ICFO - Institut de Ciències Fotòniques (Spain) and Radiant Light SL (Spain) and Institució Catalana de Recerca i Estudis Avançats (Spain) [10516-30]

Highly efficient periodically poled KTP-isomorphs with large apertures and extreme domain aspect-ratios, Carlota Canalias, Andrius Zukauskas, Valdas Pasiskevicius, Fredrik Laurell, KTH Royal Institute of Technology (Sweden) and Tailored Photons AB (Sweden) [10516-31]

Zinc indiffused PPLN ridge waveguides, Lewis G. Carpenter, Sam A. Berry, James W. Field, Corin B. E. Gawith, Univ. of Southampton (United Kingdom) [10516-32]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Extending Z-scan to mid-IR regime, Sean P. O'Connor, Dawson T. Nodurft, Christopher B. Marble, Vladislav V. Yakovlev, Texas A&M Univ. (USA) [10516-43]

90° phase-matched Hg_{0.35}Cd_{0.65}Ga₂S₄ optical parametric oscillator pumped by a Nd:YAG laser, Nobuhiro Umemura, Chitose Institute of Science and Technology (Japan); Valentin Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Takayuki Okamoto, Okamoto Optics Works, Inc. (Japan); Kiyoshi Kato, Chitose Institute of Science and Technology (Japan) and Okamoto Optics Works, Inc. (Japan) [10516-44]

Fabrication of ridge waveguides in potassium titanyl phosphate (KTP) for nonlinear frequency conversion, Martin F. Volk, Christian E. Rüter, Detlef Kip, Helmut-Schmidt Univ. (Germany) [10516-45]

Domain engineering in PPLN waveguides for tailored QPM spectral response, Sam A. Berry, Lewis G. Carpenter, James W. Field, Peter G. R. Smith, Corin B. E. Gawith, Univ. of Southampton (United Kingdom) [10516-46]

Detection of electronic, orientational and thermal nonlinear refractive indices by polarization-resolved Z-scan measurements with a Q-switched and mode-locked laser, Emerson C. Barbano, Tiago G. B. de Souza, Sérgio C. Zilio, Lino Misoguti, Univ. de São Paulo (Brazil) [10516-47]

Upconversion of the mid-IR pulses to the near-IR in LiGaS₂, Kiyoshi Kato, Okamoto Optics Works, Inc. (Japan) and Chitose Institute of Science and Technology (Japan); Nobuhiro Umemura, Chitose Institute of Science and Technology (Japan); Takayuki Okamoto, Okamoto Optics Works, Inc. (Japan); Valentin Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) [10516-48]

Design and manufacture of single mode PPLN diced waveguides for quantum applications, Sam A. Berry, Lewis G. Carpenter, James W. Field, Corin B. E. Gawith, Univ. of Southampton (United Kingdom) [10516-49]

Ten-watt level picosecond parametric mid-IR source broadly tunable in wavelength, Michal Vybílečka, HiLASE Ctr. (Czech Republic), Charles Univ. in Prague (Czech Republic); Ondrej Novák, HiLASE Ctr. (Czech Republic); Lukáš Roškot, HiLASE Ctr. (Czech Republic), Czech Technical Univ. in Prague (Czech Republic); Martin Smrz, Jirí Muzík, Akira Endo, Tomáš Moček, HiLASE Ctr. (Czech Republic) [10516-50]

Broadband temperature-insensitivity of dispersion-engineered waveguides and resonators, Lijuan Xu, Liuqing He, Yuhao Guo, Tianjin Univ. (China); Kazumi Wada, Univ. of Tokyo (Japan); Lionel C. Kimerling, Anuradha Murthy Agarwal, Jurgen Michel, Massachusetts Institute of Technology (USA); Guifang Li, Tianjin Univ. (China) and Univ. of Central Florida (USA); Lin Zhang, Tianjin Univ. (China) [10516-51]

Modified nonlinear amplifying loop mirror for mode-locked fibre oscillators with record-high energy and high-average-power pulsed output, Sergey M. Kobtsev, Alexey Ivanenko, Sergey Smirnov, Alexey Kokhanovsky, Novosibirsk State Univ. (Russian Federation) . [10516-52]

Wavelength adjustability of frequency conversion light of Yb-doped fiber laser based on FBGs, Kazuma Dobashi, Yasuhiro Tomihari, Koichi Imai, Masayuki Hoshi, Junji Hirohashi, Satoshi Makio, Oxide Corp. (Japan) [10516-53]

Investigation of a second-, third- and fourth-harmonic generation at interfaces of a uniaxial crystal, Emerson C. Barbano, Tiago G. B. de Souza, Sérgio C. Zilio, Lino Misoguti, Univ. de São Paulo (Brazil) [10516-54]

A versatile, C-band spanning, high repetition rate, cascaded four wave mixing based multi wavelength source, B.S. Vikram, Roopa Prakash, K.P. Nagarjun, Shankar Kumar Selvaraja, V.R. Supradeepa, Indian Institute of Science (India) [10516-55]

Study of nonlinear liquid effects into ytterbium-doped fiber laser for multi-wavelength generation, Tania Lozano, Daniel Jauregui, Julián Estudillo, Luis Herrera, Roberto Rojas, Juan Hernandez, Juan Sierra, Univ. de Guanajuato (Mexico) [10516-56]

A birefringent phase-matching method in multilayered hyperbolic metamaterials, Prathan Buranasiri, King Mongkut's Institute of Technology Ladkrabang (Thailand); Surawut Wicharn, Srinakharinwirot Univ. (Thailand) [10516-57]

Semiclassical noise treatment of the generated supercontinuum light by finite energy Airy pulse, Abolfazl Safaei, Graduate Univ. of Advanced Technology - Kerman (Iran, Islamic Republic of); Mohammad Agha Bolorizadeh, Yazd Univ. (Iran, Islamic Republic of) [10516-59]

Compact efficient 236.5-nm laser with walk-off compensated BBO stack, Da Li, Huai-Chuan Lee, Helmut E. Meissner, Onyx Optics Inc. (USA) [10516-61]

Near fully compressed 1053 nm pulses directly obtained from 800 nm laser-seeded photonic crystal fiber below zero dispersion point, Zaharit Refaeli, Yariv Shamir, Soreq Nuclear Research Ctr. (Israel); Gilad Marcus, The Hebrew Univ. of Jerusalem (Israel) [10516-62]

WEDNESDAY 31 JANUARY

SESSION 9 WED 8:20 AM TO 9:50 AM

Optical Parametric Devices and Applications I

Session Chair: **Kenneth L. Schepler**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Advances in ultrafast mid-infrared optical parametric sources based on CdSiP₂ (Invited Paper), Chaitanya Kumar Suddapalli, Radiant Light SL (Spain) [10516-33]

First 1.57-micron-pumped CdSiP₂ optical parametric oscillator, Leonard A. Pomeranz, John C. McCarthy, Randy C. Day, Kevin T. Zawilski, Peter G. Schunemann, BAE Systems (USA) [10516-34]

Femtosecond deep-infrared optical parametric oscillator pumped directly by a Ti:sapphire laser, Callum O'Donnell, Chaitanya Kumar S., Radiant Light SL (Spain); Kevin T. Zawilski, Peter G. Schunemann, BAE Systems (USA); Majid Ebrahim-Zadeh, ICFO - Institut de Ciències Fotòniques (Spain) [10516-35]

Femtosecond Yb-fiber laser synchronously pumped HgGa₂S₄ OPO tunable in the 4.4-12- μ m range, Stefan Popien, Marcus Beutler, Ingo Rimke, APE Angewandte Physik & Elektronik GmbH (Germany); Dmitrii Badikov, Valeriy Badikov, Kuban State Technological Univ. (Russian Federation); Valentin Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) [10516-36]

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and Reinhart Poprawe, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 2:00 pm

SESSION 10 WED 2:00 PM TO 3:10 PM

Optical Parametric Devices and Applications II

Session Chair: **Konstantin L. Vodopyanov**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

- Fibre MOPA pumped MIR parametric wavelength conversion** (*Invited Paper*), Robert T. Murray, Timothy H. Runcorn, Imperial College London (United Kingdom); Shekhar Guha, Air Force Research Lab. (USA); James Roy Taylor, Imperial College London (United Kingdom) [10516-37]
- A new way of controlling NesCOPOs (nested cavity doubly resonant OPO) for faster and more efficient high resolution spectrum measurement**, Johann Georges des Aulnois, Benjamin Szymanski, Axel Grimieau, Léo Sillard, Blue Industry and Science (France) [10516-38]
- Mid-infrared generation based on orientation-patterned gallium arsenide**, Wenyan Tian, Rui Pu, Nadezhda Baranova, Ye Huang, Yelena Isyanova, Kevin F. Wall, Q-Peak, Inc. (USA); Peter G. Schunemann, BAE Systems (USA); Peter F. Moulton, MIT Lincoln Lab. (USA); Eric D. Park, Q-Peak, Inc. (USA) [10516-39]

SESSION 11 WED 3:40 PM TO 5:10 PM

Optical Parametric Devices and Applications III

Session Chair: **Kenneth L. Schepler**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

- Optical parametric oscillation in a random poly-crystalline medium: ZnSe ceramic** (*Invited Paper*), Konstantin L. Vodopyanov, Qitian Ru, Nathaniel Lee, Xuan Chen, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Kai Zhong, Tianjin Univ. (China); Mike Mirov, Sergey Vasilyev, IPG Photonics - Mid-Infrared Lasers (USA); Sergey B. Mirov, Univ. of Alabama at Birmingham (USA) [10516-40]
- Semiconductor parametric amplifiers using second order nonlinearities** (*Invited Paper*), Amr S. Helmy, Zhizhong Yan, Meng Lon Lu, Eric Chen, Univ. of Toronto (Canada) [10516-41]
- Advances in integrated parametric sources** (*Invited Paper*), Giuseppe Leo, Univ. Paris 7-Denis Diderot (France); Costantino De Angelis, Univ. degli Studi di Brescia (Italy); Michele Celebrano, Politecnico di Milano (Italy); Maurizio De Rosa, Istituto Nazionale di Ottica (Italy); Stefan Wabnitz, Univ. degli Studi di Brescia (Italy) and Istituto Nazionale di Ottica (Italy) [10516-42]

LASE

CONFERENCE 10517

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10517

Real-time Measurements, Rogue Phenomena, and Single-Shot Applications III

Conference Chairs: **Bahram Jalali**, Univ. of California, Los Angeles (USA); **Daniel R. Solli**, Univ. of California, Los Angeles (USA), Georg-August-Univ. Göttingen (Germany); **Günter Steinmeyer**, Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy (Germany)

Program Committee: **Nail Akhmediev**, The Australian National Univ. (Australia); **Mohammad H. Asghari**, Univ. of California, Los Angeles (USA); **Serge Bielawski**, Univ. des Sciences et Technologies de Lille (France); **John M. Dudley**, FEMTO-ST, Univ. de Franche - Comté, CNRS (France); **Moti Fridman**, Bar-Ilan Univ. (Israel); **Hideaki Furukawa**, National Institute of Information and Communications Technology (Japan); **Goëry Genty**, Tampere Univ. of Technology (Finland); **Georg Herink**, Georg-August-Univ. Göttingen (Germany); **Takuro Ideguchi**, The Univ. of Tokyo (Japan); **Dario Polli**, Politecnico di Milano (Italy); **Claus Ropers**, Georg-August-Univ. Göttingen (Germany); **Pierre Suret**, Lab. de Physique des Lasers, Atomes et Molécules (France); **Masayuki Suzuki**, Aichi Medical Univ. (Japan); **Majid Taki**, Univ. des Sciences et Technologies de Lille (France); **Paul D. Trinh**, Time Photonics, Inc. (USA)

MONDAY 29 JANUARY

OPENING REMARKS 8:00 AM TO 8:20 AM

Bahram Jalali, Univ. of California, Los Angeles (USA)

SESSION 1 MON 8:20 AM TO 10:00 AM

Laser Transients and Nonrepetitive Phenomena

Session Chair: **Daniel R. Solli**, Univ. of California, Los Angeles (USA), Georg-August-Univ. Göttingen (Germany)

Phase and amplitude single-shot measurement by using heterodyne time-lens and ultrafast digital time-holography (*Invited Paper*), Pierre Suret, Alexey M. Tikan, Christophe Szwej, Stephane Randoux, Serge Bielawski, Lab. de Physique des Lasers, Atomes et Molécules (France) [10517-1]

Excitation and control of soliton molecules in a femtosecond laser (*Invited Paper*), Felix Kurtz, Georg-August-Univ. Göttingen (Germany); Bahram Jalali, Daniel Solli, Univ. of California, Los Angeles (USA); Claus Ropers, Georg-August-Univ. Göttingen (Germany); Georg Herink, Univ. Bayreuth (Germany) [10517-2]

The picosecond structure of ultra-fast rogue waves (*Invited Paper*), Moti Fridman, Bar-Ilan Univ. (Israel) [10517-3]

Real-time full field measurements of transient dissipative soliton dynamics in a passively mode-locked laser (*Invited Paper*), Piotr Ryczkowski, Mikko Närhi, Tampere Univ. of Technology (Finland); Cyril Billet, Jean-Marc Merolla, Univ. Bourgogne Franche-Comté (France); Goëry Genty, Tampere Univ. of Technology (Finland); John M. Dudley, Univ. Bourgogne Franche-Comté (France) [10517-4]

Observing soliton explosion in unstable mode locked Yb fiber laser with time stretch spectroscopy (*Invited Paper*), Masayuki Suzuki, Aichi Medical Univ. (Japan); Ozdal Boyraz, Univ. of California, Irvine (USA); Mohammad H. Asghari, Paul D. Trinh, Time Photonics, Inc. (USA); Hiroto Kuroda, Aichi Medical Univ. (Japan); Bahram Jalali, Univ. of California, Los Angeles (USA) [10517-5]

SESSION 2 MON 10:30 AM TO 12:26 PM

Real-time Techniques

Session Chair: **Daniel R. Solli**, Univ. of California, Los Angeles (USA), Georg-August-Univ. Göttingen (Germany)

Single-shot recording of terahertz pulses at high repetition rate, using a combination of photonic time-stretch and electro-optic sampling (*Invited Paper*), Serge Bielawski, Clément Evain, Christophe Szwej, Marc Le Parquier, Univ. des Sciences et Technologies de Lille (France); Eléonore Roussel, Pascale Roy, Laurent Manceron, Synchrotron SOLEIL (France); Edmund Blomley, Erik Bründermann, Stefan Funkner, Karlsruher Institut für Technologie (Germany); Nicole Hiller, Paul Scherrer Institut (Switzerland); Gudrun Niehues, Patrik Schoenfeldt, Marcel Schuh, Johannes Steinmann, Sophie Walther, Anke-Susanne Mueller, Michael Nasse, Karlsruher Institut für Technologie (Germany) [10517-6]

Photonic time stretch to measure small spectral changes with broad wavelength coverage for high-speed coherent Raman microscopy (*Invited Paper*), Francesco Saltarelli, ETH Zurich (Switzerland); Vikas Kumar, Daniele Viola, Francesco Crisafi, Antonio Perri, Giulio Cerullo, Dario Polli, Politecnico di Milano (Italy) [10517-7]

Time stretch dispersive Fourier transform based single-shot pulse-by-pulse spectrum measurement using a pulse-repetition-frequency-variable gain-switched laser (*Invited Paper*), Hideaki Furukawa, Takeshi Makino, National Institute of Information and Communications Technology (Japan); Xiaomin Wang, Tetsuya Kobayashi, Optoquest Co., Ltd. (Japan); Mohammad H. Asghari, Paul D. Trinh, Time Photonics, Inc. (USA); Bahram Jalali, Univ. of California, Los Angeles (USA); Wai S. Man, Kwong S. Tsang, Amonics Ltd. (Hong Kong, China); Naoya Wada, National Institute of Information and Communications Technology (Japan) . . . [10517-8]

Fast wide-field Raman spectroscopic imaging based on multi-channel narrow-band imaging and Wiener estimation (*Invited Paper*), Quan Liu, Clint Perlaki, Yeu Cian Yoo, Nanyang Technological Univ. (Singapore) [10517-9]

Accuracy and precision in broadband laser ranging, Michelle A. Rhodes, Corey Bennett, Daniel Perry, Lawrence Livermore National Lab. (USA) [10517-10]

Dynamic chromo-angular-modal excitation of multimode waveguides via acousto-optic deflection, Jacky C. K. Chan, Sebastian Karpf, Bahram Jalali, Univ. of California, Los Angeles (USA) [10517-11]

Spectral gyroscope: dispersive Fourier transformation for gyroscopic effect evaluation with a bidirectional ultrafast fibre laser, Maria Chernysheva, Srikanth Sugavanam, Sergei Turitsyn, Aston Univ. (United Kingdom) [10517-12]

Lunch Break Mon 12:26 pm to 2:00 pm

SESSION 3..... MON 2:00 PM TO 3:28 PM

Nonlinear Dynamics and Measurements I

Session Chair: **Bahram Jalali**, Univ. of California, Los Angeles (USA)

Optical Kerr spatiotemporal dark extreme waves (*Invited Paper*), Stefan Wabnitz, Fabio Baronio, Univ. degli Studi di Brescia (Italy); Yuji Kodama, The Ohio State Univ. (USA) [10517-13]

Non-destructive phase and intensity distributed measurements of the nonlinear stage of modulation instability in optical fibers (*Invited Paper*), Arnaud Mussot, Lab. de Physique des Lasers, Atomes et Molécules (France); Stefano Trillo, Univ. degli Studi di Ferrara (Italy); Matteo Conforti, Francois Copie, Corentin Naveau, Alexandre Kudlinski, Univ. des Sciences et Technologies de Lille (France) [10517-14]

The role of intrapulse coherence in supercontinuum generation, Günter Steinmeyer, Nils Raabe, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Ayhan Demircan, Leibniz Univ. Hannover (Germany); Carsten Brée, Weierstrass-Institut für Angewandte Analysis und Stochastik (Germany) [10517-15]

Megahertz measurement rate wavemeter with sub-picometer resolution using second harmonic generation, Mathias Christensen, Norlase ApS (Denmark); Anders K. Hansen, Technical Univ. of Denmark (Denmark); Danny Noordegraaf, Peter M. W. Skovgaard, Norlase ApS (Denmark); Ole B. Jensen, Technical Univ. of Denmark (Denmark) [10517-16]

Optical dynamic range compression, Yunshan Jiang, Bahram Jalali, Univ. of California, Los Angeles (USA) [10517-17]

Coherent modes in a random fibre laser, Dmitry V. Churkin, Novosibirsk State Univ. (Russian Federation); Srikanth Sugavanam, Mariia Sorokina, Aston Univ. (United Kingdom) [10517-18]

SESSION 4..... MON 4:00 PM TO 5:00 PM

Nonlinear Dynamics and Measurements II

Session Chair: **Bahram Jalali**, Univ. of California, Los Angeles (USA)

Nonlinear Fourier transform for experimental characterization of pulsed fibre lasers, Srikanth Sugavanam, Morteza Kamalian-Kopae, Junsong Peng, Yaroslav Prylepyskiy, Sergei Turitsyn, Aston Univ. (United Kingdom) . [10517-19]

Polarization noise study in all-normal dispersion fiber supercontinuum generation, Ivan Bravo Gonzalo, Rasmus Dybbro Engelsholm, DTU Fotonik (Denmark); Andreas Falkenström Mieritz, Mads Peter Sørensen, Technical Univ. of Denmark (Denmark); Ole Bang, DTU Fotonik (Denmark) and NKT Photonics (Denmark) [10517-20]

A complete temporal ultrashort pulse characterization system by applying cascading second-order nonlinearity inside a spectrometer, Ning Hsu, Jean-Claude M. Diels, The Univ. of New Mexico (USA) .. [10517-21]

A real-time multi-gases detection and concentration measurements based-on a time-division multiplexed-lasers, Fatemeh Yazdandoust, Herve Tatenguem Fankem, Tobias Milde, Alvaro Jimenez, Joachim Sacher, Sacher Lasertechnik GmbH (Germany) [10517-22]

Symmetry breaking and polarization domain walls in a passive resonator, Bruno Garbin, The Univ. of Auckland (New Zealand); Julien Fatome, Univ. Bourgogne Franche-Comté (France); Yadong Wang, The Univ. of Auckland (New Zealand); Abdelkrim Bendahmane, Univ. Bourgogne Franche-Comté (France); Gian-Luca Oppo, Univ. of Strathclyde (United Kingdom); Stuart G. Murdoch, Miro Erkintalo, Stephane Coen, The Univ. of Auckland (New Zealand) [10517-23]

TUESDAY 30 JANUARY

TUESDAY POSTER SESSION.....TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Laser goniometer used for remote measurement of angular position and movement for metrology, Nkpoikanke A. Eno, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [10517-24]

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- Metrology tools

CONFERENCE 10518

Monday–Thursday 29–1 February 2018 • Proceedings of SPIE Vol. 10518

Laser Resonators, Microresonators, and Beam Control XX

Conference Chairs: **Alexis V. Kudryashov**, Institute of Geosphere Dynamics (Russian Federation); **Alan H. Paxton**, Air Force Research Lab. (USA); **Vladimir S. Iichenko**, OEwaves, Inc. (USA)

Conference Co-Chair: **Lutz Aschke**, TRUMPF Lasertechnik GmbH (Germany)

Program Committee: **Andrea M. Armani**, The Univ. of Southern California (USA); **Gaurav Bahl**, Univ. of Illinois (USA); **Yanne K. Chembo**, FEMTO-ST (France); **Jean-Claude M. Diels**, The Univ. of New Mexico (USA); **Hans Joachim Eichler**, Technische Univ. Berlin (Germany); **Andrew Forbes**, Univ. of the Witwatersrand, Johannesburg (South Africa); **Pierre Galarneau**, INO (Canada); **Michael L. Gorodetsky**, Russian Quantum Ctr. (Russian Federation); **Thomas Graf**, Univ. Stuttgart (Germany); **Tobias J. Kippenberg**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **James R. Leger**, Univ. of Minnesota, Twin Cities (USA); **Andrey B. Matsko**, OEwaves, Inc. (USA); **Gualtiero Nunzi Conti**, Istituto di Fisica Applicata “Nello Carrara” (Italy); **Andrew W. Poon**, Hong Kong Univ. of Science and Technology (Hong Kong, China); **Michael J. Scaggs**, Haas Laser Technologies, Inc. (USA); **Haiyin Sun**, ChemImage Corp. (USA); **Yun-Feng Xiao**, Peking Univ. (China); **Lei Xu**, Fudan Univ. (China); **Lan Yang**, Washington Univ. in St. Louis (USA)

MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:00 AM

Novel Microresonator Topologies and Sensors I

Session Chair: **Vladimir S. Iichenko**, OEwaves, Inc. (USA)

Electro-optic tuning of potassium tantalate-niobate whispering-gallery resonators, Jan Szabados, Sushanth Kini Manjeshwar, Univ. of Freiburg (Germany); Ingo Breunig, Karsten Buse, Univ. of Freiburg (Germany) and Fraunhofer-Institut für Physikalische Messtechnik (Germany) [10518-1]

Nanofiber nanoscopy and quantum noise limited biosensing (*Invited Paper*), Lars Madsen, The Univ. of Queensland (Australia) . . . [10518-2]

Nonlinear behavior in hybrid microcavities (*Invited Paper*), Andrea M. Armani, Dongyu Chen, Andre Kovach, Xiaoqin Shen, Hyungwoo Choi, Soheil Soltani, The Univ. of Southern California (USA) [10518-3]

Hollow whispering gallery resonators (*Invited Paper*), Sho Kasumie, Okinawa Institute of Science and Technology Graduate Univ (Japan); Fuchuan Lei, Ramgopal Madugani, Jonathan M. Ward, Yong Yang, Sile Nic Chormaic, Okinawa Institute of Science and Technology Graduate Univ. (Japan) [10518-4]

Microcomb LIDAR using counter-propagating solitons (*Invited Paper*), Kerry J. Vahala, California Institute of Technology (USA) [10518-5]

SESSION 2 MON 10:30 AM TO 12:10 PM

Quantum Optics with Microresonators

Session Chair: **Andrea M. Armani**, The Univ. of Southern California (USA)

Efficient coupling of organic molecules to microcavities with ultrasmall mode volume (*Invited Paper*), Vahid Sandoghdar, Max-Planck-Institut für die Physik des Lichts (Germany) [10518-6]

Chip-integrated nanocavities for efficient room-temperature single photon sources, spin-photon interfaces, and few-photon nonlinear optics (*Invited Paper*), Dirk R. Englund, Massachusetts Institute of Technology (USA) [10518-7]

Exciton-polaritons as a semiconductor platform for quantum simulations (*Invited Paper*), Alexey Kavokin, Univ. of Southampton (United Kingdom) [10518-8]

Practical excitation schemes for integrated micro-cavity-based quantum frequency combs (*Invited Paper*), Piotr Roztock, Institut National de la Recherche Scientifique (Canada); Michael Kues, Institut National de la Recherche Scientifique (Canada) and Univ. of Glasgow (United Kingdom); Christian Reimer, Institut National de la Recherche Scientifique (Canada); Benjamin Wetzel, Institut National de la Recherche Scientifique (Canada) and Univ. of Sussex (United Kingdom); Stefania Sciara, Institut National de la Recherche Scientifique (Canada) and Univ. degli Studi di Palermo (Italy); Yanbing Zhang, Institut National de la Recherche Scientifique (Canada); Alfonso Cino, Univ. degli Studi di Palermo (Italy); Sai T. Chu, City Univ. of Hong Kong (China); Brent E. Little, Xi'an Institute of Optics and Precision Mechanics, CAS (China); David J. Moss, Swinburne Univ. of Technology (Australia); Roberto Morandotti, Institut National de la Recherche Scientifique (Canada) and Univ. of Electronic Science and Technology of China (China) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) [10518-9]

Lunch Break Mon 12:10 pm to 1:25 pm

SESSION 3 MON 1:25 PM TO 3:25 PM

Microresonators and Optical Frequency Combs I

Joint Session with Conferences 10516 and 10518

Session Chair: **Andrey B. Matsko**, OEwaves, Inc. (USA)

Microwave and RF applications of optical micro-combs (*Invited Paper*), David J. Moss, Swinburne Univ. of Technology (Australia) [10518-10]

Dissipative Kerr solitons in optical microresonators (*Invited Paper*), Tobias J. Kippenberg, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10518-11]

Temporal cavity solitons in synchronously driven Fabry-Perot microresonators (*Invited Paper*), Tobias Herr, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); Ewelina Obrzud, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) and Univ. de Genève (Switzerland); Steve Lecomte, Victor Brasch, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) [10518-12]

Advances on nonlinear phenomena in WGM resonators, Yanne K. K. Chembo, FEMTO-ST (France) and Georgia Tech-Lorraine (France) [10518-13]

Gallium phosphide microresonator frequency combs (*Invited Paper*), Simon Hönl, Katharina Schneider, IBM Research - Zürich (Switzerland); Miles Anderson, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Dalziel Wilson, IBM Research - Zürich (Switzerland); Tobias J. Kippenberg, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Paul Seidler, IBM Research - Zürich (Switzerland) [10518-14]

SESSION 4..... MON 3:55 PM TO 6:05 PM

Microresonators and Optical Frequency Combs II

Joint Session with Conferences 10516 and 10518

Session Chair: **Konstantin L. Vodopyanov**, CREOL,
The College of Optics and Photonics, Univ. of Central Florida (USA)

Kerr-microresonator combs for low-noise frequency synthesis (*Invited Paper*), Scott Diddams, Scott Papp, National Institute of Standards and Technology (USA)..... [10516-12]

Dynamics and locking of switching waves in a normally dispersive fiber ring resonator, Bruno Garbin, Yadong Wang, Stuart G. Murdoch, Univ. of Auckland (New Zealand); Gian-Luca Oppo, Univ. of Strathclyde (United Kingdom); Stephane Coen, Miro Erkintalo, Univ. of Auckland (New Zealand)..... [10518-15]

Whispering gallery optical parametric oscillators for the mid-infrared spectral range (*Invited Paper*), Ingo Breunig, Kevin Hanka, Yuechen Jia, Univ. of Freiburg (Germany); Karsten Buse, Univ. of Freiburg (Germany) and Fraunhofer-Institut für Physikalische Messtechnik (Germany)..... [10516-13]

Saturable absorption by carbon nanotubes on silica microtoroids for stable mode-locking, Tsutaru Kumagai, Naoya Hirota, Katsuya Sato, Koki Namiki, Atsuhiko Hori, Hideyuki Maki, Takasumi Tanabe, Keio Univ. (Japan)..... [10518-16]

Wideband critically-coupled resonators, Clément Arlotti, Antoine Monmayrant, Olivier Gauthier-Lafaye, Napoléon Gutierrez, Arnaud Fernandez, Olivier Llopis, Stéphane Calvez, Lab. d'Analyse et d'Architecture des Systèmes (France)..... [10518-17]

Agile generation of microresonator-based frequency combs without pump detuning and local temperature controlling, Jing Wang, Tianjin Univ. (China); Lijuan Xu, Tianjin Univ. of Technology and Education (China); Yuhao Guo, Tianjin Univ. (China); Alan E. Willner, Univ. of Southern California (USA); Guifang Li, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Lin Zhang, Tianjin Univ. (China)..... [10518-18]

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:00 AM TO 10:10 AM

Microresonator Lasers and RF Photonics

Session Chair: **Yanne K. K. Chembo**, FEMTO-ST (France)

Low threshold dye whispering gallery mode microlasers fabricated by two-photon polymerization, Nathália B. Tomazio, Leonardo De Boni, Cleber R. Mendonça, Instituto de Física de São Carlos (Brazil)..... [10518-19]

Highly efficient polarization-selective out-coupling of harmonic light in birefringent WGM resonators, Luke S. Trainor, Univ. of Otago (New Zealand); Florian Sedlmeir, Max-Planck-Institut für die Physik des Lichts (Germany) and Univ. of Otago (New Zealand); Christian Peuntinger, Harald G. L. Schwefel, Univ. of Otago (New Zealand)..... [10518-20]

Optical square waves from a nonlinear amplifying loop mirror laser, A. Aadhi, Institut National de la Recherche Scientifique (Canada); Anton V. Kovalev, ITMO Univ. (Russian Federation); Michael Kues, Institut National de la Recherche Scientifique (Canada) and Univ. of Glasgow (United Kingdom); Piotr Roztocky, Christian Reimer, Yanbing Zhang, Institut National de la Recherche Scientifique (Canada); Tao Wang, Institut National de la Recherche Scientifique (Canada) and Univ. of Electronic Science and Technology of China (China); Brent E. Little, State Key Lab. of Transient Optics and Photonics (China); Sai T. Chu, City Univ. of Hong Kong (China); David J. Moss, Swinburne Univ. of Technology (Australia); Zhiming Wang, Univ. of Electronic Science and Technology of China (China); Evgeny Viktorov, ITMO Univ. (Russian Federation); Roberto Morandotti, Institut National de la Recherche Scientifique (Canada) and ITMO Univ. (Russian Federation) and Univ. of Electronic Science and Technology of China (China)..... [10518-21]

Ultra-low noise microwave signal generation with an optical frequency comb (*Invited Paper*), Xiaopeng Xie, Romain Bouchand, Daniele Nicolodi, Observatoire de Paris (France); Michele Giunta, Wolfgang Hänsel, Matthias Lezius, Menlo Systems GmbH (Germany); Abhay Joshi, Shubhashish Datta, Discovery Semiconductors, Inc. (USA); Christophe Alexandre, CNAM-Lab. Cédric (France); Michel Lours, Observatoire de Paris (France); Pierre-Alain Tremblin, Giorgio Santarelli, Lab. Photonique, Numérique et Nanosciences (France); Ronald Holzwarth, Menlo Systems GmbH (Germany); Yann Le Coq, Observatoire de Paris (France)..... [10518-22]

Diode laser self-injection locking and mode-locking with whispering-gallery mode microresonators (*Invited Paper*), Michael L. Gorodetsky, Nikita M. Kondratiev, Valery E. Lobanov, Andrey S. Voloshin, Russian Quantum Ctr. (Russian Federation); Nikolay Pavlov, Russian Quantum Ctr. (Russian Federation) and Moscow Institute of Physics and Technology (Russian Federation); Grigory Lihachev, Artem Shitikov, Russian Quantum Ctr. (Russian Federation) and M.V. Lomonosov Moscow State Univ. (Russian Federation)..... [10518-23]

Whispering gallery mode resonators for mid-IR quantum and interband cascade laser analysis and control, Mario Siciliani de Cumis, Agenzia Spaziale Italiana (Italy); Simone Borri, Giacomo Insero, Silvia Viciani, Francesco D'Amato, Istituto Nazionale di Ottica (Italy) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Gabriele Santambrogio, Istituto Nazionale di Ricerca Metrologica (Italy); Davide D'Ambrosio, Istituto Nazionale di Ottica (Italy) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Anatoliy Savchenkov, Danny Eliyahu, Vladimir Ilchenko, Andrey Matsko, Lute Maleki, OEwaves, Inc. (USA); Paolo De Natale, Istituto Nazionale di Ottica (Italy) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy)..... [10518-24]

SESSION 6..... TUE 10:40 AM TO 12:40 PM

Quantum Optics and Optomechanics with Microresonators

Session Chair: **Michael L. Gorodetsky**,
Russian Quantum Ctr. (Russian Federation)

Quantum state control in single quantum dots and the coupling with photonic crystal cavities (*Invited Paper*), Xiulai Xu, Kai Peng, Chenjiang Qian, Institute of Physics, Chinese Academy of Sciences (China)..... [10518-25]

Spin nano-optomechanics (*Invited Paper*), Paul Barclay, Univ. of Calgary (Canada)..... [10518-26]

Surface scattering and opto-mechanical effects in droplet microresonators (*Invited Paper*), Gianluca Gagliardi, Istituto Nazionale di Ottica (Italy)..... [10518-27]

Chiral optomechanical cooling and disorder suppression (*Invited Paper*), Seunghwi Kim, Univ. of Illinois at Urbana-Champaign (USA); Xunnong Xu, Joint Quantum Institute (USA); Jacob M. Taylor, Joint Quantum Institute (USA) and Joint Ctr. for Quantum Information and Computer Science, NIST (USA); Gaurav Bahl, Univ. of Illinois at Urbana-Champaign (USA)..... [10518-28]

Incoherently pumped lasing and self-pumped three-wave mixing in laser-active whispering-gallery resonators, Simon J. Herr, Univ. of Freiburg (Germany); Karsten Buse, Ingo Breunig, Fraunhofer-Institut für Physikalische Messtechnik (Germany) and Univ. of Freiburg (Germany)..... [10518-29]

Lunch/Exhibition Break..... Tue 12:40 pm to 2:10 pm

SESSION 7..... TUE 2:10 PM TO 3:30 PM

Novel Microresonator Topologies and Sensors II

Session Chair: **Gaurav Bahl**, Univ. of Illinois (USA)

Using the lasing threshold in whispering gallery mode resonators for refractive index sensing, Alexandre François, Univ. of South Australia (Australia); Harald G. L. Schwefel, Univ. of Otago (New Zealand); Tanya M. Monro, Univ. of South Australia (Australia)..... [10518-30]

Dual coupler coupled cavities optical gyroscope with enhanced performance, George A. Adib, Yasser M. Sabry, Diaa Khalil, Ain Shams Univ. (Egypt)..... [10518-31]

Environmentally stable integrated ultra-high-Q optical cavities, Dongyu Chen, Andre Kovach, Xiaoqin Shen, The Univ. of Southern California (USA); Sumiko Poust, Northrop Grumman Corp. (USA); Andrea M. Armani, The Univ. of Southern California (USA)..... [10518-32]

Mid-infrared whispering gallery resonators based on non-oxide nonlinear optical crystals, Yuechen Jia, Kevin Hanka, Univ. of Freiburg (Germany); Ingo Breunig, Karsten Buse, Univ. of Freiburg (Germany) and Fraunhofer-Institut für Physikalische Messtechnik (Germany)..... [10518-33]

CONFERENCE 10518

SESSION 8 TUE 4:00 PM TO 5:00 PM

Novel Microresonator Topologies and Sensors III

Session Chair: **Vladimir S. Ichenko**, OEwaves, Inc. (USA)

Microstructured optical fibers for evanescent coupling to passive whispering gallery mode microspheres, Nicolas Riesen, Univ. of South Australia (Australia) [10518-34]

Sensitivity-enhanced intracavity-absorption acetylene sensor based on mode competition, Haiwei Zhang, Liangcheng Duan, Wei Shi, Ying Lu, Jianquan Yao, Tianjin Univ. (China) [10518-35]

Refractive Index dip sensor based on mode-splitting of whispering gallery modes, Yvonne Qiongyue Kang, Nicolas Riesen, Alexandre François, Tanya M. Monro, Univ. of South Australia (Australia) [10518-37]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Analysis and optimization of a triple-coated microdisk resonator coupled by a waveguide, Mengyu Wang, Xueying Jin, Fei Li, Jing Wang, Liming Chen, Keyi Wang, Univ. of Science and Technology of China (China) [10518-36]

Dielectric equilateral triangle microresonators: Integral equations and semiclassical physics approaches, Illia Sukharevskyi, Technische Univ. München (Germany); Mélanie Lebental, Stefan Bittner, Ecole Normale Supérieure de Cachan (France) [10518-67]

Controlled Fano resonances in a robust quasi-cylindrical microresonator photonic system, Xueying Jin, Mengyu Wang, Univ. of Science and Technology of China (China); Yongchao Dong, Guangdong Univ. of Technology (China); Jing Wang, Fei Li, Keyi Wang, Univ. of Science and Technology of China (China) [10518-68]

Investigation of an ultra large mode area power amplifier stage for a pulsed 1550-nm laser system, Leanne J. Henry, Air Force Research Lab. (USA); Michael Klopfer, Ravinder K. Jain, Leidos, Inc. (USA) [10518-69]

Fractal modes and multibeam generation from hybrid microlaser resonators, José A. Rivera, Austin Steinforth, Thomas Galvin, J. Gary Eden, Univ. of Illinois at Urbana-Champaign (USA) [10518-71]

Efficient octave-spanning frequency comb generation in normal dispersion regime, Minghui Yang, Yuhao Guo, Lin Zhang, Tianjin Univ. (China); Guifang Li, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Alan E. Willner, Univ. of Southern California (USA) [10518-72]

Longitudinally excited CO₂ laser with short laser pulse and high quality beam, Kazuyuki Uno, Jianhui Li, Hayato Goto, Univ. of Yamanashi (Japan); Takahisa Jitsuno, Osaka Univ. (Japan) [10518-73]

High-efficiency coupling to small-core microstructured fibers for broadband dispersion characterization, Dmytro Suslov, Matej Komanec, Tomas Nemecek, Stanislav Zvanovec, Czech Technical Univ. in Prague (Czech Republic) [10518-74]

New topologies of femtosecond Er:fibre laser cavities, Sergey M. Kobtsev, Novosibirsk State Univ. (Russian Federation); Boris Nyushkov, Institute of Laser Physics (Russian Federation) and Novosibirsk State Univ. (Russian Federation); Natalia Koliada, Institute of Laser Physics (Russian Federation); Alexander Antropov, Novosibirsk State Univ. (Russian Federation) and Institute of Laser Physics (Russian Federation); Victor Pivtsov, Institute of Laser Physics (Russian Federation); Arkadii Yakovlev, Novosibirsk State Univ. (Russian Federation) [10518-75]

High spatial resolution bimorph deformable mirror for laser beam control, Alexis V. Kudryashov, Institute of Geosphere Dynamics (Russian Federation) and Moscow Polytechnic Univ. (Russian Federation); Vadim Samarkin, Institute of Geosphere Dynamics (Russian Federation); Arkady Skvortsov, Danila Pshonkin, Vladimir Toporovsky, Moscow Polytechnic Univ. (Russian Federation) [10518-76]

WEDNESDAY 31 JANUARY

SESSION 9 WED 8:30 AM TO 9:50 AM

Laser Mode Control and Modeling I

Session Chair: **Alexis V. Kudryashov**,
Institute of Geosphere Dynamics (Russian Federation)

Dynamically stable operation of a 100-watt level CW single frequency ring laser at 1064 nm, Niklaus U. Wetter, Allan Bereczki, Amauri A. Ferreira, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10518-38]

Understanding of solid state laser resonator design aspects and trade-off design simulations for a mJ Er:Yb:phosphate glass laser, Arunika Kumari, Indian Institute of Space Science and Technology (India); Raja V.L. N. Sridhar, Anjana Venkat, A.S. Laxmiprasad, Kalpana Aravind, Indian Space Research Organisation (India) [10518-39]

FPGA based laser frequency stabilization using FM spectroscopy, Christian Spindeldreier, Wolfgang Bartosch, Thijs Wendrich, Ernst M. Rasel, Wolfgang Ertmer, Holger Blume, Leibniz Univ. Hannover (Germany) [10518-40]

Characterization on the effect of group delay in a total reflection prism ring resonator, Dong Li, Jianlin Zhao, Northwestern Polytechnical Univ. (China) [10518-41]

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and **Reinhart Poprawe**, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 2:00 pm

SESSION 10 WED 2:00 PM TO 3:05 PM

Laser Mode Control and Modeling II

Session Chair: **Jean-Claude M. Diels**, The Univ. of New Mexico (USA)

Analytic treatment of high power diode pumped lasers with unstable resonator in a flowing medium (*Invited Paper*), Glen P. Perram, Athanasios Gavrielides, L. A. Schlie, Robert D. Loper, Michael R. Hawks, Air Force Institute of Technology (USA) [10518-42]

Side-pumped Nd:YLF/KGW intracavity Raman laser in DBMC configuration at 1147 nm and at 1163 nm, Niklaus U. Wetter, Marilyn S. Ferreira, Helen M. Pask, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10518-43]

Spectrally stabilized high-power high-brightness DBR-tapered lasers in the VIS and NIR range, Bernd Sumpf, Katrin Paschke, Ferdinand-Braun-Institut (Germany) [10518-44]

SESSION 11 WED 3:35 PM TO 5:00 PM

Adaptive Optics I

Session Chair: **Alan H. Paxton**, Air Force Research Lab. (USA)

Comparison of the efficiency of laser beam focusing through the scattering medium using 14- and 31-channel bimorph mirrors (*Invited Paper*), Ilya Galaktionov, Active Optics Night N Ltd. (Russian Federation) and Institute of Geosphere Dynamics (Russian Federation) and Moscow Polytech (Russian Federation); Alexis Kudryashov, Julia Sheldakova, Alexander Nikitin, Vadim Samarkin, Institute of Geosphere Dynamics (Russian Federation) and Active Optics Night N Ltd. (Russian Federation) ... [10518-45]

Development of an adaptive laser beam shaper, Hans-Georg König, Oliver Pütsch, Felix Lange, RWTH Aachen Univ. (Germany); Jochen Stollenwerk, Peter Loosen, RWTH Aachen Univ. (Germany) and Fraunhofer-Institut für Lasertechnik (Germany) ... [10518-46]

Arbitrary control of the polarization state and intensity of non-diffracting beams along their propagation direction, Ahmed Dorrah, Univ. of Toronto (Canada); Mateus Corato-Zanarella, Michel Zamboni-Rached, Univ. Estadual de Campinas (Brazil); Mo Mojahedi, Univ. of Toronto (Canada) ... [10518-47]

High-energy OPA stability control with adaptive lenses, Martino Quintavalla, CNR-IFN Padova (Italy); Jacopo Mocci, Univ. degli Studi di Verona (Italy); Matteo Negro, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Riccardo Muradore, Univ. degli Studi di Verona (Italy); Anna Ciriolo, Michele Devetta, Salvatore Stagira, Caterina Vozzi, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Stefano Bonora, CNR-IFN Padova (Italy) ... [10518-48]

THURSDAY 1 FEBRUARY

SESSION 12 THU 8:00 AM TO 9:05 AM

Adaptive Optics II

Session Chair: **Jean-Claude M. Diels**, The Univ. of New Mexico (USA)

Large deformable mirrors for above 400-mm diameter PetaWatt laser beamlines (*Invited Paper*), Xavier Levecq, Guillaume Beaugrand, Nadezda Varkentina, Imagine Optic SA (France) ... [10518-49]

Adaptive optics strategy to securely optimize ultra intense laser focalization at full power, Xavier Levecq, Guillaume Beaugrand, Imagine Optic SA (France) ... [10518-50]

Formation of the doughnut and Super-Gaussian intensity distribution by means of different types of wavefront correctors, Anna Lylova, Moscow Polytech (Russian Federation); Julia Sheldakova, Institute of Geosphere Dynamics (Russian Federation) and Moscow Polytech (Russian Federation); Alexis Kudryashov, Vadim Samarkin, Alexander Nikitin, Institute of Geosphere Dynamics (Russian Federation); Alexey Rukosuev, Moscow Polytech (Russian Federation) ... [10518-51]

SESSION 13 THU 9:05 AM TO 10:10 AM

Ultrashort Laser

Session Chair: **James R. Leger**, Univ. of Minnesota, Twin Cities (USA)

Conditions for creating super-radiant emission in the sky (*Invited Paper*), Jean-Claude M. Diels, Ladan Arissian, The Univ. of New Mexico (USA) ... [10518-52]

High power ultrafast laser sources based on multimode fiber, Logan Wright, Cornell Univ. (USA); Demetrios N. Christodoulides, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Frank W. Wise, Cornell Univ. (USA) ... [10518-53]

Femtosecond laser transverse mode conversion by an achromatic volume phase mask, Evan R. Hale, Ivan B. Divlianky, Leonid B. Glebov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) ... [10518-54]

SESSION 14 THU 10:40 AM TO 12:05 PM

Beam Characterization and Shaping I

Session Chair: **Lutz Aschke**, TRUMPF Lasertechnik GmbH (Germany)

Anamorphic beam shaping for efficient laser homogenization: Methods and high power applications (*Invited Paper*), Christoph Tillkorn, TRUMPF Laser GmbH (Germany); Andreas Heimes, Daniel Flamm, TRUMPF Laser- und Systemtechnik GmbH (Germany); Stefan Dorer, Julian Hellstern, TRUMPF Laser GmbH (Germany); Christian Lingel, Felix Marschall, TRUMPF Laser- und Systemtechnik GmbH (Germany) ... [10518-55]

Analysis of wavefront structures of diode lasers by their spatial and current depended evolution, Inga-Maria Eichentopf, Martin Reufer, Hochschule Ruhr West (Germany) ... [10518-56]

M-squared measurement with improved repeatability for CW to single pulse lasers, Michael J. Scaggs, Gilbert Haas, Haas Laser Technologies, Inc. (USA) ... [10518-57]

Solving the logarithmic Monge-Ampère equation with a RK4 algorithm for beam shaping purposes of femtosecond laser beams with a spatial light modulator, Alexander Kratsch, Hochschule Mittweida (Germany) ... [10518-58]

Lunch/Exhibition Break Thu 12:05 pm to 1:05 pm

SESSION 15 THU 1:05 PM TO 3:50 PM

Beam Characterization and Shaping II

Session Chair: **Michael J. Scaggs**, Haas Laser Technologies, Inc. (USA)

Compensation of the laser diode smile by the use of micro optics, Thomas Mitra, Gabriel Pelegrina-Bonilla, LIMO Lissotschenko Mikroskop GmbH (Germany) ... [10518-59]

A novel laser resonator for fractal modes, Hend Sroor, Univ. of the Witwatersrand, Johannesburg (South Africa); Darryl Naidoo, CSIR National Laser Ctr. (South Africa); Johannes Courtial, Univ. of Glasgow (United Kingdom); Andrew Forbes, Univ. of the Witwatersrand, Johannesburg (South Africa) ... [10518-60]

The evolution of the optical vortices in optically induced 2D square photonic lattice, Yali Qin, Linlin Xue, Wensu Yu, Hongliang Ren, Zhejiang Univ. of Technology (China) ... [10518-61]

Manipulation of Airy beams in photonic lattices by means of optical Bloch oscillation, Fajun Xiao, Wuyun Shang, Jianlin Zhao, Northwestern Polytechnical Univ. (China) ... [10518-62]

Non-paraxial diffractive and refractive laser beam shaping, Frank Wyrowski, Friedrich-Schiller-Univ. Jena (Germany); Roberto Knoth, LightTrans International UG (Germany); Liangxin Yang, Friedrich-Schiller-Univ. Jena (Germany); Christian Hellmann, Wyrowski Photonics UG (Germany) ... [10518-63]

Power handling for LCoS spatial light modulators, Kipp Bauchert, Neil Rebolledo, Meadowlark Optics, Inc. (USA) ... [10518-64]

Gradient-index beam shapers: Fabricated devices and 3D design (*Invited Paper*), W. Minster Kunkel, Ali Ghoreyshi, Univ. of Minnesota, Twin Cities (USA); Glen Douglass, Simon Gross, Michael J. Withford, Macquarie Univ. (Australia); James R. Leger, Univ. of Minnesota, Twin Cities (USA) ... [10518-65]

Generation and amplification of vector vortex beams, Hend Sroor, Univ. of the Witwatersrand, Johannesburg (South Africa); Nyameko Lisa, Igor Litvin, Darryl Naidoo, CSIR National Laser Ctr. (South Africa); Andrew Forbes, Univ. of the Witwatersrand, Johannesburg (South Africa) ... [10518-66]

CONFERENCE 10519

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10519

Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XXIII

Conference Chairs: **Beat Neuenschwander**, Berner Fachhochschule Technik und Informatik (Switzerland); **Costas P. Grigoropoulos**, Univ. of California, Berkeley (USA); **Tetsuya Makimura**, Univ. of Tsukuba (Japan); **Gediminas Račiukaitis**, Ctr. for Physical Sciences and Technology (Lithuania)

Program Committee: **Craig B. Arnold**, Princeton Univ. (USA); **J. Thomas Dickinson**, Washington State Univ. (USA); **Jan J. Dubowski**, Univ. de Sherbrooke (Canada); **Bo Gu**, Bos Photonics (USA); **Henry Helvajian**, The Aerospace Corp. (USA); **Sami T. Hendow**, ALP (USA); **Guido Hennig**, Daetwyler Graphics AG (Switzerland); **Heinz P. Huber**, Hochschule für Angewandte Wissenschaften München (Germany); **Michel Meunier**, Ecole Polytechnique de Montréal (Canada); **Carlos Molpeceres**, Univ. Politécnica de Madrid (Spain); **Yoshiki Nakata**, Osaka Univ. (Japan); **Hiroyuki Niino**, National Institute of Advanced Industrial Science and Technology (Japan); **Alberto Piqué**, U.S. Naval Research Lab. (USA); **Andrei V. Rode**, The Australian National Univ. (Australia); **Stephan Roth**, BLZ Bayerisches Laserzentrum GmbH (Germany); **Klaus Sokolowski-Tinten**, Univ. Duisburg-Essen (Germany); **Razvan Stoian**, Lab. Hubert Curien (France); **Koji Sugioka**, RIKEN (Japan); **Xianfan Xu**, Purdue Univ. (USA); **Steven M. Yalisove**, Univ. of Michigan (USA)

Conference Sponsors:  

MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:20 AM

Industrial Applications I: Processes and Applications

Session Chair: **Gediminas Račiukaitis**,
Ctr. for Physical Sciences and Technology (Lithuania)

Laser ablation of copper for microelectronics (*Invited Paper*),
Jan Kleinert, Zhibin Lin, Hisashi Matsumoto, Electro Scientific Industries, Inc.
(USA) [10519-1]

Advanced laser material processing of steel and silicon (*Invited Paper*),
Andreas Michalowski, Heiko Ridderbusch, Stephanie Karg, Franziska Bauer,
Alexander Kroschel, Mawuli Ametowobla, Martin Lustfeld, Gerhard Kunz,
Thomas Kiedrowski, Dmitriy Mikhaylov, Adina K. Kanstinger, Ulrich Graf,
Robert Bosch GmbH (Germany) [10519-2]

**Machining of semiconductors and dielectrics with ultra-short pulses:
Influence of the wavelength and pulse bursts**, Beat Neuenschwander,
Beat Jäggi, Stefan M. Remund, Berner Fachhochschule Technik und
Informatik (Switzerland); Sergei M. Pimenov, A. M. Prokhorov General Physics
Institute of the Russian Academy of Sciences (Russian Federation) . . [10519-3]

**Micromachining using pulse-bursts: Influence of the pulse duration
and the number of pulses in the burst on the specific removal rate**,
Beat Jäggi, Berner Fachhochschule Technik und Informatik (Switzerland)
and LASEA Switzerland (Switzerland); Beat Neuenschwander, Berner
Fachhochschule Technik und Informatik (Switzerland); Camille Hairaye,
Jose Antonio Ramos de Campos, Lasea (Belgium); Paul-Etienne Martin,
Mathieu Dijoux, Lasea France (France) [10519-4]

Advanced welding of transparent materials by ultrashort laser pulses,
Felix Zimmermann, Michael Jenne, Daniel G. Grossmann, Malte Kumkar,
TRUMPF Laser- und Systemtechnik GmbH (Germany) [10519-5]

SESSION 2 MON 10:50 AM TO 12:30 PM

Industrial Applications II: Towards Digital Photonics Production

Session Chair: **Andreas Michalowski**,
Robert Bosch GmbH (Germany)

Digital photonic production along the lines of industry 4.0 (*Invited Paper*),
Reinhard Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . [10519-6]

**Beam delivery methods for highly efficient USP-laser micro structuring
of large cylindrical surfaces for printing and embossing tools**,
Guido Hennig, Daetwyler Graphics AG (Switzerland); Stephan Brüning,
Scheppers GmbH & Co., KG (Germany); Beat Neuenschwander, Beat Jäggi,
Adrian Stirnimann, Berner Fachhochschule Technik und Informatik
(Switzerland) [10519-7]

**Correlation between ablation efficiency, surface morphology, and
multipass capability using a 100-W 10-MHz ultrafast laser**, John Lopez,
Ctr. Lasers Intenses et Applications (France) and ALPhANOV (France);
Girolamo Mincuzzi, ALPhANOV (France); Konstantin Mishchik, Eric Audouard,
Eric P. Mottay, Amplitude Systèmes (France); Rainer Kling, ALPhANOV
(France) [10519-8]

Ultra-short pulse fiber beam delivery in micromachining applications,
Max C. Funck, Björn Wedel, Sebastian Eilzer, PT Photonic Tools GmbH
(Germany) [10519-9]

Lunch Break Mon 12:30 pm to 2:00 pm

SESSION 3 MON 2:00 PM TO 3:40 PM

Diagnostics and its Applications

Session Chair: **Guido Hennig**, Daetwyler Graphics AG (Switzerland)

**Development of a tunable high repetition rate XUV source for time-
resolved photoemission studies of ultrafast dynamics at surfaces**
(*Invited Paper*), Christopher Corder, Peng Zhao, Xinlong Li, Stony Brook Univ.
(USA); Matthew D. Kershish, Michael G. White, Brookhaven National Lab.
(USA); Thomas K. Allison, Stony Brook Univ. (USA) [10519-10]

**Advanced in-situ diagnostics of ultra short pulsed micromachining in
glass**, Daniel Grossmann, Michael Jenne, Daniel Flamm, Jonas Kleiner,
Felix Zimmermann, Malte Kumkar, TRUMPF Laser- und Systemtechnik GmbH
(Germany) [10519-11]

Using a camera feedback loop for phase retrieval in an iterative Fourier transform algorithm to calculate beam splitter phase gratings for parallel laser microstructuring, Alexander Kratsch, Hochschule Mittweida (Germany) [10519-12]

In situ observation of ultrashort pulse laser ablation process, Stefan M. Remund, Berner Fachhochschule Technik und Informatik (Switzerland); Antonia Neels, EMPA (Switzerland); Thorsten Kramer, Josef Zürcher, Beat Jäggi, Beat Neuenschwander, Berner Fachhochschule Technik und Informatik (Switzerland) [10519-13]

SESSION 4..... MON 4:10 PM TO 5:30 PM

Thin Film and Wafer Processing

Session Chair: **Henry Helvajian**, The Aerospace Corp. (USA)

Laser processing of CZTS thin-films for photovoltaic applications (*Invited Paper*), Stela Canulescu, Mungunshagai Ganskukh, Jørgen Schou, Technical Univ. of Denmark (Denmark) [10519-14]

Electrical micro-heating structures on glass created by laser ablation, Marcel Neitz, Technische Univ. Berlin (Germany); Gunnar Böttger, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Marco Queisser, Technische Univ. Berlin (Germany); Norbert Arndt-Staufenbiel, Martin Schneider-Ramelow, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) [10519-15]

InGaAsP multiple quantum well partially intermixed tunable laser diode, Thamer Tabbakh, Patrick Lickamwa, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) [10519-16]

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:00 AM TO 10:00 AM

Laser Direct Writing I

Session Chair: **Gediminas Račiukaitis**,
Ctr. for Physical Sciences and Technology (Lithuania)

Digital laser printing at the nanoscale (*Invited Paper*), Anders Kristensen, Xiaolong Zhu, Mehdi K. Hedayati, Soren Raza, DTU Nanotech (Denmark); Uriel Levi, The Hebrew Univ. of Jerusalem (Israel); N. Asger Mortensen, Univ. of Southern Denmark (Denmark) [10519-17]

Breaking the ultrafast breakdown barrier in bulk silicon (*Invited Paper*), David Grojo, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) [10519-18]

Femtosecond written buried waveguides in silicon, Gabor Matthäus, Helena Kämmer, Friedrich-Schiller-Univ. Jena (Germany) [10519-19]

Controlling properties of few-layer MoS₂ with a multi-laser processing framework, Jeffrey K. Wuenschell, Henry Helvajian, The Aerospace Corp. (USA) [10519-20]

SESSION 6..... TUE 10:30 AM TO 11:30 AM

Laser Direct Writing II

Session Chair: **Jean-Philippe Colombier**,
Univ. Jean Monnet Saint-Etienne (France)

High-resolution printing through flow focusing with blister-actuated laser-induced forward transfer (BA-LIFT), Emre Turkoz, Craig B. Arnold, Princeton Univ. (USA) [10519-21]

Multiple-pulse effects during printing of silver paste using laser induced forward transfer, Miguel Morales, Univ. Politécnica de Madrid (Spain); Emre Turkoz, Princeton Univ. (USA); David Munoz-Martin, Carlos Molpeceres, Univ. Politécnica de Madrid (Spain); Craig B. Arnold, Princeton Univ. (USA) [10519-22]

Laser-induced forward transfer with optical stamp for high-quality film printing, Aiko Narazaki, Tadatake Sato, Hiroyuki Niino, National Institute of Advanced Industrial Science and Technology (Japan) [10519-23]

Lunch/Exhibition Break Tue 11:30 am to 1:10 pm

SESSION 7..... TUE 1:10 PM TO 3:30 PM

Fundamental Aspects of Laser-Materials Interaction

Session Chair: **Klaus Sokolowski-Tinten**,
Univ. Duisburg-Essen (Germany)

Relaxation processes in laser-excited dielectrics (*Invited Paper*), Baerbel Rethfeld, Nils Brouwer, Technische Univ. Kaiserslautern (Germany) [10519-24]

Effect of plasma formation on the double pulse laser excitation of cubic silicon carbide, Tomohito Otake, National Institutes for Quantum and Radiological Science and Technology (Japan) [10519-25]

Point defect initiation in ultrashort laser excited GaAs: Onset of extraordinary diffusion (*Invited Paper*), Ben R. Torralva, Rico S. Cahyadi, Steven M. Yalisove, Univ. of Michigan (USA) [10519-26]

Nonequilibrium optical response of metals irradiated by ultrafast laser pulses, Jean-Philippe Colombier, Emile Bevilion, Elena P. Silaeva, Razvan Stoian, Univ. Jean Monnet Saint-Etienne (France) [10519-27]

Nonequilibrium properties of gold after excitation with an ultra-short laser pulse, Sebastian Weber, Pascal D. Ndione, Baerbel Rethfeld, Technische Univ. Kaiserslautern (Germany) [10519-28]

SESSION 8..... TUE 4:00 PM TO 5:40 PM

Laser-induced Modification of Glasses or Transparent Materials

Session Chair: **Beat Neuenschwander**,
Berner Fachhochschule Technik und Informatik (Switzerland)

Investigation of femtosecond laser written waveguide refractive index change in toughened glass: Towards integration of photonics device inside cellphone screens, Jean-Sébastien Boisvert, Raman Kashyap, Antoine Drouin, Pierre Lorre, Ecole Polytechnique de Montréal (Canada) [10519-29]

Direct laser writing of double track waveguides inside calcium fluoride crystals, Wendwesen Gebremichael, Univ. Bordeaux 1 (France) and Amplitude Systèmes (France); Inka B. Manek-Hönninger, Ctr. Lasers Intenses et Applications (France); Yannick G. Petit, Institut de Chimie de la Matière Condensée de Bordeaux (France) and Ctr. Lasers Intenses et Applications (France); Sophie Rouzet, Ctr. Lasers Intenses et Applications (France); Clemens Hönninger, Amplitude Systèmes (France); Lionel Canioni, Ctr. Lasers Intenses et Applications (France) [10519-30]

Asymmetrical Bessel-Gaussian beams for fast glass cutting, Gediminas Račiukaitis, Juozas Dudutis, Paulius Gečys, Ctr. for Physical Sciences and Technology (Lithuania) [10519-31]

Microfabrication of PDMS structures based on wave optics using EUV radiations from laser-produced plasma, Tetsuya Makimura, Hikari Urai, Eriko Kira, Univ. of Tsukuba (Japan); Hiroyuki Niino, National Institute of Advanced Industrial Science and Technology (Japan) [10519-32]

Laser processing transparent materials with nanosecond, picosecond and femtosecond pulses for industrial applications, Jie Zhang, Advanced Optowave Corp. (USA) [10519-33]

CONFERENCE 10519

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Microfabrication of UV transparent fluoroc polymer using a conventional pulsed green laser, Yasutaka Hanada, Moe Takeuchi, Hiroaki Univ. (Japan)..... [10519-44]

Investigation of cavitation bubble induced by ultrashort pulse laser and its bio-applications, Saaya Takayama, Yasutaka Hanada, Shunko A. Inada, Hiroaki Univ. (Japan)..... [10519-45]

Formation of superconducting NbN ultra-thin film using photochemical processing with Nd:YAG laser, Sang Min Jung, Jin Hwan Kim, Chul Jin Park, Moo Whan Shin, Yonsei Univ. (Korea, Republic of) [10519-46]

Femtosecond laser induced periodic nanostructures formation on medical polymer plate surface for control of cell spreading, Keisuke Takenaka, Masahiro Tukamoto, Satoru Asai, Yuji Sato, Takahiro Ooga, Osaka Univ. (Japan); Kensuke Murai, National Institute of Advanced Industrial Science and Technology (Japan)..... [10519-47]

Production and characterization of femtosecond laser-written double line waveguides in heavy metal oxide glasses, Diego Silvério da Silva, Niklaus U. Wetter, Wagner de Rossi, Ricardo E. Samad, Anderson Zanardi de Freitas, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Luciana R. P. Kassab, Faculdade de Tecnologia de São Paulo (Brazil) [10519-48]

Maskless high-resolution patterning of flexible nickel electrodes by laser reductive sintering, Daeho Lee, Vu Binh Nam, Gachon Univ. (Korea, Republic of)..... [10519-49]

Ablation of perovskite thin films with short and ultrashort laser pulses, Lukas Bayer, Pierre Lorenz, Xinyuan Ye, Leibniz-Institut für Oberflächenmodifizierung e.V. (Germany); Georg Hillrichs, Hochschule Merseburg (Germany); Klaus Zimmer, Leibniz-Institut für Oberflächenmodifizierung e.V. (Germany); Stefano Pisoni, EMPA (Switzerland) [10519-50]

Simultaneous measurement of surface profile and thickness variation of transparent parallel plate using wavelength tuning Fizeau interferometer, Yangjin Kim, Pusan National Univ. (Korea, Republic of); Naohiko Sugita, Mamoru Mitsuishi, The Univ. of Tokyo (Japan) [10519-51]

WEDNESDAY 31 JANUARY

PANEL DISCUSSION 8:30 AM TO 10:00 AM

3D Printing: The Next Challenges To Come

See <http://spie.org/PW/special-events/Industry-Event> for details.

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and Reinhart Poprawe, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 1:30 pm

SESSION 9 WED 1:30 PM TO 3:10 PM

3D Manufacturing in Micro- and Nanoscale

Session Chair: **Craig B. Arnold**, Princeton Univ. (USA)

3D printed complex micro- and nano-optical devices: Aberration correction, hybrid systems, and integration of plasmonics (*Invited Paper*), Harald Giessen, Simon Thiele, Ksenia Weber, Simon Ristok, Michael Schmid, Alois Herkommer, Univ. Stuttgart (Germany) [10519-34]

3D laser nano-printing for bio-scaffolds and metamaterials (*Invited Paper*), Martin Wegener, Karlsruher Institut für Technologie (Germany) [10519-35]

Numerical modeling of multi-photon polymerization by ultrafast laser, Paul Somers, Purdue Univ. (USA); Xiaolong He, Purdue Univ. (USA) and Harbin Institute of Technology (China); Xianfan Xu, Purdue Univ. (USA) [10519-36]

Femtosecond laser based micro/nano-additive manufacturing, Heng Pan, Missouri Univ. of Science and Technology (USA) [10519-37]

SESSION 10 WED 3:40 PM TO 5:50 PM

Laser Nanoscale Materials Processing and Manufacturing

Session Chair: **Costas P. Grigoropoulos**, Univ. of California, Berkeley (USA)

Ultrashort pulsed laser surface structuring for biomimetics and tissue engineering (*Invited Paper*), Emmanuel Stratakis, Foundation for Research and Technology-Hellas (Greece) [10519-38]

Simple fabrication of semiconductor microspheres by laser ablation in air, Daisuke Nakamura, Ryohei Tasaki, Yuichiro Wakiyama, Sho Kawagoe, Hiroki Oshima, Mitsuhiro Hiashihata, Kyushu Univ. (Japan); Nilesh J. Vasa, Indian Institute of Technology Madras (India); Hiroshi Ikenoue, Kyushu Univ. (Japan) [10519-39]

Fabrication of hollow microneedles by optical vortex illumination, Yoichi Oikawa, Kohei Toyoda, Dexiang Wang, Kunio Miyaji, Think-Lands Co., Ltd. (Japan); Takashige Omatsu, Chiba Univ. (Japan) [10519-40]

Fabrication of superhydrophobic silicone rubber by 193-nm ArF excimer laser for repelling water in water, Masayuki Okoshi, Wisnu S. Pambudi, Hidetoshi Nojiri, National Defense Academy (Japan) [10519-41]

Fabrication of transparent flexible electrodes by laser-assisted processing of flash light sintered gold nanoparticles on a polycarbonate filter membrane, Renyun Zhang, Magnus Engholm, Håkan Olin, Mid Sweden Univ. (Sweden) [10519-42]

SERS microchips integrated with 2D periodic Cu-Ag SERS nanostructure inside a 3D microfluidics by all-femtosecond-laser-processing, Shi Bai, Beijing Univ. of Technology (China); Anming Hu, Beijing Univ. of Technology (China) and The Univ. of Tennessee Knoxville (USA); Koji Sugioka, RIKEN Ctr. for Advanced Photonics (Japan) [10519-43]

ANNOUNCEMENT OF AWARD WINNERS 5:50 PM TO 6:00 PM

Presented by **Beat Neuenschwander**, Berner Fachhochschule Technik und Informatik (Switzerland)

AWARD SPONSORS:



CONFERENCE 10520

Tuesday–Thursday 30–1 February 2018 • Proceedings of SPIE Vol. 10520

Laser-based Micro- and Nanoprocessing XII

Conference Chair: **Udo Klotzbach**, Fraunhofer IWS Dresden (Germany)

Conference Co-Chairs: **Kunihiko Washio**, Paradigm Laser Research Ltd. (Japan); **Rainer Kling**, ALPhANOV (France)

Program Committee: **Antonio Ancona**, CNR-Istituto di Fotonica e Nanotecnologie (Italy); **Arkadiusz J. Antonczak**, Wroclaw Univ. of Technology (Poland); **Craig B. Arnold**, Princeton Univ. (USA); **Jiyeon Choi**, Korea Institute of Machinery & Materials (Korea, Republic of); **Francois Courvoisier**, Univ. de Franche-Comté (France); **Chunlei Guo**, Univ. of Rochester (USA); **Miguel Holgado Bolaños**, Univ. Politécnica de Madrid (Spain); **Minghui Hong**, National Univ. of Singapore (Singapore); **Andrés-Fabián Lasagni**, TU Dresden (Germany); **Yongfeng Lu**, Univ. of Nebraska-Lincoln (USA); **Yoshiki Nakata**, Osaka Univ. (Japan); **Andreas E. H. Oehler**, Lumentum (Switzerland); **Wilhelm Pfleging**, Karlsruhe Institute of Technology (Germany); **Martin Sharp**, Liverpool John Moores Univ. (United Kingdom); **Barbara Stadlober**, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria); **Razvan Stoian**, Lab. Hubert Curien (France); **Koji Sugioka**, RIKEN (Japan); **Hong-Bo Sun**, Jilin Univ. (China); **Jorma Vihinen**, Tampere Univ. of Technology (Finland); **Akira Watanabe**, Tohoku Univ. (Japan); **Michael J. Withford**, Macquarie Univ. (Australia); **Xianfan Xu**, Purdue Univ. (USA); **Haibin Zhang**, Electro Scientific Industries, Inc. (USA); **Haiyan Zhao**, Tsinghua Univ. (China)

TUESDAY 30 JANUARY

SESSION 1..... TUE 8:00 AM TO 10:00 AM

Laser Micro Structuring and Processing I

Session Chair: **Udo Klotzbach**, Fraunhofer IWS Dresden (Germany)

Increasing the throughput in microprocessing with ultrafast lasers: an industrial perspective (*Invited Paper*), Ulf Quentin, TRUMPF Laser- und Systemtechnik GmbH (Germany) [10520-1]

New laser slicing technology named KABRA process enables high speed and high efficiency SiC slicing (*Invited Paper*), Kazuya Hirata, DISCO Corp. (Japan) [10520-2]

Stealth dicing technology with SWIR laser realizing high throughput Si wafer dicing, Yasunaga Nara, Hiroki Kiyota, Hamamatsu Photonics K.K. (Japan) [10520-3]

Laser ablation of silicon wafers: New findings, new insights, Dongshi Zhang, RIKEN (Japan) [10520-4]

Femtosecond laser direct writing of Cu-based fine patterns using Cu₂O nanospheres, Yukinari Kondo, Mizue Mizoshiri, Junpei Sakurai, Seiichi Hata, Nagoya Univ. (Japan) [10520-5]

SESSION 2..... TUE 10:30 AM TO 12:00 PM

Laser Micro Structuring and Processing II

Session Chair: **Rainer Kling**, ALPhANOV (France)

Direct laser writing of 3D microfluidic structures in glass for lab-on-a-chip applications (*Invited Paper*), Ya Cheng, Shanghai Institute of Optics and Fine Mechanics (China) [10520-6]

Application of 400-W laser MicroJet for high-throughput and low-impact micro-structuring of aerospace and tooling industry parts, Helgi Diehl, Jérémie Diboine, Ronan Martin, Bernold Richerzhagen, Synova S.A. (Switzerland) [10520-7]

Improving femtosecond glass cutting using programmable spatial light modulators, Konstantin Mishchik, Amplitude Systèmes (France); Sebastien Landon, Yoann Di Maio, Benjamin Dusser, QiOVA (France); Clemens Hoenninger, Eric Audouard, Eric Mottay, Amplitude Systèmes (France) [10520-8]

Incubation effect in burst mode fs-laser ablation of stainless steel samples, Caterina Gaudiuso, Univ. degli Studi di Bari Aldo Moro (Italy) and Femtika Ltd. (Italy); Giuseppe Giannuzzi, Univ. degli Studi di Bari Aldo Moro (Italy) and CNR-Istituto di Fotonica e Nanotecnologie (Italy); Isabelle Choquet, Univ. West (Sweden); Pietro M. Lugarà, Univ. degli Studi di Bari Aldo Moro (Italy) and CNR-Istituto di Fotonica e Nanotecnologie (Italy); Antonio Ancona, CNR-Istituto di Fotonica e Nanotecnologie (Italy) and Univ. West (Sweden) [10520-9]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 3..... TUE 1:30 PM TO 3:30 PM

Laser Micro/Nano Structuring on Flexible Substrates

Session Chair: **Akira Watanabe**, Tohoku Univ. (Japan)

Laser microstructured diamond electrode arrays for bionic eye applications (*Invited Paper*), Steven Prawer, The Univ. of Melbourne (Australia) [10520-10]

Nanoablation of Si surface with femtosecond-laser-induced plasmonic near-fields (*Invited Paper*), Godai Miyaji, Tokyo Univ. of Agriculture and Technology (Japan) [10520-11]

Direct observation of internal void-formation in stealth dicing, Yasunaga Nara, Hiroki Kiyota, Hamamatsu Photonics K.K. (Japan) [10520-12]

Solvent induced reversible deformations of polymeric 3D microstructures for actuation and sensing applications, Sima Rekštyte, Domas Paipulas, Mangirdas Malinauskas, Vilnius Univ. (Lithuania); Vyngantas Mizeikis, Shizuoka Univ. (Japan) [10520-13]

Flexible and stretchable micro GO/rGO optical structures by femtosecond laser photoreduction, Hyub Lee, Mun J. Low, Chin Huat Joel Lim, Vadakke M. Murukeshan, Young-Jin Kim, Nanyang Technological Univ. (Singapore) [10520-14]

SESSION 4..... TUE 4:00 PM TO 5:50 PM

High-speed Laser Beam Engineering Systems for High-power, Ultrashort Pulsed Lasers

Session Chair: **Kunihiko Washio**, Paradigm Laser Research Ltd. (Japan)

Diverse nanostructures and magical nano-functions induced by ultrafast laser (*Invited Paper*), Minlin Zhong, Tsinghua Univ. (China) [10520-15]

Ultrafast dynamics of material excitation of dielectrics with ultrashort pulsed Bessel beams, Christian Kalupka, Tim Holtum, RWTH Aachen Univ. (Germany); Martin Reininghaus, Fraunhofer-Institut für Lasertechnik (Germany) [10520-16]

Ultrafast z-scanning for high efficiency laser material processing, Ting Hsuan Chen, Princeton Univ. (USA); Pascal Dreher, Univ. Duisburg-Essen (Germany); Craig B. Arnold, Princeton Univ. (USA) [10520-17]

Parallel processing of functional surfaces with ultrafast lasers, Thomas Mitra, LIMO Lissotschenko Mikroskopik GmbH (Germany); Stephan Brüning, Schepers GmbH & Co., KG (Germany); Keming Du, EdgeWave GmbH (Germany); Gerald Jenke, Ronny Schlegel, Saueressig GmbH + Co. KG (Germany); Manfred Jarczyński, LIMO Lissotschenko Mikroskopik GmbH (Germany) [10520-18]

Accelerated ultra-fast ablation using dual wavelength pulsed time delay, Thomas Ward, Claude Aguergaray, Peter Sorrensen, M. Cather Simpson, The Univ. of Auckland (New Zealand) [10520-19]

LASE

CONFERENCE 10520

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Laser interference lithography on non-planar surface for roll-to-roll process, Yong-Won Ma, Dan Hee Yun, Gyeongju Je, Cheong Y. Gwak, Bo-Sung Shin, Jun Han Park, Pusan National Univ. (Korea, Republic of) [10520-24]

Improving piezo actuators for nanopositioning tasks, Martin Seeliger, Bert Götzt, Vassil Gramov, piezosystem jena GmbH (Germany) [10520-52]

Laser ablation in water for Sn-based nanomaterials synthesis by millisecond-pulsed laser, Takahiro Kondo, Gakushuin Univ. (Japan); Sergei A. Kulnich, Tokai Univ. (Japan); Yuika Saito, Gakushuin Univ. (Japan); Satoru Iwamori, Tokai Univ. (Japan) [10520-53]

Femtosecond laser hybrid subtractive-additive 3D micro- and nano-fabrication: A magic bullet in today's material processing, Linas Jonušauskas, Vilnius Univ. (Lithuania); Femtika Ltd. (Lithuania); Sima Rekštyte, Vilnius Univ. (Lithuania); Titas Tičkunas, Darius Gailevičius, Vilnius Univ. (Lithuania); Femtika Ltd. (Lithuania); Ričardas Buividas, Swinburne Univ. of Technology (Australia); Simas Butkus, Vilnius Univ. (Lithuania); Gedvinas Nemickas, Femtika (Lithuania); Roaldas Gadosnas, Vilnius Univ. (Lithuania); Femtika Ltd. (Lithuania); Saulius Juodkazis, Swinburne Univ. of Technology (Australia); Melbourne Ctr. for Nanofabrication (Australia); Mangirdas Malinauskas, Vilnius Univ. (Lithuania) [10520-54]

Controlling the morphology of the conjugated polymer film by single shot process of femtosecond laser, SiWoo Lee, Sangmin Chae, Ahra Yi, Pusan National Univ. (Korea, Republic of); Hyun Hwi Lee, Pohang Accelerator Lab. (Korea, Republic of); Jiyeon Choi, Korea Institute of Machinery & Materials (Korea, Republic of); Hyo Jung Kim, Pusan National Univ. (Korea, Republic of) [10520-55]

Formation mechanism of polarization-dependent periodic nanostructures in multicomponent glasses, Yuta Tsuji, Yasuhiko Shimotsuma, Masaaki Sakakura, Kiyotaka Miura, Kyoto Univ. (Japan) [10520-56]

Formation mechanism of self-assembled polarization-dependent periodic nanostructures in β -Ga₂O₃, Yuta Nakanishi, Yasuhiko Shimotsuma, Masaaki Sakakura, Kiyotaka Miura, Kyoto Univ. (Japan) [10520-57]

Local temperature measurement during ultrafast laser 3D nanolithography writing, Simonas Varapnickas, Dovile Baziliute-Paulaviciene, Linas Jonušauskas, Simas Sakirzanovas, Mangirdas Malinauskas, Vilnius Univ. (Lithuania) [10520-58]

Nano and micro structuring of fused silica using time-delay adjustable double flash ns-laser radiation, Pierre Lorenz, Leibniz-Institut für Oberflächenmodifizierung e.V. (Germany); Xiongtao Zhao, Martin Ehrhardt, Nanjing Univ. of Science and Technology (China); Igor Zagoranskiy, Klaus Zimmer, Leibniz-Institut für Oberflächenmodifizierung e.V. (Germany) [10520-59]

Femtosecond laser inscribed cladding waveguides in aminoacid crystals, Cleber R. Mendonça, Renato J. Martins, Juliana Almeida, Instituto de Física de São Carlos (Brazil); José Rodrigues Jr., Univ. Federal de Sergipe (Brazil); Gustavo F. B. Almeida, Jonathas Siqueira, Instituto de Física de São Carlos (Brazil) [10520-60]

Durable superhydrophobic-superoleophilic copper mesh fabricated by pulsed laser ablation for oil/water separation from Xiamen University, Shengdong Lin, Fei Shen, Guobiao Zhang, Rui Zhou, Xiamen Univ. (China) [10520-61]

Three-dimensional micro-nano-hierarchical porous structures based on the deposition of the ablated material by picosecond pulses, Aifei Pan, Wenjun Wang, Xuesong Mei, Xi'an Jiaotong Univ. (China) [10520-62]

Pulsed laser micro-scribing of copper thin films on polyimide substrate in NaCl solution, Sooraj Shiby, Srinagalakshmi Nammi, Nilesh J. Vasa, Siavarama Krishnan, Indian Institute of Technology Madras (India) . [10520-63]

On the strength of toughened multimedia glass exposed to fs laser for inscription of photonics circuits, Jean-Sébastien Boisvert, Raman Kashyap, Polytechnique Montréal (Canada) [10520-64]

Light spread manipulation in thick transparent crystals by using laser-induced optical barriers technique, Lisa Bläckberg, Georges El Fakhri, Hamid Sabet, Massachusetts General Hospital (USA) and Harvard Medical School (USA) [10520-65]

An experimental study of the ultrafast microcutting process of thin stainless steel sheets, Sabina Luisa L. Campanelli, Cesare Bonserio, Andrea Angelastro, Nicola Contuzzi, Politecnico di Bari (Italy) [10520-66]

Dynamics of thermally generated microbubbles, Ujitha A. Abeywickrema, Chenglong Zhao, Partha P. Banerjee, Univ. of Dayton (USA) [10520-67]

Laser pre-exposure to mitigate damage on microparticle-contaminated fused silica surface in high power laser systems, Rajesh N. Raman, David Cross, Mary A. Norton, Jeff D. Bude, Raminder Garcha, Lawrence Livermore National Lab. (USA); Tylisia Wallace, Norfolk State Univ. (USA) [10520-68]

High throughput low CoO, and damage free laser doping method for poly-Si thin films using KrF excimer laser, Nozomu Tanaka, Akira Suwa, Daisuke Nakamura, Taizoh Sadoh, Hiroshi Ikenoue, Kyushu Univ. (Japan) [10520-69]

Optimization of femtosecond laser micromachining of polylactide and PLLA/HAP composite, Bogusz D. Stepak, Wroclaw Univ. of Technology (Poland); Konrad Szustakiewicz, Arkadiusz J. Antończak, Wroclaw Univ. of Science and Technology (Poland) [10520-70]

Degradation of poly(L-lactide) under femtosecond laser treatment, Arkadiusz J. Antończak, Bogusz D. Stepak, Malgorzata Gazińska, Konrad Szustakiewicz, Wroclaw Univ. of Science and Technology (Poland) [10520-71]

Experimental investigation of texturing complex geometry using high repetition nano laser and comparison with the simulated COMSOL model, Hamid Ebrahimi Orimi, Satvik Jagadeesh, Sivakumar Narayanswamy, Concordia Univ. (Canada) [10520-72]

Innovative approaches for coordinate extraction of curved shape and analyzing the effect of process parameters on the quality of the laser micro machined surface, Satvik Jagadeesh, Hamid Ebrahimi Orimi, Sivakumar Narayanswamy, Concordia Univ. (Canada) [10520-73]

Development of machine vision system for precision nano laser micromachining, Satvik Jagadeesh, Hamid Ebrahimi Orimi, Sivakumar Narayanswamy, Concordia Univ. (Canada) [10520-74]

WEDNESDAY 31 JANUARY

SESSION 5 WED 8:20 AM TO 9:50 AM

Large-area Micro/Nano Structuring and Laser Interference Patterning

Session Chair: **Andrés-Fabián Lasagni**, TU Dresden (Germany)

R2R fabrication of freeform micro-optics (Invited Paper), Ursula Palfinger, Ladislav Kuna, Dieter Nees, Stephan Rutloff, Johannes Götz, Barbara Stadlober, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria) [10520-20]

Optimization for high speed surface processing of metallic surfaces utilizing direct laser interference patterning, Valentin Lang, Theresa Sperk, Tim Hoffmann, Andrés-Fabián Lasagni, TU Dresden (Germany) [10520-21]

2D laser induced periodic surface structures with double cross-polarized pulses, Fotis Fraggelakis, Girolamo Mincuzzi, ALPhANOV (France); John Lopez, Univ. de Bordeaux (France) and Ctr. Lasers Intenses et Applications (France) and Ctr. National de la Recherche Scientifique (France); Inka B. Manek-Honninge, Univ. de Bordeaux (France); Rainer Kling, ALPhANOV (France) [10520-22]

Double pulses explosion drilling of transparent materials, Asato Tamura, Takuei Nishio, Hiroyuki Suhara, Norio Nagayama, Ricoh Co., Ltd. (Japan) [10520-23]

THURSDAY 1 FEBRUARY

SESSION 8..... THU 8:00 AM TO 10:00 AM

Direct-write Processing, Ablation, and Surface Modification II

Session Chair: **Antonio Ancona**, CNR-Istituto di Fotonica e Nanotecnologie (Italy)

New fast galvo scanner head for high throughput micromachining, Girolamo Mincuzzi, Alice Rebiere, Marc Faucon, Rainer Kling, ALPhANOV (France).....[10520-34]

Low energy sub-micron laser machining using photonic nanojet with shaped optical fiber tip, Sylvain Lecler, Télécom Physique Strasbourg (France) and Ctr. National de la Recherche Scientifique (France); Robin Pierron, ICube (France) and Ctr. National de la Recherche Scientifique (France); Grégoire Chabrol, ICube (France) and École Catholique d'arts et Métiers Strasbourg-Europe (France) and Ctr. National de la Recherche Scientifique (France); Frédéric Mermet, IREPA LASER (France) and Institut Carnot MICA (France); Joël Fontaine, ICube (France) and Institute National des Sciences Appliquées de Strasbourg (France).....[10520-35]

Giant opto-optical effect in femtosecond laser written type A waveguides in silver containing glasses, Alain Abou Khalil, Univ. Bordeaux 1 (France).....[10520-36]

Microfabrication of curved sidewall grooves using scanning nanosecond excimer laser ablation, Jing Gong, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Georgios Violakis, Daniel Infante, Patrik Hoffmann, EMPA (Switzerland); André Kostro, BASF Switzerland (Switzerland); Andreas Schüller, Ecole Polytechnique Fédérale de Lausanne (Switzerland).....[10520-37]

Model for ultrafast laser micromachining, Liliana Cangeiro, Lasea (Belgium); Eric Audouard, Amplitude Systèmes (France); Paul-Etienne Martin, Lasea (Belgium); Eric Mottay, Amplitude Systèmes (France); José A. R. Campos, Axel Kupisiewicz, David Bruneel, Lasea (Belgium).....[10520-38]

The effect of intermittent irradiation in laser drilling of metal in high pressure carbon dioxide, Keisuke Yoshiki, Yuki Kitahara, Yuto Okada, Univ. of Hyogo (Japan); Anna Ito, Hiromasa Furuta, Panasonic Industrial Devices SUNX Co., Ltd. (Japan).....[10520-39]

SESSION 9..... THU 10:30 AM TO 12:10 PM

Advanced 1D to 3D Subtractive and Additive Processes

Session Chair: **Xianfan Xu**, Purdue Univ. (USA)

Combining direct-write laser lithography, 3D printing, and injection molding for the fabrication of complex 3D optical system components (*Invited Paper*), Ladislav Kuna, Barbara Stadlober, Markus Postl, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria); Manuel Walch, Alexander Wörle, kdg optocomp GmbH (Austria); Georg Jakopic, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria).....[10520-40]

Direct writing of three-dimensional Cu-based sensors using femtosecond laser reduction of CuO nanoparticles (*Invited Paper*), Mizue Mizoshiri, Seiichi Hata, Nagoya Univ. Graduate School of Engineering (Japan).....[10520-41]

Laser printing and sintering of Zn nanoparticles for bioresorbable electronics, Heng Pan, Missouri Univ. of Science and Technology (USA).....[10520-42]

Current and future applications of two-photon polymerization for medical microrobots, Maura Power, Hamlyn Centre (United Kingdom).....[10520-43]

Lunch/Exhibition Break Thu 12:10 pm to 1:40 pm

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and **Reinhart Poprawe**, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 2:00 pm

SESSION 6..... WED 2:00 PM TO 3:10 PM

Direct-write Processing, Ablation, and Surface Modification I

Session Chair: **Barbara Stadlober**, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria)

Applications of ultrafast laser direct writing: From polarization control to data storage (*Invited Paper*), Martynas Beresna, Univ. of Southampton (United Kingdom).....[10520-25]

Laser direct writing of biocompatible hydrogels using a blister assisted approach with thick polyimide layers, Carlos Molpeceres, Andrés Marquez, Sara Lauzurica, Miguel Gómez-Fontela, David Muñoz, Miguel Morales, Univ. Politécnica de Madrid (Spain).....[10520-26]

Laser direct writing of reduced graphene oxide micropatterns and sensor applications, Akira Watanabe, Tohoku Univ. (Japan); Jinguang Cai, Tohoku Univ. (China).....[10520-27]

SESSION 7..... WED 3:40 PM TO 6:00 PM

Laser Micro/Nano Structuring on Metals

Session Chair: **Miguel Holgado Bolaños**, Univ. Politécnica de Madrid (Spain)

Towards high-speed controllable fabrication of micro/nano structures on material surfaces by femtosecond laser pulses (*Invited Paper*), Jianjun Yang, Changchun Institute of Optics, Fine Mechanics and Physics (China); Chunlei Guo, Univ. of Rochester (USA).....[10520-28]

High repetition frequency micro hole drilling using ultrashort pulse laser radiation (*Invited Paper*), Andreas Gruner, Joerg Schille, Udo Loeschner, Hochschule Mittweida (Germany).....[10520-29]

Characteristics of micro-holes drilled in ambient air and vacuum by high-power Nd:YAG laser, Wenqiang Duan, Xuesong Mei, Wenjun Wang, Kedian Wang, Xi'an Jiaotong Univ. (China).....[10520-30]

Drilling progress of deep holes in tool steel using high energy picosecond laser pulses, Ehsan Zahedi, Christian Freitag, Rudolf Weber, Univ. Stuttgart (Germany).....[10520-31]

Formation of two way shape memory effect in NiTi and NiTiHf alloy using pulsed laser irradiation, Saïdjafarzoda Ilhom, Khomidkhodzha Kholikov, Western Kentucky Univ. (USA); Peizhen Li, Univ. of Kentucky (USA); Ali O. Er, Western Kentucky Univ. (USA); Haluk Karaca, Univ. of Kentucky (USA); Omer San, Oklahoma State Univ. (USA).....[10520-32]

Development of AISI316L stainless steel coronary stents, Erika Garcia, Héctor R. Siller Carrillo, Ciro A. Rodríguez González, Tecnológico de Monterrey (Mexico).....[10520-33]

LASE

CONFERENCE 10520

SESSION 10 THU 1:40 PM TO 3:20 PM

Advanced Laser Structuring for Energy Storage and Conversion I

Session Chair: **Wilhelm Pflöging**,
Karlsruher Institut für Technologie (Germany)

Laser micro welding of arrester flags for assembling of lithium ion battery cells (*Invited Paper*), Michael Seiler, Andreas Patschger, Ernst-Abbe-Hochschule Jena (Germany); Wilhelm Pflöging, Maika Torge, Karlsruhe Institut für Technologie (Germany); Jens Bliedtner, Ernst-Abbe-Hochschule Jena (Germany) [10520-44]

Three-dimensional elemental imaging of Li-ion batteries using ultrafast laser ablation optical emission spectroscopy (*Invited Paper*), Vassilia Zorba, Lawrence Berkeley National Lab. (USA) [10520-45]

Laser direct writing for energy storage and integrated wireless devices, Jinguang Cai, Tohoku Univ. (China); Akira Watanabe, Tohoku Univ. (Japan); Chao Lv, Tohoku Univ. (China) [10520-46]

Laser in battery manufacturing: impact of intrinsic and artificial electrode porosity on chemical degradation and battery lifetime, Peter Smyrek, Karlsruhe Institut für Technologie (Germany) and Karlsruhe Nano Micro Facility (Germany); Yijing Zheng, Jan-Hendric Rakebrandt, Hans Jürgen Seifert, Karlsruhe Institut für Technologie (Germany); Wilhelm Pflöging, Karlsruhe Institut für Technologie (Germany) and Karlsruhe Nano Micro Facility (Germany) [10520-47]

SESSION 11 THU 3:50 PM TO 5:10 PM

Advanced Laser Structuring for Energy Storage and Conversion II

Session Chair: **Haibin Zhang**, Electro Scientific Industries, Inc. (USA)

Laser micro-spot welding of thin AISI 302 stainless steel sheets, Luis Daniel Cedeño Viveros II, Erika García, Héctor R. Siller Carrillo, Ciro A. Rodríguez González, Tecnológico de Monterrey (Mexico) ... [10520-48]

Modeling of a VMJ PV array under Gaussian high intensity laser power beam condition, Jeongsook Eom, Gunzung Kim, Yongwan Park, Yeungnam Univ. (Korea, Republic of) [10520-49]

Demonstration of glass light pipes for solar concentration, Christi K. Madsen, Texas A&M Univ. (USA) and Sunstrike Optics LLC (USA); Yusuf Dogan, Robert Atkins, Texas A&M Univ. (USA) [10520-50]

In-situ analysis of laser-generated 3D Si-based anode materials for high energy lithium-ion batteries, Yijing Zheng, Peter Smyrek, Jan-Hendric Rakebrandt, Hans Jürgen Seifert, Karlsruhe Institut für Technologie (Germany); Xiaopeng Cheng, Huifeng Shi, Yuefei Zhang, Beijing Univ. of Technology (China); Wilhelm Pflöging, Karlsruhe Institut für Technologie (Germany) [10520-51]

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- IR sources and detectors
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- Positions and mounts
- Metrology tools

CONFERENCE 10521

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10521

Synthesis and Photonics of Nanoscale Materials XV

Conference Chairs: **Jan J. Dubowski**, Univ. de Sherbrooke (Canada); **Andrei V. Kabashin**, Aix-Marseille Univ. (France); **Linyou Cao**, North Carolina State Univ. (USA); **David B. Geohegan**, Oak Ridge National Lab. (USA)

MONDAY 29 JANUARY

SESSION 1 MON 8:30 AM TO 10:10 AM

2D Materials: Fabrication and Diagnostics I

Session Chair: **Jan J. Dubowski**, Univ. de Sherbrooke (Canada)

Femtosecond optical and terahertz-driven structural dynamics in quasi-2D transition metal dichalcogenides (*Invited Paper*), Aaron M. Lindenberg, Stanford Univ. (USA) [10521-1]

Energy transfer interactions between semiconductor nanocrystals and TMDC materials (*Invited Paper*), Anton V. Malko, The Univ. of Texas at Dallas (USA) [10521-2]

Low-frequency Raman spectroscopy and second harmonic generation reveal strong interlayer interactions in layered PdSe₂, Alexander A. Puzos, Liangbo Liang, Oak Ridge National Lab. (USA); Akinola D. Oyedele, The Univ. of Tennessee Knoxville (USA); Kai Xiao, Bobby G. Sumpter, David B. Geohegan, Oak Ridge National Lab. (USA) [10521-3]

Pulsed laser deposition and crystallization of nanoparticle building blocks into functional nanostructures, David B. Geohegan, Oak Ridge National Lab. (USA); Masoud Mahjouri-Samani, Auburn Univ. (USA); Mengkun Tian, The Univ. of Tennessee Knoxville (USA); Alexander A. Puzos, Kai Wang, Wesley D. Tennyson, Oak Ridge National Lab. (USA); Gerd J. Duscher, The Univ. of Tennessee Knoxville (USA); Christopher M. Rouleau, Kai Xiao, Mina Yoon, John C. Lasseter, Gyula Eres, Miaofang Chi, Oak Ridge National Lab. (USA) [10521-4]

SESSION 2 MON 10:40 AM TO 11:50 AM

2D Materials: Fabrication and Diagnostics II

Session Chair: **Andrei V. Kabashin**, Aix-Marseille Univ. (France)

Black phosphorus: a novel 2D material and its photonics applications (*Invited Paper*), Xianfan Xu, Purdue Univ. (USA) [10521-5]

Ultrafast near-field imaging of excitonic waves formation and propagation in WSe₂ waveguides, Michael Mrejen, Lena Yadgarov, Uri Arieli, Assaf Levanon III, Haim Suchowski, Tel Aviv Univ. (Israel) [10521-6]

Holographic microscopy superlocalization monitors the electrochemical transformation of single nanoparticles, Vitor Brasiliense, Sorbonne Paris Cité (France) and Univ. Paris Descartes (France); Pascal Berto, Univ. Paris Descartes (France); Catherine Combellas, Frederic Kanoufi, Sorbonne Paris Cité (France); Robert Kuszelewicz, Gilles Tessier, Univ. Paris Descartes (France) [10521-7]

Lunch Break Mon 11:50 am to 1:30 pm

SESSION 3 MON 1:30 PM TO 3:10 PM

Biosensing Applications of Nanostructure Materials

Session Chair: **Linyou Cao**, North Carolina State Univ. (USA)

Ultra-narrow optical resonances in plasmonic nanoparticle arrays for biosensing applications, Andrei V. Kabashin, Artem Danilov, Gleb Tselikov, Aix-Marseille Univ. (France); Fan Wu, Vasyl Kravets, The Univ. of Manchester (United Kingdom); Igor Ozerov, Frederic Bedu, Aix-Marseille Univ. (France); Alexander N. Grigorenko, The Univ. of Manchester (United Kingdom) [10521-8]

Novel biodegradable laser-synthesized Si-based nanomaterials for cancer theranostics, Andrei V. Kabashin, Aix-Marseille Univ. (France) [10521-9]

Controlling the morphology and adhesion of C6 glioma cell by 3D micro/nano silicon structures based on femtosecond laser ablation, Jinglin Huo, Feng Chen, Jiale Yong, Yao Fang, Qing Yang, Hao Bian, Xun Hou, Xi'an Jiaotong Univ. (China) [10521-10]

Modification of bacterial ζ -potential for enhanced photonic biosensing using GaAs/AlGaAs nano-heterostructures, Mohammad Reza Aziziyan, Mohamed Walid Hassen, Jan J. Dubowski, Univ. de Sherbrooke (Canada) [10521-11]

Plasmonic nanostructures: thermal modeling, characterization, and imaging, Adrien Lalisse, Univ. Paris Descartes (France) and Lab. de Nanotechnologie et d'Instrumentation Optique (France); Abeer Al Mohtar, Univ. Paris Descartes (France) and Institut Langevin (France) and Ecole Supérieure de Physique et de Chimie Industrielles (France); Fabrice Valentino, Univ. Paris Descartes (France); Guillaume Baffou, Institut Fresnel (France); Rémi Carminati, Institut Langevin (France) and École Supérieure de Physique et de Chimie Industrielles (France); Jérôme Plain, Univ. de Technologie Troyes (France); Gilles Tessier, Univ. Paris Descartes (France) [10521-12]

SESSION 4 MON 3:40 PM TO 5:20 PM

Nanostructures by Laser Ablation and Ablation-free Fabricated

Session Chair: **David B. Geohegan**, Oak Ridge National Lab. (USA)

Ablation-free fabrication of nanochannels in solids (*Invited Paper*), Manoj K. Bhuyan, RIKEN Ctr. for Advanced Photonics (Japan) [10521-13]

Pulsed laser ablation synthesis and structure of interstitially boron-doped turbostratic few-layer graphene, Wesley D. Tennyson, Oak Ridge National Lab. (USA); Mengkun Tian, The Univ. of Tennessee Knoxville (USA); Brian Sneed, Lizhi Zhang, Christopher M. Rouleau, Karren L. More, Oak Ridge National Lab. (USA); Gerd J. Duscher, Oak Ridge National Lab. (USA) and The Univ. of Tennessee Knoxville (USA); Thomas A. Zawodzinski, The Univ. of Tennessee Knoxville (USA) and Oak Ridge National Lab. (USA); Alexander A. Puzos, Mina Yoon, David B. Geohegan, Oak Ridge National Lab. (USA) [10521-14]

Superoleophobic surfaces (*Invited Paper*), Feng Chen, Xi'an Jiaotong Univ. (China) [10521-15]

Pattern formation and self-organization in the growth of titanium dioxide nanotubes, Rakesh Arul, Junzhe Dong, Ellen Jose, Tristan Pang, Wei Gao, M. Cather Simpson, Univ. of Auckland (New Zealand) [10521-16]

LASE

CONFERENCE 10521

TUESDAY 30 JANUARY

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Scattering properties of gold nanoparticles inside a quadrupole ion trap during fs-laser irradiation, Javier Hernandez Rueda, Anne de Beurs, Dries van Oosten, Utrecht Univ. (Netherlands) [10521-17]

Cross-species bioinspired superhydrophobic surface with tri-directional adhesion fabricated by femtosecond laser, Yao Fang, Xi'an Jiaotong Univ. (China); Feng Chen, Xi'an Jiaotong Univ. (China); Jiale Yong, Jinglan Huo, Qing Yang, Hao Bian, Xun Hou, Xi'an Jiaotong Univ. (China) [10521-18]

Fabrication of 3D microelectronic devices based on femtosecond laser and metal microsolidification inside hard brittle material, Chao Shan, Feng Chen, Qing Yang, Hao Bian, Xun Hou, Xi'an Jiaotong Univ. (China) [10521-19]

Metal-insulator-metal waveguide lasing element based on nanoporous anodic alumina membrane, Saleem Shaik, Indian Institute of Technology Kanpur (India) [10521-20]

Investigation of the influence of silicon nanoparticles on the performance of Yb³⁺/Er³⁺: Bi₂O₃-GeO₂ pedestal waveguides for amplification at 1.53 μm, Diego Silvério da Silva, Niklaus U. Wetter, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Luciana R. P. Kassab, Faculdade de Tecnologia de São Paulo (Brazil) [10521-21]

Enhancement of the monolayer MoS₂ emission due to energy coupling from nanocrystal films, Anton V. Malko, Tianle Guo, Siddharth Sampat, The Univ. of Texas at Dallas (USA); Kehao Zhang, Joshua Robinson, The Pennsylvania State Univ. (USA); Sara Rupich, Yves J. Chabal, Yuri N. Garstein, The Univ. of Texas at Dallas (USA) [10521-22]

CONFERENCE 10522

Sunday–Tuesday 28–30 January 2018 • Proceedings of SPIE Vol. 10522

Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII

Conference Chairs: Peter R. Herman, Univ. of Toronto (Canada); Michel Meunier, Ecole Polytechnique de Montréal (Canada); Roberto Osellame, CNR-Istituto di Fotonica e Nanotecnologie (Italy)

Program Committee: Craig B. Arnold, Princeton Univ. (USA); Yves Bellouard, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Adela Ben-Yakar, The Univ. of Texas at Austin (USA); Alexander Heisterkamp, Leibniz Univ. Hannover (Germany); Denise M. Krol, Univ. of California, Davis (USA); Eric Mazur, Harvard Univ. (USA); Eric P. Mottay, Amplitude Systèmes (France); Beat Neuenschwander, Berner Fachhochschule Technik und Informatik (Switzerland); Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany); Christopher B. Schaffer, Cornell Univ. (USA); Koji Sugioka, RIKEN (Japan); Mitsuhiro Terakawa, Keio Univ. (Japan); Alfred Vogel, Univ. zu Lübeck (Germany); Sascha Weiler, TRUMPF Inc. (USA); Dvir Yelin, Technion-Israel Institute of Technology (Israel)

Conference Cosponsors:



SUNDAY 28 JANUARY

SESSION 1 SUN 8:20 AM TO 10:10 AM

Biomedical Applications of Ultrafast Lasers

Session Chair: Michel Meunier,
Ecole Polytechnique de Montréal (Canada)

Monitoring protein configurations in the fingerprint region with micro-FTIR spectroscopy by employing a 98 fs solid-state laser tunable from 1.33 to 8 μm at 73 MHz repetition rate, Florian Mörz, Rostyslav Semenyshyn, Univ. Stuttgart (Germany); Frank Neubrech, Ruprecht-Karls-Univ. Heidelberg (Germany); Tobias Steinle, ICFO - Institut de Ciències Fotòniques (Spain); Andy Steinmann, Harald Giessen, Univ. Stuttgart (Germany) [10522-1]

Femtosecond laser-triggered molecular release from biodegradable polymer microcapsules incorporated in hydrogel, Taiga Umemoto, Mitsuhiro Terakawa, Keio Univ. (Japan) [10522-2]

Elastic diffraction grating in a hydrogel fabricated by femtosecond-laser-photoreduction, Manan Machida, Yasutaka Nakajima, Toshihiko Uemura, Keio Univ. (Japan); Maria Leilani Torres-Mapa, Leibniz Univ. Hannover (Germany); Dag Heinemann, Laser Zentrum Hannover e.V. (Germany); Alexander Heisterkamp, Leibniz Univ. Hannover (Germany); Mitsuhiro Terakawa, Keio Univ. (Japan) [10522-3]

Scattering properties of ultrafast laser-induced refractive index shaping lenticular structures in hydrogels, Kaitlin T. Wozniak, Univ. of Rochester (USA); Thomas A. Germier, National Institute of Standards and Technology (USA); Sam C. Butler, Daniel R. Brooks, Krystal R. Huxlin, Jonathan D. Ellis, Univ. of Rochester (USA) [10522-4]

Biomedical applications of multiphoton processing (Invited Paper), Aleksandr Ovsianikov, Technische Univ. Wien (Austria) [10522-5]

SESSION 2 SUN 10:40 AM TO 12:20 PM

Ultrafast Laser Interaction with Cells and Tissues

Session Chair: Aleksandr Ovsianikov,
Technische Univ. Wien (Austria)

Plasmonic eradication of malignant cells in a three dimensional culture, Limor Minai, Dvir Yelin, Technion-Israel Institute of Technology (Israel) [10522-6]

Plasmonics enhanced femtosecond laser nanocavitation and optoporation: Fundamentals and nanomedicine applications, Michel Meunier, Ecole Polytechnique de Montréal (Canada) [10522-7]

Self-focusing and maximum ablation depth in ultrafast laser surgery of tissue, Chris Martin, Adela Ben-Yakar, The Univ. of Texas at Austin (USA) [10522-8]

Multimodal imaging fiber probe for biomedical applications, Marco Andreana, Medizinische Univ. Wien (Austria); Tuan Le, FEMTOLASERS Produktions GmbH (Austria); Wolfgang Drexler, Angelika Unterhuber, Medizinische Univ. Wien (Austria) [10522-9]

Intracellular cargo delivery with polymer substrates and nanosecond pulsed laser, Weilu Shen, Harvard Univ. (USA); Stefan Kalies, Leibniz Univ. Hannover (Germany); Nabiha Saklayen, Marinna Madrid, Harvard Univ. (USA); Alexander Heisterkamp, Leibniz Univ. Hannover (Germany); Eric Mazur, Harvard Univ. (USA) [10522-10]

Lunch/BiOS Exhibition Break Sun 12:20 pm to 1:50 pm

SESSION 3 SUN 1:50 PM TO 3:30 PM

Surface Structuring with Ultrafast Lasers

Session Chair: Malte Kumkar,
TRUMPF Laser- und Systemtechnik GmbH (Germany)

Ultrafast moving-spot microscopy: Birth, growth and control of laser-induced periodic surface structures (Invited Paper), Jan Siegel, Instituto de Óptica "Daza de Valdés" (Spain) [10522-11]

Laser micromachined SERS substrates in etched fused silica, Katie Murphy, Herriot Watt Univ. (United Kingdom); Mark D. Mackenzie, Heriot-Watt Univ. (United Kingdom); Haonan Chi, Heriot-Watt Univ. (United Kingdom); Manoj Varma, Parama Pal, Ctr. for Nano Science and Engineering (CeNSE) (India); Lynn Paterson, Herriot Watt Univ. (United Kingdom); Ajoy K. Kar, Heriot-Watt Univ. (United Kingdom) [10522-12]

Surface functionalization of metal surfaces by large-area USP laser texturing, Laura Gemini, ALPhANOV (France) [10522-13]

Plasmonic colours on bulk metals: Laser coloring of large areas exhibiting high topography (Invited Paper), Jean-Michel Guay, Antonino Cala Lesina, Jaspreet Walia, Lora Ramunno, Pierre Berini, Arnaud Weck, Univ. of Ottawa (Canada) [10522-14]

LASE

CONFERENCE 10522

SESSION 4..... SUN 4:00 PM TO 5:30 PM

Novel Techniques for Material Characterization

Session Chair: **Jan Siegel**,
Instituto de Óptica “Daza de Valdés” (Spain)

Beam shaping and in-situ diagnostics for development of transparent materials processing (*Invited Paper*), Malte Kumkar, TRUMPF Laser- und Systemtechnik GmbH (Germany) [10522-15]

Supercontinuum generation in large-mode-area photonic crystal fibers for coherent Raman microspectroscopy, Yujie Shen, Texas A&M Univ. (USA) [10522-16]

Study of femtosecond laser induced circular optical properties in silica by Mueller matrix spectro-polarimetry, Jing Tian, Univ. Paris-Sud 11 (France); Sang Hyuk Yoo, Enric Garcia Caurel, Razvigor Ossikovski, Ecole Polytechnique (France); Bertrand Pommellec, Matthieu Lancry, Univ. Paris-Sud 11 (France) [10522-17]

Visualizing photocarrier dynamics in space and time with scanning ultrafast electron microscopy, Bolin Liao, Univ. of California, Santa Barbara (USA) [10522-18]

MONDAY 29 JANUARY

SESSION 5..... MON 8:00 AM TO 10:00 AM

Ultrafast Laser Writing of Waveguide and Fiber Devices

Session Chair: **Roberto Osellame**,
CNR-Istituto di Fotonica e Nanotecnologie (Italy)

Direct laser writing of near-surface waveguides in silver containing glasses with no additional processing, Alain Abou Khalil, Univ. Bordeaux 1 (France) [10522-19]

Longitudinal writing of vertical waveguides in fused silica: Toward new integrated photonic technologies, Diogo Pereira Lopes, Politecnico di Milano (Italy); Rebeca Martínez Vázquez, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Luigi Tallone, Marco Romagnoli, Consorzio Nazionale Interuniversitario per le Telecomunicazioni (Italy); Roberto Osellame, Politecnico di Milano (Italy) [10522-20]

Femtosecond laser direct inscription of mid-IR transmitting waveguides in BGG glasses, Arthus Le Camus, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada) and Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France); Jean-Philippe Bérubé, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada); Sandra H. Messaddeq, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada); Yannick G. Petit, Institut de Chimie de la Matière Condensée de Bordeaux (France); Younès Messaddeq, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada); Lionel Canioni, Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France); Réal Vallée, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada) [10522-21]

Femtosecond laser writing of low-loss waveguide fanout with self-guided sockets for routing multi-core to single-core fibers, Stephen Ho, Moez Haque, Gligor Djogo, Erden Ertorer, Jianzhao Li, Peter R. Herman, Univ. of Toronto (Canada) [10522-22]

Fs-written fiber Bragg gratings in multicore fibers for astrophotonic applications, Thorsten A. Goebel, Ria G. Krämer, Maximilian Heck, Daniel Richter, Friedrich-Schiller-Univ. Jena (Germany); Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10522-23]

Phase-front shaping to inhibit or enhance nonlinear Kerr effect for improving filament tracks and waveguide losses, Ehsan Alimohammadian, Sifan Liu, Erden Ertorer, Gligor Djogo, Erick Mejia Uzeda, Jianzhao Li, Peter R. Herman, Univ. of Toronto (Canada) [10522-24]

SESSION 6..... MON 10:30 AM TO 12:20 PM

Laser Ablation of Transparent Materials

Session Chair: **Peter R. Herman**, Univ. of Toronto (Canada)

Suppression of ablation by double-pulse femtosecond laser irradiation (*Invited Paper*), Masaki Hashida, Shinichiro Masuno, Yuki Furukawa, Kyoto Univ. (Japan); Mitsuhiro Kusaba, Osaka Sangyo Univ. (Japan); Shunsuke Inoue, Shuji Sakabe, Kyoto Univ. (Japan) [10522-25]

Ablation-cooled material removal with ultrafast bursts of pulses (*Invited Paper*), Fatih Ömer Ilday, Bilkent Univ. (Turkey) [10522-26]

Which period ripples will form on the ablated surface: Subwavelength or deep-subwavelength? (*Invited Paper*), Saulius Juodkazis, Swinburne Univ. of Technology (Australia) [10522-27]

Femtosecond laser induced formation of stacked nano- and micro-cavities in transparent thin-films with layered quantized blistering, David M. Roper, Univ. of Toronto (Canada) and Univ. of Cambridge (United Kingdom) [10522-28]

Lunch Break Mon 12:20 pm to 1:30 pm

SESSION 7..... MON 1:30 PM TO 3:00 PM

Laser-assisted Chemical Structuring of Glasses

Session Chair: **Saulius Juodkazis**,
Swinburne Univ. of Technology (Australia)

FEMTOPRINT: From a community research project to a widely used industrial 3D printing platform for glass micro/nano devices (*Invited Paper*), Andrea Lovera, FEMTOprint SA (Switzerland) [10522-29]

Selective laser-induced etching (SLE): A scalable subtractive 3D printing process for transparent glasses and crystals, Jens Gottmann, Martin Hermans, Nikolai Repiev, Jürgen Ortmann, LightFab GmbH (Germany) [10522-30]

Femtosecond laser based three dimensionals micromachining of optical fibers, David Lambalet, Yves Bellouard, Claude-Alban Ranély-Vergé-Dépré, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10522-31]

Chemical-assisted etching of single-pulse laser filaments for rapid 3D micro-structuring in fused silica, Erden Ertorer, Erick Mejia Uzeda, Jianzhao Li, Peter R. Herman, Univ. of Toronto (Canada) [10522-32]

SESSION 8..... MON 3:30 PM TO 5:00 PM

Advanced Ultrafast Laser for Material Processing

Session Chair: **Eric P. Mottay**, Amplitude Systèmes (France)

Generation of TW-scale mid-IR femtosecond pulse using dual-chirped optical parametric amplification (*Invited Paper*), Eiji J. Takahashi, RIKEN (Japan) [10522-33]

Material processing with fiber based ultrafast pulse delivery, Stefan Baumbach, Sebastian Pricking, Simone Russ, Elke Kaiser, TRUMPF Laser GmbH (Germany); Florian Kanal, Max Kahmann, TRUMPF Laser- und Systemtechnik GmbH (Germany); Aleksander Budnicki, Dirk H. Sutter, Alexander Killi, TRUMPF Laser GmbH (Germany) [10522-34]

GHz-level femtosecond laser system and applications, Guillaume Bonamis, Konstantin Mishchik, Eric Audouard, Amplitude Systèmes (France); John Lopez, Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France) and Ctr. National de la Recherche Scientifique (France) and Commissariat à l'Énergie Atomique (France); Inka Manek-Hönninger, Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France) and Commissariat à l'Énergie Atomique (France); Eric Mottay, Clemens Hönninger, Amplitude Systèmes (France) [10522-35]

GHz-burst pulses from a high-power femtosecond fiber-laser system for materials processing, Tino Eidam, Active Fiber Systems GmbH (Germany); Xun Brückner, Michael Müller, Friedrich-Schiller-Univ. Jena (Germany); Jens Limpert, Active Fiber Systems GmbH (Germany) and Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10522-36]

**BEST STUDENT PAPER
COMPETITION AND AWARDS CEREMONY5:00 PM TO 6:15 PM**



Competition 5:00 pm to 6:00 pm
Judging & Award Ceremony 6:00 pm to 6:15 pm

We are pleased to announce that a cash prize will be awarded to the best student presentation in this conference (both poster and oral papers considered).

Papers submitted and presented by graduate and undergraduate students are eligible. In order to ensure a fair evaluation, the conference chairs and the program committee will judge the students during a special student competition session held during the conference. Here the students present a brief 5-minute summary of their original talk or poster presented at the conference.

Following the student competition, the judges will meet and decide on the winner. The winner and runner-up will be announced during the award ceremony and awarded a cash prize. In order to claim your cash prize, a manuscript must be submitted to the conference proceedings.

AWARD SPONSORS:

TUESDAY 30 JANUARY

SESSION 9 TUE 8:30 AM TO 10:20 AM

3D Glass Modification

Session Chair: **Roberto Osellame**,
CNR-Istituto di Fotonica e Nanotecnologie (Italy)

- Femtosecond laser inscribed 5D optical memories** (*Invited Paper*), Peter G. Kazansky, Univ. of Southampton (United Kingdom). [10522-37]
- Tuning of the thermal expansion coefficient of fused silica by femtosecond laser**, Yves Bellouard, Pieter Vlugter, Ecole Polytechnique Fédérale de Lausanne (Switzerland). [10522-38]
- Glass cutting optimization with pump-probe microscopy and Bessel beam profiles**, Michael Jenne, Daniel Flamm, Daniel G. Großmann, Jonas Kleiner, Trumpf GmbH + Co. KG (Germany); Klaus Bergner, Institute of Applied Physics, Friedrich-Schiller-Univ. Jena (Germany); Julian Hellstern, Taoufiq Ouaj, Malte Kumkar, Trumpf GmbH + Co. KG (Germany); Stefan Nolte, Institute of Applied Physics, Friedrich-Schiller-Univ. Jena (Germany). [10522-39]
- Distortion-compensated multifocusing of ultrashort pulse beams using a cascade optical system**, Jun Amako, Hidetoshi Nakano, Toyo Univ. (Japan). [10522-40]
- Integrated micro-opto-mechanical cantilever fabricated by three dimensional femtosecond laser processing and chemical etching**, Gligor Djogo, The Edward S. Rogers Sr. Department of Electrical & Computer Engineering, University of Toronto (Canada); Zhangchao Wei, Univ. of Toronto (Canada) and Univ. of Science and Technology of China (China); Sifan Liu, Univ. of Toronto (Canada); Stephen Ho, Moez Haque, Jianzhao Li, Peter R. Herman, The Edward S. Rogers Sr. Department of Electrical & Computer Engineering, University of Toronto (Canada). [10522-41]

SESSION 10 TUE 10:50 AM TO 12:10 PM

3D Crystal Structuring

Session Chair: **Roberto Osellame**,
CNR-Istituto di Fotonica e Nanotecnologie (Italy)

- Extended wavelength femtosecond laser between 1.6 and 1.9µm and its application to glass and silicon processing**, Julien Nillon, Konstantin Mishchik, Eric Audouard, Amplitude Systèmes (France); John Lopez, Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France) and Ctr. National de la Recherche Scientifique (France) and Commissariat à l'Énergie Atomique (France); Eric Mottay, Clemens Hönninger, Amplitude Systèmes (France). [10522-42]
- Femtosecond laser-induced structural changes on polycrystalline silicon**, Qing He, Ting Huang, Rongshi Xiao, Beijing Univ. of Technology (China). [10522-43]
- Three-dimensional laser nanostructuring of crystals**, Airán Ródenas, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Ajoy K. Kar, Heriot Watt Univ. (United Kingdom); Sajeev John, Univ. of Toronto (Canada); Min Gu, RMIT Univ. (Australia); Roberto Osellame, CNR-Istituto di Fotonica e Nanotecnologie (Italy). [10522-44]
- High resolution study on laser fabrication inside diamond**, Patrick S. Salter, Martin J. Booth, Arnaud Courvoisier, Univ. of Oxford (United Kingdom); David Moran, Donald MacLaren, Univ. of Glasgow (United Kingdom). [10522-45]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Posters-Tuesday

- Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.
- Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.
- Single-shot temporal characterization of kilojoule-level, picosecond pulses on OMEGA EP**, Leon Waxer, Christophe Dorrer, Adam Kalb, Elizabeth Hill, Wade Bittle, Univ. of Rochester (USA). [10522-46]
- High-speed 'multi-grid' pulse-retrieval algorithm for frequency-resolved optical gating**, Rana Jafari, Rick Trebino, Georgia Institute of Technology (USA). [10522-47]
- Measuring long duration ultrafast optical waveforms using a hybrid optical-electronic system**, Daniel J. Kane, Mesa Photonics, LLC (USA). [10522-48]
- One-step synthesis of three-dimensional microtubes with single exposure of structured femtosecond optical vortices**, Liang Yang, Zhijiang Hu, Chen Xin, Yanlei Hu, Jiawen Li, Dong Wu, Jiaru Chu, Univ. of Science and Technology of China (China). [10522-49]
- Comparative study between the novel Type A and the standard type I photo-induced refractive index change in silver containing zinc phosphate glasses**, Alain Abou Khalil, Univ. Bordeaux 1 (France). [10522-50]
- Enhanced ablation with a femtosecond-nanosecond dual-pulse**, Haley Kerrigan, Shermineh Rostami, Martin Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA). [10522-51]
- Fast pulse-to-pulse modulation scheme for high power and high pulse repetition rate femtosecond lasers**, Gilles Dalla Barba, Martin Delaigue, Julien Pouysegur, Benoit Tropheime, Eric Audouard, Eric Mottay, Amplitude Systèmes (France); Miguel Melo, Martin Berendt, MWTechnologies, Lda (Portugal); Clemens Hönninger, Amplitude Systèmes (France). [10522-52]
- Fast shutter and modulator for high-power ultrafast lasers**, Tino Eidam, Active Fiber Systems GmbH (Germany); Arno Klenke, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany); Armin Hoffmann, Marco Kienel, Active Fiber Systems GmbH (Germany); Jens Limpert, Active Fiber Systems GmbH (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). [10522-53]

CONFERENCE 10522

Benefits of high repetition rate femtosecond laser glass welding using an optical head with long focal length, Marion Gstalter, ICube (France); Grégoire Chabrol, ICube (France); Armel Bahouka, IREPA LASER (France); Kokou-Dodzi Dorkenoo, Jean-Luc Rehspringer, Institut de Physique et Chimie des Matériaux de Strasbourg (France); Sylvain Lecler, ICube (France) [10522-54]

Switching waves dynamics in optical bistable cavity-free system at femtosecond laser pulse propagation in semiconductor under light diffraction, Vyacheslav A. Trofimov, Mariya M. Loginova, Vladimir A. Egorenkov, M.V. Lomonosov Moscow State Univ. (Russian Federation) [10522-55]

Short pulse characterization requires recognizing inseparability of auto-correlation and spectral measurements, Chandrasekhar Roychoudhuri, Univ. of Connecticut (USA); Narasimha S. Prasad, NASA Langley Research Ctr. (USA) [10522-56]

Fiber beam delivery of ultra-short pulses in the visible and near infrared spectral regime, Max C. Funck, Sebastian Eilzer, Björn Wedel, PT Photonic Tools GmbH (Germany) [10522-57]

High-power optical parametric chirped-pulse amplifiers for free-electron laser applications, Robert Riedel, Class 5 Photonics GmbH (Germany); Mark J. Prandolini, Class 5 Photonics GmbH (Germany) and Univ. Hamburg (Germany); Michael Schulz, Class 5 Photonics GmbH (Germany) [10522-58]

Wavelength comb swept laser to measure the extended coherence axial length, SooKyung Chun, Hansol Jang, Pusan National Univ. (Korea, Republic of); Nam Su Park, SAMSUNG Electro-Mechanics (Korea, Republic of); Sang-Won Lee, Korea Research Institute of Standards and Science (Korea, Republic of) and Univ. of Science and Technology (Korea, Republic of); Chang-Seok Kim, Pusan National Univ. (Korea, Republic of) . . . [10522-59]

Femtosecond laser-induced electron plasma dynamics simulations in different materials: Balance between ionisation and thermal energy, Javier Hernandez Rueda, Utrecht Univ. (Netherlands); Denise M. Krol, Univ. of California, Davis (USA); Dries van Oosten, Utrecht Univ. (Netherlands) [10522-60]

The laser-only single-event effects test method for space electronics based on ultrashort-pulsed-laser 'local irradiation', Oleg B. Mavritskii, Andrey Egorov, Alexander Pechenkin, Alexander Chumakov, Dmitry Savchenkov, National Research Nuclear Univ. MEPhI (Russian Federation) [10522-61]

Development of underwater spectrometer for in-situ chemical analysis of seawater by laser induced breakdown spectroscopy, Yuliya S. Biryukova, Sergey S. Golik, Alexander Mayor, Alexey Ilyin, Dmitry Proshenko, Michael Babiy, Nataliya Golik, Tygran Gevorgyan, Vladimir Lisitsa, Anton Borovski, Far Eastern Federal Univ. (Russian Federation); Yuri Kulchin, Far Eastern Federal Univ. (Russian Federation) and Institute of Automation and Control Processes (Russian Federation) [10522-62]

Qualitative analysis of single shot ablation craters with ultra-short pulses, Daniel P. Weber, Embry-Riddle Aeronautical Univ. (USA); Haley Kerrigan, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) [10522-63]

Rapid prototyping of 2D glass microfluidic devices based on femtosecond laser assisted selective etching, Sung-il Kim, Korea Institute of Machinery & Materials (Korea, Republic of); Chiwan Koo, Yeun-Ho Joung, Hanbat National Univ. (Korea, Republic of); Jiyeon Choi, Korea Institute of Machinery & Materials (Korea, Republic of) [10522-64]

Picosecond fiber laser micromachining of sapphire, glass, and ceramics, Li Jia Jiang, Xiao Nong Zhu, Shi Bin Jiang, Suzhou Tusen Laser Co., Ltd. (China) [10522-65]

All-fiber ultrafast oscillator mode-locked using nonlinear polarization evolution in polarization maintaining fibers, Yuriy Stepanenko, Institute of Physical Chemistry of the Polish Academy of Sciences (Poland); Jan Szczepanek, Univ. of Warsaw (Poland); Tomasz Kardaś, Michal Nejbauer, Institute of Physical Chemistry of the Polish Academy of Sciences (Poland); Czesław Radzewicz, Univ. of Warsaw (Poland) [10522-66]

CONFERENCE 10523

Monday–Thursday 29–1 February 2018 • Proceedings of SPIE Vol. 10523

Laser 3D Manufacturing V

Conference Chairs: **Henry Helvajian**, The Aerospace Corp. (USA); **Bo Gu**, Bos Photonics (USA); **Alberto Piqué**, U.S. Naval Research Lab. (USA)

Conference Co-Chairs: **Corey M. Dunsky**, Aeos Consulting, Inc. (USA); **Jian Liu**, PolarOnyx, Inc. (USA)

Program Committee: **John T. Fourkas**, Univ. of Maryland, College Park (USA); **Youping Gao**, Aerojet Rocketdyne (USA); **Craig Goldberg**, Newport Corp. (USA); **Weidong Huang**, Northwestern Polytechnical Univ. (China); **Yuji Sano**, IMPACT (Japan); **Michael Thiel**, Nanoscribe GmbH (Germany); **Paul S. Unwin**, Stanmore Implants (United Kingdom); **Augustine M. Urbas**, Air Force Research Lab. (USA); **Martin Wegener**, Karlsruher Institut für Technologie (Germany)

Conference Cosponsor:

PolarOnyx

MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:30 AM

Different Views of Laser 3D Processing

Session Chair: **Henry Helvajian**, The Aerospace Corp. (USA)

Additive manufacturing of reflective and transmissive optics: Potential and new solutions for optical systems (*Invited Paper*), Andreas Heinrich, Rainer Börret, Markus Merkel, Harald Riegel, Hochschule Aalen (Germany). [10523-1]

Stereolithographic fabrication of engineered lattice structures having non-traditional strut geometries (*Invited Paper*), Denis Cormier, Rochester Institute of Technology (USA). [10523-2]

Additive manufacturing: Capabilities, challenges, and future (*Invited Paper*), Yung C. Shin, Purdue Univ. (USA) [10523-3]

Development of a hybrid exposure system for lithography-based additive manufacturing technologies, Bernhard Buseti, Technische Univ. Wien (Austria); Bernhard Lutzer, IN-VISION Digital Imaging Optics GmbH (Austria); Jürgen Stampfl, Technische Univ. Wien (Austria) [10523-4]

3D printing of transparent materials by selective laser etching and multi-photon polymerization in one machine, Jens Gottmann, LightFab GmbH (Germany); Sönke Steenhusen, Fraunhofer-Institut für Silicatiforschung ISC (Germany); Martin Hermans, Jürgen Ortman, LightFab GmbH (Germany) [10523-5]

Laser heated, fiber fed additive manufacturing of transparent soda-lime glass, John M. Hostetler, Daniel Peters, Missouri Univ. of Science and Technology (USA); Jonathan T. Goldstein, Air Force Research Lab. (USA); Robert G. Landers, Douglas A. Bristow, Edward C. Kinzel, Missouri Univ. of Science and Technology (USA) [10523-6]

SESSION 2 MON 11:00 AM TO 12:30 PM

Other Processes with Lasers

Session Chair: **Corey M. Dunsky**, Aeos Consulting, Inc. (USA)

Advances in laser peening technology and possible extension to 3D manufacturing tools (*Invited Paper*), Yuji Sano, IMPACT (Japan); Yoshihiro Sagisaka, Industrial Research Institute of Shizuoka Prefecture (Japan); Tomokazu Sano, Osaka Univ. (Japan) [10523-7]

Light controlling sound: Selective laser sintering as a tool for building aqueous acoustic metamaterials (*Invited Paper*), Charles Rohde, Gregory J. Orris, Matthew D. Guild, U.S. Naval Research Lab. (USA) [10523-8]

Laser printing of large area and patterned graphene (*Invited Paper*), Minlin Zhong, Tsinghua Univ. (China). [10523-9]

Lunch Break Mon 12:30 pm to 2:00 pm

SESSION 3 MON 2:00 PM TO 3:10 PM

Microfluidic

Session Chair: **Weidong Huang**, Northwestern Polytechnical Univ. (China)

3D microfluidic fabrication using a low refractive index polymer for clear microscopic observation at the fluid boundary (*Invited Paper*), Yasutaka Hanada, Hiroaki Univ. (Japan) [10523-10]

Dynamic programming approach to adaptive slicing for optimization under a global volumetric error constraint, Andrew Deng, Yasmine Badr, Puneet Gupta, Univ. of California, Los Angeles (USA) [10523-11]

Selective laser melting of glass using ultrashort laser pulses, Brian Seyfarth, Lisa Kaden, Gabor Matthäus, Tobias Ullsperger, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) [10523-12]

SESSION 4 MON 3:40 PM TO 5:40 PM

Polymers Optical Material 3D

Session Chair: **Martin Wegener**, Karlsruher Institut für Technologie (Germany)

Complex freeform micro-optics by femtosecond laser direct writing (*Invited Paper*), Simon Thiele, Andrea Hartung, Simon Ristok, Institute of Applied Optics and SCoPE, Univ. Stuttgart (Germany); Ksenia Weber, 4th Physics Institute and Research Ctr. SCoPE, Univ. Stuttgart (Germany); Michael Schmid, Institute of Applied Optics and SCoPE, Univ. Stuttgart (Germany); Harald Giessen, 4th Physics Institute and Research Ctr. SCoPE, Univ. Stuttgart (Germany). [10523-13]

SLA 3D printer with novel biocompatible materials based on carbon nanotubes, Jose Valentin V. Guzmán-González, Univ. Autónoma de Nuevo León (Mexico); Aleksandr Alexandrovich Polokhin, National Research Univ. of Electronic Technology (Russian Federation); Mauricio Ivan Saldana Martinez, Univ. Autónoma de Nuevo León (Mexico); Vitaly Markovich Podgaetsky, Alexander Yurevich Gerasimenko, National Research Univ. of Electronic Technology (Russian Federation); Valentin Guzmán, Univ. Autónoma de Nuevo León (Mexico); Mario A. García, Univ. de Guadalajara (Mexico); Oscar G. Barajas-González, Goethe Univ. (Germany) [10523-14]

Tailored irradiation by VCSEL for controlled thermal states in thermoplastic tape placement, Thomas Weiler, RWTH Aachen Univ. (Germany) [10523-15]

Laser additive manufacturing for enhanced performance of optoelectronic devices (*Invited Paper*), Martí Duocastella, Istituto Italiano di Tecnologia (Italy). [10523-16]

High-throughput 3D printing of customized imaging lens, Xiangfan Chen, Wenzhong Liu, Biqin Dong, Hao F. Zhang, Cheng Sun, Northwestern Univ. (USA). [10523-17]

LASE



CONFERENCE 10523

TUESDAY 30 JANUARY

SESSION 5 TUE 8:00 AM TO 10:20 AM

3D Laser Lithography I

Joint Session with Conferences 10523 and OE201

Session Chair: **Georg von Freymann**,
Technische Univ. Kaiserslautern (Germany)

Fabrication of hyperuniform disordered photonic network materials (*Invited Paper*), Nicolas Muller, Univ. de Fribourg (Switzerland); Jakub Haberk, AGH Univ. of Science and Technology (Poland); Stefan Aebly, Catherine Marichy, Luis-Salvador Froufe-Pérez, Frank Scheffold, Univ. de Fribourg (Switzerland) [10544-26]

Multiphoton processing technologies for applications in biology and tissue engineering (*Invited Paper*), Aleksandr Ovsiyanikov, Technische Univ. Wien (Austria) [10544-27]

2PP-DLW in hydrogels for excitation and immobilization of living cells, Wolfgang Horn, Frederik Hasselmann, Michael Hackmann, Cornelia Denz, Westfälische Wilhelms-Univ. Münster (Germany) [10544-28]

Towards a cellulose-based photoresist, Marie-Christin Angermann, Technische Univ. Kaiserslautern (Germany); Maximilian Rothhammer, Cordt Zollfrank, Technische Univ. München (Germany); Georg von Freymann, Technische Univ. Kaiserslautern (Germany) [10544-29]

Printing structural colors via direct laser writing, Gordon Zyla, Ruhr-Univ. Bochum (Germany); Alexander Kovalev, Christian-Albrechts-Univ. zu Kiel (Germany); Evgeny L. Gurevich, Cemal Esen, Andreas Ostendorf, Ruhr-Univ. Bochum (Germany); Stanislav Gorb, Christian-Albrechts-Univ. zu Kiel (Germany) [10544-30]

3D microfabrication of mouse and human variants of serum albumin by femtosecond laser multiphoton cross-linking, Daniela Serien, Katsumi Midorikawa, Koji Sugioka, RIKEN (Japan) [10523-18]

SESSION 6 TUE 10:50 AM TO 12:20 PM

3D Laser Lithography II

Joint Session with Conferences 10523 and OE201

Session Chair: **Frank Scheffold**, Univ. de Fribourg (Switzerland)

Direct laser writing of electromagnetic metasurfaces for infra-red frequency range (*Invited Paper*), Vygantas Mizeikis, Ihar Fanyaeu Faniayeu, Shizuoka Univ. (Japan) [10544-31]

Femtosecond laser-induced optical properties in silver-containing gallo-germinate heavy metal oxide glasses, Yannick G. Petit, Institut de Chimie de la Matière Condensée de Bordeaux (France); Arthur Le Camus, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada) and Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France); Sylvain Danto, Tea Skopak, Institut de Chimie de la Matière Condensée de Bordeaux (France); Jean-Philippe Bérubé, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada); Thierry Cardinal, Institut de Chimie de la Matière Condensée de Bordeaux (France); Réal Vallée, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada); Lionel Canioni, Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France) [10544-32]

Metal and metal-composite micro-structures via direct laser writing, Erik H. Waller, Technische Univ. Kaiserslautern (Germany) [10544-33]

Optical lithography using stimulated emission depletion, Paul Somers, Sanjoy Mukherjee, Brandon Franz, Bryan Boudouris, Xiaolong He, Liang Pan, Xianfan Xu, Purdue Univ. (USA) [10523-19]

Lunch/Exhibition Break Tue 12:20 pm to 1:30 pm

SESSION 7 TUE 1:30 PM TO 3:30 PM

Special Session: Laser Peening/Cladding

Session Chair: **Yuji Sano**, ImpACT (Japan)

Optimizing alloys for laser additive manufacturing (*Invited Paper*), Christian Leinenbach, EMPA (Switzerland) [10523-20]

Development of experimental station for laser shock peening at HiLASE (*Invited Paper*), Danijela Rostohar, Jan Brajer, Jan Kaufman, Marek Bohm, Sanin Zulic, Tomas Mocek, Institute of Physics of the ASCR, v.v.i. (Czech Republic) [10523-21]

Significance of laser cladding in 3D metal printing by direct metal laser melting and sintering, Shiva P. Gadag, Radovan Kovacevic, Southern Methodist Univ. (USA); Nilesh G. Ramani, Naren S. Shikarkhane, Scantech Laser Pvt. Ltd. (India) [10523-22]

Synchrotron x-ray induced real time observations of cobalt-chromium alloy layer formation by micro laser cladding, Yuji Sato, Masahiro Tsukamoto, Osaka Univ. (Japan); Takahisa Shobu, Japan Atomic Energy Agency (Japan); Ritsuko Higashino, Osaka Univ. (Japan); Yoshinori Funada, Yorihiro Yamashita, Industrial Research Institute of Ishikawa (Japan); Yuu Sakon, Muratani Machine Manufacture Co., Ltd. (Japan); Nobuyuki Abe, Osaka Univ. (Japan) [10523-23]

Additive Manufacturing of reflective optics: Evaluating finishing methods, Georg Leuteritz, Roland Lachmayer, Leibniz Univ. Hannover (Germany) [10523-24]

SESSION 8 TUE 4:00 PM TO 5:40 PM

Forward Transfer

Session Chair: **Alberto Piqué**, U.S. Naval Research Lab. (USA)

Extending the printing capabilities of laser-induced forward transfer from two-dimensional patterning to direct three-dimensional printing, Paul Delrot, Sylvain P. Hauser, Jan Krizek, Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10523-25]

Micro patterning of glassy, polymeric, and metallic materials by fs-LIFT, Juliana M. P. Almeida, Kelly T. Paula, Oriana Avila, Paulina R. Ferreira, Univ. de São Paulo (Brazil); Craig B. Arnold, Princeton Univ. (USA); Cleber R. Mendonça, Univ. de São Paulo (Brazil) [10523-26]

Printing with light: Ultrafast printing technologies for flexible electronics, Gari Arutinov, Merijn P. Giesbers, Jeroen van den Brand, Holst Ctr. (Netherlands) [10523-27]

Laser induced forward transfer bioprinting of immune cells and chemoattractant proteins for immunological responses studies, Sara Lauzurica, Andrés Marquez, Carlos Molpeceres, Univ. Politécnica de Madrid (Spain); Miguel Gómez-Fontela, Laura Notario, Pilar Lauzurica, Instituto de Salud Carlos III (Spain) [10523-28]

Laser-induced forward transfer (LIFT) of 3D microstructures, Kristin M. Charipar, U.S. Naval Research Lab. (USA); Rubén E. Díaz-Rivera, Univ. de Puerto Rico Mayagüez (USA); Nicholas A. Charipar, Alberto Piqué, U.S. Naval Research Lab. (USA) [10523-29]

WEDNESDAY 31 JANUARY

PANEL DISCUSSION 8:30 AM TO 10:00 AM

3D Printing: The Next Challenges To Come

See <http://spie.org/PW/special-events/Industry-Event> for details.

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and Reinhart Poprawe, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 2:00 pm

SESSION 9 WED 2:00 PM TO 3:10 PM

Status Additive Technology

Session Chair: **Bo Gu**, Bos Photonics (USA)

Development and qualification of additively manufactured parts for space (*Invited Paper*), Michael J. O'Brien, The Aerospace Corp. (USA) [10523-30]

Wide format, high speed and low cost fabrication of 3D cardboard molds by laser based rapid layered manufacturing (RLM) technology, Claudio Rottman, Highcon Systems Ltd. (Israel) [10523-31]

All inkjet printed frequency steered phased array antennas with multi angle receiving demonstrated via simulation, Peter M. Grubb, The Univ. of Texas at Austin (USA); Wentao Li, Xidian Univ. (China) and The Univ. of Texas at Austin (USA); Farzad Mokhtari-Koushyar, Ray Chen, The Univ. of Texas at Austin (USA) [10523-32]

SESSION 10 WED 3:40 PM TO 5:20 PM

Microprinting

Session Chair: **Michael Thiel**, Nanoscribe GmbH (Germany)

Nanoscale 3D printing enables fundamental biology studies (*Invited Paper*), Alice White, Boston Univ. (USA) [10523-33]

Current and future role of two-photon polymerization for medical microrobots (*Invited Paper*), Maura Power, Imperial College London (United Kingdom) [10523-34]

Single-photon micro-additive manufacturing through a multimode optical fiber, Paul Delrot, Damien Loterie, Demetri Psaltis, Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10523-35]

Optical 3D printing in mesoscale, Mangirdas Malinauskas, Vilnius Univ. (Lithuania); Linas Jonušauskas, Darius Gailevičius, Vilnius Univ. (Lithuania), Femtika (Lithuania); Sima Rekštyte, Vilnius Univ. (Lithuania); Saulius Juodkazis, Swinburne Univ. of Technology (Australia) [10523-36]

THURSDAY 1 FEBRUARY

SESSION 11 THU 8:00 AM TO 10:20 AM

Metal Processing

Session Chair: **Jian Liu**, PolarOnyx, Inc. (USA)

The effect of laser focus and process parameters on microstructure and mechanical properties of SLM Inconel 718 (*Invited Paper*), Glenn Bean, The Aerospace Corp. (USA) [10523-37]

Development of laser metal deposition technology with IR and blue diode lasers (*Invited Paper*), Masahiro Tsukamoto, Yuji Sato, Ritsuko Higashino, Osaka Univ. (Japan); Kohei Asano, Osaka Univ. (Japan) and Yamazaki Mazak corporation (Japan); Yoshinori Funada, Industrial Research Institute of Ishikawa (Japan); Keita Asuka, Nichia Corp. (Japan); Yu Sakon, Muratani Machine Inc. (Japan); Nobuyuki Abe, Osaka Univ. (Japan); Koji Tojo, Shonan Shimadzu Co., Ltd. (Japan) [10523-38]

Designing for the DMLS process, Greg Thompson, Proto Labs, Inc. (USA) [10523-39]

4D manufacturing of intermetallic SMA fabricated by SLM process, Igor V. Shishkovsky, P.N. Lebedev Physical Institute (Russian Federation) [10523-40]

Selective laser melting of copper using ultrashort laser pulses at different wavelengths, Lisa Kaden, Brian Seyfarth, Tobias Ullsperger, Gabor Matthäus, Friedrich-Schiller-Univ. Jena (Germany) [10523-41]

Selective laser melting for copper modeling with high power blue diode laser, Shinichiro Masuno, Masahiro Tsukamoto, Osaka Univ. (Japan); Koji Tojo, Shonan Shimadzu Co., Ltd. (Japan); Kohei Asano, Yamazaki Mazak Corp. (Japan) and Osaka Univ. (Japan); Keita Asuka, Nichia Corp. (Japan); Yoshinori Funada, Industrial Research Institute of Ishikawa (Japan) [10523-42]

SESSION 12 THU 10:50 AM TO 12:10 PM

New Processes and Process Control I

Session Chair: **Augustine M. Urbas**, Air Force Research Lab. (USA)

Possible application of laser heterodyne and ultrasonics as in situ process control for additive manufacturing, Anthony J. Manzo, Henry Helvajian, The Aerospace Corp. (USA) [10523-43]

Rapid TMC laser prototyping: Compositional and phase-structural sustainability via combinatorial design of titanium based gradient alloy reinforced by nano sized TiC or TiB₂ ceramics, Igor V. Shishkovsky, Nina Kakovkina, P.N. Lebedev Physical Institute (Russian Federation) [10523-44]

A compact beam diagnostic device for 3D additive manufacturing systems, Andreas Koglbauer, Stefan Wolf, Otto Märten, Reinhard Kramer, PRIMES GmbH (Germany) [10523-45]

Solid-state microchip based scanning laser 3D system, Alexandr S. Grishkanich, ITMO Univ. (Russian Federation); Dmitriy Redka, Konstantin Tsvetkov, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [10523-46]

Lunch/Exhibition Break Thu 12:10 pm to 1:40 pm

LASE

CONFERENCE 10523

SESSION 13THU 1:40 PM TO 3:20 PM

New Processes and Process Control II

Session Chair: **Henry Helvajian**, The Aerospace Corp. (USA)

Development of hot-engraved letter reading device using a two-dimensional laser distance meter, Yuto Tanaka, JFE Steel Corp. (Japan).....[10523-47]

Optics to Control Thermal Effects in Selective Laser Melting, Alexander V. Laskin, AdlOptica Optical Systems GmbH (Germany); Dietrich Faidel, Forschungszentrum Jülich GmbH (Germany); Vadim Laskin, AdlOptica Optical Systems GmbH (Germany)[10523-48]

In-situ x-ray observation of molten pool dynamics while laser cladding with blue direct diode laser, Ritsuko Higashino, Masahiro Tsukamoto, Yuji Sato, Nobuyuki Abe, Osaka Univ. (Japan); Takahisa Shobu, Japan Atomic Energy Agency (Japan); Yoshinori Funada, Yorihiro Yamashita, Industrial Research Institute of Ishikawa (Japan); Yuu Sakon, Muratani Machine Manufacture Co., Ltd. (Japan); Masanori Sengoku, Minoru Yoshida, Kindai Univ. (Japan)[10523-49]

Thermal field monitoring and analysis of its influence on the deposition of single tracks of a nickel superalloy, Sabina Luisa Campanelli, Andrea Angelastro, Marco Latte, Politecnico di Bari (Italy); Antonella Rizzo, Fania Palano, ENEA (Italy)[10523-50]

Investigation of direct metal sintering process of iron powder with low laser power, Prathan Buranasiri, Setthanun Thongsuwan, King Mongkut's Institute of Technology Ladkrabang (Thailand); Assawin Ranusawud, AML Technology Co., Ltd. (Thailand); Pichet Limsuwan, King Mongkut's Univ. of Technology Thonburi (Thailand)[10523-51]

CONFERENCE 10524

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10524

Free-Space Laser Communication and Atmospheric Propagation XXX

Conference Chairs: **Hamid Hemmati**, Facebook Inc. (USA); **Don M. Boroson**, MIT Lincoln Lab. (USA)

Program Committee: **Abhijit Biswas**, Jet Propulsion Lab. (USA); **Donald M. Cornwell Jr.**, NASA Goddard Space Flight Ctr. (USA); **Olga Korotkova**, Univ. of Miami (USA); **William S. Rabinovich**, U.S. Naval Research Lab. (USA); **Zoran Sodnik**, European Space Research and Technology Ctr. (Netherlands); **Morio Toyoshima**, National Institute of Information and Communications Technology (Japan)

MONDAY 29 JANUARY

SESSION 1 MON 8:00 AM TO 10:00 AM

Terminal and System Designs and Components I

Session Chair: **Hamid Hemmati**, Facebook Inc. (USA)

Cost reduction concepts for high-throughput optical intersatellite links, Eric D. Miller, Kevin M. Birnbaum, Brian Parris, Facebook Inc. (USA) . [10524-1]

Free space optics for tactical environments, Linda M. Thomas, William S. Rabinovich, Christopher I. Moore, U.S. Naval Research Lab. (USA)..... [10524-2]

Reconfigurable free space optical data center network using gimbal-less MEMS retroreflective acquisition and tracking, Peng Deng, Tim Kane, Omar Alharbi, The Pennsylvania State Univ. (USA) [10524-3]

Assessment of gamma and proton radiation effects on 100 Gbps commercial optical coherent DSP ASIC, Raichelle J. Aniceto, Facebook Inc. (USA) [10524-4]

All-optical retro-modulation for terabit-per-second free-space optical communication, Brandon Born, Ilija R. Hristovski, Simon Geoffroy-Gagnon, Jonathan F. Holzman, The Univ. of British Columbia Okanagan (Canada) [10524-5]

Optoelectronic components for optical information processing and communication in 850nm/1060nm/1550nm regimes, Qin Wang, Stéphane Junique, Adrien Chopard, Mikael Karlsson, Ingemar Petermann, Olof Öberg, RISE Acreo AB (Sweden) [10524-6]

SESSION 2 MON 10:30 AM TO 12:10 PM

Terminal and System Designs and Components II

Session Chair: **Bryan S. Robinson**, MIT Lincoln Lab. (USA)

Design and qualification of a small, customizable fast steering mirror (FSM) for FSOC, stabilization, and scanning applications, Jim J. McNally, Nick Jacka, Bill Walker, Mariah Roybal, Applied Technology Associates (USA)..... [10524-7]

FSO links using high sensitivity gigabit combinational sensors and an adaptive high-throughput error-correction protocol, Mike S. Ferraro, Rita Mahon, James L. Murphy, William S. Rabinovich, U.S. Naval Research Lab. (USA)..... [10524-8]

The effect of photon counting detector blocking on centroiding for deep space optical communications, Meera Srinivasan, Erik Alerstam, Kenneth Andrews, Andre Wong, Jet Propulsion Lab. (USA) [10524-9]

Optimizing deep-space optical communication under power constraints, Michal Jachura, Marcin Jarzyna, Konrad Banaszek, Univ. of Warsaw (Poland)..... [10524-10]

On achieving high performance optical communications from very deep space, Don M. Boroson, MIT Lincoln Lab. (USA)..... [10524-11]

Lunch Break Mon 12:10 pm to 1:30 pm

SESSION 3 MON 1:30 PM TO 3:30 PM

Space and Air Systems and Demonstrations

Session Chair: **Zoran Sodnik**,

European Space Research and Technology Ctr. (Netherlands)

Optical feeder link program and first adaptive optics test results, Rudolf Saathof, Remco den Breeje, Wimar Klop, Stefan Kuiper, TNO (Netherlands); Niek Doelman, TNO (Netherlands) and Leiden Observatory (Netherlands); Federico Pettazzi, Amir Vosteen, Thijs Moens, Justin Wildschut, Hans Spierdijk, Tjeerd Russchenberg, Niel Truyens, Will E. Crowcombe, Jet Human, TNO (Netherlands); Ramon Mata Calvo, Ricardo Barrios, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Ivan Ferrario, TNO (Netherlands); Juraj Poliak, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [10524-12]

OPTEL-D: An optical communication system for the deep space, Max C. Stumpf, Christoph Roth, Martin Mosberger, Laurent Francou, Thales Alenia Space Switzerland (Switzerland); Marcos R. Garcia-Talavera, Instituto de Astrofísica de Canarias (Spain); Clemens Heese, Zoran Sodnik, European Space Research and Technology Ctr. (Netherlands) [10524-13]

Testing of a compact 10-Gbps Lasercom system at Trident Warrior 2017, Juan C. Juarez, Johns Hopkins Univ. Applied Physics Lab., LLC (USA) [10524-14]

Design status of the development for a GEO-to-ground optical feeder link, HICALI, Tetsuharu Fuse, National Institute of Information and Communications Technology (Japan) [10524-15]

Demonstration of a bidirectional, coherent air-to-ground optical link, Andrew Grier, Chien-Chung Chen, Eric M. Booen, Adit Sahasrabudhe, Harvard K. Harding Jr., Chiyun Xia, Matthew T. Hunwardsen, Joseph Demers, Konstantin Kudinov, Ferze Patawaran, Alan Wang, Cen Zhao, Dee Leang, Jonathan Gin, Brett Smith, Mark Lewis, Boyang Zhang, Danh Nguyen, Facebook Inc. (USA); Dominic Jandrain, Avena (Canada); Matt Malfa, Farhana Haque, Kevin J. Quirk, Facebook Inc. (USA) [10524-16]

Experimental demonstration of multi-spatial mode digital coherent combining over a 1.6-km atmospheric link, Timothy M. Yarnall, David J. Geisler, Gavin Lund, Curt M. Schieler, Mark L. Stevens, MIT Lincoln Lab. (USA)..... [10524-17]

SESSION 4 MON 4:00 PM TO 5:20 PM

Link Analysis and Optimization

Session Chair: **Hamid Hemmati**, Facebook Inc. (USA)

Performance improvement in LEO-to-ground free space optical communication systems with adaptive distributed frame repetition, Yoshimasa Ono, Yasunori Futatsugi, Yohei Hasegawa, Manabu Arikawa, Takashi Ishikawa, Toshiharu Ito, NEC Corp. (Japan)..... [10524-18]

Performance limits and simplified analysis of photon-counted noisy free-space optical links, Don M. Boroson, MIT Lincoln Lab. (USA) [10524-19]

Estimation of terrestrial FSO availability, William S. Rabinovich, Rita Mahon, Rachel E. Freeman, Mike S. Ferraro, James L. Murphy, U.S. Naval Research Lab. (USA) [10524-20]

Data volume analysis of a 100+ Gb/s LEO-to-ground optical link with ARQ, Curt M. Schieler, Bryan S. Robinson, MIT Lincoln Lab. (USA) . [10524-21]

LASE

CONFERENCE 10524

TUESDAY 30 JANUARY

SESSION 5..... TUE 8:00 AM TO 9:00 AM

Free-Space Quantum

Session Chair: **Don M. Boroson**, MIT Lincoln Lab. (USA)

Free space laser communications with adaptive optics and quantum key distribution, Francis Bennet, Ping-Koy Lam, Lyle E. Roberts, Daniel Shaddock, Jordan Smith, James Spollard, Chunle Xiong, Australian National Univ. (Australia) [10524-22]

A BB84 free space quantum key distribution link implemented with modulating retro-reflectors, William S. Rabinovich, Rita Mahon, Mike S. Ferraro, Peter G Goetz, Mark Bashkansky, Rachel E. Freeman, U.S. Naval Research Lab. (USA); John Reintjes, Sotera Defense (USA); James Murphy, U.S. Naval Research Lab. (USA) [10524-23]

Superdense teleportation (SDT) for quantum communication from LEO to earth, Herbert Bernstein, Hampshire College, School of Natural Science & ISIS Institute (USA) [10524-24]

SESSION 6..... TUE 9:00 AM TO 10:00 AM

Space Programs I

Session Chair: **Don M. Boroson**, MIT Lincoln Lab. (USA)

Latest changes to NASA's Laser Communications Relay Demonstration Project, Bernard Edwards, NASA Goddard Space Flight Ctr. (USA) [10524-25]

European deep-space optical communications program, Zoran Sodnik, Clemens Heese, European Space Research and Technology Ctr. (Netherlands); Klaus-Jürgen Schulz, Igor Zayer, Robert J. Daddato, European Space Operations Ctr. (Germany) [10524-26]

The OSIRIS program at DLR, Christopher Schmidt, Christian Fuchs, Deutsches Zentrum für Luft und Raumfahrt e.V. (Germany) [10524-27]

SESSION 7..... TUE 10:30 AM TO 11:50 AM

Space Programs II

Session Chair: **Hamid Hemmati**, Facebook Inc. (USA)

Laser communications for manned space exploration in cislunar space: ILLUMA-T and O2O, Bryan S. Robinson, Tina Shih, Farzana I. Khatri, Don M. Boroson, Owen Guldner, Steven Constantine, Jamie W. Burnside, James Torres, Timothy M. Yarnall, Catherine E. DeVoe, William Hubbard, David J. Geisler, John E. Kaufmann, Jesse Mills, Mark L. Stevens, Olga V. Mikulina, Neal W. Spellmeyer, Jade P. Wang, Raymond Butler, Michael J. Hogan, MIT Lincoln Lab. (USA); Mark D. Brumfield, Todd T. King, Antonios A. Seas, NASA Goddard Space Flight Ctr. (USA) [10524-28]

The European data relay system and Alphasat to T-AOGS space to ground links, status and achievements in 2017, Frank F. Heine, Karen Saucke, Daniel Troendle, Patricia Martin-Pimentel, Tesat-Spacecom GmbH & Co. KG (Germany); Rolf Meyer, Michael Lutzer, Deutsches Zentrum für Luft und Raumfahrt e.V. (Germany); Christoph Rochow, Tesat-Spacecom GmbH & Co. KG (Germany) [10524-29]

Deep space optical communication technology demonstration, Abhijit Biswas, Meera Srinivasan, Sabino Piazzolla, Ryan Rogalin, Jet Propulsion Lab. (USA) [10524-30]

Terabyte delivery system (TDS): A demonstration of large-volume direct-to-earth data transfer from low-earth orbit, Bryan S. Robinson, Don M. Boroson, Curt M. Schieler, Farzana I. Khatri, Owen Guldner, Steven Constantine, Tina Shih, Jamie W. Burnside, Bryan C. Bilyeu, Farhad Q. Hakimi, Ajay Garg, Gregory Allen, Emily Clements, MIT Lincoln Lab. (USA) [10524-31]

Lunch/Exhibition Break Tue 11:50 am to 1:20 pm

SESSION 8..... TUE 1:20 PM TO 3:20 PM

Transmitter Architectures and Components

Session Chair: **Abhijit Biswas**

Monolithic InP master oscillator power amplifier for free space optical transmissions at 1.5 μm , Cécil Pham, Frédéric Van Dijk, III-V Lab. (France); Mickaël Faugeron, Thales Alenia Space (France); Olivier Parillaud, Yannick Robert, Eric Vinet, III-V Lab. (France) [10524-32]

Exploration of double clad fibers for increased stability of bidirectional free space optical links, Sarah A. Tedder, Bryan L. Schoenholz, NASA Glenn Research Ctr. (USA) [10524-33]

RZ-DPSK photonic integrated transmitter for space optical communications, Joseph Fridlander, Sergio Pinna, Victoria Rosborough, Univ. of California, Santa Barbara (USA); Steven Estrella, Freedom Photonics, LLC (USA) and Univ. of California, Santa Barbara (USA); Leif Johansson, Freedom Photonics, LLC (USA); Jonathan Klamkin, Univ. of California, Santa Barbara (USA) [10524-34]

Space qualification of multi-channel optical fiber amplifier for low Earth orbit to ground direct downlinks, Efstratios Kehayas, James Edmunds, Clive Palmer, Chris Coopman, Richard Webb, Martin Tuci, Marios Kechagias, Keith Simpson, Matthew Welch, Leontios Stampoulidis, Gooch & Housego Systems Technology Group (United Kingdom) [10524-35]

Radiation influence on Er and Er/Yb doped fiber amplifiers performances: High power and WDM architectures, Ayoub Ladaci, Sylvain Girard, Univ. Jean Monnet Saint-Etienne (France); Luciano Mescia, Politecnico di Bari (Italy); Thierry Robin, Benoît Cadier, Arnaud Laurent, Carine Ranger, David Kermen, iXBlue SAS (France); Mathieu Boutillier, Ctr. National d'Études Spatiales (France); Baidy Sane, Emmanuel Marin, Aziz Boukenter, Youcef Ouerdane, Univ. Jean Monnet Saint-Etienne (France) [10524-36]

Laser wireless power transfer system with atmospheric compensation, Vitaliy V. Kapranov, Vjatcheslav Tugaenko, Ivan S. Matsak, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation) [10524-37]

SESSION 9..... TUE 3:50 PM TO 5:50 PM

Receiver Architectures and Components

Session Chair: **Bryan S. Robinson**, MIT Lincoln Lab. (USA)

HgCdTe APDs for free space optical communications, Johan Rothman, Pierre Bleuet, Luc André, Quentin Abadie, Geoffroy Bordot, Sylvette Bisotto, Guillaume Audoit, Jean-Alain Nicolas, Bertrand Dupont, Jean-Pierre Rostaing, Gilles Lasfargues, CEA-LETI (France) [10524-38]

Mode diversity coherent receiver with few-mode fiber-coupling for high-speed free-space optical communication under atmospheric turbulence, Manabu Arikawa, Yoshimasa Ono, Toshiharu Ito, NEC Corp. (Japan) [10524-39]

Examining the ability of an FSO receiver to simultaneously communicate with multiple transmitters, Peter G. LoPresti, The Univ. of Tulsa (USA); Shannon Suddath, Hazem Refai, The Univ. of Oklahoma - Tulsa (USA); Sarah A. Tedder, NASA Glenn Research Lab. (USA); Bryan L. Schoenholz, NASA Glenn Research Ctr. (USA) [10524-40]

Adaptive optics on small astronomical telescope with multi-actuator adaptive lens, Martino Quintavalla, CNR-IFN Padova (Italy); Jacopo Mocchi, Riccardo Muradore, Univ. degli Studi di Verona (Italy); Alain J. Corso, Stefano Bonora, CNR-IFN Padova (Italy) [10524-41]

Bit error rate performance on passive alignment in free space optical links using large core fibers, Bryan L. Schoenholz, Sarah A. Tedder, Patrick Millican, NASA Glenn Research Ctr. (USA) [10524-42]

Ultra-narrow bandpass optical interference filters for deep space optical communication, Thomas D. Rahmlow Jr., Timothy Upton, Markus Fredell, Terrance Finnell Jr., Stephen Washkevich, Kirk Winchester, Tina Hoppock, Robert L. Johnson Jr., Omega Optical, Inc. (USA) .. [10524-43]

TUESDAY POSTER SESSION TUE 6:00 PM TO 8:00 PM

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

An inverse-kinematic approach to dual-stage servo control for an optical pointing system, Eric D. Miller, Facebook Inc. (USA) [10524-44]

Long-term measurements of atmospheric turbulence parameters on a maritime link, Rita Mahon, Mike S. Ferraro, Rachel E. Freeman, James L. Murphy, William S. Rabinovich, U.S. Naval Research Lab. (USA) [10524-45]

Giant pulse phenomena in a high gain Erbium doped fiber amplifier, Steven X. Li, Scott A. Merritt, Michael A. Krainak, Anthony Yu, NASA Goddard Space Flight Ctr. (USA) [10524-46]

Improvements to the U.S. Naval Research Laboratory free-space laser-communication facility, Taylor A. Page, Christopher I. Moore, Linda M. Thomas, William S. Rabinovich, Rita Mahon, Lindsey Willstatter, Mike S. Ferraro, U.S. Naval Research Lab. (USA) [10524-47]

Atmospheric turbulence across 13 km terrestrial path, Konstantin Kudinov, Kevin M. Birnbaum, Facebook Inc. (USA) [10524-48]

Performance and characterization of a modular superconducting nanowire single photon detector system for space-to-earth optical communications links, Brian E. Vyhnaek, Sarah A. Tedder, Jennifer M. Nappier, NASA Glenn Research Ctr. (USA) [10524-49]

Low-cost optical communications ground terminal architecture for Inter-planetary and high data rate communications links, Jim J. McNally, John Garnham, Paul D. Shubert, Bob E. Pierson, Applied Technology Associates (USA) [10524-50]

Development of an optical slice for an RF and optical software defined radio, Jennifer M. Nappier, Nicholas C. Lantz, NASA Glenn Research Ctr. (USA) [10524-51]

The non-mechanical accessing method for tracking multi terminals when building the laser communication network, Xiangru Wang, Tianyi Zhang, Qi Qiu, Univ. of Electronic Science and Technology of China (China) [10524-52]

Chaos and the order of positional parameters of wave beams at the output of a lengthy atmospheric path, Arkadiy Blank, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation) and M.V. Lomonosov Moscow State Univ. (Russian Federation); Eugene A. Babanin, M.V. Lomonosov Moscow State Univ. (Russian Federation); Vitaliy V. Kapranov, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation); Natalia A. Suhareva, M.V. Lomonosov Moscow State Univ. (Russian Federation); Vjacheslav Tugaenko, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation) [10524-53]

Wavefront aberration study using Geometric phase shifting radial shearing interferometer, Pramod Panchal, Chittur S. Narayanamurthy, Indian Institute of Space Science and Technology (India) [10524-54]

Non-linear time/frequency analysis of the wave beams positional and scintillation characteristics in the turbulent atmosphere, Arkadiy Blank, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation) and M.V. Lomonosov Moscow State Univ. (Russian Federation); Eugene A. Babanin, M.V. Lomonosov Moscow State Univ. (Russian Federation); Vitaliy V. Kapranov, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation); Rinat Strungis, Natalia A. Suhareva, M.V. Lomonosov Moscow State Univ. (Russian Federation); Vjacheslav Tugaenko, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation) [10524-55]

High-peak power fiber amplifier for deep space laser communications, Robert E. Lafon, Graham R. Allan, NASA Goddard Space Flight Ctr. (USA); Jeff W. Nicholson, OFS Fitel, LLC (USA); Scott A. Merrit, NASA Goddard Space Flight Ctr. (USA) [10524-56]

Independent components analysis for processing optical signals in support of multi-user communication, Hazem Refai, Federica Aveta, The Univ. of Oklahoma - Tulsa (USA); Peter G. LoPresti, The Univ. of Tulsa (USA); Sarah A. Tedder, Bryan L. Schoenholz, NASA Glenn Research Ctr. (USA) [10524-57]

Stress test verification of optical fiber wrap design for compact free space optical communications gimbals, Jim J. McNally, Andrew Cline, Isaiah Ware, Paul D. Shubert, Applied Technology Associates (USA) [10524-58]

Satellite-ground laser communication with diversity advantages, Paul Christopher, PFC Associates (USA) [10524-59]

Day-time atmospheric turbulence profiler, Konstantin Kudinov, Kevin M. Birnbaum, Chien-Chung Chen, Facebook Inc. (USA) [10524-60]



CONFERENCE 10525

Wednesday–Thursday 31–1 February 2018 • Proceedings of SPIE Vol. 10525

High-Power Laser Materials Processing: Applications, Diagnostics, and Systems VII

Conference Chairs: **Stefan Kaierle**, Laser Zentrum Hannover e.V. (Germany); **Stefan W. Heinemann**, TRUMPF Photonics (USA)

Program Committee: **Bo Gu**, Bos Photonics (USA); **Klaus R. Kleine**, Coherent, Inc. (USA); **Annett Klotzbach**, Fraunhofer IWS Dresden (Germany); **Wolfgang Knapp**, Cooperation Laser Franco-Allemande (France); **Lin Li**, The Univ. of Manchester (United Kingdom); **Silke Pflueger**, Consultant (USA); **Stephan Roth**, BLZ Bayerisches Laserzentrum GmbH (Germany); **Leonardo D. Scintilla**, Politecnico di Bari (Italy); **Stefaan Vandendriessche**, Edmund Optics Inc. (USA); **Kunihiko Washio**, Paradigm Laser Research Ltd. (Japan)

WEDNESDAY 31 JANUARY

SESSION 1 WED 8:10 AM TO 9:50 AM

Systems I

Session Chair: **Stefan Kaierle**,
Laser Zentrum Hannover e.V. (Germany)

The Laser Megajoule facility: Laser performances and comparison with computational simulation, Vincent Denis, Commissariat à l'Énergie Atomique (France) [10525-1]

Multi-physical modeling of thermal and dispersive effects in optical systems for high power ultra-short laser pulses, Tobias Bonhoff, Luca Frenken, RWTH Aachen Univ. (Germany); Jochen Stollenwerk, Peter Loosen, Fraunhofer-Institut für Lasertechnik (Germany) [10525-2]

Tuneable UV solid-state laser lines for surface processing, Mikhail M. Ivanenko, Vyacheslav Grimm, Fabian Gaussmann, Henning Kalis, Janis Sils, Markus Wiesner, LIMO Lissotschenko Mikrooptik GmbH (Germany) [10525-3]

Influence of thermally induced aberrations on resulting intensity distribution, Alexander V. Laskin, Vadim V. Laskin, AdlOptica Optical Systems GmbH (Germany); Aleksei B. Ostrun, ITMO Univ. (Russian Federation) [10525-4]

Beam shaping of focused radiation of multimode lasers, Alexander V. Laskin, AdlOptica Optical Systems GmbH (Germany); Joerg Volpp, Luleå Univ. of Technology (Sweden); Vadim V. Laskin, AdlOptica Optical Systems GmbH (Germany); Aleksei B. Ostrun, ITMO Univ. (Russian Federation) [10525-5]

PLENARY SESSION WED 10:20 AM TO 12:30 PM

LASE PLENARY SESSION

- 10:20 am: **Welcome and Opening Remarks**
Koji Sugioka, RIKEN (Japan) and **Reinhart Poprawe**, Fraunhofer-Institut für Lasertechnik (Germany)
- 10:25 am: **Announcement of the 3D Printing, Fabrication, and Manufacturing Best Paper Award**
Henry Helvajian, The Aerospace Corp. (USA)
- 10:30 to 11:10 am: **Gigahertz Laser Frequency Combs and Dual-Comb Spectroscopy**
Ursula Keller, ETH Zurich (Switzerland)
- 11:10 to 11:50 am: **Optical Lattice Clocks: Reading the 18th Decimal Place of Frequency**
Hidetoshi Katori, The Univ. of Tokyo (Japan) and RIKEN (Japan)
- 11:50 am to 12:30 pm: **Advanced Industrial Laser Systems and Applications**
Berthold Schmidt, TRUMPF Photonics (USA)

Lunch/Exhibition Break Wed 12:30 pm to 2:00 pm

SESSION 2 WED 2:00 PM TO 3:20 PM

Systems II

Session Chair: **Stefan Kaierle**,
Laser Zentrum Hannover e.V. (Germany)

Improving accuracy of robot-guided 3D laser surface processing by workpiece measurement in a blink, Richard Ludwig Schares, Stefan Schmitt, Michael Emonts, Kai Fischer, RWTH Aachen Univ. (Germany); Boris Frühauf, ARGES GmbH (Germany); Rüdiger Moser, Precitec GmbH & Co. KG (Germany) [10525-6]

Mobile laser cutting system for difficult rescue operations, Christian Hennigs, Michael Hustedt, Alexander Brodesser, Stefan Kaierle, Laser Zentrum Hannover e.V. (Germany) [10525-7]

Ball-shaped end caps for fiber laser systems, Wenxin Zheng, Gongwen Zhu, AFL (USA) [10525-8]

Measurement of the dispersion properties of large aperture mirrors at arbitrary incidence angle and polarization state, Máté Kovács, ELI-HU Nonprofit Kft. (Hungary) and Univ. of Szeged (Hungary); Tamás Somoskői, Imre Seres, Univ. of Szeged (Hungary); Adam Börzsönyi, ELI-HU Nonprofit Kft. (Hungary) and Univ. of Szeged (Hungary); Áron Sipos, CE Optics Ltd. (Hungary) [10525-9]

SESSION 3 WED 3:50 PM TO 5:30 PM

Joining and Welding

Session Chair: **Stefan W. Heinemann**, TRUMPF Photonics (USA)

Laserbeam-submerged arc hybrid welding, Oliver Engels, RWTH Aachen Univ. (Germany) [10525-10]

BrightLine weld-spatter reduced high speed welding with disk lasers, David L. Havrilla, TRUMPF Inc. (USA); Nicolai Speker, Patrick Haug, Matthias Koitzsch, TRUMPF Laser- und Systemtechnik GmbH (Germany) ... [10525-11]

Pores in laser beam welding: Generation mechanism and impact on the melt flow, Florian Fetzner, Univ. Stuttgart (Germany) [10525-12]

New welding techniques and laser sources for battery welding, Henrikki Pansar, TRUMPF Inc. (USA); Jack Gabzdyl, SPI Lasers UK Ltd. (United Kingdom); Elke Kaiser, TRUMPF Laser GmbH (Germany); Tim Hesse, Marc Kirchhoff, Birgit Faisst, TRUMPF Laser- und Systemtechnik GmbH (Germany) [10525-13]

Modified single mode laser beam welding of coated 22MnB5, Benjamin Gerhards, RWTH Aachen Univ. (Germany) [10525-14]

THURSDAY 1 FEBRUARY

SESSION 4..... THU 8:00 AM TO 10:00 AM

Surface Treatment I

Session Chair: **Lin Li**, The Univ. of Manchester (United Kingdom)

Research on inorganic cladding of neodymium phosphate glass in slab amplifier, Bingyan Wang, Jianqiang Zhu, Haiyuan Li, Huai Xiong, Shanghai Institute of Optics and Fine Mechanics (China) [10525-15]

Backscattered light properties of femtosecond laser ablation aiming a dynamic interferometric focusing system, Marcus Paulo Raele, Ricardo E. Samad, Lucas R. De Pretto, Anderson Z. de Freitas, Nilson D. Vieira Jr., Niklaus U. Wetter, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10525-16]

Laser beam ablation of thick steel plates without affecting the material underneath, Christian Hoff, Jörg Hermsdorf, Stefan Kaieler, Ludger Overmeyer, Laser Zentrum Hannover e.V. (Germany) [10525-17]

Femtosecond pulsed laser deposition of a boron thin film aiming at the development of a low-cost neutron detector, Priscila Costa, Marcus Paulo Raele, Ricardo E. Samad, Noé G. P. Machado, Nilson D. Vieira Jr., Frederico A. Genezini, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10525-18]

Green fiber laser processing of transparent materials, Xiao Nong Zhu, Li Jia Jiang, Shi Bin Jiang, Suzhou Tusen Laser Co., Ltd. (China) . . . [10525-19]

Approaches for increasing process rate of local 3D laser decoating for series production of hybrid composites, Richard Ludwig Schares, Stefan Schmitt, Michael Emonts, Kai Fischer, RWTH Aachen Univ. (Germany) [10525-20]

SESSION 5..... THU 10:30 AM TO 12:10 PM

Surface Treatment II

Session Chair: **Kunihiko Washio**, Paradigm Laser Research Ltd. (Japan)

Integrated numerical-experimental design of laser shock processing treatments of metallic alloys for high-reliability applications, José Luis Ocaña, Angel García-Beltrán, Juan A. Porro, Marcos Díaz, Ignacio Angulo, Francisco Cordovilla, Cristobal Colon, Aurelia Alonso, Cristina Moreno, Isabel de Andres, Univ. Politécnica de Madrid (Spain) [10525-21]

Influence of operating parameters on morphology of laser hardened surfaces, Niroj Maharjan, Wei Zhou, Nanyang Technological Univ. (Singapore); Yu Zhou, Advanced Remanufacturing Technology Ctr. (Singapore); Naïen Wu, Precision Laser Solutions Pte. Ltd. (Singapore) [10525-22]

Development of high power laser ablation process for polycrystalline diamond polishing, William Scalbert, Element Six Ltd. (Ireland) . . . [10525-23]

High pulse energy, kW average power nanosecond lasers enable breakthrough in rapid coating removal, Ioannis Metsios, DeChang Dai, Simon P. Chard, Timothy S. McComb, Young K. Kwon, Andritz Powerlase, Ltd. (United Kingdom) [10525-24]

Thermal field monitoring and analysis of its influence on the deposition of single tracks of a nickel superalloy, Sabina Luisa Campanelli, Andrea Angelastro, Marco Latte, Politecnico di Bari (Italy); Antonella Rizzo, Fania Palano, ENEA (Italy) [10525-25]



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Hans Zappe, Univ. of Freiburg (Germany)

Weimin Zhou, U.S. Army Research Lab. (USA)

Xiang Zhou, Google (USA)

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Optoelectronic Materials and Devices

Program Chair: **James G. Grote**, Air Force Research Lab. (USA)

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Photonic Integration

Program Chair: **Yakov Sidorin**, Quarles & Brady LLP (USA)

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Nanotechnologies in Photonics

Program Chair: **Ali Adibi**, Georgia Institute of Technology (USA)

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10543	Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XV (Huffaker, Eisele)	315
10544	Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI (von Freymann, Schoenfeld, Rumpf)	317

MOEMS-MEMS in Photonics

Program Chairs: **Holger Becker**, microfluidic ChipShop GmbH (Germany); **Georg von Freymann**, Technische Univ. Kaiserslautern (Germany)

10544	Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI (von Freymann, Schoenfeld, Rumpf)	317
10545	MOEMS and Miniaturized Systems XVII (Piyawattanametha, Park, Zappe)	320
10546	Emerging Digital Micromirror Device Based Systems and Applications X (Douglass, Lee)	322
10491	Microfluidics, BioMEMS, and Medical Microsystems XVI (Gray, Becker)	120
10502	Adaptive Optics and Wavefront Control for Biological Systems IV (Bifano, Kubby, Gigan)	162

Advanced Quantum and Optoelectronic Applications

Program Chair: **David L. Andrews**, Univ. of East Anglia (United Kingdom)

10547	Advances in Photonics of Quantum Computing, Memory, and Communication XI (Hasan, Hemmer, Craig, Migdall)	324
10548	Steep Dispersion Engineering and Opto-Atomic Precision Metrology XI (Shahriar, Scheuer)	325
10549	Complex Light and Optical Forces XII (Galvez, Andrews, Glückstad)	330
10550	Optical and Electronic Cooling of Solids III (Epstein, Seletskiy, Sheik-Bahae)	333
10551	Optical Data Science: Trends Shaping the Future of Photonics (Jalali)	335
10540	Quantum Sensing and Nano Electronics and Photonics XV (Razeghi)	302
10543	Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XV (Huffaker, Eisele)	315

Semiconductor Lasers and LEDs

Program Chair: **Klaus P. Streubel**, OSRAM AG (Germany)

10552	Vertical-Cavity Surface-Emitting Lasers XXII (Lei, Choquette)	337
10553	Novel In-Plane Semiconductor Lasers XVII (Belyanin, Smowton)	339
10554	Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XXII (Kim, Krames, Strassburg, Tu)	342
10526	Physics and Simulation of Optoelectronic Devices XXVI (Witzigmann, Osiński, Arakawa)	250
10532	Gallium Nitride Materials and Devices XIII (Chyi, Fujioka, Morkoç)	271

Displays and Holography

Program Chair: **Liang-Chy Chien**, Kent State Univ. (USA)

10555	Emerging Liquid Crystal Technologies XIII (Chien)	346
10556	Advances in Display Technologies VIII (Chien, Yoon, Wang) .	349
10557	Ultra-High-Definition Imaging Systems (Miyata, Yatagai, Koike)	351
10558	Practical Holography XXXII: Displays, Materials, and Applications (Bjelkhagen, Bove)	353

Optical Communications: Devices to Systems

Program Chair: **Benjamin Dingel**, Nasfine Photonics, Inc. (USA)

10559	Broadband Access Communication Technologies XII (Dingel, Tsukamoto, Mikroulis)	355
10560	Metro and Data Center Optical Networks and Short-Reach Links (Srivastava, Glick, Akasaka)	357
10561	Next-Generation Optical Communication: Components, Sub-Systems, and Systems VII (Li, Zhou)	361
10524	Free-Space Laser Communication and Atmospheric Propagation XXX (Hemmati, Boroson)	235
10531	Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XI (Sadwick, Yang)	267
10537	Silicon Photonics XIII (Reed, Knights)	292
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Visit the Photonics West Exhibition Tuesday through Thursday to discuss products and possibilities with the best suppliers from around the world.



Tuesday-Thursday

PHOTONICS WEST EXHIBITION

1,300 Companies

Tuesday 30 January 10:00 am to 5:00 pm

Wednesday 31 January 10:00 am to 5:00 pm


Thursday 1 February 10:00 am to 4:00 pm

Photonics West exhibition is the premier photonics and laser event. Find the latest components, devices, and systems for your research or business needs.

FEATURED TECHNOLOGIES

- Lasers, laser accessories, laser systems
- LEDs and other light sources
- Cameras and CCD components
- Fiber optic components, equipment, systems
- Optical components
- Communications technology
- Optical detectors
- High speed imaging and sensing
- Optical materials and substrates
- IR sources and detectors
- Electronic imaging components
- Optical coatings
- Lenses and filters
- Positions and mounts
- Metrology tools

OPTO DAILY EVENT SCHEDULE


Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
BIOS EXPO 10:00 am to 5:00 pm		OPTO Plenary Session 8:00 to 10:05 am, p.8	PHOTONICS WEST EXHIBITION		
			Nano/Biophotonics Plenary Session 10:30 to 11:30 am, p.9	OPTO Interactive Poster Session 6:00 to 8:00 pm, p.13	
			The Nature of Light: What Are Photons? 7:30 to 9:00 pm, p.14		
			Late-Breaking Results and Innovation Awards in Quantum Sensing and Nano Electronics and Photonics 7:30 to 9:00 pm, p.14		
			TECHNICAL EVENT Holography 7:30 to 9:00 pm, p.14		
Optoelectronic Materials and Devices Program Chair: James G. Grote , Air Force Research Lab. (USA)					
		10526 Physics and Simulation of Optoelectronic Devices XXVI (Witzigmann, Osiriński, Arakawa) p.250		10527 Physics, Simulation, and Photonic Engineering of Photovoltaic Devices VII (Freundlich, Lombez, Sugiyama) p.255	
		10528 Optical Components and Materials XV (Jiang, Digonnet) p.258		10529 Organic Photonic Materials and Devices XX (Tabor, Kajzar, Kaino, Koike) p.261	
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		10532 Gallium Nitride Materials and Devices XIII (Chyi, Fujioka, Morkoç) p.271			
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		10534 2D Photonic Materials and Devices (Majumdar, Xu, Hendrickson) p.281			
Photonic Integration Program Chair: Yakov Sidorin , Quarles & Brady LLP (USA)					
		10535 Integrated Optics: Devices, Materials, and Technologies XXII (García-Blanco, Cheben) p.283			
		10536 Smart Photonic and Optoelectronic Integrated Circuits XX (He, Lee) p.288			
		10537 Silicon Photonics XIII (Reed, Knights) p.292			
		10538 Optical Interconnects XVIII (Schröder, Chen) p.296			
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		10531 Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XI (Sadwick, Yang) p.267			

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Nanotechnologies in Photonics			Program Chair: Ali Adibi , Georgia Institute of Technology (USA)		
	10540 Quantum Sensing and Nano Electronics and Photonics XV (Razeghi) p.302				
		10541 Photonic and Phononic Properties of Engineered Nanostructures VIII (Adibi, Lin, Scherer) p.308			
		10542 High Contrast Metastructures VII (Chang-Hasnain, Faraon, Koyama, Zhou) p.312			
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	10547 Advances in Photonics of Quantum Computing, Memory, and Communication XI (Hasan, Hemmer, Craig, Migdall) p.324	
	10548 Steep Dispersion Engineering and Opto-Atomic Precision Metrology XI (Shahriar, Scheuer) p.325	
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	10543 Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XV (Huffaker, Eisele) p.315	

Semiconductor Lasers and LEDs

Program Chair: **Klaus P. Streubel**, OSRAM AG (Germany)

	10552 Vertical-Cavity Surface-Emitting Lasers XXII (Lei, Choquette) p.337	
10553 Novel In-Plane Semiconductor Lasers XVII (Belyanin, Smowton) p.339		
10554 Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XXII (Kim, Krames, Strassburg, Tu) p.342		
10526 Physics and Simulation of Optoelectronic Devices XXVI (Witzigmann, Osirski, Arakawa) p.250		
10532 Gallium Nitride Materials and Devices XIII (Chyi, Fujioka, Morkoç) p.271		

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Displays and Holography Program Chair: Liang-Chy Chien, Kent State Univ. (USA) p. 00					
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		10558 Practical Holography XXXII: Displays, Materials, and Applications (Bjelkhagen, Bove) p.353			
Optical Communications: Devices to Systems Program Chair: Benjamin Dingel, Nasfine Photonics, Inc. (USA)					
		10559 Broadband Access Communication Technologies XII (Dingel, Tsukamoto, Mikroulis) p.355	10560 Metro and Data Center Optical Networks and Short-Reach Links (Srivastava, Glick, Akasaka) p.357		
		10561 Next-Generation Optical Communication: Components, Sub-Systems, and Systems VII (Li, Zhou) p.361			
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OPTO

OPTO 2018 BEST PAPER AWARDS

BEST STUDENT PAPER AWARD

Ultrafast Phenomena and Nanophotonics (Conf. 10530)

For Conference 10530: We will award one or two presentations with a Best Student Paper Award. All contributed papers from conference 10530 given by a young scientist (PhD student or post-doc within the first two years after graduation) are eligible for the award. Note that this award is for contributed papers only. Invited papers and contributions to other symposia do not qualify.

Application Deadline: 15 January 2018

To facilitate handing out the award during the meeting, applications will be collected prior to the meeting. To be considered for the award, applicants have to submit the slides of their presentation (Powerpoint or PDF document). It would be helpful to provide additional information about the scientific content of the presentation. Such information can comprise published or accepted papers related to the presented work or the proceedings article for the conference. Please also indicate the date of graduation if you have already completed your PhD. The presentation and the supplementary material should be sent via email to the conference chair Markus Betz at markus.betz@tu-dortmund.de (please include your SPIE paper number).

INNOVATION AWARD

Quantum Sensing and Nano Electronics and Photonics (Conf. 10540)

For Conference 10540: SPIE announces the Innovation Award in Quantum Sensing and Nano Electronics and Photonics. These awards will recognize the outstanding scientific contribution of students and early career professionals who present the most notable recent discoveries with broad impact in the areas of quantum sensing and nano electronics and photonics. These discoveries should be innovative in that they represent a new paradigm or way of thinking which will have a broad impact in their respective field. Participants will be required to give a 15-minute presentation in the Tuesday evening Innovative Technologies for Quantum Sensing and Nano Electronics and Photonics (7:30-9:00 pm) technical event, chaired by Prof. Manijeh Razeghi. The winners will be announced at the end of the Tuesday evening event. Winner will be awarded a commemorative plaque as well as a cash prize.

Submission Deadline: 1 December 2017

To apply for participation in this session, send a presentation title and 2-page technical abstract to Prof. Manijeh Razeghi at razeghi@eecs.northwestern.edu by 1 December 2017.

BEST STUDENT AWARDS AND TRAVEL SUPPORT AWARD

Complex Light and Optical Forces (Conf. 10549)

We are pleased to announce two awards. Qualifying papers will be evaluated by an awards committee during the oral and poster presentations. The winners will be announced during the conference and the presenting authors awarded a cash prize and certificate.

To be eligible for the Best Student Paper Award, you must:

- be a junior scientist (Masters or PhD student, or post-doc with less than three years experience)
- be listed as an author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online before 3 January 2018
- present your paper as scheduled
- submit a short statement confirming your eligibility, intent to apply, and a description about how the conference will impact your research.

To be eligible for the Travel Award, you must:

be a junior scientist (Masters or PhD student, or post doc with less than three years experience)

- be listed as an author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online before **3 January 2018**
- present your paper as scheduled
- submit a 250-word statement of need
- submit a 1-page describing your research and bio (please include your SPIE Paper Number).

Application Deadline: 5 January 2018

Applicants must email a short statement confirming eligibility, intent to apply, plus additional required materials, to Prof. Enrique Galvez at egalvez@colgate.edu by 5 January 2018.

OPTICAL COMMUNICATIONS BEST PAPER AWARDS

Broadband Access Communication Technologies (Conf. 10559)

Metro and Data Center Optical Networks and Short-Reach Links (Conf. 10560)

Next-Generation Optical Communication: Components, Sub-Systems, and Systems (Conf. 10561)

We are pleased to announce Best Paper Awards in Optical Communications, sponsored by Corning and NTT Electronics. These awards will recognize the outstanding work of students and professionals who present the most notable recent results with broad impact in the area of optical communications.

Qualifying papers will be evaluated by the awards committee. Manuscripts will be judged based on technical merit, impact, and clarity. The winners will be announced during the first day of the Optical Communications conferences and the presenting authors will be awarded a certificate and cash prize.

To be eligible for the Best Student Paper Award, you must:

- be a student without a doctoral degree (undergraduate, graduate, or PhD student)
- be listed as an author on an accepted paper within conferences 10559, 10560, 10561
- have conducted the majority of the work to be presented
- submit your manuscript online by 4 December 2017
- present your paper as scheduled
- be present at the Awards Ceremony.

To be eligible for the Best Technical Paper Award, you must:

- be a post-doc or early career professional
- be listed as an author on an accepted paper within conferences 10559, 10560, 10561
- have conducted the majority of the work to be presented
- submit your manuscript online by **4 December 2017**
- present your paper as scheduled
- be present at the Awards Ceremony.

HOW TO APPLY

After your Manuscript is submitted online (by 4 December 2017), send an email to PW-Opt-Comms@gmail.com stating your desire to be considered, and for which award you qualify.

AWARD SPONSORS:

CORNING

 **NTTElectronics**

OPTO 2018 BEST PAPER AWARDS

BEST PAPER AWARD AND STUDENT PAPER AWARD

Advanced Fabrication Technologies for Micro/Nano Optics and Photonics (Conf. 10544)

We are pleased to announce that a cash prize, sponsored by Nanoscribe GmbH, will be awarded to the best paper and best student paper in this conference. Qualifying papers will be evaluated by the awards committee. Manuscripts will be judged based on scientific merit, impact, and clarity. The winners will be announced during the conference and the presenting authors will be awarded a cash prize.

To be eligible for the Best Paper Award, you must:

- be listed as an author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by **3 January 2018**
- present your paper as scheduled.

To be eligible for the Best Student Paper Award, you must:

- be a student without a doctoral degree (undergraduate, graduate, or PhD student)
- submit your abstract online, and select "Yes" when asked if you are a full-time student, and select yourself as the speaker
- be the presenting author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by **3 January 2018**
- present your paper as scheduled.

NOMINATIONS

All submitted papers will be eligible for the awards if they meet the above criteria.

AWARD SPONSOR:



BEST PAPER AWARD AND BEST STUDENT PAPER AWARD

MOEMS and Miniaturized Systems (Conf. 10545)

We are pleased to announce that a cash prize, sponsored by Samsung Advanced Institute of Technology, will be awarded to the best paper and best student paper in MOEMS and Miniaturized Systems. Qualifying papers will be evaluated by the awards committee. Manuscripts will be judged based on scientific merit, impact, and clarity. The winners will be announced during the conference and the presenting authors will be awarded a cash prize.

To be eligible for the Best Paper Award, you must:

- be listed as an author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by **3 January 2018**
- present your paper as scheduled.

To be eligible for the Best Student Paper Award, you must:

- be a student without a doctoral degree (undergraduate, graduate, or PhD student)
- submit your abstract online, and select "Yes" when asked if you are a full-time student, and select yourself as the speaker
- be the presenting author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by **3 January 2018**
- present your paper as scheduled.

NOMINATIONS

All submitted papers will be eligible for the awards if they meet the above criteria.

AWARD SPONSOR:



BEST PAPER AWARD AND BEST STUDENT PAPER AWARD

Emerging Digital Micromirror Device Based Systems and Applications (Conf. 10546)

We are pleased to announce that a cash prize, sponsored by Texas Instruments DLP Products, will be awarded to the best paper and best student paper in Emerging Digital Micromirror Device Based Systems and Applications. Qualifying papers will be evaluated by the awards committee. Manuscripts will be judged based on scientific merit, impact, and clarity. The winners will be announced during the conference and the presenting authors will be awarded a cash prize.

To be eligible for the Best Paper Award, you must:

- be listed as an author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by **3 January 2018**
- present your paper as scheduled.

To be eligible for the Best Student Paper Award, you must:

- be a student without a doctoral degree (undergraduate, graduate, or PhD student)
- submit your abstract online, and select "Yes" when asked if you are a full-time student, and select yourself as the speaker
- be the presenting author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by **3 January 2018**
- present your paper as scheduled.

NOMINATIONS

All submitted papers will be eligible for the awards if they meet the above criteria.

AWARD SPONSOR:



CONFERENCE 10526

Monday–Thursday 29 January–1 February 2018 • Proceedings of SPIE Vol. 10526

Physics and Simulation of Optoelectronic Devices XXVI

Conference Chairs: **Bernd Witzigmann**, Univ. Kassel (Germany); **Marek Osirński**, The Univ. of New Mexico (USA); **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan)

Program Committee: **Hiroshi Amano**, Nagoya Univ. (Japan); **Toshihiko Baba**, Yokohama National Univ. (Japan); **Jing Bai**, Univ. of Minnesota, Duluth (USA); **Enrico Bellotti**, Boston Univ. (USA); **Guillermo Carpintero del Barrio**, Univ. Carlos III de Madrid (Spain); **Weng W. Chow**, Sandia National Labs. (USA); **Alexandre Freundlich**, Univ. of Houston (USA); **Frédéric Grillot**, Télécom ParisTech (France); **Ortwin Hess**, Imperial College London (United Kingdom); **Thomas A. Klar**, Johannes Kepler Univ. Linz (Austria); **Stephan W. Koch**, Philipps-Univ. Marburg (Germany); **Cun-Zheng Ning**, Arizona State Univ. (USA); **Joachim Piprek**, NUSOD Institute LLC (USA); **Marc Sciamanna**, Supélec (France); **Ikuo Suemune**, Hokkaido Univ. (Japan)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600–1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:10 PM

Quantum Dot Lasers

Session Chair: **Alexander Carmele**, Technische Univ. Berlin (Germany)

Temperature-insensitive zero linewidth enhancement factor in state-of-the-art In(Ga)As/GaAs quantum-dot lasers, Soroush A. Sobhani, David T. D. Childs, Univ. of Glasgow (United Kingdom); Kenichi Nishi, Keizo Takemasa, Mitsuru Sugawara, QD Laser, Inc. (Japan); Richard A. Hogg, Univ. of Glasgow (United Kingdom) [10526-1]

A hybrid quantum-classical modeling approach for the simulation of quantum-dot devices, Markus Kantner, Markus Mittenzweig, Thomas Koprucki, Weierstrass-Institut für Angewandte Analysis und Stochastik (Germany) [10526-2]

Operating characteristics of quantum-dot lasers with asymmetric barrier layers, Levon V. Asryan, Virginia Polytechnic Institute and State Univ. (USA) [10526-3]

Design and simulation of quantum-dot-based push-pull DFB lasers, Paolo Bardella, Ivo Montrosset, Politecnico di Torino (Italy) [10526-4]

Pulse-amplitude modulation of optical injection-locked quantum-dot lasers, Cheng Wang, Yue-Guang Zhou, ShanghaiTech Univ. (China). [10526-5]

Lunch Break Mon 12:10 pm to 1:40 pm

SESSION 2 MON 1:40 PM TO 3:00 PM

Plasmonics

Session Chair: **Stephen Gray**, Argonne National Lab. (USA)

Nanophotonic inverse design using artificial neural networks, John Peurifoy, Yichen Shen, Li Jing, Yi Yang, Fidel Cano-Renteria, Max Tegmark, John D. Joannopoulos, Marin Soljacic, Massachusetts Institute of Technology (USA) [10526-6]

Silicon p-n junction nanograting surface as a flat optical modulator, Ki Young Lee, Jae Woong Yoon, Seok Ho Song, Hanyang Univ. (Korea, Republic of) [10526-7]

Optical properties of metal nanoparticles embedded in amorphous silicon analysed using discrete dipole approximation, Alessandro Fantoni, Miguel Fernandes, Yuri Vygranenko, Manuela Vieira, UNINOVA (Portugal); Elisabete Alegria, Instituto Politécnico de Lisboa (Portugal); Ana Ribeiro, Ctr. de Quimica Estrutural (Portugal) [10526-8]

Optical investigation of porous TiO₂ in mesostructured solar cells, Sameh Osama Ezzat Abdellatif, The British Univ. in Egypt (Egypt); Parvin Sharifi, Max-Planck-Institut für Kohlenforschung (Germany); Khaled Kirah, Ain Shams Univ. (Egypt); Rami Ghannam, Cairo Univ. (Egypt); Ahmed S. G. Khalil, Fayoum Univ. (Egypt); Daniel Erni, Univ. Duisburg-Essen (Germany); Frank Marlow, Max-Planck-Institut für Kohlenforschung (Germany) [10526-9]

SESSION 3 MON 3:30 PM TO 5:40 PM

Nonlinear Laser Dynamics

Session Chair: **Christopher Gies**, Univ. Bremen (Germany)

Dynamical modalities in Kerr frequency combs (Invited Paper), Jinghui Yang, Abhinav Kumar Vinod, Hao Liu, Wenting Wang, Jinkang Lim, Shu-Wei Huang, Chee Wei Wong, Univ. of California, Los Angeles (USA) [10526-10]

Extreme events and spatiotemporal chaos in a 1D microcavity laser, Sylvain Barbay, Ctr. de Nanosciences et de Nanotechnologies (France); Saliya Coulibaly, Lab. de Physique des Lasers, Atomes et Molécules (France); Foued Selmi, Ctr. de Nanosciences et de Nanotechnologies (France); Marcel G. Clerc, Univ. de Chile (Chile) [10526-11]

Third harmonic THz generation from graphene in a parallel-plate waveguide, Parvin Navaeipour, Marc Dignam, Queen's Univ. (Canada) [10526-12]

Physical-random number generation using a frequency stabilized laser diode, Kyohei Hirai, Toshihiro Taoka, Hideaki Arai, Takashi Sato, Niigata Univ. (Japan); Kohei Doi, Univ. of Toyama (Japan); Yasuo Ohndaira, Shuichi Sakamoto, Masashi Ohkawa, Niigata Univ. (Japan) [10526-13]

Interaction between stimulated current injection and polariton condensate, Burcu Ozden, David M. Myers, Mark Steger, Univ. of Pittsburgh (USA); Loren Pfeiffer, Ken West, Princeton Univ. (USA); David Snoko, Univ. of Pittsburgh (USA) [10526-14]

Large-signal capabilities of an optically injection-locked semiconductor laser using gain lever, Jean-Maxime Sarraute, Télécom ParisTech (France) and Univ. Laval (Canada); Kevin Schires, Télécom ParisTech (France); Sophie LaRoche, Univ. Laval (Canada); Frédéric Grillot, Télécom ParisTech (France) and The Univ. of New Mexico (USA) [10526-15]

TUESDAY 30 JANUARY

SESSION 4..... TUE 8:20 AM TO 9:50 AM

Non-Classical Light

Session Chair: **Cun-Zheng Ning**,

Arizona State Univ. (USA), Tsinghua Univ. (China)

Addressing non-equilibrium phonon dynamics in semiconductor quantum-dot optomechanics (*Invited Paper*), Alexander Carmele, Technische Univ. Berlin (Germany) [10526-16]

Nanolasers operating in the regime of strong coupling, Christopher Gies, Univ. Bremen (Germany); F. Gericke, Technische Univ. Berlin (Germany); Paul Gartner, National Institute of Materials Physics (Romania); S. Holzinger, C. Hopfmann, Tobias Heindel, J. Wolters, Technische Univ. Berlin (Germany); Christian Schneider, Julius-Maximilians-Univ. Würzburg (Germany); Matthias Florian, Frank Jahnke, Univ. Bremen (Germany); Sven Höfling, Martin Kamp, Julius-Maximilians-Univ. Würzburg (Germany); Stephan Reitzenstein, Technische Univ. Berlin (Germany) [10526-17]

Dispersive resonators for THz intersubband polaritons, Pierre-Baptiste Vigneron, Jean-Michel Manceau, Thibault Laurent, Ctr. de Nanosciences et de Nanotechnologies (France); Lianhe H. Li, Edmund H. Linfield, Univ. of Leeds (United Kingdom); Raffaele Colombelli, Ctr. de Nanosciences et de Nanotechnologies (France) [10526-18]

Observation of solid-state Rydberg exciton polariton and its condensate in a single-crystal perovskite, Wei Bao, Univ. of California, Berkeley (USA); Xiaoze Liu, Univ. of California, Berkeley (USA); Fan Zheng, Lawrence Berkeley National Lab. (USA); Yang Xia, Mervin Zhao, Jeongmin Kim, Sui Yang, Ying Wang, Yuan Wang, Univ. of California, Berkeley (USA); Lin-Wang Wang, Lawrence Berkeley National Lab. (USA); Xiang Zhang, Univ. of California, Berkeley (USA) and Lawrence Berkeley National Lab. (USA) [10526-19]

SESSION 5..... TUE 10:20 AM TO 12:15 PM

Photonic Crystal- and Nano-Lasers

Session Chair: **Burcu Ozden**, Univ. of Pittsburgh (USA)

Tutorial on semiconductor nanolasers: from metallic cavities to 2D transition metal dichalcogenide gain materials (*Invited Paper*), Cun-Zheng Ning, Tsinghua Univ. (China) and Arizona State Univ. (USA); Yongzhuo Li, Jianxing Zhang, Dandan Huang, Hao Sun, Tsinghua Univ. (China) .. [10526-20]

Generating beams with orbital angular momentum in nanoscale laser arrays (*Invited Paper*), Mercedeh Khajavikhan, William Hayenga, Midya Parto, Patrick Likamwa, Demetrios Christodoulides, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) [10526-21]

Characterisation of photonic crystal surface-emitting lasers via an in-line measurement process, Ben King, Guangrui Li, Pavlo Ivanov, Nasser Babazadeh, Univ. of Glasgow (United Kingdom); Nobuhiko Ozaki, Wakayama Univ. (Japan); David T. D. Childs, Richard A. Hogg, Univ. of Glasgow (United Kingdom) [10526-22]

Effective index modelling of photonic crystal surface-emitting lasers, Pavlo Ivanov, Richard A. Hogg, Univ. of Glasgow (United Kingdom); Richard J. Taylor, The Univ. of Sheffield (Japan); David T. D. Childs, Guangrui Li, Univ. of Glasgow (United Kingdom) [10526-23]

Lunch/Exhibition Break Tue 12:15 pm to 1:45 pm

SESSION 6..... TUE 1:45 PM TO 3:25 PM

Electromagnetics I

Session Chair: **Levon V. Asryan**, Virginia Polytechnic Institute and State Univ. (USA)

Fast propagation of electromagnetic fields through graded-index media, Frank Wyrowski, Huiying Zhong, Site Zhang, Rui Shi, Friedrich-Schiller-Univ. Jena (Germany); Christian Hellmann, Wyrowski Photonics UG (Germany) [10526-24]

Negative index metamaterials based on semiconductor, Mona H. Alsaleh, Dentcho A. Genov, Louisiana Tech Univ. (USA) [10526-25]

Refractive index sensing via scattering efficiency measurement of germanium dielectric nanoparticles, Mai Desouky, Ahmad B. Ayoub, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10526-26]

Optical mode properties for nano-layered aluminum-doped zinc oxide rectangular waveguides at the epsilon-near-zero spectral point, Shouxun Wang, Priscilla N. Kelly, Lyuba Kuznetsova, San Diego State Univ. (USA) [10526-27]

High-reflectivity Bragg mirrors for IR applications using novel chalcogenide hybrid inorganic/organic polymers (CHIPs), Liliana Ruiz Diaz, Laura E. Anderson, Katrina M. Konopka, Tristan S. Kleine, Jeffrey Pyun, The Univ. of Arizona (USA); Robert A. Norwood, College of Optical Sciences, The Univ. of Arizona (USA) [10526-28]

SESSION 7..... TUE 4:00 PM TO 6:00 PM

Sensors and Detectors

Session Chair: **Jonathan Schuster**, U.S. Army Research Lab. (USA)

Multi-beam and single-chip LIDAR with discrete beam-steering by digital micromirror device, Joshua Rodriguez, The Univ. of Arizona (USA); Braden Smith, Sandia National Lab. (USA) and The Univ. of Arizona (USA); Brandon Hellman, Adley Gin, Alonzo J. Espinoza, Yuzuru Takashima, The Univ. of Arizona (USA) [10526-29]

Measuring and engineering the atomic mass density wave of a Gaussian mass-polariton pulse in optical fibers, Mikko Partanen, Jukka Tulkki, Aalto Univ. (Finland) [10526-30]

Optical distance measuring method using fast frequency noise characteristics of a laser diode, Daiki Kawakami, Masamichi Suzuki, Ryotaro Kimura, Takashi Sato, Takahiro Saito, Masashi Ohkawa, Yasuo Ohdaira, Shuichi Sakamoto, Niigata Univ. (Japan) [10526-31]

Metal coated fiber-optic temperature sensor based on multi-core microstructured fiber with coupled cores, Anna Makowska, Lukasz Szostkiewicz, InPhoTech (Poland) and Warsaw Univ. of Technology (Poland); Agnieszka Kolakowska, Janusz D. Fidelus, Tomasz Stanczyk, Karol Wysokinski, Dawid Budnicki, Lukasz Ostrowski, InPhoTech (Poland); Michal Szymanski, Polish Ctr. of Photonics and Fiber Optics (Poland); Mariusz Makara, InPhoTech (Poland); Krzysztof Poturaj, Univ. of Maria Curie-Sklodowska (Poland); Tadeusz Tenderenda, InPhoTech (Poland); Pawel Mergo, Univ. of Maria Curie-Sklodowska (Poland); Tomasz Nasilowski, InPhoTech (Poland) [10526-32]

A model-based analysis of extinction ratio effects on phase-OTDR-based distributed acoustic sensing system performance, Metin Aktas, Hakan Maral, Toygar Akgun, ASELSAN A.S. (Turkey) [10526-33]

Electrical and optical modelling of light-trapping single-photon avalanche detector, Tianzhe Zheng, Hefei National Lab. for Physical Sciences at the Microscale (China) and Univ. of Science and Technology of China (China); Kai Zang, Matthew Morea, Muyu Xue, Ching-Ying Lu, Stanford Univ. (USA); Xiao Jiang, Qiang Zhang, Univ. of Science and Technology of China (China) and Hefei National Lab. for Physical Sciences at Microscale (China); Theodore I. Kamins, James S. Harris Jr., Stanford Univ. (USA) [10526-68]

OPTO

CONFERENCE 10526

WEDNESDAY 31 JANUARY

SESSION 8 WED 8:00 AM TO 10:00 AM

Electromagnetics II

Session Chair: **Jinghui Yang**, Univ. of California, Los Angeles (USA)

Optimization of diffractive optical elements using machine-learning approaches, Xavier Garcia Santiago, Philipp-Immanuel Schneider, JCMwave GmbH (Germany); Carsten Rockstuhl, Karlsruher Institut für Technologie (Germany); Sven Burger, JCMwave GmbH (Germany) [10526-34]

Exact analytical electromagnetic modelling in planar media with arbitrarily graded index profiles, Jean-Claude Krapez, ONERA (France) [10526-35]

Comprehensive modeling on luminescent coupling dependency in multi-junction solar cells, Zhanghao Sun, Peking Univ. (China); Zheng Lyu, Muyu Xue, Kaifeng Chen, Jieyang Jia, Shanhu Fan, James S. Harris Jr., Stanford Univ. (USA) [10526-36]

Analysis of the rectangular resonator with butterfly MMI coupler using SOI, Sun-Ho Kim, Jun-Hee Park, Eudum Kim, Su-Jin Jeon, Ji-Hoon Kim, Young-Wan Choi, Chung-Ang Univ. (Korea, Republic of) [10526-37]

Transfer function for electromagnetic propagation through anisotropic metamaterials, Rudra Gnawali, Partha P. Banerjee, Univ. of Dayton (USA); Dean R. Evans, Air Force Research Lab. (USA) [10526-38]

Structure-induced asymmetry between counterpropagating modes in three-port couplers, Marek Osinski, Hemashilpa Kalagara, Hosuk Lee, Gennady A. Smolyakov, The Univ. of New Mexico (USA) [10526-39]

SESSION 9 WED 10:30 AM TO 11:50 AM

Integrated Opto-Electronic Systems

Session Chair: **Marek Osinski**, The Univ. of New Mexico (USA)

High-efficiency power transfer for silicon-based photonic devices, Gyeongho Son, Kyoungsik Yu, KAIST (Korea, Republic of) [10526-40]

A polynomial chaos expansion-based building-block approach for stochastic analysis of photonic circuits, Abi Waqas, Politecnico di Milano (Italy) and Mehran Univ. of Engineering and Technology (Pakistan); Daniele Melati, Politecnico di Milano (Italy); Paolo Manfredi, Univ. Gent (Belgium); Flavia Grassi, Andrea Melloni, Politecnico di Milano (Italy) [10526-41]

Cross-talk suppression in ultra-dense optical waveguides with sub-wavelength spacing, Rui Wang, Farzad Mokhtari-Koushyar, The Univ. of Texas at Austin (USA); Hamed Dalir, Omega Optics, Inc. (USA); Ray T. Chen, The Univ. of Texas at Austin (USA) [10526-42]

Graphene on silicon: orientation effect on the optoelectronic properties, Debiprosad Roy Mahapatra, Vignesh Mahalingam, Indian Institute of Science (India) [10526-43]

Lunch/Exhibition Break Wed 11:50 am to 1:20 pm

SESSION 10 WED 1:20 PM TO 3:20 PM

Mini-Symposium on Plasmonic Nanostructures

Session Chair: **Jing Bai**, Univ. of Minnesota, Duluth (USA)

Optics and plasmonics of massless Dirac fermions (Invited Paper), Alexey Belyanin, Yongrui Wang, Zhongqu Long, Texas A&M Univ. (USA); Mikhail Tokman, Institute of Applied Physics of the Russian Academy of Sciences (Russian Federation) [10526-44]

Plasmonics without photons (Invited Paper), F. Javier García de Abajo, ICFO - Institut de Ciències Fotòniques (Spain) [10526-45]

Optical properties of nanoparticle arrays (Invited Paper), David S. Citrin M.D., Thomas D. Backes, Georgia Institute of Technology (USA) ... [10526-46]

Hybrid plasmonic systems: from optical transparencies to strong coupling and entanglement (Invited Paper), Stephen Gray, Argonne National Lab. (USA) [10526-47]

SESSION 11 WED 3:50 PM TO 5:30 PM

Semiconductor Lasers and LEDs

Session Chair: **Sylvain Barbay**, Lab. de Photonique et de Nanostructures (France)

Effect of quantum-well thickness on the optical polarization of AlGaIn-based ultraviolet light-emitting diodes, Cheng Liu, Jing Zhang, Rochester Institute of Technology (USA) [10526-48]

Thermal comparison of buried-heterostructure and shallow-ridge lasers, Valeria Rustichelli, Huub P.M.M. Ambrosius, Technische Univ. Eindhoven (Netherlands); Karim Mekhazni, Romain Brenot, III-V Lab. (France); Kevin A. Williams, Technische Univ. Eindhoven (Netherlands) [10526-49]

Valence subband engineering of AlInN/GaN digital alloy for polarization-insensitive applications in mid- and deep-UV regime, Wei Sun, Lehigh Univ. (USA); Chee-Keong Tan, Clarkson Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) [10526-50]

External probing of gain medium dynamics in quantum cascade lasers, Paul Chevalier, Marco Piccardo, Harvard Univ. (USA); Sajant Anand, Harvard Univ. (USA) and Wake Forest Univ. (USA); Enrique Mejia, Harvard Univ. (USA) and The Univ. of Texas at Austin (USA); Dmitry Kazakov, Harvard Univ. (USA); Yongrui Wang, Alexey Belyanin, Texas A&M Univ. (USA); Federico Capasso, Harvard Univ. (USA) [10526-51]

Modeling of current spreading in high-power broad-area lasers and its impact on the lateral far-field divergence, Anissa Zeghuzi, Hans Wenzel, Ferdinand-Braun-Institut (Germany); Hans-Jürgen Wünsche, Ferdinand-Braun-Institut (Germany) and Weierstrass-Institut für Angewandte Analysis und Stochastik (Germany); Mindaugas Radziunas, Uwe Bandelow, Weierstrass-Institut für Angewandte Analysis und Stochastik (Germany); Andrea Knigge, Ferdinand-Braun-Institut (Germany) [10526-52]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Polarization-sensitive optical sensors modelling, Mykhailo S. Gavrylyak, Yuriy Fedkovych Chernivtsi National Univ. (Ukraine) [10526-63]

Deep-sea optical imaging: the analysis, the present, and the prospects, Xiangqian Quan, Chinese Academy of Sciences (China); Xiangzi Chen, Hainan Tropical Ocean Univ. (China) [10526-64]

Design of tunable thermo-optic C-band filter based on coated silicon slab, Zeev Zalevsky, Hadar Pinhas, Bar-Ilan Univ. (Israel); Dror Malka, Holon Institute of Technology (Israel); Yossef Danan, Moshe Sinvani, Bar-Ilan Univ. (Israel) [10526-65]

Design of reversible TSG gate using electro-optic effect in lithium niobate based Mach-Zehnder interferometers, Chanderkanta Chauhan, Santosh Kumar, DIT Univ. (India) [10526-66]

Illumination security of white LED in visible-light communication, Shuyan Ren, Shi-Gang Cui, Tianjin Univ. of Technology and Education (China) [10526-67]

Error detecting code for long-haul network, Amrindra Pal, Santosh Kumar, Sandeep Sharma, DIT Univ. (India) [10526-69]

Fast physical-random number generation using laser diode frequency noise-influence of frequency discriminator, Kouhei Matsumoto, Yuki Kasuya, Mitsuki Yumoto, Takashi Sato, Masashi Ohkawa, Hideaki Arai, Shuichi Sakamoto, Yasuo Ohdaira, Niigata Univ. (Japan) [10526-70]

Single is better than double: Analysis of thermal poling configurations using 2D numerical modeling, Pier J. Sazio, Francesco De Lucia, Univ. of Southampton (United Kingdom) [10526-71]

Numerical investigation on the optical and electrical polarization and carrier injection and confinement of AlGaIn-based deep-ultraviolet light-emitting diodes, Jih-Yuan Chang, Yung-Cheng Chang, Fang-Ming Chen, Yen-Kuang Kuo, National Changhua Univ. of Education (Taiwan) ... [10526-72]

Optical characterization of excitonic features in monolayer and bilayer MoTe₂, Hao Sun, Zhen Wang, Yize Zheng, Dandan Huang, Yongzhuo Li, Cun-Zheng Ning, Tsinghua Univ. (China) [10526-73]

Electric and electro-optic properties of carbon nanotube/nematic liquid-crystal mesogen materials, Octavian Danila, Ana Barar, Doina Manaila-Maximean, Univ. Politehnica of Bucharest (Romania) [10526-74]

Design and analysis of surface plasmon resonance (SPR) sensor to check the quality of food from adulteration, Manish Kumar, Sanjeev Kumar Raghuvanshi, Indian Institute of Technology (Indian School of Mines), Dhanbad (India) [10526-75]

Signal-to-noise ratio of arbitrarily filtered spontaneous emission, Marko Šprem, Dubravko I. Babic, Univ. of Zagreb (Croatia) [10526-76]

Optical modulator based on silicon nanowires racetrack resonator, Mohamed M. Sherif, Lamees Shahada, Qatar Univ. (Qatar); Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10526-77]

High-speed BPM method using leap-frog technique, Ahmad B. Ayoub, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10526-78]

High-performance optical modulator using ultra-thin silicon waveguide in SOI technology, Ahmad B. Ayoub, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10526-79]

Stacking of azobenzene dimers, Hal S. Gokturk, Ecoken (USA) . . [10526-80]

Narrowband spectral filter based on biconical tapered fiber, Sergio Celaschi, Gilliard N. Malheiros-Silveira, Ctr. de Tecnologia da Informacao Renato Archer (Brazil) [10526-81]

Effect of rotation on single-mode optical resonances in round-cornered square-shaped resonators, Prabodh Panindre, NYU Tandon School of Engineering (USA); N.S. Susan Mousavi, Institute for Research in Fundamental Sciences (Iran, Islamic Republic of); Sunil Kumar, New York Univ. Abu Dhabi (United Arab Emirates) [10526-82]

Numerical simulation for comparison of symmetric and asymmetric waveguide laser diodes for high-power applications, Abhishek Sharma, Solid State Physics Lab. (India) [10526-83]

Gradual absorbing boundary condition for beam propagation methods, Anurag Sharma, Indian Institute of Technology Delhi (India) [10526-84]

Performance analysis of GeSn alloy-based multiple quantum-well transistor laser, Ravi Ranjan, Prakash Pareek, Syed S. A. Askari, Mukul Kumar Das, Indian Institute of Technology (Indian School of Mines), Dhanbad (India) [10526-85]

Probing the liquid crystal alignment interface and switching dynamics in a slab waveguide architecture, Henry Gotjen, Jakub S. Kolacz, Jesse A. Frantz, Jason D. Myers, Robel Y. Bekele, Jawad Naciri, Christopher M. Spillmann, U.S. Naval Research Lab. (USA) [10526-86]

First-principle electronic properties of dilute-As AINAs nanosheets, Christian Emerson, Chee-Keong Tan, Clarkson Univ. (USA); Damir Borovac, Nelson Tansu, Lehigh Univ. (USA) [10526-87]

FDTD analysis of aluminium/a-Si:H surface plasmon waveguides, Paulo Lourenço, Univ. Nova de Lisboa (Portugal); Alessandro Fantoni, UNINOVA (Portugal); Miguel Fernandes, Univ. Nova de Lisboa (Portugal) and UNINOVA (Portugal); Yuri Vygranenko, UNINOVA (Portugal) and Univ. Nova de Lisboa (Portugal); Manuela Vieira, Univ. Nova de Lisboa (Portugal) and UNINOVA (Portugal) [10526-88]

Novel method of optical image registration in wide wavelength range using matrix of piezoelectric crystals, Aleksey Pigarev, Timur Bazarov, Moscow Institute of Physics and Technology (Russian Federation); Vladimir Fedorov, Moscow Institute of Physics and Technology (Russian Federation); Oleg A. Ryabushkin, Moscow Institute of Physics and Technology (Russian Federation) and Kotelnikov Institute of Radio Engineering and Electronics, Russian Academy of Sciences (Russian Federation) . . [10526-89]

Computing dispersion relations and complete photonic band-gaps of 2D photonic crystals by using multilayer perceptron, Adriano da Silva Ferreira, Gilliard N. Malheiros-Silveira, Hugo Enrique Hernández Figueroa, Univ. Estadual de Campinas (Brazil) [10526-90]

On the prospects of application and development of solid-state photomultipliers for the task of analog detecting of pulsed optical signals, Sergey Bogdanov, P.N. Lebedev Physical Institute (Russian Federation) and DEPHAN LLC (Russian Federation); Nikolay Kolobov, Evgeny Levin, Yuri Pozdnyakov, DEPHAN LLC (Russian Federation); Vitaly Shubin, Dmitry A. Shushakov, Constantin Sitarsky, P.N. Lebedev Physical Institute (Russian Federation) and DEPHAN LLC (Russian Federation); Rostislav Torgovnikov, DEPHAN LLC (Russian Federation) [10526-91]

Numerical analysis of blazed wire-grid polarizer for plasmonic enhancement, Changhun Lee, Eunji Sim, Donghyun Kim, Yonsei Univ. (Korea, Republic of) [10526-92]

Simulated Raman spectral analysis of organic molecules, Lu Lu, Qi Lu, Jun Ren D.D.S., Delaware State Univ. (USA) [10526-93]

Numerical method for analysis of multilayer surface plasmon waveguides and devices, Enakshi Khular Sharma, Shivani Sital, Univ. of Delhi South Campus (India) [10526-94]

Novel analytical approach for strongly coupled waveguide arrays, Niharika Kohli, Univ. of Delhi South Campus (India); Sangeeta Srivastava, Univ. of Delhi (India); Enakshi Khular Sharma, Univ. of Delhi South Campus (India) [10526-95]

Pulse repetition rate multiplication by Talbot effect in a coaxial fiber, Nikhil Dhingra, Univ. of Delhi South Campus (India); Jyoti Anand, Geetika Jain Saxena, Univ. of Delhi (India); Enakshi Khular Sharma, Univ. of Delhi South Campus (India) [10526-96]

Graphene-based channel drop filter for optical communication systems using 2D photonic crystals technology, Mayur Kumar Chhipa, Srimannarayana Kamineni, Akhilesh Kumar, K L Univ. (India) [10526-97]

Optical properties of plasmonic metal nanodisk array filter and its application to infrared on-chip spectrometer, Hwa Seub Lee, Korea Univ. (Republic of Korea); Tae-Yeon Seong, Korea Univ. (Korea, Republic of); Kyu-Won Hwang, Kyeong-Seok Lee, Korea Institute of Science and Technology (Korea, Republic of) [10526-98]

Development of photoluminescent light sources for cars based on laser diodes, Arkady Skvortsov, Vladimir Khortov, Sergey V. Zuev, Moscow Polytechnic Univ. (Russian Federation) [10526-99]

Modeling of the emissivity of super-wavelength black silicon in the geometrical optics regime, Momen Anwar, Yasser Sabry, Khalil Diaa, Si-Ware Systems (Egypt) [10526-100]

THURSDAY 1 FEBRUARY

SESSION 12 THU 8:20 AM TO 10:10 AM

Photodetectors

Session Chair: **Bernd Witzigmann**, Univ. Kassel (Germany)

Modeling the modulation transfer function in HgCdTe and III-V superlattice infrared focal plane arrays (*Invited Paper*), Jonathan Schuster, U.S. Army Research Lab. (USA) [10526-53]

Reliability testing of ultra-low noise InGaAs quad photoreceivers, Abhay M. Joshi, Shubhashish Datta, Discovery Semiconductors, Inc. (USA); Narasimha Prasad, NASA Langley Research Ctr. (USA) [10526-54]

2D dark-count-rate modeling of PureB single-photon avalanche diodes in a TCAD environment, Tihomir Knezevic, Univ. of Zagreb (Croatia); Lis K. Nanver, Univ. Twente (Netherlands); Tomislav Suligoj, Univ. of Zagreb (Croatia) [10526-55]

Response time of semiconductor photodiodes, Andrew C. Harter, Oleksandr Goushcha, Luna Optoelectronics (USA) [10526-56]

A novel biasing dependent circuit modeling of resonant cavity enhanced avalanche photodetectors (RCE-APDs), Mostafa R. Abdelhamid, Yasser M. El-Batawy, Cairo Univ. (Egypt); M. Jamal Deen, McMaster Univ. (Canada) [10526-57]

CONFERENCE 10526

SESSION 13 THU 10:40 AM TO 12:00 PM

Active Materials

Session Chair: **F. Javier García de Abajo**,
ICFO - Institut de Ciències Fotòniques (Spain)

Experimental evidence of nanometer-scale localized recombination due to random In fluctuations in InGaN/GaN quantum wells,
Wiebke Hahn, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris Saclay (France); Jean-Marie Lentali, Lab. de Physique de la Matière Condensée (France); Petr Polovodov, Ecole Polytechnique (France); Nathan Young, James S. Speck, Claude Weisbuch, Univ. of California, Santa Barbara (USA); Marcel Filoche, Ecole Polytechnique (France); Fouad Maroun, Lab. de Physique de la Matière Condensée (France); Lucio Martinelli, Yves Lassailly, Jacques Peretti, Ecole Polytechnique (France) [10526-58]

Type-I and type-II band alignment in dilute-P GaNP/GaN heterojunction,
Damir Borovac, Lehigh Univ. (USA); Chee-Keong Tan, Clarkson Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) [10526-59]

Radiative and optical properties of Gd-doped ZnSe single crystals,
Evghenii Piotr Goncarencu, Dmitri Nedeoglo, Gleb Colibaba, Moldova State Univ. (Moldova) [10526-60]

Absorption enhancement in type-II coupled quantum rings due to existence of quasi-bound states, Chi-Ti Hsieh, Academia Sinica (Taiwan); Shih-Yen Lin, Academia Sinica (Taiwan) and National Taiwan Univ. (Taiwan); Shu-Wei Chang, Academia Sinica (Taiwan) and National Chiao-Tung Univ. (Taiwan) [10526-61]

CONFERENCE 10527

Wednesday–Thursday 31 January–1 February 2018 • Proceedings of SPIE Vol. 10527

Physics, Simulation, and Photonic Engineering of Photovoltaic Devices VII

Conference Chairs: **Alexandre Freundlich**, Univ. of Houston (USA); **Laurent Lombez**, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); **Masakazu Sugiyama**, The Univ. of Tokyo (Japan)

Program Committee: **Urs Aeberhard**, Forschungszentrum Jülich GmbH (Germany); **Kylie R. Catchpole**, The Australian National Univ. (Australia); **Gavin Conibeer**, The Univ. of New South Wales (Australia); **Olivier Durand**, Institut National des Sciences Appliquées de Rennes (France); **Jean-François Guillemoles**, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); **Next PV** (Japan); **Karin Hinzer**, Univ. of Ottawa (Canada); **Seth M. Hubbard**, Rochester Institute of Technology (USA); **Marina S. Leite**, Univ. of Maryland, College Park (USA); **Marek Osinski**, The Univ. of New Mexico (USA); **Ian R. Sellers**, The Univ. of Oklahoma (USA); **Samuel D. Stranks**, Univ. of Cambridge (United Kingdom); **Robert J. Walters**, U.S. Naval Research Lab. (USA); **Peichen Yu**, National Chiao Tung Univ. (Taiwan)

WEDNESDAY 31 JANUARY

WELCOME AND OPENING REMARKS 8:40 AM TO 8:50 AM

Session Chairs: **Alexandre Freundlich**, Univ. of Houston (USA); **Laurent Lombez**, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); **Masakazu Sugiyama**, The Univ. of Tokyo (Japan)

SESSION 1 WED 8:50 AM TO 10:00 AM

Perovskites-based Solar Cells

Session Chairs: **Shigeo Asahi**, Kobe Univ. (Japan); **Martina Schmid**, Univ. Duisburg-Essen (Germany)

Photophysics of organic-inorganic hybrid perovskite solar cells (*Invited Paper*), Hirokazu Tahara, Taketo Handa, Yoshihiko Kanemitsu, Kyoto Univ. (Japan) [10527-16]

Radiation hardness and self-healing of perovskite solar cells under proton irradiation, Norbert H. Nickel, F. Lang, V. V. Brus, J. Bundesmann, S. Seidel, A. Denker, S. Albrecht, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany); G. Landi, H. C. Neitzert, Univ. degli Studi di Salerno (Italy) [10527-17]

Determination of transport properties in optoelectronic devices by time-resolved fluorescence imaging, Adrien Bercegol, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and EDF (France); Daniel Ory, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); Javier Mellado, Amelle Rebai, Institut Photovoltaïque d'Ile-de-France (France); Jean Rousset, Laurent Lombez, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) [10527-18]

SESSION 2 WED 10:30 AM TO 12:10 PM

Low Dimension and High-Efficiency Concept

Session Chairs: **Masakazu Sugiyama**, The Univ. of Tokyo (Japan); **Ian R. Sellers**, The Univ. of Oklahoma (USA)

Quantum engineering InAs/GaAs single-junction concentrator solar cells, Neil Beattie, Northumbria Univ. (United Kingdom); Patrick See, Univ. of Cambridge (United Kingdom); Martial Duchamp, Nanyang Technological Univ. (Singapore); Ian Farrer, The Univ. of Sheffield (United Kingdom); David A. Ritchie, Univ. of Cambridge (United Kingdom); Stanko Tomic, Univ. of Salford (United Kingdom); Guillaume Zoppi, Northumbria Univ. (United Kingdom) [10527-5]

The effect of excited state occupation and phonon broadening in the determination of the non-equilibrium hot-carrier temperature in InGaAsP quantum-well absorbers, Hamidreza Esmailpour, Vincent R. Whiteside, The Univ. of Oklahoma (USA); Louise C. Hirst, Joseph G. Tischler, Robert J. Walters, U.S. Naval Research Lab. (USA); Ian R. Sellers, The Univ. of Oklahoma (USA) [10527-6]

Locally grown Cu(In,Ga)Se₂ micro islands for concentrator solar cells, Martina Schmid, Berit Heidmann, Univ. Duisburg-Essen (Germany); Franziska Ringleb, Katharina Eylers, Leibniz-Institut für Kristallzüchtung (Germany); Stefan Andree, Jörn Bonse, Bundesanstalt für Materialforschung und -prüfung (Germany); Sergiu Levenco, Thomas Unold, Daniel Abou-Ras, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany); Torsten Boeck, Leibniz-Institut für Kristallzüchtung (Germany); Jörg Krüeger, Bundesanstalt für Materialforschung und -prüfung (Germany) [10527-7]

Nanoscale analyses of axial and radial III-V nanowires for solar cells, Valerio Piazza, Ctr. de Nanosciences et de Nanotechnologies (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud 11 (France); Himwas Chalermchai, Univ. Paris-Sud 11 (France); Omar Saket, Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris Saclay (France); Marco Vettori, Institut des Nanotechnologies de Lyon (France); Ahmed Ali, Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris Saclay (France); François H. Julien, Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud 11 (France); Nicolas Chauvin, Philippe Régreny, Institut des Nanotechnologies de Lyon (France); Alain Fave, Institut National des Sciences Appliquées de Lyon (France); Michel Gendry, Ecole Centrale de Lyon (France); Gilles Patriarche, Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris Saclay (France); Pierre Rale, Fabrice Oehler, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France); Stéphane Collin, Univ. Paris Saclay (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud 11 (France); Jean-Christophe Harmand, Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud 11 (France) and Univ. Paris Saclay (France); Maria Tchernycheva, Univ. Paris-Sud 11 (France) [10527-8]

Carrier dynamics of type-II GaSb/GaAs quantum rings for solar cells, Shumithira Gandan, Tyndall National Institute (Ireland) and Cork Institute of Technology (Ireland); Denise Montesdeoca Cardenes, Lancaster Univ. (United Kingdom); Juan Salvador Dominguez Morales, Tyndall National Institute (Ireland) and Cork Institute of Technology (Ireland); Peter Hodgson, Peter J. Carrington, Andrew R. J. Marshall, Anthony Krier, Lancaster Univ. (United Kingdom); Tomasz J. Ochalski, Tyndall National Institute (Ireland) and Cork Institute of Technology (Ireland) [10527-9]

Lunch/Exhibition Break Wed 12:10 pm to 1:40 pm

SESSION 3 WED 1:40 PM TO 3:40 PM

Advances in Multi-Junction Devices

Session Chairs: **Alexandre Freundlich**, Univ. of Houston (USA); **Tooru Tanaka**, Saga Univ. (Japan)

AllInAsSb for GaSb-based multi-junction solar cells, Julie Tournet, Institut d'Electronique et des Systèmes (France); Yves Rouillard, Univ. Montpellier (France) and Ctr. National de la Recherche Scientifique (France); Eric Tournié, Institut d'Electronique du Sud (France) and Ctr. National de la Recherche Scientifique (France) [10527-10]

Current-matching of high-voltage multi-junction solar cells via subcell segmentation, Christopher E. Valdivia, Karin Hinzer, Univ. of Ottawa (Canada) [10527-11]

Design of wide bandgap (1.7 eV–1.9 eV) III-V dilute nitride quantum-engineered solar cells for tandem application with silicon, Khim Kharel, Alexandre Freundlich, Univ. of Houston (USA) [10527-12]

Type-II GaAsSb/GaAsN superlattice solar cells: interplay between carrier lifetime, electronic coupling, and extraction efficiency, Alicia Gonzalo, Instituto de Sistemas Optoelectrónicos y Microtecnología (Spain); Antonio D. Utrilla, Univ. Politécnica de Madrid (Spain); Urs Aeberhard, Forschungszentrum Jülich GmbH (Germany); José M. Llorens, Benito Alén, Instituto de Microelectrónica de Madrid (Spain); David Fuertes Marrón, Álvaro Guzmán, Adrián Hierro, José María Ulloa, Univ. Politécnica de Madrid (Spain) [10527-13]



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Characterization of InGaAs/GaAsN multiple quantum well with flatted conduction band targeted for improving carrier transport in multijunction solar cell, Warakorn Yanwachirakul, The Univ. of Tokyo (Japan); Naoya Miyashita, Hassanet Sodabanlu, Kentaroh Watanabe, RCAST, The Univ. of Tokyo (Japan); Masakazu Sugiyama, The Univ. of Tokyo (Japan); Yoshitaka Okada, RCAST, The Univ. of Tokyo (Japan); Yoshiaki Nakano, The Univ. of Tokyo (Japan) [10527-14]

Multi-Junction photonic power converters: comparison of non-uniform illumination measurements to distributed circuit model results, Sanmeet S. Chahal, Christopher E. Valdivia, Matthew M. Wilkins, Univ. of Ottawa (Canada); Simon Fafard, Azastra Opto Inc. (Canada); Karin Hinzer, Univ. of Ottawa (Canada) [10527-15]

SESSION 4 WED 4:10 PM TO 5:20 PM

Perovskites-based Solar Cells

Session Chairs: **Shigeo Asahi**, Kobe Univ. (Japan);
Martina Schmid, Univ. Duisburg-Essen (Germany)

Two-step photon up-conversion solar cell: propose and demonstration (Invited Paper), Shigeo Asahi, Takashi Kita, Kobe Univ. (Japan) [10527-1]

Photocatalytic hydrogen evolution efficiency of Si up to 13% by employing the cascading energy band structure and novel electrode design, Hui-Chun Fu, Purushothaman Varadhan, Meng-Lin Tsai, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10527-2]

A smart solar energy collecting device, Timothy M. Westgate, Adrian B. Boivin, Jonathan F. Holzman, Blake W. D. Veerman, Mark H. Bergen, Xian Jin, Brandon Born, Mike Bernier, The Univ. of British Columbia Okanagan (Canada) [10527-3]

Metal oxide materials for transparent photoelectric applications, Joondong Kim, Incheon National Univ. (Korea, Republic of) [10527-4]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

TiO₂ nanostructured materials for solar-cell applications, Amine Elhaimeur, Univ. de Cádiz (Spain) [10527-30]

Manipulating the molecular orientation of conjugated polymers for bilayer OPVs, Ahra Yi, Sang Min Chae, Hyo Jung Kim, Pusan National Univ. (Korea, Republic of) [10527-31]

Monte Carlo simulations of hopping transport simulations in organic photovoltaic devices, Octavian Danila, Univ. Politehnica of Bucharest (Romania) [10527-32]

Simple scalable fabrication method of wide-angle black silicon surface for energy-harvesting applications, Abdelaziz M. Gouda, Nageh K. Allam, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10527-33]

On-board solar charging for electric vehicles, Hal S. Gokturk, Ecoken (USA) [10527-34]

The role of silanized and capped with TiO₂ gold nanorods of different aspect ratios in co-sensitized DSSCs for transparent windows applications, Marina Mazzoni, Istituto di Fisica Applicata "Nello Carrara" (Italy) and Consiglio Nazionale delle Ricerche (Italy); Lorenzo Zani, Istituto di Chimica dei Composti OrganoMetallici (Italy) and Consiglio Nazionale delle Ricerche (Italy); Janardan Daggari, Univ. degli Studi di Roma "Tor Vergata" (Italy); Sarah Lai, Sonia Centi, Roberto Pini, Istituto di Fisica Applicata "Nello Carrara" (Italy) and Consiglio Nazionale delle Ricerche (Italy) [10527-35]

Investigation of double-sided thin-film GaAs single-junction solar cells, Junseok Heo, Ajou Univ. (Korea, Republic of) [10527-36]

Flexible >13% unassisted solar-to-hydrogen efficient and ultra-stable photoelectrochemical water-splitting with III-V tandem junctions, Purushothaman Varadhan, Hui-Chun Fu, King Abdullah Univ. of Science and Technology (Saudi Arabia); Ray-Hua Horng, National Chiao Tung Univ. (Taiwan); Jr-Hau He, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10527-37]

Complex metamaterials for broadband light harvesting, Marcella Bonifazi, Yi Tian, King Abdullah Univ. of Science and Technology (Saudi Arabia); Andre J. Labelle, Sjoerd Hoogland, Edward H. Sargent, Univ. of Toronto (Canada); Andrea Fratallocchi, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10527-38]

Broadband absorption enhancement in a one-step fabricated amorphous silicon nanocones using excimer laser, Sara Magdi Al Menabawy, Joumana El-Rifai, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10527-39]

Fabrication of amorphous silicon nanowires using excimer laser for solar cells applications, Sara Magdi Al Menabawy, Joumana El-Rifai, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10527-40]

Examining the performance of ZrN plasmonic nanostructures in organic solar cells, Sara Magdi Al Menabawy, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10527-41]

Investigation of carrier escape and recombination dynamics in GaAsN/GaAs superlattice and resonantly coupled -quantum well solar cells, Khim Kharel, Alexandre Freundlich, Univ. of Houston (USA) [10527-42]

Comprehensive study of various light-trapping techniques used for sandwiched thin-film solar-cell structures, S. Abdellatif, The British Univ. in Egypt (Egypt); Khaled A. Kirah, Ain Shams Univ. (Egypt); R. Ghannam, Cairo Univ. (Egypt); A. S. G. Khalil, Fayoum Univ. (Egypt); W. Anis, Ain Shams Univ. (Egypt) [10527-43]

Silicon periodic nanostructures for high-efficiency absorption in thin-film solar cells, Xiaowei Guo, Hengchang Lu, Guoling Luo, Cheng Yang, Shaorong Li, Univ. of Electronic Science and Technology of China (China) [10527-44]

THURSDAY 1 FEBRUARY

SESSION 5 THU 8:00 AM TO 10:00 AM

Light Management

Session Chairs: **Ryo Tamaki**, RCAST, The Univ. of Tokyo (Japan);
Karin Hinzer, Univ. of Ottawa (Canada)

Hyperuniform disordered structures for enhanced light absorption, Marian Florescu, George Gkantzounis, Univ. of Surrey (United Kingdom) [10527-19]

Scattering directionality of high refractive index dielectric particles: a note for solar-energy harvesting, Ángela I. Barreda Gomez, Univ. de Cantabria (Spain); Hassan Saleh, Institut Fresnel (France); Amélie Litman, Institut Fresnel (France) and Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France); Francisco González, Univ. de Cantabria (Spain); Jean-Michel Geffrin, Institut Fresnel (France) and Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France); Fernando Moreno, Univ. de Cantabria (Spain) [10527-20]

Random textured silicon oxide nanocones for high-performance thin silicon solar cells, Abdelaziz M. Gouda, Mohamed Y. El Sayed, Ahmed E. Khalifa, Yehea Ismail, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10527-21]

Simple electronic and optical coupled modeling for simulation of optically structured photovoltaic cells, Anurag Sharma, Indian Institute of Technology Delhi (India) [10527-22]

Mathematical simulation of efficiency of various shapes of solar panels for NASA geostationary satellites, Malgorzata Marciniak, LaGuardia Community College (USA); Hammad Raja, Stony Brook Univ. (USA); Delfino Enriquez-Torres, LaGuardia Community College (USA); Maria Ignacia Serey-Roman, Emmanuel Michalakakis, LaGuardia Community College (USA); Raaghav Pandya, Columbia Teachers College (USA) [10527-23]

A linear solar-cell array for prolonged and high-value light capture, Adrian B. Boivin, The Univ. of British Columbia (Canada); Timothy M. Westgate, Jonathan F. Holzman, The Univ. of British Columbia Okanagan (Canada) [10527-24]

SESSION 6 THU 10:30 AM TO 12:30 PM

Advances in Intermediate-Band Solar Cells

Session Chairs: **Maria Tchernycheva**, Univ. Paris-Sud 11 (France);
Laurent Lombez, Institut de Recherche et Développement sur
 l'Energie Photovoltaïque (France)

Improved photovoltaic properties of ZnTeO-based intermediate-band solar cells (*Invited Paper*), Tooru Tanaka, Katsuhiko Saito, Qixin Guo, Saga Univ. (Japan); Kin Man Yu, City Univ. of Hong Kong (Hong Kong, China); Wladek Walukiewicz, Lawrence Berkeley National Lab. (USA) and Univ. of California, Berkeley (USA) [10527-25]

Application of InP quantum dots toward high-temperature intermediate-band solar-cell operation (*Invited Paper*), Seth M. Hubbard, Hyun Kum, Yushuai Dai, Zachary Bittner, Rochester Institute of Technology (USA) [10527-26]

Quantum structure for a practical realization of ratchet band solar cells, Amaury Delamarre, Daniel Suchet, The Univ. of Tokyo (Japan); Masakazu Sugiyama, RCAST, The Univ. of Tokyo (Japan); Nicolas Cavassilas, Institut Matériaux Microélectronique Nanosciences de Provence (France) . . [10527-27]

Quantitative analysis of InAs quantum-dot solar cells by photoluminescence spectroscopy, Ryo Tamaki, Yasushi Shoji, RCAST, The Univ. of Tokyo (Japan); Laurent Lombez, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and RCAST, The Univ. of Tokyo (Japan); Jean-François Guillemoles, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and NextPV (Japan); Yoshitaka Okada, RCAST, The Univ. of Tokyo (Japan) and NextPV (Japan) [10527-28]

Investigation into the current loss in Si-doped InAs/GaAs quantum-dot solar cells, Dongyoung Kim, Mingchu Tang, Jiang Wu, Huiyun Liu, Univ. College London (United Kingdom) [10527-29]

CLOSING REMARKS 12:30 PM TO 12:35 PM

Alexandre Freundlich, Univ. of Houston (USA);
Laurent Lombez, Institut de Recherche et Développement sur
 l'Energie Photovoltaïque (France);
Masakazu Sugiyama, The Univ. of Tokyo (Japan)



CONFERENCE 10528

Monday-Wednesday 29-31 January 2018 • Proceedings of SPIE Vol. 10528

Optical Components and Materials XV

Conference Chairs: **Shibin Jiang**, AdValue Photonics, Inc. (USA); **Michel J. F. Digonnet**, Stanford Univ. (USA)

Program Committee: **Jean-Luc Adam**, Univ. de Rennes 1 (France); **Joel Bagwell**, Edmund Optics Inc. (USA); **Rolindes Balda**, Univ. del País Vasco (Spain); **Robert P. Dahlgren**, CSUMB/NASA Ames Research Ctr. (USA); **Angel Flores**, Air Force Research Lab. (USA); **Jesse A. Frantz**, U.S. Naval Research Lab. (USA); **Leonid B. Glebov**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Seppo K. Honkanen**, Univ. of Eastern Finland (Finland); **Jacques Lucas**, Univ. de Rennes 1 (France); **Yasutake Ohishi**, Toyota Technological Institute (Japan); **Aydogan Ozcan**, Univ. of California, Los Angeles (USA); **Giancarlo C. Righini**, Museo Storico della Fisica e Centro Studi e Ricerche Enrico Fermi (Italy); **Setshisa Tanabe**, Kyoto Univ. (Japan); **John M. Zavada**, National Science Foundation (USA); **Jun Zhang**, U.S. Army Research Lab. (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:20 PM

Nanoparticles

Optical multipole resonances of non-spherical silicon nanoparticles and the influence of illumination direction (*Invited Paper*), Pavel D. Terekhov, ITMO Univ. (Russian Federation) and Ben-Gurion Univ. of the Negev (Israel); Kseniia V. Baryshnikova, ITMO Univ. (Russian Federation); Yuriy A. Artemyev, ITMO Univ. (Russian Federation) and Ben-Gurion Univ. of the Negev (Israel); Alina Karabchevsky, Ben-Gurion Univ. of the Negev (Israel); Alexander S. Shalin, ITMO Univ. (Russian Federation); Andrey B. Evlyukhin, Laser Zentrum Hannover e.V. (Germany) and ITMO Univ. (Russian Federation). [10528-1]

Power scaling of the in-band diode-pumped Er-nanoparticle-doped fiber laser, Jun Zhang, Radha K. Pattnaik, Mark Dubinskii, U.S. Army Research Lab. (USA); Colin C. Baker, U.S. Naval Research Lab. (USA); E. Joseph Friebele, Sotera Defense Solutions, Inc. (USA); Ashley A. Burdett, Univ. Research Foundation (USA); Woohong Kim, Jasbinder S. Sanghera, U.S. Naval Research Lab. (USA) [10528-2]

Direct laser writing of NaYF₄-Yb³⁺,Er³⁺-nanocrystal-doped toroidal microcavity lasers, Abhishek Kottaram Amrithanath, Heming Wei, Sridhar Krishnaswamy, Northwestern Univ. (USA) [10528-3]

Rare-earth-doped wide-bandgap tin-oxide nanocrystals: pumping mechanisms and spectro-temporal dynamics, Joaquín Fernández, Sara García-Revilla, Rolindes Balda, Univ. del País Vasco (Spain); María Concepción Cascales, Instituto de Ciencia de Materiales de Madrid (Spain) [10528-4]

Site-resolved emission of Nd³⁺-doped oxyfluoride nano glass-ceramics, Rolindes Balda, Univ. del País Vasco (Spain); Giulio Gorni, Jose Joaquín Velazquez, María Jesús Pascual, Alicia Durán, Instituto de Cerámica y Vidrio (Spain); Joaquín Fernández, Univ. del País Vasco (Spain) [10528-5]

Lunch Break Mon 12:20 pm to 1:40 pm

SESSION 2 MON 1:40 PM TO 3:20 PM

Rare-Earth-Doped Fiber Lasers and Amplifiers I

Yb-Er co-doping for resonantly pumped fiber lasers at eye-safer wavelengths, Colin C. Baker, U.S. Naval Research Lab. (USA); E. Joseph Friebele, Sotera Defense Solutions, Inc. (USA); Ashley A. Burdett, Univ. Research Foundation (USA); Daniel L. Rhonehouse, Woohong Kim, Jasbinder S. Sanghera, U.S. Naval Research Lab. (USA); Jun Zhang, Radha K. Pattnaik, Mark Dubinskii, U.S. Army Research Lab. (USA) . [10528-6]

Tm-doped fiber laser resonantly diode-pumped at 1630 nm, G. Alex Newburgh, Jun Zhang, Mark Dubinskii, U.S. Army Research Lab. (USA) [10528-7]

Active materials for high-power fiber lasers prepared by All-Solution Doping technique, Stefan Kuhn, Christian Hupel, Sigrun Hein, Franz Beier, Johannes Nold, Nicoletta Haarlammert, Thomas Schreiber, Ramona Eberhardt, Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10528-8]

All-crystalline fiber development for high-power laser applications, Syed Qadri, Woohong Kim, L. Brandon Shaw, U.S. Naval Research Lab. (USA); Charles G. Askins, U.S. Naval Research Lab. (USA) and Sotera Defense Solutions, Inc. (USA); John R. Peele, Sotera Defense Solutions, Inc. (USA); Daniel L. Rhonehouse, Jason D. Myers, Rajesh Thapa, Collin McClain, Jasbinder S. Sanghera, U.S. Naval Research Lab. (USA) [10528-9]

Yb-doped multicomponent phosphate glass fibers for compact pulsed amplifier, Nadia Giovanna Boetti, Istituto Superiore Mario Boella (Italy); Enkeleida Balliu, Magnus Engholm, Mid Sweden Univ. (Sweden); Diego Pugliese, Edoardo Ceci-Ginistrelli, Politecnico di Torino (Italy); Davide Janner, Politecnico di Milano (Italy); Daniel Milanese, Politecnico di Torino (Italy) and Consiglio Nazionale delle Ricerche (Italy) [10528-10]

SESSION 3 MON 3:50 PM TO 5:30 PM

Free-Space Lasers and Amplifiers

Generation of 0.5mJ mid-infrared femtosecond laser at 1kHz based on multi-stage SiC and KTA optical parametrical amplifier (*Invited Paper*), Zhiyi Wei, Institute of Physics, Chinese Academy of Sciences (China) [10528-11]

633-nm single-mode master-oscillator power-amplifier module, Gunnar Blume, Daniel Jedrzejczyk, Johannes Pohl, David Feise, Alexander Sahn, Ferdinand-Braun-Institut (Germany); Christian Nölleke, Patrick Leisching, TOPTICA Photonics AG (Germany); Katrin Paschke, Ferdinand-Braun-Institut (Germany) [10528-12]

Erbium-doped GaN bulk crystals as a gain medium for high-energy lasers (*Invited Paper*), Jingyu Lin, Hongxing Jiang, Texas Tech Univ. (USA) [10528-13]

Characteristic-improvement of QD semiconductor optical amplifier using rapid-thermal annealing process, Budsara Boriboon, Duangrudee Worasuechee, Chulalongkorn Univ. (Thailand); Atsushi Matsumoto, Kouichi Akahane, Naokatsu Yamamoto, Naoya Wada, National Institute of Information and Communications Technology (Japan) [10528-14]

TUESDAY 30 JANUARY

SESSION 4..... TUE 8:00 AM TO 10:00 AM

Sensors

Distributed analysis of guided acoustic waves Brillouin scattering: a new class of fiber sensor (*Invited Paper*), Gil Bashan, H. Hagai Diamandi, Yosef London, Eyal Preter, Avinoam Zadok, Bar-Ilan Univ. (Israel) . . [10528-15]

All-optical gas remote detection using rare-earth-doped chalcogenide fibers (*Invited Paper*), Florent Starecki, Alain Braud, Jean-Louis Doualan, Ctr. de Recherche sur les Ions, les Matériaux et la Photonique (France); Julien Ari, Institut des Sciences Chimiques de Rennes (France); Catherine Boussard-Plédel, Virginie Nazabal, Univ. de Rennes 1 (France); Patrice Camy, Ctr. de Recherche sur les Ions, les Matériaux et la Photonique (France). . . [10528-17]

Few-mode microfiber knot resonator for measurement of relative humidity by considering group index difference, Duy Duong Anh Le, Kwang-Wook Yoo, Seung Min Lee, Hoeil Chung, Kyung Joon Cha, Young-Geun Han, Hanyang Univ. (Korea, Republic of) . . . [10528-16]

Weak value amplification based on optical attenuation for sensitivity improvement of fiber Bragg grating sensor, Kwang-Wook Yoo, Duy Duong Anh Le, Seung Min Lee, Ju Il Hwang, Hoeil Chung, Kyung Joon Cha, Young-Geun Han, Hanyang Univ. (Korea, Republic of) . . . [10528-18]

Analysis of the sensitivity and dynamic characteristics of the birefringent fiber temperature response for realization of the thermal field disturbance sensor, Martin Kyselák, Jan Maschke, Cestmír Vlček, Filip Dvořák, Univ. of Defence (Czech Republic) . . . [10528-19]

SESSION 5..... TUE 10:30 AM TO 12:00 PM

Optical Properties of Materials

Control of $Y_3Al_{5-x}Ga_xO_{12}:Ce^{3+}$ persistent luminescence property by trap depth engineering (*Invited Paper*), Jumpei Ueda, Kyoto Univ. (Japan). . . [10528-20]

Excitation wavelength and power effect in $ZnGa_2O_4:Cr^{3+}$ transparent glass-ceramics with persistent luminescence, Victor Castaing, Atul D. Sontakke, Ecole Nationale Supérieure de Chimie de Paris (France); Alberto Jose Fernández-Carrión, Univ. d'Orléans (France); Nadia Touatib, Laurent Binet, Mathieu Allix, Didier Gourier, Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France) . . . [10528-21]

Construction of VRBE diagrams of Eu^{2+} -doped barium silicate systems for design of novel persistent phosphors, Kazuki Asami, Kotaro Yasuda, Jumpei Ueda, Setsuhisa Tanabe, Kyoto Univ. (Japan) . . . [10528-22]

The influence of polarization orientation on bulk damage resistances of doubler KDP crystals at different wavelengths, Yinbo Zheng, Rongsheng Ba, Xinda Zhou, Jie Li, Lei Ding, Jing Yuan, Hong-Lei Xu, Jin Na, Ya-Jun Li, Xiao-Yu Yang, Bo Chen, China Academy of Engineering Physics (China). . . [10528-23]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 6..... TUE 1:30 PM TO 3:00 PM

Glass Fabrication and Components

From VIS to SWIR: a challenge for optical glass and IR materials, Gernot Weber, Ralf Jedamzik, SCHOTT AG (Germany) . . . [10528-24]

Analysis of form deviation in non-isothermal glass molding, Holger Kreilkamp, Olaf Dambon, Fraunhofer-Institut für Produktionstechnologie IPT (Germany). . . [10528-25]

Mid-infrared volume diffraction gratings in IG2 chalcogenide glass: fabrication, characterization and theoretical verification, Helen Butcher, STFC Rutherford Appleton Lab. (United Kingdom); David G. MacLachlan, Heriot-Watt Univ. (United Kingdom); David Lee, UK Astronomy Technology Ctr. (United Kingdom); Richard A. Brownsword, STFC Rutherford Appleton Lab. (United Kingdom); Robert R. Thomson, Heriot-Watt Univ. (United Kingdom); Damien Weidmann, STFC Rutherford Appleton Lab. (United Kingdom). . . [10528-26]

Optical characterization of random anti-reflecting subwavelength surface structures on binary gratings (*Invited Paper*), Karteek Kunala, Gopal Sapkota, Menelaos K. Poutous, The Univ. of North Carolina at Charlotte (USA). . . [10528-27]

SESSION 7..... TUE 3:30 PM TO 5:10 PM

Specialty Optical Fibers

Plasma technology for preparation of specialty fibers, Volker Reichel, Hardy Baierl, André Kalide, Andy Scheffel, Jan Dellith, Kay Schuster, Leibniz-Institut für Photonische Technologien e.V. (Germany) . . . [10528-28]

Mechanical behavior of carbon-polyimide coated fiber at elevated temperatures, Lei Huang, OFS (USA) . . . [10528-29]

Attenuation measurements in single-crystal sapphire fiber via Raman scattering intensity, Bo Liu, Michael P. Buric, National Energy Technology Lab. (USA); Zhihao Yu, Daniel Homa, Virginia Tech Ctr. for Photonics Technology (USA); Cary Hill, Yujie Cheng, Virginia Polytechnic Institute and State Univ. (USA); Benjamin T. Chorpene, National Energy Technology Lab. (USA); Gary Pickrell, Anbo Wang, Virginia Polytechnic Institute and State Univ. (USA) . . . [10528-30]

Multimaterial photonic crystal fibers, Christos Markos, DTU Fotonik (Denmark) . . . [10528-31]

Predicted static fatigue (delayed fracture) lifetime of a fiber-optic test specimen: application of the Boltzmann-Arrhenius-Zhurkov (BAZ) probabilistic predictive model, Ephraim Suhr, ERS Co. (USA); Sung Yi, Portland State Univ. (USA) . . . [10528-32]

SESSION 8..... TUE 5:10 PM TO 6:10 PM

Photodetectors

Waveguide integration silicon MSM photodetector in silicon nitride-on-SOI platform for visible and NIR wavelength band, Avijit Chatterjee, Shankar Kumar Selvaraja, Indian Institute of Science (India). . . [10528-33]

High-optical power handling, 1.2 to 2.2 micron wavelength, uncooled InGaAs photodiodes up to 5-GHz bandwidth for coherent spectroscopy, Abhay M. Joshi, Discovery Semiconductors, Inc. (USA) . . . [10528-34]

Development of InGaAs MPPC for NIR photon counting applications, Takashi Baba, Yusei Tamura, Yoshihito Suzuki, Kenji Makino, Takuya Fujita, Shigeyuki Nakamura, Hamamatsu Photonics K.K. (Japan); Koei Yamamoto, Hamamatsu Corp. (Japan) . . . [10528-35]

WEDNESDAY 31 JANUARY

SESSION 9..... WED 8:30 AM TO 9:50 AM

Free-Space Optics

Automated assembly of lens barrels with active wavefront sensor guiding, Marvin Berger, Tobias Müller, Bernd Meiers, Sebastian Sauer, Reik Krappig, Christoph Baum, Fraunhofer-Institut für Produktionstechnologie IPT (Germany) . . . [10528-36]

Silicon carbide TMA sensors for airborne applications, Jay P. Daniel, Coherent, Inc. (USA). . . [10528-37]

BRDF performance of highly polished Al6061 T6 and impact on TMA performance, Katherine A. Baker, Coherent, Inc. (USA). . . [10528-38]

A retina-like hemispherical imager the resolution of planar focal plane arrays, Dejiu Fan, Byungjun Lee D.D.S., Stephen R. Forrest, Univ. of Michigan (USA) . . . [10528-39]

SESSION 10..... WED 10:20 AM TO 12:10 PM

Rare-Earth-Doped Fiber Lasers and Amplifiers II

Design and characterization of a 10-modes few-mode erbium-doped fiber with multicore pedestal core (*Invited Paper*), Jean-Baptiste Trinel, Guillaume Le-Cocq, Géraud Bouwmans, Andy Cassez, Yves Quiquempois, Laurent Bigot, Univ. des Sciences et Technologies de Lille (France) and Ctr. National de la Recherche Scientifique (France) . . . [10528-40]

Large-mode-area fibers fabricated by the full vapor-phase SPCVD process, Alexandre Barnini, iXBlue Photonics (France); Thierry Robin, iXBlue SAS (France); Daniel Caurant, Gérard P. Aka, Ecole Nationale Supérieure de Chimie de Paris (France); Thierry Gotter, Arnaud Laurent, iXBlue SAS (France); Pascal Guitton, iXBlue Photonics (France); Cédric Guyon, Ecole Nationale Supérieure de Chimie de Paris (France); Benoît Cadier, iXBlue SAS (France) . . . [10528-41]

Evidence of photo-darkening in co-doped erbium-ytterbium double-clad fibers operated at high-output power, Thierry Robin, Thierry Gotter, Pascal Guitton, Ronan Montron, Gilles Mélin, Carine Ranger, Arnaud Laurent, iXBlue SAS (France) . . . [10528-42]

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High-power tunable grating-free cascaded Raman fiber lasers, Velpula Balaswamy, Santosh Aparanji, S. Arun, V.R. Supradeepa, Indian Institute of Science (India) [10528-43]

Low power generation of equalized broadband CW supercontinua using a novel technique incorporating modulation instability of line broadened pump signal, Roopa Prakash, Vishal Choudhury, S. Arun, V.R. Supradeepa, Indian Institute of Science (India) [10528-44]

Lunch/Exhibition Break Wed 12:10 pm to 1:30 pm

SESSION 11 WED 1:30 PM TO 3:10 PM

Optical Components I

Wideband omnidirectional reflectors and polarizers with minimal material embodiment, Gunpyo Kim, Jae Woong Yoon, Seok-Ho Song, Hanyang Univ. (Korea, Republic of); Robert Magnusson, The Univ. of Texas at Arlington (USA) [10528-45]

Compensation of third-order intermodulation distortion of electro-optic modulator by using frequency chirp modulation, Yuta Kashiwagi, Kosuke Takase, Tadashi Kawai, Akira Enokihara, Univ. of Hyogo (Japan); Naokatsu Yamamoto, National Institute of Information and Communications Technology (Japan); Tetsuya Kawanishi, Waseda Univ. (Japan) [10528-46]

Infrared transmitting epoxyless fiber-optic connectors, Rafael R. Gattass, Daniel L. Rhonehouse, U.S. Naval Research Lab. (USA); Frederic Kung, Univ. Research Corp. (USA); Collin McClain, Univ. Research Foundation (USA); Vinh Nguyen, Shyam S. Bayya, Jasbinder S. Sanghera, U.S. Naval Research Lab. (USA) [10528-47]

Reversible optical tuning of infrared solid-state transmission filters with novel low-loss phase change material based dielectric resonators, Jeffrey Chou, Vladimir Liberman, MIT Lincoln Lab. (USA); Yifei Zhang, Zhuoran Fang, Junying Li, Bridget Bohlin, Juejun Hu, Massachusetts Institute of Technology (USA) [10528-48]

Achromatic retarders for polarization control, Michael Kraemer, Meadowlark Optics, Inc. (USA) [10528-49]

SESSION 12 WED 3:30 PM TO 5:30 PM

Optical Components II

A tunable guided-mode resonance filter incorporating ultrathin phase-change film, Longju Liu, Russell Mahmood, Andrew C. Hillier, Meng Lu, Iowa State Univ. of Science and Technology (USA) [10528-50]

Polarization sensitivity of ordered and random antireflective surface structures in silica and spinel, Jesse A. Frantz, James B. Selby, Lynda E. Busse, L. Brandon Shaw, Jasbinder S. Sanghera, U.S. Naval Research Lab. (USA) [10528-51]

Metal-insulator-metal multilayer-based ultra-broadband perfect absorbers: from non-uniform texturing to nano-hole plasmonic units, Amir Ghobadi, Bayram Bütün, Ekmel Özbay, Bilkent Univ. (Turkey) [10528-52]

Highly efficient all-optical in-line modulator assisted by photo-thermal effect in monolayer graphene, Seongju Ha, Kyuhong Choi, Namhun Park, Hyeon Ju Lee, Dong-il Yeom, Ajou Univ. (Korea, Republic of) [10528-53]

New developments in the determination of the complex refractive index of arbitrary absorptance thin films from envelope profiles of a single transmittance curve, Eric Gaudet, Jean Desforges, Serge Gauvin, Univ. de Moncton (Canada) [10528-54]

Study of second harmonic generation in poled and un-poled silica multilayer structures, Christopher W. Smelser, Jacques Albert, Seyed Hamed Jafari, Carleton Univ. (Canada); Salah Abdullah, Univ. Laval (Canada); Tahseen Haque, Carleton Univ. (Canada) [10528-55]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Experimental observation of the cascaded Raman shift in a chalcogenide optical fiber, Tonglei Cheng, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan) [10528-56]

White-light emission characteristics of terbium-doped crystals, Bommareddi Rami Reddy, Jade Douglas, Vernessa M. Edwards, Alabama A&M Univ. (USA) [10528-57]

Self-bending of optical waveguides in a dry photosensitive medium, Ra'ed Malallah, Inbarasan Muniraj, Derek Cassidy, Min Wan, John Sheridan, Univ. College Dublin (Ireland) [10528-58]

Improvement of liquid crystal alignments through synthesis of photo-fragmentation activators, In-Hye Lee, Hongik Univ. (Republic of Korea); Dong Myung Shin, Hongik Univ. (Korea, Republic of) [10528-59]

Far-detuned four-wave mixing for mid-infrared wavelength conversion in chalcogenide As₂S₃ suspended core fiber, Kenshiro Nagasaka, Tong Hoang Tuan, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan) [10528-60]

Limit of applying DOE to precise optics, Masato Shibuya, Tokyo Polytechnic Univ. (Japan); Hidenori Kasamatsu, Tokyo Polytechnic Univ. (Japan); Takashi Hiramatsu, Tokyo Polytechnic Univ. (Japan) and Fuji Xerox Co., Ltd. (Japan) [10528-61]

All-solid tellurite optical fiber with transversely-disordered refractive index profile and its optical image transport performance, Tong Hoang Tuan, Shunei Kuroyanagi, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan) [10528-62]

Tailoring Nd³⁺ emission spectrum by a neodymium-doped tellurite all-solid photonic bandgap fiber, Daisuke Demichi, Tong Hoang Tuan, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan) [10528-63]

Interaction of noble gases with electron acceptors, Hal S. Gokturk, Ecoken (USA) [10528-64]

Mode-locked NALM-based fibre master oscillator with controllable operation regimes, Sergey M. Kobtsev, Aleksey V. Ivanenko, Novosibirsk State Univ. (Russian Federation) [10528-65]

Mid-infrared frequency conversion via normal dispersion modulation instability in chalcogenide fibers, Lai Liu, Kenshiro Nagasaka, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan) [10528-66]

Wavefront correction with photo-controlled deformable mirror, Jan Pilar, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Stefano Bonora, CNR-IFN Padova (Italy); Simon Hutchinson, Antonio Lucianetti, Tomáš Mocek, HiLASE Ctr. (Czech Republic) [10528-67]

Influence of the fraction of absorbed pump power on the performance of Nd³⁺:YVO₄ powder random lasers, Niklaus U. Wetter, Danilo A. A. da Silva, Ernesto J. Villar, Julia M. Giehl, Giordano B. C. de Simone, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10528-68]

Silicon photomultiplier sensors for time-of-flight LiDAR, Deborah Herbert, Salvatore Gnecci, Carl Jackson, SensL Technologies Ltd. (Ireland) [10528-70]

A cost-effective edge-filter-based FBG strain interrogator using catastrophic fuse effect microcavity interferometers, Paulo André, Carlos F. Marques, Maria Fátima Domingues, Instituto de Telecomunicações (Portugal); Moisés Ribeiro, Anselmo Neto, Maria J. Pontes, LABTEL (Brazil); Paulo Antunes, Instituto de Telecomunicações (Portugal); Camilo A. Rodriguez Diaz, LABTEL (Brazil) [10528-71]

Zinc selenide: an extraordinarily nonlinear material, Christopher B. Marble, Texas A&M Univ. (USA); Sean P O'Connor, Texas A&M Univ. (USA) and Engility Corporation (USA); Dawson T. Nodurft, Vladislav V. Yakovlev, Texas A&M Univ. (USA); Andrew W Wharmby, 711th Human Performance Wing, Airman Systems Directorate, Bioeffects Division, Optical Radiation Bra (USA) . [10528-72]

Tolerance analysis, fabrication, and assembly of bare aluminum optical telescope, Shayna Khatri, Coherent, Inc. (USA) [10528-73]

Enhanced solar spectrum confinement for PV cells investigated, Muddassir Iqbal, Air Univ. (Pakistan) [10528-74]

Up conversion properties of CdF₂:Tb³⁺,Yb³⁺ single crystals under infrared laser, H. Boubekri, Ecole Normale Supérieure d'Enseignement Technologique (Algeria); Madjid Diaf, Univ. Badji Mokhtar (Algeria); Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France); Jean-Pierre Jouart, Univ. de Reims Champagne-Ardenne (France) . [10528-75]

Raman spectroscopy on porous metal-coated ultralow refractive index silica aerogel, Changuk Kim, Seunghwa Baek, Dongheok Shin, Kyongsik Kim, Yonsei Univ. (Korea, Republic of) [10528-76]

Manipulation of optical fields by plasmonic metasurfaces, Shuqi Chen, Wenwei Liu, Zhancheng Li, Hua Cheng, Jianguo Tian, Nankai Univ. (China) [10528-77]

CONFERENCE 10529

Wednesday–Thursday 31 January–1 February 2018 • Proceedings of SPIE Vol. 10529

Organic Photonic Materials and Devices XX

Conference Chairs: **Christopher E. Tabor**, Air Force Research Lab. (USA); **François Kajzar**, Univ. Politehnica of Bucharest (Romania); **Toshikuni Kaino**, Tohoku Univ. (Japan); **Yasuhiro Koike**, Keio Univ. (Japan)

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WEDNESDAY 31 JANUARY

SESSION 1..... WED 8:00 AM TO 10:00 AM

Nanophotonics

Session Chair: **François Kajzar**,
Univ. Politehnica of Bucharest (Romania)

Organic and hybrid emissive materials and random lasers based on polymer nanofibers by electrospinning technologies: results from the NANO-JETS project (Keynote Presentation), Luana Persano, Andrea Camposo, Istituto Nanoscienze (Italy); Alberto Portone, Luigi Romano, Martina Montinaro, Univ. del Salento (Italy); Maria Moffa, Istituto Nanoscienze (Italy); Vito Fasano, Giovanni Morello, Riccardo Di Corato, Vincenzo Resta, Dario Pisignano, Univ. del Salento (Italy) . . . [10529-1]

Tunable light-emission in doped piezoelectric nanowires (Invited Paper), Luana Persano, Andrea Camposo, Aleksandr V. Terentjevs, Istituto Nanoscienze (Italy); Fabio Della Sala, Istituto per la Microelettronica e Microsistemi (Italy) and Istituto Italiano di Tecnologia (Italy); Eduardo Fabiano, Istituto per la Microelettronica e Microsistemi (Italy); Dario Pisignano, Univ. del Salento (Italy) and Istituto Nanoscienze (Italy) . . . [10529-2]

Recent progress of organic and hybridized nanocrystals (Invited Paper), Akito Masuhara, Yamagata Univ. (Japan) . . . [10529-3]

Strong coupling between self-assembled organic molecules and surface plasmon polaritons, John Bigeon, Ctr. de Nanosciences et de Nanotechnologies (France); Sylvain Le Lièvre, CEA-Ctr. de SACLAY (France); Simon Vassant, Commissariat à l'Énergie Atomique (France); Nadia Belabas, Christophe Minot, Nathalie Bardou, Alejandro Yacomotti, Ariel Levenson, Ctr. de Nanosciences et de Nanotechnologies (France); Fabrice Charra, Commissariat à l'Énergie Atomique (France); Sylvain Barbay, Ctr. de Nanosciences et de Nanotechnologies (France) . . . [10529-4]

SESSION 2..... WED 10:30 AM TO 12:10 PM

OLEDs

Session Chair: **Dario Pisignano**, Univ. del Salento (Italy)

Three-dimensional (3D) concave OLEDs fabricated by a multilayer coating technique of electro spray deposition (ESD) (Invited Paper), Tetsuya Aoyama, Yusuke Tajima, RIKEN (Japan); Hirokazu Tanaka, Core Concept Technologies Inc. (Japan) . . . [10529-5]

Photoluminescence stability of blue organic phosphorescent materials on plasmonic silver nanostructure architectures, Catrice Carter, Zeqing Shen, Kun Zhu, Kelsey Gwynne, Deirdre M. O'Carroll, Rutgers, The State Univ. of New Jersey (USA) . . . [10529-6]

Electrically pumped exciton-polaritons in the near-infrared, Arko Graf, Martin Held, Yuriy Zakharko, Ruprecht-Karls-Univ. Heidelberg (Germany); Laura Tropsch, Univ. of St. Andrews (United Kingdom); Jana Zaumseil, Ruprecht-Karls-Univ. Heidelberg (Germany); Malte C. Gather, Univ. of St. Andrews (United Kingdom) . . . [10529-7]

Saturation of two-photon absorption in layered transition metal dichalcogenides (Invited Paper), Jun Wang, Shanghai Institute of Optics and Fine Mechanics (China) . . . [10529-8]

Lunch/Exhibition Break . . . Wed 12:10 pm to 1:30 pm

SESSION 3..... WED 1:30 PM TO 3:00 PM

Nano-Hybrid

Session Chair: **Toshikuni Kaino**, Tohoku Univ. (Japan)

Supercritical route for organic-inorganic hybrid materials (Keynote Presentation), Tadafumi Adschiri, Tohoku Univ. (Japan) [10529-9]

Fluorescent noncovalent functionalization of graphene by surface-confined supramolecular self-assembly (Invited Paper), André-Jean Attias, Univ. Pierre et Marie Curie (France); Sylvain Le Lièvre, CEA-Ctr. de SACLAY (France); Ping Du, David Kreher, Fabrice Mathevet, Univ. Pierre et Marie Curie (France); Fabrice Charra, Commissariat à l'Énergie Atomique (France) . . . [10529-10]

Novel proton conductive core-shell type hybridized nanoparticles for polymer electrolyte membrane, Keiji Shito, Satoshi Sekine, Yuki Takahashi, Yamagata Univ. (Japan); Toshihiko Arita, Tohoku Univ. (Japan); Akito Masuhara, Yamagata Univ. (Japan) . . . [10529-11]

CONFERENCE 10529

SESSION 4 WED 3:30 PM TO 5:50 PM

Hybrid Materials

Session Chair: **Tadafumi Adschiri**, Tohoku Univ. (Japan)

New advanced materials containing rare-Earth ions (*Invited Paper*), Lada N. Puntus, Kotelnikov Institute of Radio Engineering and Electronics of Russian Academy of Sciences (Russian Federation) [10529-12]

Diverse applications of 3D nano/micro structures fabricated by two-photon-initiated polymerization (*Invited Paper*), Kwang-Sup Lee, Hannam Univ. (Korea, Republic of) [10529-13]

The intrinsic properties of Sn-based perovskite single crystals, Chen Zou, Zonglong Zhu, Chun-Ying Huang, Lih Y. Lin, Univ. of Washington (USA) [10529-14]

High-performance perovskite phototransistor prepared using multi-step slow annealing method, Mingxuan Cao, Yu Yu, Yating Zhang, Jianquan Yao, Tianjin Univ. (China) [10529-15]

Nanoscale vibrational fingerprint characterization of mixed cation organic-inorganic perovskites by near-field optical microscopy, Heiko Linnenbank, Florian Mörz, Tobias Steinle, Harald Giessen, Univ. Stuttgart (Germany); Michael Saliba, Polytechnique Fédérale de Lausanne (Switzerland) [10529-16]

Photothermal actuators based on conjugated polymers, HanWhuy Lim, Minsu Han, Jong Un Hwang, Eunyoung Kim, Yonsei Univ. (Korea, Republic of) [10529-17]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

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Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Enhancement of the inverted polymer solar cells via ZnO doped with CTAB, Ten-Chin Wen, National Cheng Kung Univ. (Taiwan) [10529-38]

Efficient hole-conductor-free fully printable mesoscopic perovskite solar cells with hybrid carbon electrode, Miao Duan, Huazhong Univ. of Science and Technology (China); Yaoguang Rong, Hongwei Han, Huazhong University of Science and Technology (China) [10529-40]

Adaptive microlens array (MLA) using electrically actuated polyvinyl chloride (PVC)/dibutyl phthalate (DBP) gel, Zuowei Zhou, Xiaolong Li, Hongwen Ren, Chonbuk National Univ. (Korea, Republic of) [10529-41]

Polarized light scattering by macromolecular self-assembly of J-aggregates, Aleksander K. Rebane, Alexander Mikhaylov, Montana State Univ. (USA) [10529-42]

High-efficiency colloidal quantum-dot solar cells using organic electric dipole layers, Randi Azmi, Sung-Yeon Jang, In Hwan Jung, Kookmin Univ. (Korea, Republic of) [10529-43]

Characteristic changes of vapor deposited films for bis-styrylbenzene derivatives after thermal treatment, Hiroyuki Mochizuki, National Institute of Advanced Industrial Science and Technology (Japan) [10529-44]

Guiding charges in organic materials by electron affinity, Hal S. Gokturk, Ecken (USA) [10529-45]

Analyzing capacitance-voltage characteristics of organic light-emitting diodes under forward bias using more accurate equivalent circuit modeling, Gyeong-Won Lee, Sang Hoon Park, Jong-In Shim, Dong-Soo Shin, Hanyang Univ. (Korea, Republic of) [10529-46]

The photonic crystals laser based on opal structure, Chie-Tong Kuo, Ting-Huei Chen, Bing-Yau Huang, National Sun Yat-sen Univ. (Taiwan); Shih-Hung Lin, Chung Shan Medical Univ. (Taiwan) [10529-47]

Probing metal-to-ligand charge transfer transitions in ruthenium complexes by quantitative two-photon absorption spectroscopy, Charles Stark, Juri Pahapill, National Institute of Chemical Physics and Biophysics (Estonia); Alexander Mikhaylov, Aleksander K. Rebane, Montana State Univ. (USA) [10529-48]

Electro-optic polymeric reflection modulator based on plasmonic metamaterial, Ahmed Abbas, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10529-49]

New donor-acceptor-based compounds for intramolecular singlet fission, Saghar Masoomi-Godarzi, Trevor A. Smith, David J. Jones, The Univ. of Melbourne (Australia) [10529-50]

THURSDAY 1 FEBRUARY

SESSION 5 THU 8:00 AM TO 10:10 AM

EO/NLO Polymers

Session Chair: **Christopher E. Tabor**, Air Force Research Lab. (USA)

Multi-scale theory-guided nano-engineering of record electro-optic device performance (*Keynote Presentation*), Larry R. Dalton, Univ. of Washington (USA) [10529-18]

Optimizing the poling efficiency of nonlinear optic polymers (*Invited Paper*), Fahima Ouchen, Emily M. Heckman, Air Force Research Lab. (USA); François Kajzar, Ileana Rau, Univ. Politehnica of Bucharest (Romania); Larry Raymond Dalton, Univ. of Washington (USA); James G. Grote, Air Force Research Lab. (USA) [10529-19]

Comprehensive evaluation of EO polymers for applications to Si hybrid modulators and THz generation waveguides, Akira Otomo, Chiyumi Yamada, Isao Aoki, Yoshihiro Takagi, Yukihiro Tominari, Takahiro Kaji, Toshiaki Yamada, National Institute of Information and Communications Technology (Japan) [10529-20]

Temperature stable electro-optic polymer modulators using high Tg polymer matrix, Hiroki Miura, Shiyoshi Yokoyama, Kyushu Univ. (Japan) [10529-21]

Plasmonic electro-optic phase modulators acting as terahertz detectors, Ileana-Cristina Benea-Chelms, Tianqi Zhu, Francesca Fabiana Settembrini, Christopher Bonzon, Elena Mavrona, Jérôme Faist, Wolfgang Heni, ETH Zurich (Switzerland); Delwin Elder, Univ. of Washington (USA) [10529-22]

SESSION 6 THU 10:30 AM TO 12:20 PM

Solar Cells

Session Chair: **Larry Raymond Dalton**, Univ. of Washington (USA)

What we can have in common from plasmonic and perovskite nanostructures (*Invited Paper*), Dong-Ha Kim, Ewha Womans Univ. (Korea, Republic of) [10529-23]

Two regioisomeric π -conjugated organic materials for optoelectronic device applications, Han Young Woo, Korea Univ. (Korea, Republic of) [10529-24]

Polymer nanofiber-carbon nanotube network generating circuits, Mustafa Umut Mutlu, Ümit Hakan Yıldız, Izmir Institute of Technology (Turkey); Osman Akin, Izmir Katip Celebi Univ. (Turkey) [10529-25]

Side chain modification of d-a-a' donor molecules for vacuum-deposited organic photovoltaics with efficiency over 9%, Xiaozhou Che, Univ. of Michigan (USA); Chin-Lung Chung, Ken-Tsung Wong, National Taiwan Univ. (Taiwan); Stephen R. Forrest, Univ. of Michigan (USA) [10529-26]

Near-infrared organic spectroscopic sensors for food quality sensing, Robert Brückner, Matthias Jahnel, Ronny Timmreck, Karl Leo, Koen Vandewal, TU Dresden (Germany) [10529-27]

Lunch/Exhibition Break Thu 12:20 pm to 1:30 pm

SESSION 7.....THU 1:30 PM TO 3:10 PM

Materials

Session Chair: **Ileana Rau**, Univ. Politehnica of Bucharest (Romania)

Integrated design, additive manufacturing, and mechanoresponsive materials (*Invited Paper*), Andrew J. Boydston, Univ. of Washington (USA).....[10529-28]

3D printing of optical materials: an investigation of the microscopic properties (*Invited Paper*), Luana Persano, Istituto Nanoscienze (Italy); Francesco Cardarelli, Istituto Nanoscienze (Italy); Arinsein Arkadii, Technion-Israel Institute of Technology (Israel); Dario Pisignano, Univ. del Salento (Italy); Eyal Zussman, Technion-Israel Institute of Technology (Israel); Andrea Camposeo, Istituto Nanoscienze (Italy)[10529-29]

3D-printed optical active components, Andreas Heinrich, Hochschule Aalen (Germany).....[10529-30]

Influence of polymer matrix in the luminous efficiency of organic light-emitting electrochemical cells, Zingway Pei, Hong-Yu Shih, Hsiao-San Chang, National Chung Hsing Univ. (Taiwan)[10529-31]

SESSION 8..... THU 3:30 PM TO 4:40 PM

Photo Chemistry

Session Chair: **Andrew J. Boydston**, Univ. of Washington (USA)

Optical humidity sensing based on azobenzene photoswitching (*Invited Paper*), Arri Priimagi, Tampere Univ. of Technology (Finland); Mikko Poutanen, Olli Ikkala, Aalto Univ. (Finland)[10529-32]

Effect of molecular side groups and local nanoenvironment on photodegradation and its reversibility, Oksana Ostroverkhova, Nicole Quist, Mark Li, Oregon State Univ. (USA); Michael M. Haley, Univ. of Oregon (USA)[10529-33]

Discrimination between photoisomerization and molecular reorientation processes in azo dye-doped polymer, Yutaka Kawabe, Kento Okoshi, Chitose Institute of Science and Technology (Japan).....[10529-34]

SESSION 9..... THU 4:40 PM TO 6:00 PM

Biophotonics

Session Chair: **James G. Grote**, Air Force Research Lab. (USA)

Multiscale conformational dynamics probed by time-resolved circular dichroism (*Invited Paper*), Francois Hache, Pascale Changenet-Barret, Marco Schmid, Lab. d'Optique et Biosciences (France)[10529-35]

Biopolymer influence on fluorescent efficiency of luminophores (*Invited Paper*), Ileana Rau, Univ. Politehnica of Bucharest (Romania); Francoios Kajzar D.D.S., Univ. Politehnica of Bucharest (Romania) and Ecole Normale Supérieure de Lyon (France); Cosmina Marin, Ana-Maria Manea, Univ. Politehnica of Bucharest (Romania)[10529-36]

Device physics and biomedical applications of organic bulk heterojunction phototransistors, Ni Zhao, Guodong Zhou, The Chinese Univ. of Hong Kong (Hong Kong, China); Huihua Xu, The Chinese Univ. of Hong Kong (China)[10529-37]



CONFERENCE 10530

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10530

Ultrafast Phenomena and Nanophotonics XXII

Conference Chairs: **Markus Betz**, Technische Univ. Dortmund (Germany); **Abdulahakem Y. Elezzabi**, Univ. of Alberta (Canada)

Program Committee: **Alan D. Bristow**, West Virginia Univ. (USA); **Kazuhiko Hirakawa**, The Univ. of Tokyo (Japan); **Rupert Huber**, Univ. Regensburg (Germany); **Robert A. Kaindl**, Lawrence Berkeley National Lab. (USA); **Dai-Sik Kim**, Seoul National Univ. (Korea, Republic of); **Xiaoqin Li**, The Univ. of Texas at Austin (USA); **Christoph Lienau**, Carl von Ossietzky Univ. Oldenburg (Germany); **Torsten Meier**, Univ. Paderborn (Germany); **Walter Pfeiffer**, Univ. Bielefeld (Germany); **Pascal Ruello**, Univ. du Maine (France); **Volker J. Sorger**, The George Washington Univ. (USA); **Fabrice Vallee**, Univ. Claude Bernard Lyon 1 (France)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600–1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 **MON 10:30 AM TO 12:00 PM**

Nonlinear Optics I

- Session Chair: **Markus Betz**, Technische Univ. Dortmund (Germany)
- Quantum nonlinear optics in one dimension** (*Invited Paper*), Nir Rotenberg, Niels Bohr Institute (Denmark) [10530-1]
- Giant anisotropic nonlinear optical response in Weyl semimetals** (*Invited Paper*), Liang Wu, Univ. of California, Berkeley (USA) [10530-2]
- Optical harmonic generation in nanoscale Si-based waveguide devices**, Curtis J. Firby, Abdulahakem Y. Elezzabi, Univ. of Alberta (Canada) [10530-3]
- Sub-femtosecond sub-pulses formation at THG for femtosecond laser pulse**, Vyacheslav A. Trofimov, Pavel S. Sidorov, M.V. Lomonosov Moscow State Univ. (Russian Federation) [10530-4]
- Lunch Break Mon 12:00 pm to 1:00 pm

SESSION 2 **MON 1:00 PM TO 3:00 PM**

Novel Methods in Ultrafast Spectroscopy

- Session Chair: **Abdulahakem Y. Elezzabi**, Univ. of Alberta (Canada)
- Particle acceleration based on photonics** (*Invited Paper*), Peter Hommelhoff, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) [10530-5]
- Accessing non-repetitive dynamics in complex systems with real-time measurements** (*Invited Paper*), Daniel R. Solli, Univ. of California, Los Angeles (USA) and Univ. of Göttingen (Germany); Georg Herink, Univ. of Bayreuth (Germany) and Georg-August-Univ. Göttingen (Germany) and Univ. of California, Los Angeles (USA); Felix Kurtz, Georg-August-Univ. Göttingen (Germany); Bahram Jalali, Univ. of California, Los Angeles (USA); Claus Ropers, Georg-August-Univ. Göttingen (Germany) [10530-6]
- Single-shot compressed ultrafast photography and its application in laser field measurement** (*Invited Paper*), Chengshuai Yang Jr., Dalong Qi Jr., Fengyan Cao Jr., Shian Zhang, East China Normal Univ. (China); Lihong V. Wang Jr., California Institute of Technology (USA) [10530-7]
- Broadband THz spectroscopy of materials at 10-nm Scale** (*Invited Paper*), Jeremy Levy, Univ. of Pittsburgh (USA) [10530-8]

SESSION 3 **MON 3:30 PM TO 6:00 PM**

Plasmonics

- Session Chair: **Nir Rotenberg**, Niels Bohr Institute (Denmark)
- High-energy electron emission from THz-irradiated nano-tips** (*Invited Paper*), Robert Jones, Univ. of Virginia (USA) [10530-9]
- Optoelectronic metasurfaces** (*Invited Paper*), Pierre Berini, Univ. of Ottawa (Canada) [10530-10]
- Ultrafast dynamics of surface plasmon polaritons** (*Invited Paper*), Frank J. Meyer zu Heringdorf, Univ. Duisburg-Essen (Germany) [10530-11]
- Propagation of surface plasmons along low-dimensional materials** (*Invited Paper*), Ji-Hun Kang, Korea Univ. (Korea, Republic of) [10530-12]
- Using resistive readout to probe ultrafast dynamics of a plasmonic sensor**, Alec Cheney, Borui Chen, Alexander N. Cartwright, Tim Thomay, Univ. at Buffalo (USA) [10530-13]
- Ultrafast surface plasmon driven beaming of secondary electrons from metallic films**, Shawn R. Greig, Abdulahakem Y. Elezzabi, Univ. of Alberta (Canada) [10530-14]

TUESDAY 30 JANUARY

SESSION 4 **TUE 8:15 AM TO 10:00 AM**

Ultrafast Nanophotonics

- Session Chair: **Frank J. Meyer zu Heringdorf**, Univ. Duisburg-Essen (Germany)
- Coherent optical spectroscopy of charged exciton complexes in semiconductor nanostructures** (*Invited Paper*), Ilya Akimov, Technische Univ. Dortmund (Germany) [10530-15]
- Bright single-photon-emitting colloidal plasmonic nanostructures with picosecond lifetimes**, Sébastien Bidault, Institut Langevin (France); Alexis Devilez, Nicolas Bonod, Jérôme Wenger, Institut Fresnel (France) [10530-16]
- Unidirectional light-emission from in-plane tunneling nanoantennas**, Surya Prakash Gurunaryanan, Niels Verellen, IMEC (Belgium) and KU Leuven (Belgium); Vyacheslav S. Zharinov, KU Leuven (Belgium); Finub James Shirley, IMEC (Belgium) and KU Leuven (Belgium); Victor V. Moshchalkov, KU Leuven (Belgium); Marc M. Heyns, IMEC (Belgium) and KU Leuven (Belgium); Joris Van de Vondel, KU Leuven (Belgium); Iuliana P. Radu, IMEC (Belgium); Pol Van Dorpe, IMEC (Belgium) and KU Leuven (Belgium) [10530-17]
- Towards atto-joule and THz modulation in nanophotonics**, Volker J. Sorger, The George Washington Univ. (USA); Jacob B. Khurgin, Johns Hopkins Univ. (USA); Cheol J. Lee, Korea Univ. (Korea, Republic of) [10530-18]
- Spatio-temporal dynamics of excitons in semiconducting nanowires**, Bongsu Kim, Ryan Khan, Alexander Fast, Eric O. Potma, Univ. of California, Irvine (USA) [10530-19]
- Exciton dephasing times and binding energies in methyl ammonium lead iodide perovskite nanoplatelets**, Bernhard J. Bohn, Verena Hintermayr, Thomas Simon, Moritz Gramlich, Alexander Richter, Lakshminarayana Polavarapu, Alexander S. Urban, Jochen Feldmann, Ludwig-Maximilians-Univ. München (Germany) [10530-20]

SESSION 5.....TUE 10:30 AM TO 12:00 PM

Phonon Dynamics

Session Chair: **Ilya Akimov**, Technische Univ. Dortmund (Germany)

Phonons in semiconductor nanowires (*Invited Paper*), Pierre-Adrien Mante, The Hong Kong Polytechnic Univ. (Hong Kong, China)[10530-21]

Coherent phonons dynamics in LaVS₃ compounds (*Invited Paper*), Davide Boschetto, Mariusz Lejman, Jérôme Faure, Geoffrey Gallé, Ecole Nationale Supérieure de Techniques Avancées (France)[10530-22]

Coherent phonon lock-in using diffraction and time-resolved photo-emission (*Invited Paper*), Patrick Kirchmann, SLAC National Accelerator Lab. (USA)[10530-23]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 6.....TUE 1:30 PM TO 3:00 PM

Nonlinear Optics II

Session Chair: **Volker J. Sorger**, The George Washington Univ. (USA)

Frequency domain nonlinear optics (*Invited Paper*), Bruno E. Schmidt, few-cycle Inc. (Canada); Vincent Gruson, Philippe Lassonde, Guilmot Ernotte, Institut National de la Recherche Scientifique (Canada); Matteo Clerici, Univ. of Glasgow (United Kingdom); Mina R. Bionta, Adrien Leblanc, Mohamed Chaker, Roberto Morandotti, Institut National de la Recherche Scientifique (Canada); Louis F. DiMauro, The Ohio State Univ. (USA); Heide Ibrahim, Institut National de la Recherche Scientifique (Canada); Paul B. Corkum, Univ. of Ottawa (Canada); François Légaré, Institut National de la Recherche Scientifique (Canada)[10530-24]

Ultrafast zero-bias photocurrent in GeS nanosheets (*Invited Paper*), Kateryna Kushnir, Worcester Polytechnic Institute (USA); Mengjing Wang, Brown Univ. (USA); Patrick Fitzgerald, Worcester Polytechnic Institute (USA); Kristie J. Koski, Univ. of California, Davis (USA); Lyubov V. Titova, Worcester Polytechnic Institute (USA)[10530-25]

Transient bleaching of two-photon absorption in optically excited semiconductors, Stephan Melzer, Claudia Ruppert, Markus Betz, Technische Univ. Dortmund (Germany)[10530-26]

Nonlinear optical functionalities of VO₂ nanocomposites, Jan Mundry, Thorben Jostmeier, Technische Univ. Dortmund (Germany); Helmut Karl, Hubert J. Krenner, Univ. Augsburg (Germany); Markus Betz, Technische Univ. Dortmund (Germany)[10530-27]

SESSION 7.....TUE 3:30 PM TO 5:45 PM

Ultrafast Carrier Dynamics

Session Chair: **Lyubov V. Titova**, Worcester Polytechnic Institute (USA)

Towards femtoseconds on-chip electronics (*Invited Paper*), Alexander Holleitner, Technische Univ. München (Germany)[10530-28]

Hot-carrier dynamics in type-II semiconductor quantum wells (*Invited Paper*), Alan D. Bristow, Herath P. Piyathilaka, West Virginia Univ. (USA); Hamidreza M. Esmailpour, Vincent R. Whiteside, Michael B. Santos, Ian R. Sellers, The Univ. of Oklahoma (USA)[10530-29]

Ultrafast orbital manipulation and Mott physics in copper oxides (*Invited Paper*), Claudio Giannetti, Francesco Banfi, Simone Peli, Gabriele Ferrini, Andrea Ronchi, Univ. Cattolica del Sacro Cuore (Italy); Stefano Dal Conte, Giulio Cerullo, Politecnico di Milano (Italy); Massimo Capone, Scuola Internazionale Superiore di Studi Avanzati (Italy); Andrea Damascelli, The Univ. of British Columbia (Canada); Federico Cilento, Fulvio Parmigiani, Elettra-Sincrotrone Trieste S.C.p.A. (Italy)[10530-30]

Effective cyclotron mass renormalization in ultrastrong coupling, Giacomo Scalari, Janine Keller, ETH Zurich (Switzerland); Sara Cibella, Roberto Leoni, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Curdin Maissen, Felice Appugliese, Mattias Beck, Jérôme Faist, ETH Zurich (Switzerland)[10530-31]

Femtosecond pump-probe study of GaAs/AlGaAs photocathode structures, Hemang P. Jani, The Univ. of Alabama in Huntsville (USA); Liang Chen, China Jiliang Univ. (China); Lingze Duan, The Univ. of Alabama in Huntsville (USA)[10530-32]

Coordinate-dependent mass and anisotropy effects of photon condensates in engineered mesoscopic cavities, Nina S. Voronova, National Research Nuclear Univ. MEPhI (Russian Federation); Yurii E. Lozovik, Institute of Spectroscopy (Russian Federation)[10530-33]

WEDNESDAY 31 JANUARY

SESSION 8.....WED 8:15 AM TO 10:00 AM

Graphene and Organic Thin Films

Session Chair: **Alexander Holleitner**, Technische Univ. München (Germany)

Landau-Zener-Stückelberg interferometer on attosecond timescales in graphene (*Invited Paper*), Takuya Higuchi, Christian Heide, Konrad Ullmann, Heiko B. Weber, Peter Hommelhoff, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany)[10530-34]

Optical excitations in organic materials: Ultrafast exciton dynamics and their collective response in organic thin films (*Invited Paper*), Benjamin Stadtmueller, Technische Univ. Kaiserslautern (Germany)[10530-35]

Terahertz orientational relaxation and phase relaxation in graphene, Harald Schneider, Jacob C. König-Otto, Helmholtz-Zentrum Dresden-Rossendorf e. V. (Germany); Martin Mittendorff, Univ. of Maryland, College Park (USA); Torben Winzer, Faris Kadi, Technische Univ. Berlin (Germany); Ermin Malic, Chalmers Univ. of Technology (Sweden); Andreas Knorr, Technische Univ. Berlin (Germany); Yongrui Wang, Alexey A. Belyanin, Texas A&M Univ. (USA); Alexej Pashkin, Manfred Helm, Stephan F. Winnerl, Helmholtz-Zentrum Dresden-Rossendorf e. V. (Germany)[10530-36]

Laser-assisted field emission in single-walled carbon nanotubes, Derek A. Bas, Air Force Research Lab. (USA) and Azimuth Corp. (USA); Mark E. Green, The Univ. of North Carolina at Charlotte (USA); Robert J. Headrick, Rice Univ. (USA); Jamie J. Gengler, UES, Inc. (USA); Matteo Pasquali, Junichiro Kono, Rice Univ. (USA); Tsing-Hua Her, The Univ. of North Carolina at Charlotte (USA); Augustine M. Urbas, Air Force Research Lab. (USA)[10530-37]

Ultrafast carrier transport through potential barrier in graphene field-effect transistors, Byung Hee Son, Ajou Univ. (Korea, Republic of); Jung Taek Hong, Ajou Univ. (Korea, Republic of); Yeong Hwan Ahn, Ajou Univ. (Korea, Republic of)[10530-38]

SESSION 9.....WED 10:30 AM TO 12:15 PM

Transition Metal Dichalcogenides

Session Chair: **Alan D. Bristow**, West Virginia Univ. (USA)

Microscopic theory of ultrafast carrier dynamics and exciton ionization in atomically thin transition metal dichalcogenide semiconductors (*Invited Paper*), Alexander Steinhoff, Matthias Florian, Michael Lorke, Christopher Gies, Malte Rösner, Gunnar Schönhoff, Tim O. Wehling, Frank Jahnke, Univ. Bremen (Germany)[10530-39]

Optical spectroscopy of interlayer excitons in TMDC heterostructures: exciton dynamics, interactions, and giant valley-selective magnetic splitting (*Invited Paper*), Tobias Korn, Philipp Nagler, Gerd Plechinger, Fabian Mooshammer, Univ. Regensburg (Germany); Anatolie A. Mitioglu, Mariana V. Ballotin, Radboud Univ. Nijmegen (Netherlands); Sebastian Meier, Nicola Paradiso, Christoph Strunk, Rupert Huber, Alexey Chernikov, Univ. Regensburg (Germany); Peter C. M. Christianen, Radboud Univ. Nijmegen (Netherlands)[10530-40]

Valley-selective photon-dressed states in transition metal dichalcogenides (*Invited Paper*), Nathaniel P. Stern, Northwestern Univ. (USA)[10530-41]

Ultrafast quantum beats of anisotropic excitons in two-dimensional semiconductor ReS₂, Sangwan Sim, Doeon Lee, Taeyoung Kim, Soonyoung Cha, Yonsei Univ. (Korea, Republic of); Ji Ho Sung, Pohang Univ. of Science and Technology (Korea, Republic of); Sungjun Cho, Wooyoung Shim, Yonsei Univ. (Korea, Republic of); Moon-Ho Jo, Pohang Univ. of Science and Technology (Korea, Republic of); Hyunyoung Choi, Yonsei Univ. (Korea, Republic of)[10530-42]

CONFERENCE 10530

Best Student Paper Award Ceremony

WED 12:15 TO 12:25 PM

Join us as we announce the winner of the Best Student Paper Award. We will award one or two presentations with a Best Student Paper Award. All contributed papers from this conference given by a young scientist (PhD student or postdoc within the first two years after graduation) are eligible for the award. Note that this award is for contributed papers only. Invited papers and contributions to other symposia do not qualify.

See the OPTO awards on page 248 for eligibility and application requirements.

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

The influences of surface plasmons and thermal effects on femtosecond laser-induced subwavelength periodic ripples on Au film by pump-probe imaging, Tianqing Jia, East China Normal Univ. (China) [10530-43]

Subwavelength imaging and control of ultrafast optical near-field in nanosized bowtie and ring, Jingquan Lin, Changchun Univ. of Science and Technology (China) [10530-44]

Bloch surface wave polariton propagation on a one-dimensional photonic crystal, Christian Mananquil Laurio, Hiroyuki Katsuki, Hisao Yanagi, Nara Institute of Science and Technology (Japan) [10530-45]

Terahertz time-domain spectroscopy with twenty-nanometer spatial resolution, Max Eisele, neaspec GmbH (Germany) [10530-46]

Sensing low-density virus using THz split-ring resonators with nanogaps, SaeJune Park, Gwy-Am Shin, Yeong Hwan Ahn, Ajou Univ. (Korea, Republic of) [10530-47]

100 micron spot size, 10 micron hole, Dawson T. Nodurft, Christopher B. Marble, Sean P. O'Connor, Vladislav V. Yakovlev, Texas A&M Univ. (USA) [10530-48]

CONFERENCE 10531

Monday–Thursday 29 January–1 February 2018 • Proceedings of SPIE Vol. 10531

Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XI

Conference Chairs: **Laurence P. Sadwick**, InnoSys, Inc. (USA); **Tianxin Yang**, Tianjin Univ. (China)

Program Committee: **René Beigang**, Technische Univ. Kaiserslautern (Germany); **Jianji Dong**, Huazhong Univ. of Science and Technology (China); **Frank Ellrich**, Univ. of Applied Sciences Bingen (Germany); **Fabian Friederich**, Fraunhofer-Institut für Physikalische Messtechnik (Germany); **Robert H. Giles**, Univ. of Massachusetts Lowell (USA); **R. Jennifer Hwu**, InnoSys, Inc. (USA); **J. Anthony Murphy**, National Univ. of Ireland, Maynooth (Ireland); **Créidhe O’Sullivan**, National Univ. of Ireland, Maynooth (Ireland); **Kyung Hyun Park**, Electronics and Telecommunications Research Institute (Korea, Republic of); **Alessia Portieri**, TeraView Ltd. (United Kingdom); **Jinghua Teng**, A*STAR Institute of Materials Research and Engineering (Singapore); **Michael Weibel**, Joint Research and Development, Inc. (USA); **Jiangfeng Zhou**, Univ. of South Florida (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:20 AM TO 12:30 PM

Terahertz Sources

Session Chairs: **Laurence P. Sadwick**, InnoSys, Inc. (USA); **René Beigang**, Technische Univ. Kaiserslautern (Germany)

Terahertz radiation sources based on nano-antennas and plasmonic light concentrators (*Invited Paper*), Mona Jarrahi, Univ. of California, Los Angeles (USA) [10531-1]

Ultra-wide terahertz generation from sub-wavelength lithium niobate waveguides, Brett N. Carnio, Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) [10531-2]

Development of THz quantum cascade lasers and hot electron bolometers for ultra-sensitive and ultra-compact heterodyne detection in astronomy applications, Francois Joint, Ctr. de Nanosciences et de Nanotechnologies (France); Edmund H. Linfield, Lianhe H. Li, Univ. of Leeds (United Kingdom); Pierre-Baptiste Vigneron, Ctr. de Nanosciences et de Nanotechnologies (France); Thibaut Vacelet, Gregory Gay, Yan Delorme, Observatoire de Paris (France); Raffaele Colombelli, Ctr. de Nanosciences et de Nanotechnologies (France) [10531-3]

Spintronic terahertz emitters based on epitaxial-grown Fe/Pt Bilayers, René Beigang, Technische Univ. Kaiserslautern (Germany); Garik Torosyan, Photonik-Zentrum Kaiserslautern e.V. (Germany); Sascha Keller, Laura Scheuer, Evangelos T. Papaioannou, Technische Univ. Kaiserslautern (Germany) [10531-4]

High-power pulsed terahertz radiation from terahertz nanoantenna arrays based on plasmonic nanocavities, Nezih Tolga Yardimci, Semih Cakmakyan, Soroosh Hemmati, Mona Jarrahi, Univ. of California, Los Angeles (USA) [10531-5]

High-repetition-rate tunable narrowband terahertz-wave generation based on nonlinear frequency-conversion pumped by dual fiber lasers in MgO: LiNbO₃, Yoshio Wada, Takumi Satoh, Yasuhiro Higashi, Ricoh Co., Ltd. (Japan); Yoshiharu Kei Urata, PHLUXi, Inc. (Japan) [10531-6]

Lunch Break Mon 12:30 pm to 2:00 pm

SESSION 2 MON 2:00 PM TO 3:30 PM

Terahertz Detection and Sensing

Session Chairs: **Tianxin Yang**, Tianjin Univ. (China); **Laurence P. Sadwick**, InnoSys, Inc. (USA)

Subterahertz and terahertz sensing of biological objects and chemical agents (*Invited Paper*), Michael S. Shur, Rensselaer Polytechnic Institute (USA) [10531-7]

THz source-detector system embedded in BCB and coupled through patch array antenna, Lorenzo Bosco, Tudor Olariu, Keita Ohtani, Giacomo Scalfari, Mattias Beck, ETH Zurich (Switzerland); Matthias Justen, Univ. zu Köln (Germany); Jérôme Faist, ETH Zurich (Switzerland) [10531-8]

An efficient terahertz detector based on an optical hybrid cavity, Tom Siday, Robert J. Thompson, Samuel Glass, Univ. College London (United Kingdom); Ting-Shan Luk, John L. Reno, Igal Brener, Sandia National Labs. (USA); Oleg Mitrofanov, Univ. College London (United Kingdom) and Sandia National Labs. (USA) [10531-9]

Enhanced performance of antenna-integrated Schottky barrier diodes for wave and photonic detection in the THz regime, Rozana Hussin, Carnegie Mellon Univ. (USA) [10531-10]

SESSION 3 MON 4:00 PM TO 6:00 PM

Terahertz Spectroscopy I

Session Chairs: **Laurence P. Sadwick**, InnoSys, Inc. (USA); **Robert H. Giles**, Univ. of Massachusetts Lowell (USA)

Terahertz spectroscopy and demonstration of visible-transparent/terahertz-functional electromagnetic structures in La-doped BaSnO₃ films, Sara Arezomandan, The Univ. of Utah (USA); Abhinav Prakash, Bharat Jalan, Univ. of Minnesota (USA); Berardi Sensale-Rodriguez, The Univ. of Utah (USA) [10531-11]

Recent progress of continuous-wave terahertz systems for spectroscopy, non-destructive testing, and telecommunication, Björn Globisch, Simon Nellen, Robert B. Kohlhaas, Lars Liebermeister, Martin Schell, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) [10531-12]

Non-destructive evaluation of GFRP-wood sandwich structure composite using terahertz imaging, Harikrishnan Kaimal, Indian Institute of Technology Madras (India); Nirmala Devi, Shaumik Ray, Jyotirmayee Dash, Bala Pesala, CSIR Madras Complex (India) and Academy of Scientific and Innovative Research (AcSIR) (India) [10531-13]

OPTO

CONFERENCE 10531

Near-field THz nanoscopy at novel accelerator-based photon sources, Lukas M. Eng, Frederik Kuschewski, Jonathan Döring, Lukas Wehmeier, Thales de Oliveira, Hans-Georg von Ribbeck, TU Dresden (Germany); Denny Lang, Bertram Green, Sergey Kovalev, Nilesh Awari, Stephan Winnerl, Manfred Helm, Michael Gensch, Helmholtz-Zentrum Dresden-Rossendorf e. V. (Germany); Susanne C. Kehr, TU Dresden (Germany) [10531-14]

Next-generation thermal imagers for room-temperature far-infrared detection, Giacomo Mariani, Matthew Kenyon, Sabah Bux, Jet Propulsion Lab. (USA) [10531-15]

Optical modelling and analysis of the Q and U bolometric interferometer for cosmology, David Burke, National Univ. of Ireland, Maynooth (Ireland) [10531-16]

TUESDAY 30 JANUARY

SESSION 4 **TUE 8:00 AM TO 10:10 AM**

Optical to Terahertz and Related Approaches and Concepts

Session Chairs: **Tianxin Yang**, Tianjin Univ. (China); **Laurence P. Sadwick**, InnoSys, Inc. (USA)

Plasmonic nanowire optical to terahertz converter operating at telecommunication wavelengths (*Invited Paper*), Diana L. Huffaker, Univ. of California, Los Angeles (USA) and California NanoSystems Institute (USA) and Cardiff Univ. (United Kingdom); Mona Jarrahi, Univ. of California, Los Angeles (USA) [10531-17]

Probing the mobility and scattering rate of topological surface state in Bi₂Se₃ thin films using terahertz spectroscopy and magnetotransport, Varun S. Kamboj, Angadit Singh, Univ. of Cambridge (United Kingdom); Thierry Ferrus, Hitachi Cambridge Lab. (United Kingdom); Harvey E. Beere, Univ. of Cambridge (United Kingdom); Liam B. Duffy, Thorsten Hesjedal, Univ. of Oxford (United Kingdom); Crispin H. W. Barnes, David A. Ritchie, Univ. of Cambridge (United Kingdom) [10531-18]

Polarization-insensitive plasmonic photoconductive terahertz emitters, Xurong Li, Mona Jarrahi, Univ. of California, Los Angeles (USA) [10531-19]

A UAV-mounted THz spectrometer for real-time gas analysis, Joseph R. Demers, Bakman Technologies (USA); Jean-Louis Coutaz, Frédéric Garet, IMEP-LAHC, Univ. Savoie Mont Blanc (France) [10531-20]

Guided terahertz pulsed reflectometry: a remote probe for near-field imaging, Mingming Pan, Frédéric Fauquet, Dean Lewis, Frédéric Darracq, Patrick Mounaix, Jean-Paul Guillet, Univ. de Bordeaux (France) [10531-21]

High-resolution skin imaging for terahertz fingerprint biometrics, Panagiotis Theofanopoulos, Peng Zheng, Georgios Trichopoulos, Arizona State Univ. (USA) [10531-22]

SESSION 5 **TUE 10:40 AM TO 12:00 PM**

Thickness Measurements using Terahertz Technologies

Session Chairs: **Frank Ellrich**, Technischen Hochschule Bingen (Germany); **Fabian Friederich**, Fraunhofer-Institut für Physikalische Messtechnik (Germany)

Terahertz thickness determination for industrial applications: challenges and solutions (*Invited Paper*), Frank Ellrich, Technischen Hochschule Bingen (Germany); Jens Klier, Fraunhofer-Institut für Techno- und Wirtschaftsmathematik (Germany); Stefan Weber, Fraunhofer-Institut für Techno- und Wirtschaftsmathematik (Germany) and Technische Univ. Kaiserslautern (Germany); Daniel Molter, Joachim Jonuscheit, Fraunhofer-Institut für Techno- und Wirtschaftsmathematik (Germany); Georg von Freymann, Technische Univ. Kaiserslautern (Germany) and Fraunhofer-Institut für Techno- und Wirtschaftsmathematik (Germany) [10531-23]

Terahertz time-domain spectroscopy for non-destructive testing (*Invited Paper*), Björn Globisch, Simon Nellen, Robert B. Kohlhaas, Lars Liebermeister, Martin Schell, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) [10531-24]

Multilayer thickness inspection with millimeter-waves, Nina Schreiner, Fraunhofer ITWM (Germany); Wolfgang Sauer-Greif, Ralph Urbansky, TU Kaiserslautern (Germany); Fabian Friederich, Fraunhofer ITWM (Germany) [10531-25]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 6 **TUE 1:30 PM TO 3:20 PM**

Terahertz Imaging and Volume Inspection

Session Chairs: **Fabian Friederich**, Fraunhofer-Institut für Physikalische Messtechnik (Germany); **Frank Ellrich**, Technischen Hochschule Bingen (Germany)

3D-additive manufacturing non-destructive characterization with terahertz waves (*Invited Paper*), Jean-Paul Guillet, Univ. Bordeaux 1 (France) and IMS Lab. UMR CNRS 5218 (France); Anne-Françoise Obaton, Lab. National de Métrologie et d'Essais (France) and Lab. commun de Métrologie (France); Jean Baptiste Perraud, Hugo Balacey, Univ. Bordeaux 1 (France); Benoit Recur, Noctylio S.A.S (France); Patrick Mounaix, Univ. Bordeaux 1 (France) [10531-26]

Millimeter-wave imaging solutions for non-destructive testing (*Invited Paper*), Fabian Friederich, Fraunhofer ITWM (Germany) [10531-27]

Multispectral terahertz imaging in CMOS technology (*Invited Paper*), Richard Al Hadi, Yan Zhao, Yuan Du, Michael K. Lo, Univ. of California, Los Angeles (USA); Xuanhong Cheng, James C. M. Hwang, Lehigh Univ. (USA); Frank M.-C. Chang, Univ. of California, Los Angeles (USA) [10531-28]

Towards industrial applications of terahertz real-time imaging, François Simoons, Laurent Dussopt, Jérôme Meilhan, Jean-Alain Nicolas, Nicolas Monnier, Alexandre Siligaris, Bruno Hiberty, CEA-LETI (France); Jean-Baptiste Perraud, Patrick Mounaix, Univ. Bordeaux 1 (France); Jérémy Lalanne-Dera, CEA Tech (France); Olivier Redon, CEA Tech (France) [10531-29]

SESSION 7 **TUE 3:50 PM TO 5:50 PM**

Radio Frequency to Terahertz

Session Chairs: **Laurence P. Sadwick**, InnoSys, Inc. (USA); **Robert H. Giles**, Univ. of Massachusetts Lowell (USA)

Terahertz response of graphene is governed by basic thermodynamics (*Invited Paper*), Dmitry Turchinovich, Max-Planck-Institut für Polymerforschung (Germany) [10531-30]

Accurate measurement and generation of linearly-chirped optical waves over broad frequency ranges, Tianxin Yang, Zhaoyu Lu, Cheng Guo, Haihao Dong, Peng Li, Chunfeng Ge, Tianjin Univ. (China) [10531-31]

Chip-scale microresonator Turing pattern formation for coherent high-power THz radiation (*Invited Paper*), Shu-Wei Huang, Jinghui Yang, Shang Hua Yang, Hao Liu, Mona Jarrahi, Chee Wei Wong, Univ. of California, Los Angeles (USA) [10531-32]

Generation of optical Nyquist pulses with pre-programmed rectangular-shape spectrum, Tianxin Yang, Cheng Guo, Zhaoyu Lu, Chunfeng Ge, Tianjin Univ. (China) [10531-33]

WEDNESDAY 31 JANUARY

SESSION 8 **WED 8:00 AM TO 10:20 AM**

Detectors

Session Chairs: **J. Anthony Murphy**, National Univ. of Ireland, Maynooth (Ireland); **Kyung Hyun Park**, Electronics and Telecommunications Research Institute (Korea, Republic of)

Nano-absorbers on InP multiplication region: a platform for mid-wavelength infrared separate absorption and multiplication avalanche photodiodes (*Invited Paper*), Dingkun Ren, Alan C. Farrell, Univ. of California, Los Angeles (USA); Xiao Meng, Cardiff Univ. (United Kingdom); Diana L. Huffaker, Univ. of California, Los Angeles (USA) and California NanoSystems Institute (USA) and Cardiff Univ. (United Kingdom) [10531-34]

Measuring electric fields with nitrogen-vacancy ensembles for neutron electric dipole moment experiments (*Invited Paper*), David C. Hovde, Southwest Sciences, Inc. (USA); Sarvagya Sharma, Douglas H. Beck, Univ. of Illinois (USA) [10531-35]

Integrated silicon-organic hybrid electromagnetic wave sensor, Xiaochuan Xu, Omega Optics, Inc. (USA); Chi-Jui Chung, Zeyu Pan, Rui Wang, Ray T. Chen, The Univ. of Texas at Austin (USA) [10531-36]

MEMS THz sensors using metasurface structures, Fabio Alves, Dragoslav Grbovic, Gamani Karunasiri, Naval Postgraduate School (USA) [10531-37]

Tunable terahertz filter using PDLC fishnet metamaterial, Wei-Chih Wang, Univ. of Washington (USA) [10531-38]

Investigation of antenna coupled Nb₅N₆ microbolometer THz detector with a substrate F-P resonant cavity, Lin Kang, Xuecou Tu, Peng Xiao, Chengtao Jiang, Jian Chen, Peiheng Wu, Xiaoqing Jia, Nanjing Univ. (China) [10531-39]

SESSION 9..... WED 10:50 AM TO 12:10 PM

Radio Frequency to 300 GHz

Session Chairs: **Laurence P. Sadwick**, InnoSys, Inc. (USA);
R. Jennifer Hwu, InnoSys, Inc. (USA)

Development of 4x4 phased array antenna on chip for 300GHz band application, Haruichi Kanaya, Kota Tsugami, Goki Sakano, Guan Chai Eu, Kazutoshi Kato, Kyushu Univ. (Japan) [10531-40]

High-power generation in UTC-PD at 110-210 GHz, Toshimasa Umezawa, Atsushi Kanno, Kouichi Akahane, Atsushi Matsumoto, Naokatsu Yamamoto, National Institute of Information and Communications Technology (Japan); Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan) and Waseda Univ. (Japan) [10531-41]

SBD detector-based THz receiver module operating at 220-320GHz, Jeong-Woo Park, Dong Woo Park, Eui-Su Lee, Kyung Hyun Park, Electronics and Telecommunications Research Institute (Korea, Republic of) . . [10531-42]

Generating simultaneous multi-band RF signals using single-mode Fabry-Perot laser diode, Bikash Nakarmi, Chen Hao, Shilong Pan, Nanjing Univ. of Aeronautics and Astronautics (China) [10531-43]

Lunch/Exhibition Break Wed 12:10 pm to 1:40 pm

SESSION 10..... WED 1:40 PM TO 3:20 PM

Wideband Communications

Session Chairs: **Laurence P. Sadwick**, InnoSys, Inc. (USA);
Frank Ellrich, Technischen Hochschule Bingen (Germany)

Low-loss silicon nitride integrated optical beamforming network for wideband communication, Yuan Liu, Brandon Isaac, Univ. of California, Santa Barbara (USA); Jean Kalkavage, Eric J. Adles, Thomas R. Clark Jr., Johns Hopkins Univ. Applied Physics Lab., LLC (USA); Jonathan Klamkin, Univ. of California, Santa Barbara (USA) [10531-44]

Terahertz wireless communication using 1.3µm photonic-based modules, Hyun-Soo Kim, Eui Su Lee, Il-Min Lee, Dong Woo Park, Dong Hun Lee, Jeong-Woo Park, Kiwon Moon, Kyung Hyun Park, Electronics and Telecommunications Research Institute (Korea, Republic of) . . [10531-45]

Compact optical coherent receiver for avionics applications, Simon Ayotte, Pascal Deladurantaye, Michel Morin, Ghislain Bilodeau, Louis-Philippe Perron, François Costin, André Babin, Guillaume Brochu, Jocelyn Blanchet-Létourneau, Charles-André Davidson, Dominique D'amato, Émile Girard-Deschênes, Philippe Chrétien, Mathieu Laplante, TeraXion Inc. (Canada) [10531-46]

Novel architectures of optoelectronic oscillators, Yanne K. K. Chembo, FEMTO-ST (France) [10531-47]

Multicomponent- multilayer hybrid plasmonic leaky-wave optical antenna with improved directivity and matching, Zahra Manzoor, Missouri Univ. of Science and Technology (USA) [10531-48]

SESSION 11..... WED 3:50 PM TO 5:20 PM

Terahertz Spectroscopy II

Session Chairs: **Jiangfeng Zhou**, Univ. of South Florida (USA);
Laurence P. Sadwick, InnoSys, Inc. (USA)

Metamaterial absorber for THz polarimetric sensing (Invited Paper), Bingnan Wang, Rui Ma, Koon Hoo Teo, Pu Wang, Phil Orlik, Mitsubishi Electric Research Labs. (USA); Wataru Tsujita, Kota Sadamoto, Yoshitsugu Sawa, Advanced Technology R&D Ctr., Mitsubishi Electric Corp. (Japan) . . [10531-49]

Towards swept source spectroscopy using THz emission from 2nd-order nonlinear optical effects in GaAs/AlGaAs multi-quantum well excitons at room temperature, Avan N. Majeed, The Univ. of Sheffield (United Kingdom); Pavlo Ivanov, Univ. of Glasgow (United Kingdom); Ed Clarke, EPSRC - National Ctr. of III-V Technologies (United Kingdom); David T. D. Childs D.D.S., Univ. of Glasgow (United Kingdom); Osamu Kojima, Kobe Univ. (Japan); Richard A. Hogg, Univ. of Glasgow (United Kingdom) [10531-51]

Compact and portable terahertz imaging system using single-mode Fabry-Perot laser diode photomixer, Wonjong Ryu, Muyoung Lee, Yong Hyub Won, KAIST (Korea, Republic of) [10531-52]

Understanding the effect of nanosilica incorporation on dicalcium silicate hydration using terahertz spectroscopy, Bala Pesala, Shaumik Ray, Jyotirmayee Dash, Nirmala Devi, CSIR - Central Electronics Engineering Research Institute (India) and Academy of Scientific and Innovative Research (AcSIR) (India); Saptarshi Sasmal, CSIR - Structural Engineering Research Ctr. (India) and Academy of Scientific and Innovative Research (AcSIR) (India) [10531-53]

WEDNESDAY POSTER SESSION..... WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Effect of thin-film interference on resonance spectra of distorted metamaterials, [10531-56]

Terahertz spectroscopy using an injection-seeded terahertz parametric generator for quantitative analysis and inspection of over-the-counter medicine tablets, Mizuki Mohara, Kei Shimura, Kenji Aiko, Hitachi High-Tech Science Corp. (Japan); Kodo Kawase, Nagoya Univ. (Japan) [10531-57]

Terahertz frequency modulated continuous wave imaging for non-destructive evaluation of painting and multilayer parts, Xue Ma, Univ. de Bordeaux (France); Kejia Wang, Wuhan National Lab. for Optoelectronics (China); Frédéric Fauquet, Corinna Ludovica Koch Dandolo, Patrick Mounaix, Jean-Paul Guillet, Univ. de Bordeaux (France) [10531-76]

The fabrication and application of ultrasensitive Nb₅N₆ microbolometer detector for 0.3 THz detection, Lin Kang, Chengtao Jiang, Xuecou Tu, Peng Xiao, Shimin Zhai, Xiaoqing Jia, Jian Chen, Peiheng Wu, Nanjing Univ. (China) [10531-77]

THURSDAY 1 FEBRUARY

SESSION 12..... THU 8:00 AM TO 9:50 AM

Terahertz Materials I

Session Chairs: **Fabian Friederich**,
Fraunhofer-Institut für Physikalische Messtechnik (Germany);
René Beigang, Technische Univ. Kaiserslautern (Germany)

Strong terahertz plasmonic resonances in thin-film cadmium arsenide: a 3D topological Dirac semimetal (Invited Paper), Ashish Chanana, Joshua Winger, Prashanth Gopalan, Neda Lotfizadeh, Vikram Deshpande, Mike A. Scarpulla, Ajay Nahata, Berardi Sensale-Rodriguez, The Univ. of Utah (USA) [10531-54]

One-dimensional photonic-crystal waveguide-based true time delay line, Chi-Jui Chung, The Univ. of Texas at Austin (USA); Xiaochuan Xu, Omega Optics, Inc. (USA); Gencheng Wang, Zhejiang Univ. (China); Zeyu Pan, The Univ. of Texas at Austin (USA); Ray T. Chen, The Univ. of Texas at Austin (USA) and Omega Optics, Inc. (USA) [10531-55]

Fabrication of electro-optic polymer waveguide devices with terahertz-wave low-loss materials, Takahiro Kaji, Yukihiko Tominari, Toshiki Yamada, Shingo Saito, Isao Morohashi, Isao Aoki, Akira Otomo, National Institute of Information and Communications Technology (Japan) [10531-57]

Numerical study of Resonance modes in terahertz metamaterials for thin film sensing perspective, S. Jagan Mohan Rao, Maidul Islam, Gagan Kumar, Indian Institute of Technology Guwahati (India); Bishnu P. Pal, Dibakar Roy Chowdhury, Mahindra École Centrale (India) [10531-58]

Terahertz-frequency dielectric anisotropy in three-dimensional methacrylates fabricated by stereolithography, Yanzen Li, Daniel B. Fullager, Edison Angelbello, Madison McKinnon, The Univ. of North Carolina at Charlotte (USA); Stefan Schöche, Craig M. Herzinger, J.A. Woollam Co., Inc. (USA); Susanne M. Lee, Erin Sharma, Harris Corp. (USA); Tino Hofmann, The Univ. of North Carolina at Charlotte (USA) [10531-59]

CONFERENCE 10531

SESSION 13 THU 10:20 AM TO 12:10 PM

Terahertz Materials II

Session Chairs: **R. Jennifer Hwu**, InnoSys, Inc. (USA);
Laurence P. Sadwick, InnoSys, Inc. (USA)

Terahertz quantum metamaterials (*Invited Paper*), Richard D. Averitt, Univ. of California, San Diego (USA) [10531-60]

Tuning near-field capacitive coupling in planar terahertz metamaterials, S. Jagan Mohan Rao, Gagan Kumar, Indian Institute of Technology Guwahati (India); Dibakar Roy Chowdhury, Mahindra École Centrale (India) ... [10531-61]

Energy-harvesting metamaterial-based wireless chemical sensor system, Wonwoo Lee, Yonghee Jung, Hyunseung Jung, Hojin Lee, Soongsil Univ. (Korea, Republic of) [10531-62]

Birefringent and optical rectification characteristics of a chalcopyrite CdSiP₂ crystal at terahertz frequencies, Brett N. Carnio, Univ. of Alberta (Canada); Peter G. Schunemann, Kevin T. Zawilski, BAE Systems (USA); Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) [10531-63]

Electrically controllable THz high-Q metamaterials based on vanadium dioxide thin film, Han-Cheol Ryu, Sahmyook Univ. (Korea, Republic of); Dae-Jun Park, Sahmyook Univ. (Korea, Republic of); Kyung Hyun Park, Electronics and Telecommunications Research Institute (Korea, Republic of) [10531-64]

Lunch/Exhibition Break Thu 12:10 pm to 1:30 pm

SESSION 14 THU 1:30 PM TO 3:10 PM

Materials, Detection, and Related Topics

Session Chairs: **Kyung Hyun Park**,
Electronics and Telecommunications Research Institute (Korea,
Republic of); **Tianxin Yang**, Tianjin Univ. (China)

Characterization of Si-MOSFET CMOS devices for detection at 170 to 250 GHz, Katherine E. Seery, Zoran Ninkov, Jack Horowitz, Rochester Institute of Technology (USA); Daniel Newman, Kenneth D. Fourspring, Andrew P. Sacco, Harris Corp. (USA); Paul P. K. Lee, Zeljko Ignjatovic, Moeen Hassanali, Judith L. Pipher, Craig W. McMurtry, Univ. of Rochester (USA) [10531-65]

Effects of polyimide layer under electrical contact pads on the response bandwidth of UTC-PD, Siwei Sun, Song Liang, Hongliang Zhu, Institute of Semiconductors, Chinese Academy of Sciences (China) [10531-66]

Ultra-high terahertz index in deep subwavelength coupled bi-layer free-standing flexible metamaterials, Leena Singh, Oklahoma State Univ. (USA) [10531-67]

Numerical studies of the plasma wave instability in gated two-dimensional electron channels, Mona Nafari, Univ. at Buffalo (USA); Gregory R. Aizin, Kingsborough Community College (USA); Josep Miquel Jornet, Univ. at Buffalo (USA) [10531-68]

Broadband terahertz wave plates based on cross polarization metasurfaces, Muhammad Tayyab Nouman, Ji Hyun Hwang, Jae-Hyung Jang, Gwangju Institute of Science and Technology (Korea, Republic of) [10531-69]

SESSION 15 THU 3:40 PM TO 5:40 PM

Radio Frequency Advances

Session Chairs: **Laurence P. Sadwick**, InnoSys, Inc. (USA);
R. Jennifer Hwu, InnoSys, Inc. (USA)

Experimental investigations for designing low-phase noise 10-GHz coupled optoelectronic oscillator, Oriane Lelièvre, Vincent Crozatier, Ghaya Baili, Pascale Nouchi, Daniel Dolfi, Thales Research & Technology (France); Fabienne Goldfarb, Fabien Bretenaker, Lab. Aimé Cotton (France); Olivier Llopis, Lab. d'Analyse et d'Architecture des Systèmes (France) ... [10531-70]

Silicon-photonics-assisted on-chip RF signal processing, Vadiyukkarasi Jeyaselvan, Shankar Kumar Selvaraja, Indian Institute of Science (India) [10531-71]

Photonic generation of a dual nonlinear chirp microwave waveform in Ku-band and its comparative study with dual linear chirping capability to distinguish rang-Doppler coupling in radar application, Ritesh Kumar, Manish Kumar, Sanjeev K. Raghuvanshi, Indian Institute of Technology (Indian School of Mines), Dhanbad (India) [10531-72]

Continuous-wave microwave-to-optical nonlinear up-converter with high photon conversion efficiency and low noise at room temperature, Gabriel Santamaria Botello, Kerlos Atia Abdalmalak, Daniel Segovia-Vargas, Luis Enrique Garcia Muñoz, Univ. Carlos III de Madrid (Spain) [10531-73]

Generation and stabilization of optoelectronic oscillation millimeter-wave signal employing frequency sextupling technique and phase-locked loop, Jingliang Liu, Anny Liu, Tian Zhang Sr., Jian Dai Sr., Kun Xu Sr., Beijing Univ. of Posts and Telecommunications (China) [10531-74]

CONFERENCE 10532

Monday–Thursday 29–1 February 2018 • Proceedings of SPIE Vol. 10532

Gallium Nitride Materials and Devices XIII

Conference Chairs: **Jen-Inn Chyi**, National Central Univ. (Taiwan); **Hiroshi Fujioka**, The Univ. of Tokyo (Japan); **Hadis Morkoç**, Virginia Commonwealth Univ. (USA)

Conference Co-Chairs: **Motoaki Iwaya**, Meijo Univ. (Japan); **Ulrich T. Schwarz**, Technische Univ. Chemnitz (Germany); **Jong-In Shim**, Hanyang Univ. (Korea, Republic of)

Program Committee: **Frank Bertram**, Otto-von-Guericke-Univ. Magdeburg (Germany); **Michal Bockowski**, Institute of High Pressure Physics (Poland); **Mitch M. C. Chou**, National Sun Yat-Sen Univ. (Taiwan); **Martin Feneberg**, Otto-von-Guericke-Univ. Magdeburg (Germany); **Mitsuru Funato**, Kyoto Univ. (Japan); **Bernard Gil**, Univ. Montpellier 2 (France); **Nicolas Grandjean**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jung Han**, Yale Univ. (USA); **Hideki Hirayama**, RIKEN (Japan); **Ray-Hua Horng**, National Chung Hsing Univ. (Taiwan); **Chih-Fang Huang**, National Tsing Hua Univ. (Taiwan); **Michael Kneissl**, Technische Univ. Berlin (Germany); **Elison Matioli**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Koh Matsumoto**, Taiyo Nippon Sanso Corp. (Japan); **Hideto Miyake**, Mie Univ. (Japan); **Yong-Tae Moon**, LG Electronics Inc. (Korea, Republic of); **Yasushi Nanishi**, Ritsumeikan Univ. (Japan); **Ümit Özgür**, Virginia Commonwealth Univ. (USA); **Piotr Perlin**, Institute of High Pressure Physics (Poland); **Fan Ren**, Univ. of Florida (USA); **Tae-Yeon Seong**, Korea Univ. (Korea, Republic of); **Bo Shen**, Peking Univ. (China); **Akio Wakejima**, Nagoya Institute of Technology (Japan); **Chih-Chung Yang**, National Taiwan Univ. (Taiwan); **Euijoon Yoon**, Seoul National Univ. (Korea, Republic of)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:15 PM

Growth I

Session Chair: **Hadis Morkoç**, Virginia Commonwealth Univ. (USA)

High-temperature annealing of AlN on sapphire using face-to-face method (*Invited Paper*), **Hideto Miyake**, Yusuke Hayashi, Shi-yu Xiao, Kazumasa Hiramatsu, Mie Univ. (Japan) [10532-1]

Direct wafer bonding of GaN-Si at room-temperature by the surface-activated bonding (SAB) method (*Invited Paper*), **Tadatomo Suga**, Fengwen Mu, The Univ. of Tokyo (Japan) [10532-2]

Characteristics of AlN layer on four-inch sapphire substrate by high-temperature annealing in nitrogen atmosphere, **Koh Matsumoto**, Akira Mishima, Yuji Tomita, Yoshiki Yano, Taiyo Nippon Sanso Corp. (Japan); **Hideto Miyake**, Mie Univ. (Japan) [10532-3]

Crystallization of HVPE-GaN:Mn with metallic Mn as dopant source, **Michal Bockowski**, **Malgorzata Iwinska**, **Tomasz Sochacki**, **Mikolaj Amilusik**, **Michal Fijalkowski**, **Boleslaw Lucznik**, Institute of High Pressure Physics (Poland) [10532-4]

Crystallization of AlGaN by HVPE method, **Michal Bockowski**, **Malgorzata Iwinska**, **Tomasz Sochacki**, **Mikolaj Amilusik**, **Michal Fijalkowski**, **Boleslaw Lucznik**, Institute of High Pressure Physics (Poland) [10532-5]

Lunch Break Mon 12:15 pm to 1:30 pm

SESSION 2 MON 1:30 PM TO 3:30 PM

Growth II

Session Chair: **Michal Bockowski**, Institute of High Pressure Physics (Poland)

Theory of GaN MOVPE process considering surface reconstruction (*Invited Paper*), **Yoshihiro Kangawa**, Kyushu Univ. (Japan) and Nagoya Univ. (Japan); **Pawel Kempisty**, Nagoya Univ. (Japan) and Institute of High Pressure Physics, Polish Academy of Sciences (Poland); **Kenji Shiraishi**, Nagoya Univ. (Japan); **Koichi Kakimoto**, Kyushu Univ. (Japan) [10532-6]

Recent progress in nitride light-emitters grown on patterned Si substrates (*Invited Paper*), **Vitaliy Avrutin**, **Kai Ding**, **Natalia Izyumskaya**, **Morteza Monavarian**, **Ümit Özgür**, **Hadis Morkoç**, Virginia Commonwealth Univ. (USA) [10532-7]

Methods for point defect reduction in AlGaN (*Invited Paper*), **Ramon Collazo**, North Carolina State Univ. (USA); **Pramod Reddy**, North Carolina State Univ. (USA) and Adroit Materials, Inc. (USA); **Shun Washiyama**, **Felix Kaess**, North Carolina State Univ. (USA); **Ronny Kirste**, North Carolina State Univ. (USA) and Adroit Materials, Inc. (USA); **Seiji Mita**, North Carolina State Univ. (USA) and Adroit Materials, Inc. (USA); **James Tweedie**, North Carolina State Univ. (USA) and Adroit Materials, Inc. (USA); **Zlatko Sitar**, North Carolina State Univ. (USA) [10532-8]

Pulse-MOCVD growth of InN/AlGaN delta-layer active region for long wavelength emitters, **Ioannis Fragkos**, **Wei Sun**, **Renbo Song**, **Nelson Tansu**, Lehigh Univ. (USA) [10532-9]

Characteristics of n-type GaN prepared by PSD, **Kohei Ueno**, **Atsushi Kobayashi**, **Jitsuo Ohta**, **Hiroshi Fujioka**, The Univ. of Tokyo (Japan) [10532-10]

SESSION 3 MON 4:00 PM TO 5:45 PM

Growth III

Session Chair: **Hiroshi Fujioka**, The Univ. of Tokyo (Japan)

Polarity control in III-nitrides: new insights into an old problem (*Invited Paper*), **Martin Albrecht**, **Natalia Stolyarchuk D.D.S.**, **Stefan Mohn**, **Toni Markurt**, **Leibniz-Institut für Kristallzüchtung** (Germany); **Ronny Kirste**, **Ramon Collazo**, North Carolina State Univ. (USA); **Aimeric Courville**, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); **Zlatko Sitar**, North Carolina State Univ. (USA); **Philippe Vennéguès**, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France) [10532-11]

MOVPE- and HVPE- GaN growth on SCAM substrates (*Invited Paper*), **Takashi Matsuoka**, **Kazuki Ohnishi**, **Shigeyuki Kuboya**, **Takuya Iwabuchi**, **Tohoku Univ.** (Japan); **Masaya Kanoh**, **Nichia Corp.** (Japan); **Tsuguo Fukuda**, **Fukuda Crystal Lab.** (Japan) [10532-12]

Improved crystalline quality of nonpolar a-plane GaN grown on r-plane patterned sapphire substrate, **Shunya Otsuki**, Meijo Univ. (Japan); **Daiki Jinno**, Meijo Univ. (Japan) and Koito Manufacturing Co., Ltd. (Japan); **Hisayoshi Daicho**, **Koito Manufacturing Co., Ltd.** (Japan); **Satoshi Kamiyama**, **Tetsuya Takeuchi**, **Motoaki Iwaya**, Meijo Univ. (Japan); **Isamu Akasaki**, Meijo Univ. (Japan) and Nagoya Univ. (Japan) [10532-13]

OPTO

CONFERENCE 10532

Selective area sublimation of GaN for top-down fabrication of nanostructures, Benjamin Damilano, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Stéphane Vézian, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Sébastien Chenot, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Marc Portail, Blandine Alloing, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Julien Brault, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (French Polynesia); Aimeric Courville, Virginie Brändli, Mathieu Leroux, Jean Massies, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France) [10532-14]

Heavily doped stacked layers of GaN/SiC for broadband infrared reflection in extreme-environment applications, Mohsen Janipour, Kursat Sendur, Sabanci Univ. (Turkey) [10532-15]

TUESDAY 30 JANUARY

SESSION 4 TUE 8:00 AM TO 10:15 AM

New Materials

Session Chair: **Siddharth Rajan**, The Ohio State Univ. (USA)

Metal-organic chemical vapor deposition of hexagonal boron nitride (*Invited Paper*), Andrew A. Allerman, Anthony Rice, Mary Crawford, Thomas Beechem, Taisuke Ohta, Douglas Medlin, Catalin Spataru, Jeffrey Figiel, Michael Smith, Sandia National Labs. (USA) [10532-16]

High-temperature molecular beam epitaxy of hexagonal boron nitride layers (*Invited Paper*), Tin S. Cheng, A. Summerfield, J. D. Albar, Andrew Davies, Christopher J. Mellor, Andrei N. Khlobystov, Laurence Eaves, C. Thomas Foxon, P.H. Beton, Sergei Novikov, The Univ. of Nottingham (United Kingdom) [10532-17]

Spatio-time-resolved cathodoluminescence studies of h-BN microcrystals (*Invited Paper*), Shigefusa F. Chichibu, Tohoku Univ. (Japan) [10532-18]

Radiation and process-induced damage in Ga₂O₃ (*Invited Paper*), Jiancheng Yang, Fan Ren, Univ. of Florida (USA); Gwangseok Yang, Jihyun Kim, Korea Univ. (Korea, Republic of); Michael Stavola, Lehigh Univ. (USA); Akito Kuramata, Tamura Corp. (Japan) and Novel Crystal Tech. (Japan); Stephen J. Pearton, Univ. of Florida (USA) [10532-19]

Electronic properties of the dilute-As InGaNaNs alloy by using first-principle calculations, Damir Borovac, Wei Sun, Lehigh Univ. (USA); Chee-Keong Tan, Clarkson Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) [10532-20]

SESSION 5 TUE 10:45 AM TO 12:15 PM

Characterization I

Session Chair: **Shigefusa F. Chichibu**, Tohoku Univ. (Japan)

Optical properties of doped GaN (*Invited Paper*), Axel Hoffmann, Christian Nenstiel, Markus Wagner, Felix Nippert, Gordon Callsen, Nadja Jankowski, Technische Univ. Berlin (Germany); Armin Dadgar, Otto-von-Guericke-Univ. Magdeburg (Germany); Stacia Keller, Univ. of California, Santa Barbara (USA) [10532-21]

Investigation of desorption-induced GaN quantum-dot formation using cathodoluminescence microscopy, Gordon Schmidt, Otto-von-Guericke-Univ. Magdeburg (Germany); Hannes Schürmann, Otto-von-Guericke Univ. Magdeburg (Germany); Sebastian Metzner, Peter Veit, Frank Bertram, Otto-von-Guericke-Univ. Magdeburg (Germany); Christoph Berger, Otto-von-Guericke Univ. Magdeburg (Germany); Jürgen Bläsing, Armin Dadgar, Otto-von-Guericke-Univ. Magdeburg (Germany); André Strittmatter, Otto-von-Guericke Univ. Magdeburg (Germany); Jürgen H. Christen, Otto-von-Guericke-Univ. Magdeburg (Germany) [10532-22]

Do we know the cause of luminescence broadening in InGaIn quantum wells?, Lucja Marona, Institute of High Pressure Physics (Poland) and TopGaN Ltd. (Poland); Przemysław Wisniewski, Institute of High Pressure Physics (Poland); Robert Czernecki, Piotr Perlin, Institute of High Pressure Physics (Poland) and TopGaN Ltd. (Poland) [10532-23]

Impact of alloy composition and well width fluctuations on linewidth broadening and carrier lifetimes in semipolar InGaIn quantum wells, Tomas K. Uzdavinyis, KTH Royal Institute of Technology (Sweden); Daniel L. Becerra, Univ. of California, Santa Barbara (USA); Mounir D. Mensi, Ruslan Ivanov, KTH Royal Institute of Technology (Sweden); Shuji Nakamura, Steven P. DenBaars, James S. Speck, Univ. of California, Santa Barbara (USA); Saulius Marcinkevicius, KTH Royal Institute of Technology (Sweden) [10532-24]

Carrier dynamics and modulation of (Al,In)GaIn laser diodes, Matthias Wachs, Ulrich T. Schwarz, Technische Univ. Chemnitz (Germany) [10532-25]

Lunch/Exhibition Break Tue 12:15 pm to 1:45 pm

SESSION 6 TUE 1:45 PM TO 3:30 PM

Characterization II

Session Chair: **Alex Hoffman**, Apple Inc. (USA)

Alloy fluctuations at dislocations in III-nitrides: identification and impact on optical properties (*Invited Paper*), Fabien Massabuau, Univ. of Cambridge (United Kingdom); Sneha Rhode, Imperial College London (United Kingdom); Matthew Horton, Univ. of California, Berkeley (USA); Thomas O'Hanlon, Univ. of Cambridge (United Kingdom); Andras Kovacs, Forschungszentrum Jülich GmbH (Germany); Marcin Zielinski, Attolight AG (Switzerland); Menno J. Kappers, Univ. of Cambridge (United Kingdom); Michelle Anna Moram, Imperial College London (United Kingdom); Rafal Dunin-Borkowski, Forschungszentrum Jülich GmbH (Germany); Philip Dawson, The Univ. of Manchester (United Kingdom); Colin J. Humphreys, Rachel A. Oliver, Univ. of Cambridge (United Kingdom) [10532-26]

Carrier localization induced by alloy disorder in nitride devices: theory and experiments, Marcel Filoche, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris Saclay (France); Marco Piccardo, Harvard John A. Paulson School of Engineering and Applied Sciences (USA); Chi-Kang Li, Yuh-Renn Wu, Graduate Institute of Photonics and Optoelectronics, National Taiwan Univ. (Taiwan); James S. Speck, Bastien Bonef, Robert M. Farrell, Univ. of California, Santa Barbara (USA); Svitlana Mayboroda, Univ. of Minnesota, Twin Cities (USA); Lucio Martinelli, Jacques Peretti, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris Saclay (France); Claude Weisbuch, Univ. of California, Santa Barbara (USA) [10532-27]

Leakage currents and Fermi-level shifts in C- and Fe-doped GaN, Aqdas Fariza, Andreas Lesnik, Otto-von-Guericke Univ. Magdeburg (Germany); Silvio Neugebauer, Matthias Wieneke, Otto-von-Guericke-Univ. Magdeburg (Germany); Jonas Hennig, Otto-von-Guericke Univ. Magdeburg (Germany); Jürgen Bläsing, Otto-von-Guericke-Univ. Magdeburg (Germany); Hartmut Witte, Otto-von-Guericke Univ. Magdeburg (Germany); Armin Dadgar, Otto-von-Guericke-Univ. Magdeburg (Germany); André Strittmatter, Otto-von-Guericke Univ. Magdeburg (Germany) [10532-28]

Measurement mechanism of the electrical properties of extremely high-conductivity layered p-type structures, Hao-Tsung Chen, Yang Kuo, Yu-Feng Yao, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) [10532-29]

A-plane GaN epitaxial lateral overgrowth structures: growth domains, morphological defects, and impurity incorporation directly imaged by cathodoluminescence microscopy, Kasey Hogan, SUNY CNSE/SUNYIT (USA); Sebastian Metzner, Frank Bertram, Institut für Experimentelle Physik, Otto-von-Guericke-Univ. Magdeburg (Germany); Isra Mahaboob, Emma Rocco, F. Shahedipour-Sandvik, SUNY CNSE/SUNYIT (USA); Anja Dempewolf, Jürgen H. Christen, Institut für Experimentelle Physik, Otto-von-Guericke-Univ. Magdeburg (Germany) [10532-30]

Demonstration of AlGaIn-delta-GaN QW by plasma-assisted molecular beam epitaxy for 260-nm ultraviolet light-emitting diodes, Cheng Liu, Rochester Institute of Technology (USA); Kevin Lee, S.M. Islam, Huiji Xing, Debdeep Jena, Cornell Univ. (USA); Jing Zhang, Rochester Institute of Technology (USA) [10532-31]

SESSION 7 TUE 4:00 PM TO 5:30 PM

Tunnel Junction

Session Chair: **Claude Weisbuch**,
Univ. of California, Santa Barbara (USA)

MOVPE-grown GaN-based tunnel junction and its application (*Invited Paper*), Tetsuya Takeuchi, Satoshi Kamiyama, Motoaki Iwaya, Isamu Akasaki, Meijo Univ. (Japan) [10532-32]

Tunnel-injected ultraviolet light-emitting diodes (*Invited Paper*), Siddharth Rajan, Yuewei Zhang, Zane Jamal-Eddine, Fatih Akyol, Jinwoo Hwang, Jared Johnson, The Ohio State Univ. (USA) [10532-33]

Tunnel junction design for InGaN/GaN-based light emitters (*Invited Paper*), André Strittmatter, Otto-von-Guericke Univ. Magdeburg (Germany) [10532-34]

WEDNESDAY 31 JANUARY

SESSION 8 WED 8:00 AM TO 10:15 AM

Electron Devices

Session Chair: **Jen-Inn Chyi**, National Central Univ. (Taiwan)

Next-generation efficient GaN-on-Si power converters in the MHz-range (*Invited Paper*), Patrick Waltereit, Richard Reiner, Beatrix Weiss, Stefan Müller, Rüdiger Quay, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) [10532-35]

Vertical GaN-based power devices on bulk GaN substrates for future power switching systems (*Invited Paper*), Daisuke Shibata, Ryo Kajitani, Hiroyuki Handa, Nanako Shiozaki, Shinji Ujita, Masahiro Ogawa, Kenichiro Tanaka, Satoshi Tamura, Tsuguyasu Hatsuda, Masahiro Ishida, Tetsuzo Ueda, Panasonic Corp. (Japan) [10532-36]

Thick homoepitaxial Ga₂O₃ Schottky and MOSFET devices for power electronics applications (*Invited Paper*), Marko Tadjer, Lunet Luna, Boris Feigelson, Nadeem Mahadik, Tatyana Feygelson, Virginia Wheeler, Karl Hobart, Fritz Kub, Bradford Pate, U.S. Naval Research Lab. (USA) [10532-37]

High electron mobility AlInGaN/AlN/GaN heterostructures grown on 150-mm silicon substrate, Indraneel Sanyal, Yen Chang Lee, Jen Inn Chyi, National Central Univ. (Taiwan); Kun Lin Lin, National Nano Device Labs. (Taiwan) [10532-38]

Electrical and optical characterization of GaN MIS-HEMTs used for energy conversion, Mariam El Khatib, Georges E. Bremond, Institut des Nanotechnologies de Lyon (France); Philippe Ferrandis, Erwan Morvan, CEA-LETI (France); Bruno Masenelli, Institut des Nanotechnologies de Lyon (France) [10532-39]

Room-temperature preparation of InGaN for thin-film transistors, Kyohei Nakamura, Atsushi Kobayashi, Kohei Ueno, Jitsuo Ohta, Yuki Tokumoto, Hiroshi Fujioka, The Univ. of Tokyo (Japan) [10532-40]

SESSION 9 WED 10:45 AM TO 12:30 PM

Lasers

Session Chair: **Motoaki Iwaya**, Meijo Univ. (Japan)

Carrier screening of built-in electric fields in nitride laser diodes and superluminescent diodes, Anna Kafar, Szymon Stanczyk, Katarzyna Pieniak, Tadek Suski, Institute of High Pressure Physics (Poland); Piotr Perlin, Institute of High Pressure Physics (Poland) and TopGaN Ltd. (Poland) [10532-41]

White-light sources based on GaN laser diodes: analysis and application study, Nicola Trivellini, Maksym Yushchenko, Matteo Meneghini, Gaudenzio Meneghesso, Enrico Zanoni, Univ. degli Studi di Padova (Italy) [10532-42]

GaN laser diodes for high-power optical integration and quantum technologies, Stephen P. Najda, TopGaN Ltd. (Poland) [10532-44]

Single-frequency 461-nm gallium-nitride diode lasers for strontium optical clocks, Stephen P. Najda, TopGaN Ltd. (Poland); Piotr Perlin, TopGaN Ltd. (Poland), Institute of High Pressure Physics, Polish Academy of Sciences (Poland); Tadeusz Suski, Lucja Marona, Institute of High Pressure Physics (Poland); Szymon Stanczyk, Mike Leszczyński, Przemysław Wisniewski, Robert Czernecki, TopGaN Ltd. (Poland), Institute of High Pressure Physics, Polish Academy of Sciences (Poland); G. Targowski, TopGaN Ltd. (Poland); Loyd J. McKnight, Fraunhofer UK Research Ltd. (United Kingdom) [10532-43]

Distributed feedback InGaN/GaN laser diodes, Thomas J. Slight, Compound Semiconductor Technologies Global Ltd. (United Kingdom); Scott Watson, Univ. of Glasgow (United Kingdom); Amit Yadav, Aston Univ. (United Kingdom); Stephen P. Najda, TopGaN Ltd. (Poland); Kevin E. Docherty, Kelvin Nanotechnology Ltd. (United Kingdom); Piotr Perlin, Mike Leszczyński, TopGaN Ltd. (Poland); Edik U. Rafailov, Aston Univ. (United Kingdom); Anthony E. Kelly, Univ. of Glasgow (United Kingdom) [10532-45]

Highly reflective 369.5nm AlGaIn-metal hybrid distributed Bragg reflectors, Theeradetch Detchprohm, Young Jae Park, Karan Mehta, Oliver Moreno, Georgia Institute of Technology (USA); Shuo Wang, Shanthan Alugubelli, Arizona State Univ. (USA); Yuh-Shiuan Liu, Shyh-Chiang Shen, Paul D. Yoder, Georgia Institute of Technology (USA); Fernando A. Ponce, Arizona State Univ. (USA); Russell D. Dupuis, Georgia Institute of Technology (USA) [10532-46]

Metalized monolithic high-contrast grating as a mirror for GaN-based VCSELs, Robert P. Sarzała, Michał Wasiak, Adam K. Sokol, Lukasz Piskorski, Maciej Kuc, Patrycja Śpiewak, Magdalena Maciniak, Marcin Gebiski, Tomasz G. Czyszanowski, Lodz Univ. of Technology (Poland) [10532-47]

Lunch/Exhibition Break Wed 12:30 pm to 2:00 pm

SESSION 10 WED 2:00 PM TO 3:00 PM

Nano Structure Devices

Session Chair: **Russell D. Dupuis**,
Georgia Institute of Technology (USA)

Bandgap engineering by strain in selectively grown GaN-(Al,Ga)N core-shell nanowire heterostructures (*Invited Paper*), Martin Hetzl, Max Kraut, Julia Winnerl, Technische Univ. München (Germany); Luca Francaviglia, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Markus Döblinger, Ludwig-Maximilians-Univ. München (Germany); Sonja Matich, Technische Univ. München (Germany); Anna Fontcuberta i Morral, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Martin Stutzmann, Technische Univ. München (Germany) [10532-48]

Nanosopic insights into the structural and optical properties of a thick InGaIn shell grown coaxially on GaN microrod, Frank Bertram, Otto-von-Guericke-Univ. Magdeburg (Germany); Marcus Mueller, Otto-von-Guericke Univ. Magdeburg (Germany); Gordon Schmidt, Sebastian Metzner, Peter Veit, Jürgen H. Christen, Otto-von-Guericke-Univ. Magdeburg (Germany); Jana Hartmann, Hao Zhou, H.H. Wehmann, Andreas Waag, Technische Univ. Braunschweig (Germany) [10532-49]

Emission color control for densely packed InGaIn-based nanocolumns and demonstration of independent drive of multicolor (RGBY) micro-LED array, Kazuki Narita, Naoki Sakakibara, Takao Oto, Katsumi Kishino, Sophia Univ. (Japan) [10532-50]

SESSION 11 WED 3:30 PM TO 5:45 PM

New Devices

Session Chair: **Frank Bertram**,
Otto-von-Guericke-Univ. Magdeburg (Germany)

GaN-based heterostructures for gas and bio sensing (*Invited Paper*), Ferdinand Scholz, Martin Schneidereit, Florian Huber, Sabyasashi Chakraborty, Univ. Ulm (Germany); Paulette Iskandar, Ulm Univ. (Germany); Jassim Shahbaz, Univ. of Ulm (Germany); Benedikt Hoerbrand, Institut für Quantenmaterie, Univ. Ulm (Germany); Tanja Weil, Klaus Thonke, Univ. Ulm (Germany) [10532-51]

Second harmonic generation from polarity-inverted GaN waveguide (*Invited Paper*), Ryuji Katayama, Osaka Univ. (Japan) [10532-52]

Demonstration of GaN p-i-p-i-n ultraviolet avalanche photodiodes, Mi-Hee Ji, Georgia Institute of Technology (USA); Jeomoh Kim, LG Electronics (Korea, Republic of); Bill Chaikasarikul, Theeradetch Detchprohm, Shyh-Chiang Shen, Russell D. Dupuis, Georgia Institute of Technology (USA); Ashok K. Sood, Magnolia Optical Technologies, Inc. (USA); Nibir K. Dhar, U.S. Army Night Vision & Electronic Sensors Directorate (USA) [10532-53]

Degradation processes and origin in InGaIn-based high-power photodetectors, Carlo De Santi, Matteo Meneghini, Alessandro Caria, Univ. degli Studi di Padova (Italy); Ezgi Dogmus, Institut d'Electronique de Microélectronique et de Nanotechnologie (France); Malek Zegaoui, Univ. des Sciences et Technologies de Lille (France); Farid Medjdoub, Institut d'Electronique de Microélectronique et de Nanotechnologie (France); Enrico Zanoni, Gaudenzio Meneghesso, Univ. degli Studi di Padova (Italy) [10532-54]

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III-nitride on silicon microdisks: electrical injection and bus waveguide side-coupling, Farsane Tabataba-Vakili, Ctr. de Nanosciences et de Nanotechnologies (France) and Institut NéEL (France); Iannis Roland, Univ. Paris-Saclay (France) and C2N-CNRS (France); Stéphanie Rennesson, Eric Frayssinet, Julien Brault, Univ. Côte d'Azur (France) and Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Moustafa El Kurdi, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Univ. Paris Saclay (France); Xavier Checoury, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris Sud 11 (France) and Univ. Paris Saclay (France); Bruno Paulillo, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Univ. Paris Saclay (France); Raffaele Colombelli, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris Sud 11 (France) and Univ. Paris Saclay (France); Thierry Guillet, Christelle Brimont, Lab. Charles Coulomb, Univ. Montpellier (France) and Ctr. National de la Recherche Scientifique (France); Benjamin Damilano, Fabrice Semond, Univ. Côte d'Azur (France) and Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Bruno Gayral, Institut Nanosciences et Cryogénie, Commissariat à l'Énergie Atomique (France) and Univ. Grenoble Alpes (France); Philippe Boucaud, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Univ. Paris Saclay (France) [10532-55]

Optoelectrical properties of (Al,In)GaN optical amplifiers, Szymon Stanczyk, Institute of High Pressure Physics (Poland); Anna Kafar, Institute of High Pressure Physics (Poland) and TopGaN Ltd. (Poland); Anna Nowakowska-Siwinska, Irina Makarowa, TopGaN Ltd. (Poland); Marcin Sarzynski, Institute of High Pressure Physics (Poland) and TopGaN Ltd. (Poland); Tadeusz Suski, Institute of High Pressure Physics (Poland); Piotr Perlin, Institute of High Pressure Physics (Poland) and TopGaN Ltd. (Poland) [10532-56]

Hybrid molybdenum disulfide on GaN for linear and nonlinear optics, Brian Squires, Arup Neogi, Univ. of North Texas (USA) [10532-57]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Arrangement technique of GaN-nanowires based on top-down approach, Minoru Takebayashi, Myunghee Kim, Atsushi Suzuki, Yuki Kurisaki, Hiroki Shibuya, Kyohei Nokimura, Kohei Sasaki, Satoshi Kamiyama, Tetsuya Takeuchi, Motoaki Iwaya, Meijo Univ. (Japan); Isamu Akasaki, Meijo Univ. (Japan) and Nagoya Univ. (Japan) [10532-76]

Optical simulations of blue and green semipolar InGaN/GaN lasers, Maciej Kuc, Lukasz Piskorski, Michal Wasiaik, Tomasz G. Czystanowski, Maciej Dems, Adam K. Sokol, Robert P. Sarzala, Lodz Univ. of Technology (Poland) [10532-77]

High-performance ZnO/Ag/ZnO transparent electrodes for flexible organic photovoltaic cells, Byeong Ryong Lee, School of Electrical Engineering, Korea Univ. (Korea, Republic of); Gi Eun Park, Yong Woon Kim, Kyung Rock Son, Dong Hoon Choi, Tae Geun Kim, Korea Univ. (Korea, Republic of) [10532-78]

Universal method of reducing the sheet resistance of ultrathin metal-oxide films: its application to organic light-emitting diodes, Tae Ho Lee, Byeong Ryong Lee, Kyung Rock Son, Tae Hoon Park, Dae Yun Kang, Tae Geun Kim, Korea Univ. (Korea, Republic of) [10532-79]

Carrier transport in the AlGaIn/GaN HFETs with uniaxial strain, Sejoon Oh, Taehoon Jang, Jaehee Cho, Chonbuk National Univ. (Korea, Republic of) [10532-80]

InGaIn light-emitting diode with electrochemical-etched porous distributed Bragg reflector, Chia-Feng Lin, National Chung Hsing Univ. (Taiwan); Tsung-Lian Tsai, Lextar Electronics Corp. (Taiwan); Guo-Yi Shiu, National Chung Hsing Univ. (Taiwan) [10532-81]

Investigation on optical quality of white light-emitting diodes realized by monolithic integration of blue, green, and red InGaIn-based quantum wells, Kwanjae Lee, Ilgyu Choi, Sangmoon Han, Jihoon Song, Cheul-Ro Lee, Jin Soo Kim, Chonbuk National Univ. (Korea, Republic of) [10532-82]

THURSDAY 1 FEBRUARY

SESSION 12 THU 8:00 AM TO 10:30 AM

Quantum Efficiency

Session Chair: **Bernard Gil**, Lab. Charles Coulomb (France)

A measurement technique of the internal quantum efficiency based on the room-temperature reference-point method (RTRM) (*Invited Paper*), Jong-In Shim, Dong-Pyo Han, Dong-Soo Shin, Hanyang Univ. (Korea, Republic of); Hyundon Jung, Etamax Co. Ltd. (Korea, Republic of) . [10532-58]

Internal quantum efficiency of nitride light emitters: a critical perspective (*Invited Paper*), Andreas Hangleiter, Technische Univ. Braunschweig (Germany) [10532-59]

Carrier lifetimes in polar InGaIn-based LEDs (*Invited Paper*), Lai Wang, Jie Jin, Zhibiao Hao, Yi Luo, Tsinghua Univ. (China) [10532-60]

Determination of absolute quantum efficiency of radiation in nitride semiconductor using an integrating sphere (*Invited Paper*), Kazunobu Kojima, Tohoku Univ. (Japan); Hiroataka Ikeda, Kenji Fujito, Mitsubishi Chemical Corp. (Japan); Shigefusa F. Chichibu, Tohoku Univ. (Japan) [10532-61]

Estimation of internal quantum efficiency in III-nitride materials using simultaneous photo-acoustic and photoluminescence measurements (*Invited Paper*), Atsushi A. Yamaguchi, Naoto Shimizu, Shigeta Sakai, Takashi Nakano, Haruki Fukada, Kanazawa Institute of Technology (Japan); Yuya Kanitani, Shigetaka Tomiya, Sony Corp. (Japan) [10532-62]

SESSION 13 THU 11:00 AM TO 12:45 PM

LED I

Session Chair: **Jong-In Shim**, Hanyang Univ. (Korea, Republic of)

Flexible optoelectronics based on nitride nanostructures (*Invited Paper*), Maria Tchernycheva, Univ. Paris-Sud 11 (France); Nan Guan, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France); Martina Morassi, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France); Lorenzo Mancini, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France); Joël Eymery, Christophe Durand, CEA-INAC (France) and Univ. Grenoble Alpes (France); Hezhi Zhang, Lu Lu, Noelle Gogneau, Ali Madouri, Ludovic Largeau, Jean-Christophe Harmand, Ctr. de nanosciences et de Nanotechnologies (France) and Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France) [10532-63]

Molecular beam epitaxy of GaN nanowires on epitaxial graphene and flexible metal foils (*Invited Paper*), Sergio Fernandez-Garrido, Gabriele Calabrese, Guanhuai Gao, Pierre Corfdir, Carsten Pfüller, Manfred Ramsteiner, Lauren A. Galves, Bharat Sharma, Paul-Drude-Institut für Festkörperelektronik (Germany); Sverre V. Pettersen, Jostein K. Grepstad, Norwegian Univ. of Science and Technology (Norway); Ziani D. S. Schiaber, Paul-Drude-Institut für Festkörperelektronik (Germany); Achim Trampert, João M. Lopes, Oliver Brandt, Lutz Geelhaar, Paul-Drude-Institut für Festkörperelektronik (Germany) [10532-64]

GaN nanostructures grown on graphene for flexible light-emitting diodes (*Invited Paper*), Gyu-Chul Yi, Seoul National Univ. (Korea, Republic of) [10532-65]

Investigation of GaN-based light-emitting diodes on various substrates, Rishabh Raj, Sehrish Amin, Arvind Ujjwal, VIT Univ. (India); Rajeev Ranjan, National Institute of Technology, Jamshedpur (India); Rangaswamy Navamathavan, VIT Univ. (India) [10532-66]

Lunch/Exhibition Break Thu 12:45 pm to 2:00 pm

SESSION 14..... THU 2:00 PM TO 3:00 PM

LED II

Session Chair: **Julien Brault**, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France)

Recent progress on GaN-based superluminescent light-emitting diodes in the visible range (*Invited Paper*), Antonino Castiglia, Marco Rossetti, Marco Malinverni, Christian Mounir, Nicolai Matuschek, Marcus Duellk, Christian Velez, Exalos AG (Switzerland)[10532-67]

Using chessboard phosphor structure and patterned sapphire substrate technique to enhance white LED packaging efficiency, Shih-Wei Huang, National Central Univ. (Taiwan)[10532-68]

Polar and semi-polar oriented InGaN-(In)GaN multiple quantum wells for red-light emitters, Thi Huong Ngo, Univ. Montpellier (France); Bernard Gil, Lab. Charles Coulomb, Univ. Montpellier (France); Benjamin Damilano, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Univ. Côte d'Azur (France); Aimeric Courville, Univ. Côte d'Azur, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Philippe De Mierry, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Univ. Côte d'Azur (France).....[10532-69]

SESSION 15..... THU 3:30 PM TO 5:45 PM

LED III

Session Chair: **Hadis Morkoç**, Virginia Commonwealth Univ. (USA)

From heterostructure design to package: development of efficient and reliable UVB LEDs (*Invited Paper*), Neysha Lobo Ploch, UVphotonics NT GmbH (Germany) and Ferdinand-Braun-Institut (Germany); Tim Kolbe, Ferdinand-Braun-Institut (Germany); Arne Knauer, Jens Rass, Hyun Kyong Cho, Johannes Glaab, Jan Ruschel, Anna Andrie, Sylvia Hagedorn, Katrin Hilbrich, Christoph Stoelmacker, Steffen Knigge, Maria Reiner, Ina Ostermay, Andreas Thies, Deepak Prasai, Olaf Krueger, Sven Einfeldt, Markus Weyers, Ferdinand-Braun-Institut (Germany); Michael Kneissl, Technische Univ. Berlin (Germany) and Ferdinand-Braun-Institut (Germany)[10532-70]

Deep ultra-violet (Al,Ga)N quantum dots from 275 nm to 340 nm for the fabrication of LEDs by molecular beam epitaxy (*Invited Paper*), Julien Brault, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) [10532-71]

Highly-efficient top-emitting UV A-to-C LEDs using AlN-based glass electrodes (*Invited Paper*), Tae Geun Kim, Tae Ho Lee, Tae Hoon Park, Byeong Ryong Lee, Kyung Rock Son, Korea Univ. (Korea, Republic of) [10532-72]

Unintentionally formed thin barriers of elevated Al contents in a deep-UV AlGaIn quantum well for generating favored compressive strain, Chia-Ying Su, Meng-Che Tsai, Keng-Ping Chou, Huang-Hui Lin, Ming-Yen Su, Hsin-Chun Chiang, Yuh-Renn Wu, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) [10532-73]

Electrical p-contacts for UV-LEDs: contact resistivity, reflectivity, and aging performance, Jens Rass, Hyun Kyong Cho, Johannes Glaab, Jan Ruschel, Anna Andrie, Anna Mogilatenko, Ute Zeimer, Maria Reiner, Ina Ostermay, Ferdinand-Braun-Institut (Germany); Neysha Lobo Ploch, Tim Kolbe, Ferdinand-Braun-Institut (Germany) and UVphotonics NT GmbH (Germany); Arne Knauer, Sven Einfeldt, Markus Weyers, Ferdinand-Braun-Institut (Germany); Michael Kneissl, Technische Univ. Berlin (Germany) and Ferdinand-Braun-Institut (Germany) [10532-74]

Development of UVC LED structure growth on four-inch sapphire substrate, Kyoung Hoon Kim, Photon Wave Co., Ltd. (Korea, Republic of) [10532-75]



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Oxide-based Materials and Devices IX

Conference Chairs: **David J. Rogers**, Nanovation (France); **David C. Look**, Wright State Univ. (USA); **Ferechteh H. Teherani**, Nanovation (France)

Program Committee: **Philippe Bove**, Nanovation (France); **Subhananda Chakrabarti**, Indian Institute of Technology Bombay (India); **Ekaterina Chikoidze**, Univ. de Versailles Saint-Quentin-en Yvelines (France); **Jean-Jacques Delaunay**, The Univ. of Tokyo (Japan); **Aleksandra B. Djurišić**, The Univ. of Hong Kong (Hong Kong, China); **Rodrigo Ferrão de Paiva Martins**, CEMOP/Uninova (Portugal); **Elvira M. C. Fortunato**, Univ. Nova de Lisboa (Portugal); **Michael Gerhold**, U.S. Army Research Office (USA); **Michael A. Harper**, CIV USN ONR GLOBAL (USA); **Adrián Hierro**, Univ. Politécnica de Madrid (Spain); **Axel Hoffmann**, Technische Univ. Berlin (Germany); **Ching-Ting Lee**, National Cheng Kung Univ. (Taiwan); **Maria Losurdo**, CNR-NANOTEC (Italy), Univ. degli Studi di Bari Aldo Moro (Italy); **Tariq Manzur**, Naval Undersea Warfare Ctr. (USA); **Jagdish Narayan**, North Carolina State Univ. (USA); **Norbert H. Nickel**, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany); **Fabrice Odobel**, Univ. de Nantes (France); **Tatsuo Okada**, Kyushu Univ. (Japan); **Seong-Ju Park**, Gwangju Institute of Science and Technology (Korea, Republic of); **Thierry Pauporte**, Ecole Nationale Supérieure de Chimie de Paris (France); **Manijeh Razeghi**, Northwestern Univ. (USA); **Vinod Eric Sandana**, Nanovation (France); **Michael L. Schuette**, Air Force Research Lab. (USA); **Chris G. Van de Walle**, Univ. of California, Santa Barbara (USA); **Bruno Viana**, Ecole Nationale Supérieure de Chimie de Paris (France); **Markus R. Wagner**, Technische Univ. Berlin (Germany); **Magnus Willander**, Linköping Univ. (Sweden); **Hideki Yamamoto**, NTT Basic Research Labs. (Japan)

SUNDAY 28 JANUARY

SESSION 1 **SUN 1:10 PM TO 3:15 PM**

Gallium Oxide I: Theoretical Exploration

Session Chairs: **Walter R. L. Lambrecht**, Case Western Reserve Univ. (USA); **Markus R. Wagner**, Technische Univ. Berlin (Germany)

First-principles modeling of gallium-oxide and related semiconductors (*Invited Paper*), Chris G. Van de Walle, Univ. of California Santa Barbara (USA) [10533-1]

Theoretical exploration of the transport properties of Ga₂O₃ (*Invited Paper*), Youngho Kang, Univ. of California, Santa Barbara (USA) [10533-2]

Computational studies of beta-Ga₂O₃ band structure and the electron paramagnetic resonance spectra of the Ga-vacancy defects (*Invited Paper*), Walter R. L. Lambrecht, Dmitry Skachkov, Amol Ratnaparkhe, Case Western Reserve Univ. (USA); Hans Jürgen von Bardeleben, Univ. Pierre et Marie Curie (France); Uwe Gerstmann, Univ. Paderborn (Germany); Quoc Duy Ho, Peter Déak, Univ. Bremen (Germany) [10533-3]

Optical properties of Ga₂O₃ from first principles: excitons, free-carriers, and dielectric screening (*Invited Paper*), André Schleife, Univ. of Illinois (USA) [10533-4]

Doping of beta-gallium-oxide (*Invited Paper*), Catalin Badescu, Daniel Hashemi, Jonghoon J Lee, US Air Force Research Laboratory (USA); Jacob P Tavenner, Colorado School of Mines (USA) [10533-5]

SESSION 2 **SUN 3:45 PM TO 6:15 PM**

Gallium Oxide II: Thin Films and Epitaxy

Session Chairs: **Chris G. Van de Walle**, Univ. of California, Santa Barbara (USA); **James S. Speck**, Univ. of California, Santa Barbara (USA)

Progress in beta-gallium-oxide materials and devices (*Invited Paper*), James S. Speck, Univ. of California, Santa Barbara (USA) [10533-6]

Deep traps in epitaxial gallium-oxide materials and devices (*Invited Paper*), Steven A. Ringel, Aaron Arehart, Esmat Farzana, The Ohio State Univ. (USA); Elaheh Ahmadi, James S. Speck, Univ. of California, Santa Barbara (USA) [10533-7]

Growth of Ga₂O₃ and AlGaO epitaxial structures by MOCVD (*Invited Paper*), Andrei V. Osinsky, Agnitron Technology, Inc. (USA) [10533-8]

Conductivity of undoped β-gallia thin films (*Invited Paper*), Ekaterina Chikoidze, A. Fellous, Yves Dumont, Univ. de Versailles Saint-Quentin-en Yvelines, CNRS, Paris Saclay Univ. (France); Ferechteh H. Teherani, David J. Rogers, Vinod Eric Sandana, Philippe Bove, Nanovation (France); A. Perez-Tomas, Institut Català de Nanociència i Nanotecnologia (ICN2) (Spain); Tamar Tcheldidze, Tbilisi State Univ. (Georgia); Cuong Ton-That, Thuan Huynh, Matthew R. Phillips, Univ. of Technology, Sydney (Australia); Stephen Russell, Mike Jennings, Univ. of Warwick (United Kingdom) [10533-9]

Title to be determined (*Invited Paper*), Debdeep Jena, Univ. of Notre Dame (USA) [10533-10]

Schottky diodes on gallium-oxide and indium-oxide thin-films: optimization of the sample structure and modeling of the IV characteristics (*Invited Paper*), Holger von Wenckstern, Daniel Splith, Univ. Leipzig (Germany) [10533-11]

MONDAY 29 JANUARY

PLENARY SESSION **8:00 AM TO 10:05 AM**

OPTO PLENARY SESSION

8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)

8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)

8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)

9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 3 **MON 10:30 AM TO 12:10 PM**

Gallium Oxide III: Bulk Crystals and Substrates

Session Chairs: **Martin Albrecht**, Leibniz-Institut für Kristallzüchtung (Germany); **Akito Kuramata**, Tamura Thermal Device Corp. (Japan)

Growth optimizing and characterization of β-Ga₂O₃ single crystals grown by EFG method (*Invited Paper*), Zhitai Jia, Wenxiang Mu, Na Lin, Jian Zhang, Shandong Univ. (China); Giovanni Cittadino D.D.S., Univ. di Pisa (Italy); Stefano Veronesi, Univ. di Pisa (Italy) and NEST Istituto di Nanoscienze, CNR (Italy); Yanru Yin, Shandong Univ. (China); Claudio Luperini, Univ. di Pisa (Italy); Qian Feng, Xidian Univ. (China); Shibing Long, Institute of Microelectronics (China); Mauro Tonelli, Univ. di Pisa (Italy) and NEST Istituto di Nanoscienze, CNR (Italy); Xutang Tao, Shandong Univ. (China) .. [10533-12]

Bulk crystal growth of Ga₂O₃ (*Invited Paper*), Akito Kuramata, Novel Crystal Technology, Inc. (Japan) [10533-13]

Atomic defects in oxides studied by transmission electron microscopy (*Invited Paper*), Martin Albrecht, Leibniz-Institut für Kristallzüchtung (Germany) [10533-14]

TUESDAY 30 JANUARY

SESSION 6 TUE 8:00 AM TO 10:30 AM

UV Photodetectors

Session Chairs: **Manijeh Razeghi**, Northwestern Univ. (USA);
Dong-Sing Wu, National Chung Hsing Univ. (Taiwan)

The new oxide paradigm for solar blind photodetectors (*Invited Paper*), Manijeh Razeghi, Ryan McClintock, Northwestern Univ. (USA); Ferechteh H. Teherani, Philippe Bove, X. Arrateig, Vinod Eric Sandana, David J. Rogers, Nanovation (France) [10533-25]

Ga₂O₃-based metal-insulator-semiconductor photodiodes (*Invited Paper*), Takayoshi Oshima, Saga Univ. (Japan) [10533-26]

Aluminium-gallium oxide materials for UVC photodetectors with 200-250nm flat-band responsivity (*Invited Paper*), Dong-Sing Wu, National Chung Hsing Univ. (Taiwan) [10533-27]

Atomically-thin deep-ultraviolet-wavelength selective gallium-oxide photodetectors (*Invited Paper*), Yoon-Jong Moon, Sun-Kyung Kim, Kyung Hee Univ. (Korea, Republic of); Sang Woon Lee, Seung Hyun Lee, Ajou Univ. (Korea, Republic of) [10533-28]

Tin-gallium-oxide-based UV-C detectors (*Invited Paper*), Winston V. Schoenfeld, Mykyta Toporkov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) and BRIDG (USA); Partha Mukhopadhyay, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) [10533-29]

Applications of ZnO nanorods/nanoflowers and their nanocomposites with core-shell heterostructure quantum dots (*Invited Paper*), Qin Wang, David Rihtnesberg, RISE Acreo AB (Sweden); Xuran Yang, Yichen Zhao, Abhilash Sugunan, Mats Göthelid, Muhammet S. Toprak, KTH Royal Institute of Technology (Sweden) [10533-30]

SESSION 7 TUE 10:50 AM TO 12:10 PM

Superconductors and Highly-Correlated Complex Oxides

Session Chairs: **David C. Look**, Wright State Univ. (USA);
Vinod Eric Sandana, Nanovation (France)

Microfabrication process using LaAlO₃/BaO_x water-soluble sacrificial bilayers (*Invited Paper*), Takayuki Harada, Tohoku University (Japan); Atsushi Tsukazaki, Tohoku Univ. (Japan) [10533-31]

Superconductor sandwiches, Benjamin Mallett, The Univ. of Auckland (New Zealand); Premysl Marsik, Jarji Khmaladze, Univ. de Fribourg (Switzerland); Rakesh Arul, M. Cather Simpson, The Univ. of Auckland (New Zealand); Christian Bernhard, Univ. de Fribourg (Switzerland) [10533-32]

Oscillation electron model superconductors: phase diagram, temperature transition, isotopic shift, Nadezhda P. Netesova, M.V. Lomonosov Moscow State Univ. (Russian Federation) [10533-33]

Optical absorption characteristics and charge-carrier dynamics in cupric oxide (CuO) nanocrystals, Ilija R. Hristovski, Brandon Born, Jeffrey D. A. Krupa, Jonathan F. Holzman, The Univ. of British Columbia Okanagan (Canada) [10533-34]

Lunch/Exhibition Break Tue 12:10 pm to 1:10 pm

SESSION 8 TUE 1:10 PM TO 4:25 PM

Transparent Contacts and Electronics

Session Chairs: **David C. Look**, Wright State Univ. (USA);
Vinod Eric Sandana, Nanovation (France)

Free-carrier absorption in transparent conducting oxides (*Invited Paper*), Hartwin Peelaers, Univ. of California, Santa Barbara (USA) [10533-96]

Novel transparent conducting oxide with room-temperature conductivity exceeding 10⁴ S/cm (*Invited Paper*), Bharat Jalan, Univ. of Minnesota, Twin Cities (USA) [10533-99]

In₂O₃-based transparent-conducting oxide films with high-electron mobility: effects of dopant species and crystallization processes on transport properties (*Invited Paper*), Takashi Koida, Yuko Ueno, Hajime Shibata, National Institute of Advanced Industrial Science and Technology (Japan) [10533-35]

Ion implantation and iono-luminescence studies in β-Ga₂O₃ (*Invited Paper*), Marco B. Peres, L. C. Alves, Eduardo P. Alves, Instituto Superior Técnico (Portugal); Teresa Monteiro, Univ. de Aveiro (Portugal); Susana Cardoso, INESC MN (Portugal); Manuel Alonso-Orts, Emilio Nogales Diaz, Bianchi Méndez, Univ. Complutense de Madrid (Spain); X. Biquard, Commissariat à l'Énergie Atomique (France); Garcia G. Villora, Kiyoshi Shimamura, National Institute for Materials Science (Japan); Katharina Lorenz, Instituto Superior Técnico (Portugal) [10533-15]

Lunch Break Mon 12:10 pm to 1:10 pm

SESSION 4 MON 1:10 PM TO 3:40 PM

Gallium Oxide IV: Spectroscopy and Polytypes

Session Chairs: **Ekaterine Chikoidze**, Univ. de Versailles Saint-Quentin-en Yvelines (France);
Andrei V. Osinsky, Agnition Technology, Inc. (USA)

Epsilon-Ga₂O₃ polymorph: epitaxial growth, properties, and possible applications (*Invited Paper*), Matteo Bosi, Istituto dei Materiali per l'Elettronica ed il Magnetismo, Consiglio Nazionale delle Ricerche (Italy); Maura Pavesi, Vincenzo Montedoro, Univ. degli Studi di Parma (Italy); Detlef Klimm, Leibniz-Institut für Kristallzüchtung (Germany); Francesco Mezzadri, Gianluca Calestani, Univ. degli Studi di Parma (Italy); Ildiko Cora, Bela Pecz, Ctr. for Energy Research, Hungarian Academy of Sciences (Hungary); Francesco Boschi, Antonella Parisini, Andrea Baraldi, Univ. degli Studi di Parma (Italy); Claudio Ferrari, Enos Gombia, Istituto dei Materiali per l'Elettronica ed il Magnetismo, Consiglio Nazionale delle Ricerche (Italy); Roberto Fornari, Univ. degli Studi di Parma (Italy) [10533-16]

Optical properties of metastable polytypes of Ga₂O₃ (*Invited Paper*), Martin Feneberg, Otto-von-Guericke-Universität Magdeburg (Germany) [10533-17]

Phonons and thermal transport in Ga₂O₃ polymorphs (*Invited Paper*), Sebastian Reparaz, Institut de Ciència de Materials de Barcelona (Spain) [10533-18]

Optical and vibrational properties of various Ga₂O₃ polymorphs (*Invited Paper*), Nadja Jankowski, Roland Gillen, Axel Hoffmann, Markus R. Wagner, Technische Univ. Berlin (Germany) [10533-19]

Growth of Ga₂O₃ and AlGaO epitaxial structures by MOCVD (*Invited Paper*), Mathias Schubert, Univ. of Nebraska-Lincoln (USA) and Linköping Univ. (Sweden) and Leibniz Institute for Polymer Research (Germany); A. Mock, Rafal Korlacki, Sean Knight, Univ. of Nebraska-Lincoln (USA); Vanya Darakchieva, Linköping Univ. (Sweden); Bo Monemar, Linköping Univ. (Sweden) and Tokyo Univ. of Agriculture and Technology (Japan); Hisashi Murakami, Yoshinao Kumagai, Tokyo Univ. of Agriculture and Technology (Japan); Ken Goto, Tokyo Univ. of Agriculture and Technology (Japan) and Tamura Corp. (Japan); Masataka Higashiwaki, National Institute of Information and Communications Technology (Japan) [10533-20]

Donor states and deep levels in bulk and epitaxial β-Ga₂O₃ (*Invited Paper*), Andrej Yu. Kuznetsov, Univ. i Oslo (Norway) [10533-97]

SESSION 5 MON 4:10 PM TO 5:50 PM

Oxide-based Power Electronics

Session Chairs: **Masataka Higashiwaki**, National Institute of Information and Communications Technology (Japan); **Siddharth Rajan**, The Ohio State Univ. (USA)

Epitaxial growth of a new wide-bandgap semiconductor ZnGa₂O₄ (*Invited Paper*), Ray-Hua Horng, National Chiao Tung Univ. (Taiwan) [10533-21]

Latest progress in gallium-oxide electronic devices (*Invited Paper*), Masataka Higashiwaki, Man Hoi Wong, National Institute of Information and Communications Technology (Japan); Keita Konishi, Tokyo Univ. of Agriculture and Technology (Japan) and National Institute of Information and Communications Technology (Japan); Yoshiaki Nakata, Chia-Hung Lin, Takafumi Kamimura, Lingaparathi Ravikiran, National Institute of Information and Communications Technology (Japan); Kohei Sasaki, Ken Goto, Tamura Corp. (Japan); Akinori Takeyama, Takahiro Makino, Takeshi Ohshima, National Institutes for Quantum and Radiological Science and Technology (Japan); Akito Kuramata, Shigenobu Yamakoshi, Tamura Corp. (Japan); Hisashi Murakami, Yoshinao Kumagai, Tokyo Univ. of Agriculture and Technology (Japan) [10533-22]

Enhancement/depletion mode ZnGa₂O₄ MOSFETs grown on sapphire substrate and thickness dependence on devices (*Invited Paper*), Li-Chung Cheng, Chiung-Yi Huang, Ray-Hua Horng, Institute of Electronics, National Chiao Tung Univ. (Taiwan) [10533-23]

Material and device engineering for gallium-oxide transistors (*Invited Paper*), Siddharth Rajan, The Ohio State Univ. (USA); Zhanbo Xia, Chandan Joishi, Yüwei Zhang, Ohio State Univ (USA) [10533-24]

OPTO

CONFERENCE 10533

Deep-level traps in pulsed-laser-deposited InGaZnO thin-films studied by thermally stimulated current spectroscopy (*Invited Paper*), Buguo Wang, Jason Anders, Wright State Univ. (USA); Kevin D. Leedy, Michael Schuette, Air Force Research Lab. (USA); David C. Look, Wright State Univ. (USA) [10533-36]

Degenerate Ga₂O₃: a highly-conductive TCO with an extremely wide bandgap (*Invited Paper*), David C. Look, Wright State Univ. (USA); Kevin D. Leedy, Air Force Research Lab. (USA) [10533-37]

Multilayer with ZnO/V/VO₂/ZnO transparent conduction thin films (*Invited Paper*), Chia-Hua Lin, National Central Univ. (Taiwan). [10533-38]

Solution-processed coplanar a-InGaZnO thin-film transistors with photo-patterned ionic-polymer gate dielectric, Dayoon Lee, Yongchan Kim, Hoin Lee, Soongsil Univ. (Korea, Republic of) [10533-39]

Anisotropic resistivity in nanocrystalline ZnO and amorphous InGaZnO, Jonathan P. McCandless, Michael L. Schuette, Kevin D. Leedy, Gregg H. Jessen, Air Force Research Lab. (USA). [10533-40]

SESSION 9 TUE 4:25 PM TO 6:30 PM

Perovskite-based Materials and Devices I

Session Chair: **Norbert H. Nickel**, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany)

Development of amorphous oxide semiconductors with tunable properties and applications in solar cells (*Invited Paper*), Paul François Ndione, Andriy Zakutayev, Mukesh Kumar, Jeffrey A. Christians, Zhen Li, Donghoe Kim, National Renewable Energy Lab. (USA); Corinne E. Packard, National Renewable Energy Lab. (USA) and Colorado School of Mines (USA); John D. Perkins, Kai Zhu, Joseph M. Luther, Joseph J. Berry, David S. Ginley, National Renewable Energy Lab. (USA) [10533-98]

Design principles to achieve highly efficient phase- and temperature-stable perovskite semiconductors (*Invited Paper*), Michael Saliba, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10533-101]

Inverted planar organic-inorganic hybrid perovskite solar cells with NiO hole-transport layers as light-in window (*Invited Paper*), Zhubing He, Wei Chen, Southern Univ. of Science and Technology of China (China) [10533-63]

Green-perovskite-distributed feedback lasers (*Invited Paper*), Ifor D. W. Samuel, Jonathon R Harwell, Guy L Whitworth, Graham A Turnbull, Univ. of St. Andrews (United Kingdom) [10533-62]

Noise spectroscopy of perovskites (*Invited Paper*), Heinz-Christoph Neitzert, Univ. degli Studi di Salerno (Italy) [10533-104]

WEDNESDAY 31 JANUARY

SESSION 10 WED 8:00 AM TO 10:10 AM

ZnO-based Materials and Devices

Session Chairs: **Magnus Willander**, Linköping Univ. (Sweden); **David J. Rogers**, Nanovation (France)

Optical and magneto-optical properties of zinc-oxide nanorods grown by the low-temperature chemical route (*Invited Paper*), Magnus Willander, Rania Adam, Hatim Alnoor, Linköping Univ. (Sweden); Adrien Savoyant, Aix-Marseille Univ. (France); Omer Nur, Linköping Univ. (Sweden). [10533-42]

Probing photoluminescence at the individual micro and nanowire level in a gaseous environment (*Invited Paper*), Camilla Baratto, Istituto Nazionale di Ottica (Italy); Federica Rigoni, Istituto Nazionale di Ottica (Italy) and Univ. degli Studi di Brescia (Italy); Elisabetta Comini, Maurizio Donarelli, Guido Faglia, Istituto Nazionale di Ottica (Italy) and Univ. degli Studi di Brescia (Italy) [10533-43]

Sensing based on surface-enhanced Raman scattering and the use of Au-coated ZnO nanoarrays as substrates (*Invited Paper*), Pierre-Michel Adam, Feng Tang, Univ. de Technologie Troyes (France); David J. Rogers, Vinod Eric Sandana, Philippe Bove, Ferechteh H. Teherani, Nanovation (France) [10533-95]

Persistent Zn-polarity of Ga-doped ZnO nanoneedles grown with the vapor-liquid-solid mode on substrates of opposite polarities, Yu-Feng Yao, Huang-Hui Lin, Keng-Ping Chou, Shaobo Yang, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) [10533-44]

Structural and optical properties of indium-doped highly-conductive ZnO bulk crystals grown by the hydrothermal technique, Buguo Wang, Wright State Univ. (USA); Bruce Claffin, Air Force Research Lab. (USA); David C. Look, Wright State Univ. (USA) [10533-45]

Influence of annealing to the defect of inkjet-printed ZnO thin-film, Van-Thai Tran, Yuefan Wei, Zhaoyao Zhan, Hejun Du, Nanyang Technological Univ. (Singapore) [10533-46]

SESSION 11 WED 10:30 AM TO 1:00 PM

ZnO Bandgap Engineering

Session Chairs: **Adrián Hierro**, Univ. Politécnica de Madrid (Spain); **Ifor D. W. Samuel**, Univ. of St. Andrews (United Kingdom)

Monolithic ZnO optical microcavities: from materials science to room-temperature polariton lasers (*Invited Paper*), Jesús Zúñiga-Pérez, Ctr. National de la Recherche Scientifique (France); Omar Jamadi, Institut Pascal (France) and Univ. Clermont-Auvergne (France); Christiane Deparis, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); François Reveret, Institut Pascal (France); Xavier Lafosse, Sophie Bouchoule, Lab. de Photonique et de Nanostructures (France); Pierre Disseix, François Médard, Martine Mihailovic, Dmitry Solnyshkov, Guillaume Malpuech, Joël Leymarie, Institut Pascal (France); Mathieu Leroux, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France). [10533-47]

Phonon-intersubband transition coupling in MgZnO/ZnO quantum wells (*Invited Paper*), Adrián Hierro, Miguel Montes Bajo, Julien Tamayo-Arriola, Univ. Politécnica de Madrid (Spain); Maxime Hugues, Univ. Côte d'Azur (France) and Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Jose María Ulloa, Univ. Politécnica de Madrid (Spain); Nolwenn Le Biavan, Univ. Côte d'Azur (France) and Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Romain Peretti, Institute for Quantum Electronics, ETH Zurich (Switzerland); François Julien, Univ. Paris-Sud 11 (France); Jérôme Faist, Institute for Quantum Electronics, ETH Zurich (Switzerland); Jean-Michel Chauveau, Univ. Côte d'Azur (France) and Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France) [10533-48]

Breakage of the polarization selection rules for intersubband transitions in ZnO/MgZnO quantum wells (*Invited Paper*), Miguel Montes Bajo, Instituto de Sistemas Optoelectrónicos y Microtecnología, Univ. Politécnica de Madrid (Spain); Nolwenn Le Biavan, Univ. Côte d'Azur (France) and Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Julien Tamayo-Arriola, Instituto de Sistemas Optoelectrónicos y Microtecnología, Univ. Politécnica de Madrid (Spain); A. Torres-Pardo, J. M. González-Calbet, Univ. Complutense de Madrid (Spain) and Ctr. Nacional de Microelectrónica (Spain); Jose María Ulloa, Instituto de Sistemas Optoelectrónicos y Microtecnología, Univ. Politécnica de Madrid (Spain); D. Lefebvre, M. Hugues, Jean-Michel Chauveau, Univ. Côte d'Azur (France) and Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France) and Ctr. National de la Recherche Scientifique (France); Adrián Hierro, Instituto de Sistemas Optoelectrónicos y Microtecnología, Univ. Politécnica de Madrid (Spain) [10533-49]

Electrically-driven ultraviolet ZnO semiconductor lasers (*Invited Paper*), Jianlin Liu, Univ. of California, Riverside (USA) [10533-50]

Homoeptaxy of non-polar ZnO/(Zn,Mg)O multi-quantum wells: from a precise growth control to the observation of intersubband transitions (*Invited Paper*), Jean-Michel Chauveau, Nolwenn Le Biavan, Maxime Hugues, CRHEA-CNRS (France); Miguel Montes Bajo, Julien Tamayo-Arriola, ISOM, Universidad Politécnica de Madrid (Spain); Arnaud Jollivet, C2N, University Paris-Sud, (France); Borislav Hinkov, TU Wien (Austria); Bo Meng, ETH (Switzerland); Denis Lefebvre, Yvon Cordier, CRHEA-CNRS (France); Francoi H Julien, C2N (France); Adrian Hierro, ISOM Universidad Politécnica de Madrid (Spain); Gottfried Strasser, TU Wien (Austria); Jerome Faist, ETH (Switzerland) [10533-51]

Optical transitions due to native defects and impurities in ZnO (*Invited Paper*), John L. Lyons, U.S. Naval Research Lab. (USA) . . . [10533-100]

Lunch/Exhibition Break Wed 1:00 pm to 2:00 pm

SESSION 12 WED 2:00 PM TO 3:20 PM

Multifunctional Oxides for Energy Harvesting

Session Chairs: **Amador Pérez-Tomás**,
Institut Català de Nanociència i Nanotecnologia (ICN2) (Spain);
Charles Surya, Nazarbayev Univ. (Kazakhstan)

Ultra-transparent conducting oxides for enhanced photo-ferroelectric harvesting and functionality (*Invited Paper*), Amador Pérez-Tomás, Institut Català de Nanociència i Nanotecnologia (ICN2) (Spain). [10533-52]

ZnO-based materials for energy harvesting: thermoelectric and photovoltaic (*Invited Paper*), Yining Feng, Purdue Univ. (USA); Chuanle Zhou, Ian T. Ferguson, Missouri Univ. of Science and Technology (USA); Na Lu, Purdue Univ. (USA). [10533-53]

Ga-doped ZnO nanoneedles for anti-reflection function on a Si solar cell, Chun-Han Lin, Yu-Feng Yao, Jia-Yu Liao, Shaobo Yang, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan). [10533-54]

Effects of interfacial SiO₂ on the performance of ZnO/p-Si heterojunction solar cell, Syed Sadique Anwer Askari, Manoj Kumar, Mukul K. Das, Indian Institute of Technology (Indian School of Mines), Dhanbad (India). [10533-55]

SESSION 13 WED 3:40 PM TO 6:10 PM

Perovskite-based Materials and Devices II

Session Chair: **Ifor D. W. Samuel**,
Univ. of St. Andrews (United Kingdom)

For the lead-halides luminescence efficiency is everything (*Invited Paper*), Eli Yablonovitch, Univ. of California, Berkeley (USA). [10533-56]

Photo-induced defect formation in CH₃NH₃PbI₃ at low temperatures (*Invited Paper*), Felix Lang, Victor V. Brus, Oleksandra Shargaieva, Jörg Rappich, Norbert H. Nickel, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany). [10533-57]

Metal oxides as effective interface materials in solution-processible solar cells (*Invited Paper*), Gang Li, The Hong Kong Polytechnic Univ. (Hong Kong, China). [10533-58]

Photo-induced dissociation of CH₃NH₃PbI₃ and HC(NH₂)₂PbI₃ (*Invited Paper*), Felix Lang, Viktor Brus, Oleksandra Shargaieva, Jörg Rappich, Norbert H. Nickel, Helmholtz-Zentrum Berlin (Germany). [10533-59]

Novel growth techniques for the deposition of high-quality perovskite thin films (*Invited Paper*), Charles Surya, Nazarbayev Univ. (Kazakhstan); Annie Ng, Zhiwei Ren, Gang Li, The Hong Kong Polytechnic Univ. (Hong Kong, China); Aleksandra B. Djurišić, The Univ. of Hong Kong (Hong Kong, China). [10533-60]

Critical role of Interface and perovskite lattice in high-efficiency and photostable solar cells (*Invited Paper*), Olivier Durand, Institut National des Sciences Appliquées de Rennes (France); Wanyi Nie, Los Alamos National Lab. (USA); Hsinhan Tsai, Los Alamos National Lab. (USA) and Rice Univ. (USA); Reza Asadpour, Purdue Univ. (USA); Jean-Christophe Blancon, Fangze Liu, Los Alamos National Lab. (USA); Constantinos C. Stoumpos, Northwestern Univ. (USA); Joseph Strzalka, Argonne National Lab. (USA); Jared J. Crochet, Los Alamos National Lab. (USA); Pulickel M. Ajayan, Rice Univ. (USA); Boubacar Traore, Mikhaël Kepenekian, Claudine Katan, Institut des Sciences Chimiques de Rennes, Univ. de Rennes 1 (France); Sergei Tretiak, Los Alamos National Lab. (USA); Mercouri G. Kanatzidis, Northwestern Univ. (USA); Muhammad Ashraf Alam, Purdue Univ. (USA); Jacky Even, Institut National des Sciences Appliquées de Rennes (France); Aditiya D. Mohite, Los Alamos National Lab. (USA). [10533-61]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Advances in nonlinear optical properties of nanostructured fluorine-doped ZnO thin-films for photonic-device applications, Albin Antony, Poornesh P., Manipal Institute of Technology (India). [10533-75]

Correlation between Yb-O distance and photodarkening in yb-doped silica glass, Tomoya Okazaki, Haruhiko E. Sekiya, Kazuya Saito, Toyota Technological Institute (Japan). [10533-76]

Thermal conductivity of β-Ga₂O₃ bulk and thin films using the 3ω technique, Nicholas Blumenschein, Michael Slomski, North Carolina State Univ. (USA); Plamen Paskov, Linköping Univ. (Sweden); John Muth, Tania Paskova, North Carolina State Univ. (USA). [10533-77]

Reliability and mechanism of ZnO/Cu/ZnO transparent electrode on flexible substrate, Wei Hao Chen, National Central Univ. (Taiwan). [10533-78]

ZnO exciton recombination radiation in a weak magnetic field, Andrey P. Tarasov, Moscow Institute of Physics and Technology (Russian Federation); Valery Markushev, Charus Briskina, Kotelnikov Institute of Radio Engineering and Electronics of Russian Academy of Sciences (Russian Federation); Mikhail Shiryayev, M.V. Lomonosov Moscow State Univ. (Russian Federation). [10533-79]

Low-threshold ultraviolet lasing and enhanced photodegradation via a single ultra-thin-walled ZnO microtube, Yijian Jiang, Beijing Institute of Petrochemical Technology (China); Qiang Wang, Yinzhou Yan, Institute of Laser Engineering, Beijing Univ. of Technology (China). [10533-80]

Temperature-dependent phosphorus dopant activation in ZnO thin-film deposited using plasma immersion ion implantation, Punam Murkute, Hemant Ghadi, Indian Institute of Technology Bombay (India); Shantanu Saha, Madanapalle Institute of Technology & Science (India); Vinayak Chavan, Subhananda Chakrabarti, Indian Institute of Technology Bombay (India). [10533-81]

Effect of time varying phosphorus implantation on optoelectronics properties of RF-sputtered ZnO thin-films, Punam Murkute, Hemant Ghadi, Indian Institute of Technology Bombay (India); Shantanu Saha, Madanapalle Institute of Technology & Science (India); Vinayak Chavan, Subhananda Chakrabarti, Indian Institute of Technology Bombay (India). [10533-82]

Cleaning nitrogen oxides with titanium oxide, Hal S. Gokturk, Ecoken (USA). [10533-83]

A comparative study on omnidirectional anti-reflection SiO₂ nanostructure films coating by glancing angle deposition, Rattagan Prachachet, King Mongkut's Institute of Technology Ladkrabang (Thailand); Mati Horprathum, Pitak Eiamchai, Saksorn Limwichean, Chanunthorn Chananonawathorn, National Electronics and Computer Technology Ctr. (Thailand); Benjarong Samransuksamer, Tossaporn Lertvanithphol, King Mongkut's Univ. of Technology Thonburi (Thailand); Prathan Buranasiri, King Mongkut's Institute of Technology Ladkrabang (Thailand). [10533-84]

Goos-Hänchen effect on Si thin films with spherical and cylindrical pores, Cherrie May Olaya, Nathaniel P. Hermosa II, Wilson O. Garcia, Univ. of the Philippines (Philippines). [10533-85]

Stability of perovskite solar cells on flexible substrates, Ho Won Tam, The Univ. of Hong Kong (Hong Kong, China); Wei Chen, Southern Univ. of Science and Technology of China (China); Tik Lun Leung, Fangzhou Liu, Yushu Wang, Man Kwong Wong, Aleksandra B. Djurišić, The Univ. of Hong Kong (Hong Kong, China); Alan Man Ching Ng, Zhubing He, Southern Univ. of Science and Technology of China (China); Wai Kin Chan, Jinyao Tang, The Univ. of Hong Kong (Hong Kong, China). [10533-86]

ZnO nanostructures for organometallic halide perovskite solar cells, Ho Won Tam, Fangzhou Liu, Yushu Wang, Wei Chen, Tik Lun Leung, Aleksandra B. Djurišić, The Univ. of Hong Kong (Hong Kong, China); Alan Man Ching Ng, Southern Univ. of Science and Technology of China (China); Wai Kin Chan, Jinyao Tang, The Univ. of Hong Kong (Hong Kong, China). [10533-87]

Impedance spectroscopy response of perovskite solar cells, Thierry Pauporte, P. Wang, M. Ulfa, Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France). [10533-88]

CONFERENCE 10533

Low-temperature electro-deposition of Si and Zr layers, Thierry Pauporte, S. Qi , Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France) [10533-89]

Detectors based on Pd-doped and PdO-functionalized ZnO nanostructures, V. Postica, Oleg Lupan, N. Ababii, Technical Univ. of Moldova (Moldova); M. Hoppe, R. Adelung, Christian-Albrechts-Universität zu Kiel (Germany); L. Chow, Univ. of Central Florida (USA); Bruno Viana, Thierry Pauporte, Ecole Nationale Supérieure de Chimie de Paris (France) [10533-90]

Structural optimization of plasmonic metal/ titanium dioxide photocatalyst, Yunha Ryu, Kyoungsik Kim, Yonsei Univ. (Korea, Republic of) [10533-91]

Ratiometric optical sensing of oxygen by mixed-phase titanium oxide, Stefano Lettieri, Deborah K. Pallotti, Consiglio Nazionale delle Ricerche (Italy); Felice Gesuele, Pasquale Maddalena, Univ. degli Studi di Napoli Federico II (Italy) [10533-92]

Electro-optical characterization to understand the UV-blue emission bands in Ga₂O₃, Marco B. Peres, L. C. Alves, Eduardo P. Alves, Instituto Superior Técnico (Portugal); Teresa Monteiro, Univ. de Aveiro (Portugal); Susana Cardoso, INESC MN (Portugal); Manuel Alonso-Orts, Emilio Nogales Díaz, Bianchi Méndez, Univ. Complutense de Madrid (Spain); Garcia G. Villora, Kiyoshi Shimamura, National Institute for Materials Science (Japan); Katharina Lorenz, Instituto Superior Técnico (Portugal) [10533-93]

Formation of an InGaN/Si tandem cells by epitaxial oxide mediated lift-off and direct wafer bonding, David J. Rogers, Nanovation (France); Pierre Bellanger, ICube (France); Philippe Bove, Nanovation (France); Zakaria Djebbour, Walid Elhuni, Lab. de Génie Électrique de Paris (France); Alain Fave, Institut National des Sciences Appliquées de Lyon (France); A. Migan-Dubois, Lab. de Génie Électrique de Paris (France); Abdallah Ougazzaden, Jean Paul Salvestrini, Georgia Tech-Lorraine (France); Vinod Eric Sandana, Nanovation (France); Abdellilah Slaoui, ICube (France); Suresh Sundaram, Georgia Tech-Lorraine (France); Ferechteh H. Teherani, Nanovation (France); Paul L. Voss, Georgia Tech-Lorraine (France) . [10533-94]

THURSDAY 1 FEBRUARY

SESSION 14 THU 8:00 AM TO 10:20 AM

Optical Studies and Applications I

Session Chairs: **Bruno Viana**, Ecole Nationale Supérieure de Chimie de Paris (France); **Alain Ibanez**, Institut NÉEL (France)

Optical characteristics of novel bulk and nanoengineered hydroxyapatites (*Invited Paper*), Narasimha S. Prasad, NASA Langley Research Ctr. (USA); Stacey Sova, Lisa Kelly, Brad Arnold, Fow-Sen Choa, N.B. Singh, Univ. of Maryland, Baltimore County (USA) [10533-64]

Persistent luminescence of metal transition (Co, Ni...) -doped ZnGa₂O₄ nanophosphors for applications in the near-infrared range (*Invited Paper*), Morgane Pellerin, Didier Gourier, Ecole Nationale Supérieure de Chimie de Paris (France); Corinne Chanéac, UPMC Sorbonne Univ. (France) and Ctr. National de la Recherche Scientifique (France); Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France) [10533-65]

Synthesis of high-quality garnet-type nanocrystals with controlled size (*Invited Paper*), Geraldine Dantelle, Denis Testemale, Institut NÉEL (France); Estelle Homeyer, Christophe Dujardin, Institut Lumière Matière (France); Alain Ibanez, Institut NÉEL (France) [10533-66]

Electronic and structural defects in rare-earth oxides (*Invited Paper*), Anderson Janotti, Univ. of Delaware (USA) [10533-102]

Optical fluorescent spider silk electrospun nanofibers with embedded cerium oxide nanoparticles, Nader Shehata, Ishac Kandas, Alexandria Univ (Egypt); Ibrahim Hassounah, Randolph Lewis, Utah State University (USA); Patrik Sobolciak, Igor Krupa, Qatar University (Qatar) [10533-67]

Non-contact temperature Raman measurement in YSZ and alumina ceramics, Juddha Thapa, Benjamin T. Chorpene, Michael P. Buric, National Energy Technology Lab. (USA) [10533-68]

SESSION 15 THU 10:40 AM TO 12:30 PM

Optical Studies and Applications II

Session Chairs: **Bruno Viana**, Ecole Nationale Supérieure de Chimie de Paris (France); **Alain Ibanez**, Institut NÉEL (France)

Lanthanide-free amorphous aluminum-borate micropowders: broadband-emitting phosphors for warm-white-LED lighting (*Invited Paper*), Alain Ibanez, Institut NÉEL (France); Mathieu Salaun, Institut NÉEL, CNRS (France); Atul D. Sontake, PSL Research University, Chimie ParisTech, CNRS and Sorbonne Universités (France); Vincent Maurel, Univ. Grenoble Alpes, CEA, CNRS, INAC, SYMMES (France); Michel Bardet, Univ. Grenoble Alpes, CEA, CNRS, INAC, MEM (France); Jean-Marie Mouesca, Serge Gambarelli, Univ. Grenoble Alpes, CEA, CNRS, INAC (France); Alban Ferrier, Bruno Viana, PSL Research University, Chimie ParisTech – CNRS and Sorbonne Universités (France); Isabelle Gautier-Luneau, Inst NEEL, CNRS and Univ. Grenoble Alpes (France) [10533-69]

Realizing bulk metamaterials: designed optical properties in doped cadmium oxide multilayer films free of physical interfaces or lithography (*Invited Paper*), Jon-Paul Maria, Evan Lars Runnerstrom, Kyle Kelley, The Pennsylvania State Univ. (USA); Thomas G. Folland, Joshua D. Caldwell, Vanderbilt Univ. (USA) [10533-70]

Uncovering the dielectric optical constants of nanostructured EuO_x films for future photonics- and spintronics-integrated devices, Antonio Mariscal, Rosalia Serna, Consejo Superior de Investigaciones Científicas (Spain) [10533-71]

Magneto-photoluminescence in self-assembled vertically-aligned LaSrMnO₃:ZnO nanopillars, Wei Pan, Sandia National Labs. (USA) [10533-72]

Optical coatings based on metal-oxide gallium nanoparticles for optoelectronic devices, Flavio Nucciarelli, Univ. Autónoma de Madrid (Spain); Eva Repiso, Peter James Carrington, Anthony Krier, Lancaster Univ. (United Kingdom); José Luis Pau, Univ. Autónoma de Madrid (Spain) [10533-73]

Vanadium oxide-based mid-infrared optoelectronics devices, Laurent Bouley, Pierre Lafaille, Paul Goulain, Thomas Maroutian, Raffaele Colombelli, Adel Bousseksou, Ctr. National de la Recherche Scientifique (France) [10533-74]

Lunch/Exhibition Break Thu 12:30 pm to 1:30 pm

SESSION 16 THU 1:30 PM TO 2:15 PM

Electrochromic and Thermochemical Oxides

Session Chair: **Aline D. Rougier**, Institut de Chimie de la Matière Condensée de Bordeaux (France)

Mechanisms of electrochromism in WO₃ (*Invited Paper*), Wennie Wang, Hartwin Peelaers, Jimmy-Xuan Shen, Chris G. Van de Walle, Univ. of California, Santa Barbara (USA) [10533-103]

Lithium-doped nickel oxide for optoelectronic applications, Vinod Eric Sandana, David J. Rogers, Ferechteh H. Teherani, Philippe Bove, Nanovation (France) [10533-41]

CONFERENCE 10534

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10534

2D Photonic Materials and Devices

Conference Chairs: **Arka Majumdar**, Univ. of Washington (USA); **Xiaodong Xu**, Univ. of Washington (USA); **Joshua R. Hendrickson**, Air Force Research Lab. (USA)

Program Committee: **Ritesh Agarwal**, Univ. of Pennsylvania (USA); **Nathaniel P. Stern**, Northwestern Univ. (USA); **Carlos M. Torres Jr.**, SPAWAR Systems Ctr. Pacific (USA); **A. Nick Vamivakas**, Univ. of Rochester (USA); **Feng Wang**, Univ. of California, Berkeley (USA); **Fengnian Xia**, Yale Univ. (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 1:30 PM TO 3:30 PM

Growth and Physics of 2D Materials I

Session Chair: **Arka Majumdar**, Univ. of Washington (USA)

- Exciton dissociation and electron cooling in 2D material heterostructures** (*Invited Paper*), Frank H. L. Koppens, ICFO - Institut de Ciències Fotòniques (Spain). [10534-1]
- Coherent phonons and plasmons in 2D materials and related device applications** (*Invited Paper*), Farhan Rana, Cornell Univ. (USA) [10534-2]
- 2D materials under the microscope(s): connecting material properties and electronic structure to many-body excitonic phenomena in monolayer WS₂**, Christoph Kastl, Roland Koch, Chris Chen, Johanna Eichhorn, Bruno Schuler, Tev Kuykendall, Simon Moser, Aaron Bostwick, Chris Jowiak, Shaul Aloni, Alexander Weber-Bargioni, Eli Rotenberg, Adam M. Schwartzberg, Lawrence Berkeley National Lab. (USA). . . . [10534-3]
- 2D binary, ternary, and heterostructures based on MoS₂ and WS₂ grown by chemical vapor deposition**, Sourav Garg, Joseph L Waters, Seongsin M. Kim, Patrick Kung, The Univ. of Alabama (USA) [10534-4]
- Hot carrier electron-induced exciton-plasmon coupling and enhanced light emission in molybdenum disulfide**, Yuba Poudel, Arup Neogi, Francis D'souza, Univ. of North Texas (USA). [10534-5]

SESSION 2 MON 4:00 PM TO 5:50 PM

Growth and Physics of 2D Materials II

Session Chair: **Frank H. L. Koppens**, ICFO - Institut de Ciències Fotòniques (Spain)

- Charge transfer in 2D semiconductor monolayer heterostructures** (*Invited Paper*), Qihua Xiong, Nanyang Technological Univ. (Singapore) [10534-6]
- Observation of exciton redshift-blueshift crossover in monolayer WS₂**, Christopher Gies, Univ. Bremen (Germany); Edbert J. Sie, Massachusetts Institute of Technology (USA); Alexander Steinhoff, Univ. Bremen (Germany); C. H. Lui, Univ. of California, Riverside (USA); Q. Ma, Massachusetts Institute of Technology (USA); Malte Rösner, Gunnar Schönhoff, Frank Jahnke, Tim O. Wehling, Univ. Bremen (Germany); Y.-H. Lee, National Tsing Hua Univ. (Taiwan); J. Kong, P. Jarillo-Herrero, Nuh Gedik, Massachusetts Institute of Technology (USA) [10534-7]
- Impact of temperature on pulsed-mode MOCVD hexagonal boron nitride on sapphire**, Xu Yang, Shugo Nitta, Kentaro Nagamatsu, Markus Pristovsek, Nagoya Univ. (Japan); Yuhuai Liu, Zhengzhou Univ. (China); Yoshio Honda, Hiroshi Amano, Nagoya Univ. (Japan) [10534-8]
- Photoluminescence from 1T'-2H phase alloy molybdenum ditelluride (MoTe₂)**, Tae Wan Kim, Hyeji Park, Donghwan Kim, Korea Research Institute of Standards and Science (Korea, Republic of); Jae Cheol Shin, Yeungnam Univ. (Korea, Republic of); Sang-Woo Kang, Korea Research Institute of Standards and Science (Korea, Republic of) [10534-9]
- Ultra-long lifetimes of defect-trapped single quantum emitters in monolayer WSe₂/hBN heterostructures**, Chandriker K. Dass, Air Force Research Lab. (USA); Genevieve Clark, Univ. of Washington (USA); Jeffrey A. Simon, Wright-Patterson Air Force Base (USA); Michael N. Leuenberger, Univ. of Central Florida (USA); Ricky D. Gibson Jr., Univ. of Dayton Research Institute (USA); Shin Mou, Air Force Research Lab. (USA); Xiaodong Xu, Univ. of Washington (USA); Joshua R Hendrickson, Air Force Research Lab. (USA) [10534-10]

TUESDAY 30 JANUARY

SESSION 3 TUE 8:00 AM TO 10:20 AM

2D Material Integrated Photonic Devices I

Session Chair: **Ritesh Agarwal**, Univ. of Pennsylvania (USA)

- Strong light-matter interaction in Van der Waals materials** (*Invited Paper*), Vinod M. Menon, The City College of New York (USA). [10534-11]
- 2D materials infrared optoelectronics** (*Invited Paper*), Tony Low, Univ. of Minnesota, Twin Cities (USA) [10534-12]
- Scalable and transfer-free fabrication of high-Q MoS₂/SiO₂ hybrid nanophotonic cavity arrays**, Sebastian Hammer, Hans-Moritz Mangold, Univ. Augsburg (Germany); Ariana E. Nguyen, Dominic Martinez-Ta, Sahar Naghbi Alvililar, Ludwig Bartels, Univ. of California, Riverside (USA); Hubert J. Krenner, Univ. Augsburg (Germany) [10534-13]
- Coupling emission from single localized defects in 2D semiconductor to surface plasmon polaritons**, Tao Cai, Subhojit Dutta, Shahriar Aghaeimeibodi, Zhili Yang, Sanghee Nah, John T. Fourkas, Edo Waks, Univ. of Maryland, College Park (USA) [10534-14]
- Ultrafast optical modulators based on atomically-thin transition-metal dichalcogenides**, Peiguang Yan, Hao Chen, JinDe Yin, Jinwei Yang, JinTao Wang, Shenzhen Univ. (China) [10534-15]
- Flexible paper photodetectors based on 2D h-BN**, Chun-Ho Lin, Meng-Lin Tsai, Hui-Chun Fu, King Abdullah Univ. of Science and Technology (Saudi Arabia); Wei Luo, Lihui Zhou, Soo-Hwan Jang, Liangbing Hu, Univ. of Maryland (USA); Jr-Hau He, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10534-16]

OPTO

CONFERENCE 10534

SESSION 4 TUE 10:50 AM TO 12:10 PM

2D Material Integrated Photonic Devices II

Session Chair: **Vinod M. Menon**, The City College of New York (USA)

2D quantum materials for quantum information processing and sensing (*Invited Paper*), Dirk R. Englund, Massachusetts Institute of Technology (USA) [10534-17]

Mid-infrared electro-optic modulation in few-layer black phosphorus (*Invited Paper*), Ruoming Peng, Kaveh Khaliji, Nathan Youngblood, Roberto Grassi, Tony Low, Mo Li, Univ. of Minnesota, Twin Cities (USA) [10534-18]

Room-temperature operation of silicon-nanobeam laser based on exciton emission of 2D-monolayer MoTe₂, Yongzhuo Li, Jianxing Zhang, Dandan Huang, Hao Sun, Tsinghua Univ. (China); Fan Fan, Tsinghua Univ. (China) and Arizona State Univ. (USA); Jiabin Feng, Zhen Wang, Tsinghua Univ. (China); C.Z. Ning, Tsinghua Univ. (China) and Arizona State Univ. (USA) [10534-19]

Lunch/Exhibition Break Tue 12:10 pm to 1:30 pm

SESSION 5 TUE 1:30 PM TO 3:30 PM

2D Material Integrated Photonic Devices III

Session Chair: **Tony Low**, Univ. of Minnesota, Twin Cities (USA)

Valley phenomena in the microcavity polariton regime in transition metal dichalcogenides (*Invited Paper*), Alexander I. Tartakovskii, The Univ. of Sheffield (United Kingdom) [10534-20]

Realization of an atomically thin mirror (*Invited Paper*), Atac Imamoglu, Patrick Back, ETH Zurich (Switzerland) [10534-21]

All-fiber graphene-based electro-optic modulators with non-resonant large modulation depth, NamHun Park, Seong Ju Ha, Hyeon Ju Lee, Kwan Byung Chae, Ji-Yong Park, Dong-Il Yeom, Ajou Univ. (Korea, Republic of) [10534-22]

UV-Vis photodetector based on perovskite/nitrogen-doped graphene quantum dots composite, Mingxuan Cao, Yu Yu, Yating Zhang, Jianquan Yao, Tianjin Univ. (China) [10534-23]

Control of coherently-coupled exciton-polaritons in monolayer tungsten disulphide, Xiaoze Liu, Wei Bao, Quanwei Li, Chad Ropp, Univ. of California, Berkeley (USA); Yuan Wang, Univ. of California, Berkeley (USA) and Lawrence Berkeley National Lab. (USA); Xiang Zhang, Univ. of California, Berkeley (USA) [10534-24]

SESSION 6 TUE 4:00 PM TO 6:10 PM

2D Material Integrated Photonic Devices IV

Session Chair: **Alexander I. Tartakovskii**, The Univ. of Sheffield (United Kingdom)

Graphene heterostructure photodetectors for light sensing and imaging applications (*Invited Paper*), Zhaohui Zhong, Univ. of Michigan (USA) [10534-25]

Second harmonic generation and light emission in 2D semiconductors (*Invited Paper*), Thomas Mueller, Technische Univ. Wien (Austria) ... [10534-26]

Planar heterostructures through selective-area alloying of 2D transition metal dichalcogenide (*Invited Paper*), Hossein Taghinejad, Ali A. Eftekhar, Ali Adibi, Georgia Institute of Technology (USA) [10534-27]

Optical characterization of phase-changeable and TMD alloys, Ryan Beams, National Institute of Standards and Technology (USA) [10534-28]

Band alignment at Au/exfoliated-MoS₂-flake contacts, Dong-Wook Kim, Ahrum Sohn, Hankyool Moon, Jayeong Kim, Miri Seo, Ewha Womans Univ. (Korea, Republic of); Kyung-Ah Min, Sejong Univ. (Korea, Republic of); Sang Wook Lee, Seokhyun Yoon, Ewha Womans Univ. (Korea, Republic of); Suklyun Hong, Sejong Univ. (Korea, Republic of) [10534-29]

WEDNESDAY 31 JANUARY

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Improved electrical and photoresponsive properties of transition metal disulfides via hydrazine treatment, Moon-Ho Ham, Sang-Soo Chee, Gwangju Institute of Science and Technology (Korea, Republic of) . [10534-30]

CONFERENCE 10535

Monday–Thursday 29–1 February 2018 • Proceedings of SPIE Vol. 10535

Integrated Optics: Devices, Materials, and Technologies XXII

Conference Chairs: **Sonia M. García-Blanco**, Univ. Twente (Netherlands); **Pavel Cheben**, National Research Council Canada (Canada)

Conference Co-Chairs: **Jean-Emmanuel Broquin**, IMEP-LAHC (France); **Gualtiero Nunzi Conti**, Istituto di Fisica Applicata Nello Carrara (Italy)

Program Committee: **Pierre Berini**, Univ. of Ottawa (Canada); **Romeo Bernini**, Istituto per il Rilevamento Elettromagnetico dell'Ambiente (Italy); **Alexandra Boltasseva**, Purdue Univ. (USA); **Xudong Fan**, Univ. of Michigan (USA); **Christoph M. Greiner**, LightSmyth Technologies, Inc. (USA); **Robert Halir**, Univ. de Málaga (Spain); **Robert A. Norwood**, College of Optical Sciences, The Univ. of Arizona (USA); **Alessia Pasquazi**, Univ. of Sussex (United Kingdom); **François Royer**, Univ. Jean Monnet Saint-Etienne (France); **Jens H. Schmid**, National Research Council Canada (Canada); **Yakov Sidorenko**, Quarles & Brady LLP (USA); **Avinoam Zadok**, Bar-Ilan Univ. (Israel); **Wei Zhou**, Virginia Polytechnic Institute and State Univ. (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:50 PM

Integrated Optical Sensors

Session Chair: **Goran Z. Mashanovich**, Univ. of Southampton (United Kingdom)

On-a-chip biosensing based on optical nanoresonators (*Invited Paper*), Romain Quidant, ICFO - Institut de Ciències Fotòniques (Spain) [10535-1]

Single-molecule sensing in a hybrid photonic-plasmonic nanocavity (*Invited Paper*), Qimin Quan, The Rowland Institute at Harvard (USA). [10535-2]

High quality factor Al₂O₃ microring resonators for on-chip sensing applications, Michiel de Goede, Meindert Dijkstra, Univ. Twente (Netherlands); Raquel Obregón Núñez, Institute for Bioengineering of Catalonia (Spain); Elena Martínez, Institute for Bioengineering of Catalonia (Spain); Sonia M. García-Blanco, Univ. Twente (Netherlands) [10535-3]

Design of ultra-compact composite plasmonic Mach-Zehnder interferometer for chemical vapor sensing, Souvik Ghosh, B. M. A. Rahman, City, Univ. of London (United Kingdom) [10535-4]

System for tracking femtometer resonance shifts of silicon photonics microring resonator by locking tunable laser, Nicola Peserico, Politecnico di Milano (Italy); Paolo Barbi, Elite TechPartners (Italy); Melchiorre Bruccoleri, STMicroelectronics N.V. (Italy); Charles Baudot, STMicroelectronics (France); Antonello Fincato, Maurizio Zuffada, STMicroelectronics (Italy); Carlo Gardiani, Elite TechPartners (Italy); Andrea I. Melloni, Politecnico di Milano (Italy) [10535-5]

An integrated optical fiber device for harsh environment refractometry at indices above silica for monitoring hydrocarbon fuels, Alan Gray, Alexander Jantzen, Optoelectronics Research Ctr. (United Kingdom); Naruo Yoshikawa, Univ. of Southampton (United Kingdom); Paul C. Gow, Corin B. E. Gawith, Peter G. R. Smith, Christopher Holmes, Optoelectronics Research Ctr. (United Kingdom) [10535-6]

Lunch Break Mon 12:50 pm to 2:00 pm

SESSION 2 MON 2:00 PM TO 3:30 PM

Nonlinear Photonics I

Session Chair: **Sonia M. García-Blanco**, Univ. Twente (Netherlands)

SiNOI and AlGaAs-on-SOI nonlinear circuits for continuum generation in Si photonics, Houssein El Dirani, CEA-LETI (France); Christelle Monat, Institut des Nanotechnologies de Lyon (France); Stéphane Brisson, Nicolas Olivier, Christophe Jany, CEA-LETI (France); Xavier Letartre, Institut des Nanotechnologies de Lyon (France); Minhao Pu, Peter D. Giroard, Lars Hagedorn Frandsen, Elizaveta Semenova, Leif Katsuo Oxenlowe, Kresten Yvind, Technical Univ. of Denmark (Denmark); Corrado Sciancalepore, CEA-LETI (France) [10535-7]

Hybrid ultra-high-Q silica microcavity Raman lasers (*Invited Paper*), Andrea M. Armani, Hyungwoo Choi, Xiaoqin Shen, Dongyu Chen, Andre Kovach, The Univ. of Southern California (USA). [10535-8]

Chalcogenide glass waveguides in etched silica cladding, Moshe Katzman, Dvir Munk, Mirit Hen, Arik Bergman, Mark Oksman, Yuri Kaganovskii, Michael Rosenbluh, Avinoam Zadok, Bar-Ilan Univ. (Israel) [10535-9]

Parallel periodically-poled LiNbO₃ waveguides module for polarization diversity wavelength conversion and amplification, Tadashi Kishimoto, Oki Electric Industry Co., Ltd. (Japan) and National Institute of Information and Communications Technology (Japan); Koji Inafune, Oki Electric Industry Co., Ltd. (Japan); Yoh Ogawa, Norihiko Sekine, National Institute of Information and Communications Technology (Japan); Hitoshi Murai, Hironori Sasaki, Oki Electric Industry Co., Ltd. (Japan). [10535-10]

SESSION 3 MON 4:00 PM TO 5:40 PM

Nonlinear Photonics II

Session Chair: **Sonia M. García-Blanco**, Univ. Twente (Netherlands)

Nonlinear components for polarization control (*Invited Paper*), Luke Nicholls, Francisco J. Rodriguez Fortuno, Mazhar Nasir, Gregory A. Wurtz, Anatoly V. Zayats, King's College London (United Kingdom). [10535-11]

AlGaAs-OI waveguides for nonlinear applications, Stuart May, Marc Sorel, Univ. of Glasgow (United Kingdom). [10535-12]

Hybrid integration of 300nm-thick LiNbO₃ films on ion-exchanged glass waveguides for efficient nonlinear integrated devices, Louison Legrand, Univ. Grenoble Alpes (France); Aude Bouchard, Ctr. National de la Recherche Scientifique (France); Grégory Grosa, Institut National Polytechnique de Grenoble (France); Jean-Emmanuel Broquin, IMEP-LAHC (France) . [10535-13]

Resonance control of a silicon micro-ring resonator modulator under high-speed operation using an intrinsic photocurrent (*Invited Paper*), Andrew P. Knights, Zhao Wang, McMaster Univ. (Canada) [10535-55]

CONFERENCE 10535

TUESDAY 30 JANUARY

SESSION 4.....TUE 8:30 AM TO 10:20 AM

Subwavelength Photonics and Metamaterials

Session Chair: **Pavel Cheben**,
National Research Council Canada (Canada)

On-chip microwave photonic sensor featuring silicon-polymer hybrid subwavelength grating waveguide and bowtie antenna, Chi-Jui Chung, The Univ. of Texas at Austin (USA); Xiaochuan Xu, Omega Optics, Inc. (USA); Farzad Mokhtari-Koushyar, The Univ. of Texas at Austin (USA); Ray T. Chen, The Univ. of Texas at Austin (USA) and Omega Optics, Inc. (USA) .. [10535-14]

Sub-wavelength grating waveguide sensors (*Invited Paper*), Lukas Chrostowski, Enxiao Luan, Han Yun, Loic Laplatine, Jonas Flückiger, Karen Cheung, The Univ. of British Columbia (Canada); Yonathan Dattner, Luxmux Technology Corp. (Canada); Daniel Ratner, Univ. of Washington (USA) [10535-15]

Controlling light fields with metamaterial inspired silicon nanostructures (*Invited Paper*), Isabelle Staude, Friedrich-Schiller-Univ. Jena (Germany) [10535-16]

Silicon photonic devices with enhanced performance using subwavelength engineering (*Invited Paper*), Dan-Xia Xu, Jens H. Schmid, Yuri Grinberg, Colin Cherry, Siegfried Janz, Jean Lapointe, Shurui Wang, Martin Vachon, Pierre Verly, André Delâge, National Research Council Canada (Canada); Alejandro Sánchez-Postigo, Robert Halir, Gonzalo Wangüemert-Pérez, Alejandro Ortega-Moñux, Íñigo Molina-Fernández, Univ. de Málaga (Spain); Daniel Benedikovic, Institut d'Electronique Fondamentale (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud 11 (France) [10535-17]

SESSION 5.....TUE 10:50 AM TO 11:50 AM

Integrated Acousto-Optics

Session Chair: **Avinoam Zadok**, Bar-Ilan Univ. (Israel)

Brillouin lasers and amplifiers in silicon photonics (*Invited Paper*), Peter T. Rakich, Eric Kittlaus, Nils Otterstrom, Yale Univ. (USA); Ryan Behunin, Northern Arizona Univ. (USA) [10535-18]

Tailoring Brillouin scattering for optical memory and sensing applications on chip (*Invited Paper*), Birgit Stiller, Moritz Merklein, Atiyeh Zarifi, Benjamin J. Eggleton, The Univ. of Sydney (Australia) . [10535-19]
Lunch/Exhibition BreakTue 11:50 am to 1:20 pm

SESSION 6.....TUE 1:20 PM TO 3:00 PM

Novel Waveguide Technologies

Session Chair: **Robert A. Norwood**, College of Optical Sciences,
The Univ. of Arizona (USA)

Direct UV-written integrated waveguides using 213nm light, Paul C. Gow, Rex H. S. Bannerman, James C. Gates, Christopher Holmes, Peter G. R. Smith, Optoelectronics Research Ctr. (United Kingdom) [10535-20]

Composite material hollow core fibers: functionalization with silicon and 2D materials, Pier J. Sazio, Adam H. Lewis, Francesco De Lucia, Walter Belardi, Francesco Poletti, Daniel Hewak, Chung-Che Huang, Univ. of Southampton (United Kingdom) [10535-21]

High-contrast slab waveguide fabrication in KY(WO₄)₂ by swift heavy-ion irradiation, Raimond Frentrup, Univ. Twente (Netherlands); Victoria Tormo-Márquez, José Olivares, Univ. Autónoma de Madrid (Spain); Sonia M. García-Blanco, Univ. Twente (Netherlands) [10535-22]

Electrically tunable optical filters based on liquid crystal core microring resonators, Florentia A. Costache, Haldor Hartwig, Anja Martin, Martin Blasl, Andreas Rieck, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) [10535-23]

Pedestal waveguides in potassium yttrium double tungstate, Simen M. Martinussen, Raimond Frentrup, Meindert Dijkstra, Univ. Twente (Netherlands); Victoria Tormo-Márquez, Univ. Autónoma de Madrid (Spain); José Olivares, Instituto de Óptica, Consejo Superior de Investigaciones Científicas (Spain); Sonia M. García-Blanco, Univ. Twente (Netherlands) [10535-24]

SESSION 7.....TUE 3:30 PM TO 6:10 PM

Photonic Integration

Session Chair: **Dan-Xia Xu**,
National Research Council Canada (Canada)

Breaking the mold of photonic packaging (*Invited Paper*), Tymon Barwicz, IBM Thomas J. Watson Research Ctr. (USA); Ted Lichoulas, AFL (USA); Yoichi Taira, Yves Martin, IBM Thomas J. Watson Research Ctr. (USA); Shotaro Takenobu, Asahi Glass Co., Ltd. (Japan); Alexander Janta-Polczynski, IBM Canada Ltd. (Canada); Hidetoshi Numata, IBM Research - Tokyo (Japan); Eddie L. Kimbrell, AFL (USA); Jae-Woong Nah, Bo Peng, IBM Thomas J. Watson Research Ctr. (USA); Darrell Childers, US Conec Ltd. (USA); Robert Leidy, GLOBALFOUNDRIES Inc. (USA); Marwan Khater, Swetha Kamlapurkar, IBM Thomas J. Watson Research Ctr. (USA); Elaine Cyr, IBM Canada Ltd. (Canada); Sebastian Engelmann, IBM Thomas J. Watson Research Ctr. (USA); Paul Fortier, Nicolas Boyer, IBM Canada Ltd. (Canada) [10535-25]

Transfer printing of III-V devices for heterogeneous integration (*Invited Paper*), Yifeng Song, Univ. of Glasgow (United Kingdom); Benoit Jack Eloi Guilhabert, John McPhillimy, Michael J. Strain, Univ. of Strathclyde (United Kingdom); Charalambos Klitis, Marc Sorel, Univ. of Glasgow (United Kingdom) [10535-88]

Relaxed tolerance adiabatic silicon nitride coupler for high I/O port-density optical interconnects, Erfan M. Fard, Soha Namnabat, Stephanie Arouh, Robert A. Norwood, Nasser Peyghambarian, Thomas L. Koch, The Univ. of Arizona (USA) [10535-26]

A novel polishing stop for accurate integration of potassium yttrium double tungstate on a silicon dioxide platform, Carlijn I. van Emmerik, Simen M. Martinussen, Meindert Dijkstra, Sonia M. García-Blanco, Univ. Twente (Netherlands) [10535-27]

Low temperature bonding of heterogeneous materials using Al₂O₃ as an intermediate layer, Hitesh Kumar Sahoo, Luisa Ottaviano, Yi Zheng, DTU Fotonik (Denmark); Ole Hansen, DTU Nanotech (Denmark); Kresten Yvind, DTU Fotonik (Denmark) [10535-28]

High-directionality L-shaped fiber-chip grating couplers realized in 300-nm silicon-on-insulator platform with deep-ultraviolet lithography, Carlos A. Alonso-Ramos, Daniel Benedikovich, Diego Pérez-Galacho, Ctr. de Nanosciences et de Nanotechnologies (France); Sylvain Guerber, STMicroelectronics (France); Vladyslav Vakarin, Guillaume Marcaud, Xavier Le Roux, Eric Cassan, Delphine Marris-Morini, Ctr. de Nanosciences et de Nanotechnologies (France); Pavel Cheben, National Research Council Canada (Canada); Frédéric Boeuf, Charles Baudot, STMicroelectronics (France); Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) [10535-29]

Monolithic integration of photonic components for NIR on-chip micro-instrument, Maurine Malak, Tom Claes, Rita Van Hoof, Pol Van Dorpe, Xavier Rottenberg, Harrie A. C. Tilmans, IMEC (Belgium) [10535-30]

WEDNESDAY 31 JANUARY

SESSION 8.....WED 8:30 AM TO 10:00 AM

Novel Materials

Session Chair: **Jean-Emmanuel Broquin**, IMEP-LAHC (France)

Efficient synthesis and innovative processing of high-performance electro-optic polymers for integrated photonics (*Invited Paper*), Jingdong Luo III, City Univ. of Hong Kong (Hong Kong, China) [10535-31]

Phase change materials exhibit tunable volatility in integrated photonics, Nathan Youngblood, Carlos A. Rios, Zengguang Cheng, Harish Bhaskaran, Univ. of Oxford (United Kingdom) [10535-32]

Design and fabrication of Bragg-grating-coupled high Q-factor ring resonator using liquid-source CVD-deposited Si₃N₄ film at 150°C, Xiaoyang Cheng, Jianxun Hong, Shiyoshi Yokoyama, Kyushu Univ. (Japan) [10535-33]

Materials with giant interband transitions: a new landscape for low-loss and switchable nanophotonics, Johann Toudert, Consejo Superior de Investigaciones Científicas (Spain) and ICFO - Institut de Ciències Fotòniques (Spain); Rosalia Serna, Consejo Superior de Investigaciones Científicas (Spain) [10535-34]

SESSION 9 WED 10:30 AM TO 12:10 PM

Mid IR

Session Chair: **Laurent Vivien**,
Ctr. de Nanosciences et de Nanotechnologies (France)

Group IV mid-infrared devices and circuits (*Invited Paper*), Goran Z. Mashanovich, Jordi Soler-Penadés, Wei Cao, Zhibo Qu, Ahmed Osman, Yangbo Wu, Ali Z. Khokhar, Callum J. Littlejohns, Stevan Stanković, Scott Reynolds, Vinita Mittal, Ganapathy S. Murugan, James S. Wilkinson, Yanli Qi, Frederic Y. Gardes, David J. Thomson, Milos Nedeljkovic, Univ. of Southampton (United Kingdom) [10535-35]

Development of integrated platform based on chalcogenides for sensing applications in the mid-infrared (*Invited Paper*), Aldo Gutierrez-Arroyo, Loic Bodiou, Univ. de Rennes 1 (France); Jonathan Lemaitre, Emeline Baudet, Univ. de Rennes I (France); Marion Baillieul, Isabelle Hardy, Virginie Nazabal, Joel Charrier, Univ. de Rennes 1 (France) [10535-36]

Ultrafast laser-inscribed waveguides in IG2 chalcogenide glass for mid-infrared photonics applications, Helen L. Butcher, Science and Technology Facilities Council (United Kingdom); David G. MacLachlan, Scottish Univ. Physics Alliance (United Kingdom) and Heriot-Watt Univ. (United Kingdom); David Lee, UK Astronomy Technology Ctr. (United Kingdom) and Science and Technology Facilities Council (United Kingdom); Robert R. Thomson, Scottish Univ. Physics Alliance (United Kingdom) and Heriot-Watt Univ. (United Kingdom); Damien Weidmann, Science and Technology Facilities Council (United Kingdom) [10535-37]

Silicon membrane Bragg filters for near- and mid-infrared applications, Carlos A. Alonso-Ramos, Xavier Le Roux, Daniel Benedikovic, Vladyslav Vakarin, Elena Durán-Valdeiglesias, Dorian Oser, Diego Pérez-Galacho, Eric Cassan, Delphine Marris-Morini, Ctr. de Nanosciences et de Nanotechnologies (France); Pavel Cheben, National Research Council Canada (Canada); Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) [10535-38]

Lunch/Exhibition Break Wed 12:10 pm to 1:40 pm

SESSION 10 WED 1:40 PM TO 3:20 PM

Metrology

Session Chair: **Pavel Cheben**,
National Research Council Canada (Canada)

Comparative study of quantitative phase imaging techniques for refractometry of photo-induced waveguides in glass, Bertrand de Dorlodot, Erik Bélanger, Ctr. de recherche CERVO (Canada) and Ctr. d'Optique, Photonique et Laser (Canada); Jean-Philippe Bérubé, Réal Vallée, Ctr. d'Optique, Photonique et Laser (Canada); Pierre Marquet, Ctr. de recherche CERVO (Canada) and Ctr. d'Optique, Photonique et Laser (Canada) [10535-39]

Random all-dielectric anti-reflective metasurfaces on the waveguide facet, Yuriy Artemyev, Alexander Shalin, ITMO Univ. (Russian Federation); Alina Karabchevsky, Ben-Gurion Univ. of the Negev (Israel) [10535-40]

Multi-parameter estimation of high-Q silicon rich nitride resonators using optical frequency domain reflectometry, Luis A. Bru, Univ. Politècnica de València (Spain); Zhichao Ye, Chalmers Univ. of Technology (Sweden); Daniel Pastor, Univ. Politècnica de València (Spain); Victor Torres-Company, Chalmers Univ. of Technology (Sweden); Pascual Muñoz, Univ. Politècnica de València (Spain) and VLC Photonics (Spain) [10535-41]

Measurement of photon torques with torsional nano-optomechanical systems, Li He, Huan Li, Mo Li, Univ. of Minnesota, Twin Cities (USA) [10535-42]

Uncertainty quantification and stochastic modelling of photonic device from experimental data through polynomial chaos expansion, Abi Waqas, Politecnico di Milano (Italy) and Mehran Univ. of Engineering and Technology (Pakistan); Daniele Melati, Politecnico di Milano (Italy); Zarlish Mushtaq, Mehran Univ. of Engineering & Technology (Pakistan) and Politecnico di Milano (Italy); Andrea I. Melloni, Politecnico di Milano (Italy) [10535-43]

SESSION 11 WED 3:50 PM TO 5:50 PM

Integrated Quantum Optics

Session Chair: **Jens H. Schmid**,
National Research Council Canada (Canada)

Quantum information processing with a travelling wave of light (*Invited Paper*), Takahiro Serikawa, Yu Shiozawa, Hisashi Ogawa, Naoto Takanashi, Shuntaro Takeda, Jun-ichi Yoshikawa, Akira Furusawa, The Univ. of Tokyo (Japan) [10535-44]

Integrated quantum optics with nanowires (*Invited Paper*), Val Zwiller, KTH Royal Institute of Technology (Sweden) [10535-45]

Engineering quantum light on photonic chips, Qiang Lin, Univ. of Rochester (USA) [10535-46]

Integrated waveguide photonics circuits for quantum simulation and beyond, Paolo Mataloni, Sapienza Univ. di Roma (Italy) [10535-47]

Germanium on silicon single-photon avalanche detectors using silicon-on-insulator substrates, Emanuele Alberto Ghisetti, Derek Dumas, Jaroslaw Kirdoda, Kevin Gallacher, Ross William Millar, Muhammad M. A. Mirza, Douglas J. Paul, Univ. of Glasgow (United Kingdom) [10535-48]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Polarization independent tunable wavelength filters based on polymer waveguide Bragg reflector, Tae-Hyun Park, Eon-Tae Kim, Guanghao Huang, Sung-Moon Kim, Min-Cheol Oh, Pusan National Univ. (Korea, Republic of) [10535-62]

Hybrid plasmonic electro-optical absorption modulator based on epsilon-near-zero characteristics of ITO, Mohamed Y. Abdelatty, The American Univ. in Cairo (Egypt) and The British Univ. in Egypt (Egypt); Mohamed M. Badr, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10535-63]

A waveguide loss measurement method based on the reflected interferometric pattern of a Fabry-Perot cavity, Yiming He, Zhaocong Li, Dan Lu, Institute of Semiconductors, Chinese Academy of Sciences (China) [10535-64]

Polarization-tailored broad color palette in transmission mode based on resonant grating structure, Ishwor Koirala, Kwangwoon Univ. (Korea, Republic of); Vivek Raj Shrestha, Kwangwoon Univ. (Korea, Republic of) and The Univ. of Melbourne (Australia); Chul-Soon Park, Sang-Shin Lee, Kwangwoon Univ. (Korea, Republic of); Duk-Yong Choi, The Australian National Univ. (Australia) [10535-65]

Subwavelength focusing in the infrared range using a planar metallic lens of binary slits with refractive index modulation, Manar Abdel-Galil, Yehea Ismail, Zewail City of Science and Technology (Egypt) and The American Univ. in Cairo (Egypt); Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10535-66]

Optical current sensors incorporating an integrated optic device based on quadrature phase interferometer, Sung-Moon Kim, Tae-Hyun Park, Gaung-Hao Huang, Min-Cheol Oh, Pusan National Univ. (Korea, Republic of) [10535-67]

Precise core alignment in fabrication of polymer optical waveguides using the mosquito method for three-dimensional optical circuits, Kumi Date, Koji Fukagata, Takaaki Ishigure, Keio Univ. (Japan) [10535-68]

Wavelength independent integrated optic polarization splitters using a birefringent polymer, Guanghao Huang, Tae-Hyun Park, Pusan National Univ. (Korea, Republic of) [10535-69]

All-silicon transparent conducting oxide-integrated electro-optical modulator, Mohamed M. Badr, The American Univ. in Cairo (Egypt); Mohamed Y. Abdelatty, The American Univ. in Cairo (Egypt) and The British Univ. in Egypt (Egypt); Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10535-70]

The transmission characteristics of waveguide-typed nano-gap plasmonic resonator, Geum-Yoon Oh, Han-Young Lee, Korea Electronics Technology Institute (Korea, Republic of) [10535-71]

CONFERENCE 10535

Miniaturized semiconductor MOPA laser source at 772 nm for the generation of UV laser light, Alexander Sahn, Ferdinand-Braun-Institut (Germany); Stefan Baumgärtner, TOPTICA Photonics AG (Germany); Julian Hofmann, Ferdinand-Braun-Institut (Germany); Patrick Leisching, TOPTICA Photonics AG (Germany); Katrin Paschke, Ferdinand-Braun-Institut (Germany) [10535-72]

Mid-infrared graphene-insulator-graphene plasmonic modulator, Mohamed Y. El Sayed, Yehea Ismail, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10535-73]

Planar waveguide optics based on Bloch surface waves in photonic crystals, Kirill Safronov, Ksenia Abrashitova, Dmitry Gulkin, Natalia Kokareva, Ilya Antropov, Vladimir Bessonov, Andrey Fedyanin, M.V. Lomonosov Moscow State Univ. (Russian Federation) [10535-74]

Compact broadband taper for low-loss coupling to a silicon nitride photonic wire, Purnima Sethi, Ctr. for Nano Science and Engineering, Indian Institute of Science (India); Anubhab Haldar, Univ. of Massachusetts Amherst (USA); Rakshitha Kallega, Shankar Kumar Selvaraja, Ctr. for Nano Science and Engineering, Indian Institute of Science (India) [10535-75]

Mode converter using 2D MMI, Amr Wageeh, Salwa El-Sabban, Helwan Univ. (Egypt); Diaa Khalil, Ain Shames Univ. (Egypt) [10535-76]

True resolution enhancement for optical spectroscopy, Jeffrey B. Oleske, Justin Cooper, Andor Technology Ltd. (USA) [10535-77]

All-optical modulation using the Kerr effect in c-Si, a-Si:H, and Ge₂₃Sb₇S₇₀ microring resonators, Dusan Gostimirovic, Peter Neathway, Winnie N. Ye, Carleton Univ. (Canada) [10535-78]

Fabrication of high extinction ratio lithium niobate integrated optical modulators using photorefractive trimming, Aleksandr Tronev, ITMO Univ. (Russian Federation) and Ioffe Institute (Russian Federation); Mikhail Parfenov, Saint-Petersburg State Polytechnical Univ. (Russian Federation) and Ioffe Institute (Russian Federation); Petr Agruzov, Igor Ilichev, Aleksandr V. Shamrai, Ioffe Institute (Russian Federation) [10535-79]

Analysis of surface plasmon biosensor for dengue detection using modified BPM, Adel Sharkawy, Mohamed Hameed, Ctr. for Photonics and Smart Materials, Zewail City of Science and Technology (Egypt); Lotfi Gomaa, Benha Univ. (Egypt); Wei Wong Wong, Faisal Adikan, Integrated Lightwave Research Group, Univ. of Malaya (Malaysia); Mohamed A. Swillam, The American Univ. in Cairo (Egypt); Salah Obayya, Ctr. for Photonics and Smart Materials, Zewail City of Science and Technology (Egypt) [10535-80]

High-performance double-slot waveguide-based electro-optic ring resonator modulator, Ahmed S. Salama, Mohamed M. Badr, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10535-81]

Slow-light modulator using semiconductor metamaterial waveguide, Zohreh Vafapour, Johns Hopkins Univ. (USA) [10535-82]

A new type of reactor system: aerogel optofluidic microreactor with waveguide (AOMW), Yaprak Özbakir, Koç Univ. (Turkey); Alexandr Jonáš, Istanbul Technical Univ. (Turkey); Alper Kiraz, Can Erkey, Koç Univ. (Turkey) [10535-83]

Aerogel-based photocatalytic optofluidic microreactors, Yaprak Özbakir, Koç Univ. (Turkey); Alexandr Jonáš, Istanbul Technical Univ. (Turkey); Alper Kiraz, Can Erkey, Koç Univ. (Turkey) [10535-84]

Low chirp electroabsorption-modulated DFB laser fabricated by combining selective-area growth and double-stack active layer techniques, Qiufang Deng, Song Liang, Hongliang Zhu, Institute of Semiconductors, Chinese Academy of Sciences (China) [10535-85]

High-performance infrared graphene photodetectors based on metallic nanostructures, Semih Cakmakyapan, Univ. of California, Los Angeles (USA) [10535-86]

Rare-earth-doped selenide ridge waveguides and microdisks on pedestal for integrated mid-infrared light sources, Walid El Ayed, Loic Bodiou, Jonathan Lemaitre, Yannick Dumeige, Isabelle Hardy, Univ. de Rennes 1 (France); Florent Starecki, Emeline Baudet, Univ. de Rennes 1 (France); Radwan Chahal, Virginie Nazabal, Joel Charrier, Univ. de Rennes 1 (France) [10535-87]

THURSDAY 1 FEBRUARY

SESSION 12 THU 8:30 AM TO 10:00 AM

Plasmonics

Session Chair: **Pierre Berini**, Univ. of Ottawa (Canada)

Benchmarking CMOS metal-based dielectric loaded surface plasmon waveguide at telecom frequencies (*Invited Paper*), Alain Dereux, Jean-Claude Weeber, Univ. Bourgogne Franche-Comté (France); Juan Arocas, Olivier Heintz, Laurent Markey, Lab. Interdisciplinaire Carnot de Bourgogne (France) and Ctr. National de la Recherche Scientifique (France); Sviatlana Viarbitskaya, Gérard Colas des Francs, Kamal Hammani, Univ. Bourgogne Franche-Comté (France); Claudia Hoessbacher, Ueli Koch, Juergen Leuthold, ETH Zurich (Switzerland); Karl Rohrer, ams AG (Austria); Anna-Lena Giesecke, Caroline Porschatis, Thorsten Wahlbrink, B. Chmielak, AMO GmbH (Germany); Dimitris Tsiokos, Nikos Pleros, Aristotle Univ. of Thessaloniki (Greece) [10535-49]

Efficient coupling between Si₃N₄ photonic and hybrid slot-based CMOS plasmonic waveguide, Evangelia Chatzianagnostou, Dimitra Ketzaki, Athanasios Manolis, George Dabos, Nikos Pleros, Aristotle Univ. of Thessaloniki (Greece); Laurent Markey, Jean-Claude Weeber, Alain Dereux, Lab. Interdisciplinaire Carnot de Bourgogne (France); Anna Lena Giesecke, AMO GmbH (Germany) and Advanced Microelectronic Ctr. Aachen (Germany); Caroline Porschatis, AMO GmbH (Germany) and Advanced Microelectronic Ctr. Aachen (Germany); Dimitris Tsiokos, Aristotle Univ. of Thessaloniki (Greece) [10535-50]

Surface-plasmon optomagnetic field enhancement for all-optical magnetization switching, Aveek Dutta, Alexander V. Kildishev, Vladimir M. Shalaev, Alexandra Boltasseva, Ernesto E. Marinero, Purdue Univ. (USA) [10535-51]

CMOS plasmonic waveguides co-integrated with LPCVD-based Si₃N₄ via a butt-coupled interface, Athanasios Manolis, George Dabos, Dimitra Ketzaki, Evangelia Chatzianagnostou, Sotirios Papaioannou, Dimitris Tsiokos, Aristotle Univ. of Thessaloniki (Greece); Laurent Markey, Jean-Claude Weeber, Alain Dereux, Lab. Interdisciplinaire Carnot de Bourgogne (France) and Ctr. National de la Recherche Scientifique (France); Anna-Lena Giesecke, AMO GmbH (Germany) and AMICA - Advanced Microelectronic Ctr. Aachen (Germany); Caroline Porschatis, AMO GmbH (Germany); Nikos Pleros, Aristotle Univ. of Thessaloniki (Greece) [10535-52]

SESSION 13 THU 10:30 AM TO 12:10 PM

Planar Lightwave Circuits

Session Chair: **Avinoam Zadok**, Bar-Ilan Univ. (Israel)

Advanced modulation format using silicon modulators (*Invited Paper*), Diego Pérez-Galacho, Ctr. de Nanociencias et de Nanotechnologies (France); Laurent Bramerie, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France); Charles Baudot, STMicroelectronics (France); Mohamed Chaibi, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France); Sonia Messaoudène, Nathalie Vulliet, STMicroelectronics (France); Laurent Vivien, Ctr. de Nanociencias et de Nanotechnologies (France); Christophe Peucheret, FOTON Lab. (France); Delphine Marris-Morini, Ctr. de Nanociencias et de Nanotechnologies (France) [10535-53]

Reconfigurable integrated waveguide meshes for photonic signal processing and emerging applications (*Invited Paper*), Jose Capmany, Ivana Gasulla, Daniel Perez, Univ. Politècnica de Valencia (Spain) . . [10535-54]

O-band Echelle grating CWDM demultiplexers on SiNOI exhibiting quasi-absolute thermal insensitiveness, Corrado Sciancalepore, Hussein El Dirani, Quentin Wilmart, Carole Socquet-Clerc, Laetitia Adelmini, Sébastien Pauliac, Daniel Robin-Brosse, Ségolène Olivier, CEA-LETI (France) [10535-56]

High-aggregate-capacity visible light communication links using stacked multimode polymer waveguides and micro-pixelated LED arrays, Nikos Bamiedakis, Univ. of Cambridge (United Kingdom); Jonathan J. D. McKendry, Enyuan Xie, Erdan Gu, Martin D. Dawson, Univ. of Strathclyde (United Kingdom); Richard V. Pentyl, Ian H. White, Univ. of Cambridge (United Kingdom) [10535-57]

Lunch/Exhibition Break Thu 12:10 pm to 1:40 pm

SESSION 14.....THU 1:40 PM TO 3:00 PM

Diffractives

Session Chair: **Xudong Fan**, Univ. of Michigan (USA)

Thermally-controlled Si photonic crystal slow light beam steering device, Goro Takeuchi, Yosuke Terada, Moe Takeuchi, Hiroshi Abe, Hiroyuki Ito, Keisuke Kondo, Toshihiko Baba, Yokohama National Univ. (Japan)[10535-58]

Highly efficient grating couplers with mode conversion functions, Meng Zhang, Liuqing He, Yuhao Guo, Tianjin Univ. (China); Kazumi Wada, Lionel C. Kimerling, Jurgen Michel, Anuradha Murthy Agarwal, Massachusetts Institute of Technology (USA); Guifang Li, Univ. of Central Florida (USA); Lin Zhang, Tianjin Univ. (China)[10535-59]

Integrated and steerable vortex laser using bound states in continuum, Babak Bahari, Felipe Valini, Thomas Lepetit, Ricardo Tellez-Limon, Junhee Park, Ashok Kodigala, Yeshaiahu Fainman, Boubacar Kanté, Univ. of California, San Diego (USA)[10535-60]

Temperature-dependence of polymer grating couplers on single and dual mode waveguides, Pei Li, Stanislav Sherman, Univ. of Freiburg (Germany); Maher Rezem, Leibniz Univ. Hannover (Germany); Kirsten Honnef, Hans Zappe, Univ. of Freiburg (Germany)[10535-61]

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Tuesday-Thursday

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- Optical materials and substrates
- IR sources and detectors
- Electronic imaging components
- Optical coatings
- Lenses and filters
- Positions and mounts
- Metrology tools

CONFERENCE 10536

Monday–Thursday 29 January–1 February 2018 • Proceedings of SPIE Vol. 10536

Smart Photonic and Optoelectronic Integrated Circuits XX

Conference Chairs: **Sailing He**, KTH Royal Institute of Technology (Sweden); **Ei-Hang Lee**, Inha Univ. (Korea, Republic of)

Program Committee: **Pavel Cheben**, National Research Council Canada (Canada); **Ray T. Chen**, The Univ. of Texas at Austin (USA); **Louay A. Eldada**, Quanergy Systems, Inc. (USA); **Shanhui Fan**, Stanford Univ. (USA); **Chennupati Jagadish**, The Australian National Univ. (Australia); **Stefan A. Maier**, Imperial College London (United Kingdom); **Joachim Piprek**, NUSOD Institute LLC (USA); **David V. Plant**, McGill Univ. (Canada); **Andrew W. Poon**, Hong Kong Univ. of Science and Technology (Hong Kong, China); **Ali Serpengüzel**, Koç Univ. (Turkey); **Alan X. Wang**, Oregon State Univ. (USA); **Qian Wang**, A*STAR - Data Storage Institute (Singapore); **Michael R. Watts**, Massachusetts Institute of Technology (USA); **Lin Yang**, Institute of Semiconductors (China); **Rui Q. Yang**, The Univ. of Oklahoma (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600–1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:35 PM

Mid-Infrared Optoelectronics

Session Chair: **Rui Q. Yang**, The Univ. of Oklahoma (USA)

- Electrically-pumped VCSELs using type-II quantum wells for the mid-infrared** (*Invited Paper*), Ganpath Kumar Veerabathran, Stephan Sprengel, Alexander Andrejew, Markus-Christian Amann, Walter Schottky Institut (Germany) [10536-1]
- III-V/silicon photonic integrated circuits for spectroscopic sensing in the 2 μ m wavelength range** (*Invited Paper*), Ruijun Wang, Muhammad Muneeb, Anton Vasiliev, Aditya Malik, Univ. Gent (Belgium); Stephan Sprengel, Gerhard Boehm, Technische Univ. München (Germany); Ieva Simonyte, Augustinas Vizbaras, Kristijonas Vizbaras, Brolis Semiconductors UAB (Lithuania); Roel Baets, Univ. Gent (Belgium); Markus-Christian Amann, Technische Univ. München (Germany); Gunther Roelkens, Univ. Gent (Belgium) [10536-2]
- Monolithic integration of quantum cascade lasers and detectors** (*Invited Paper*), Gottfried Strasser, Benedikt Schwarz, Andreas Harrer, Rolf Szedlak, Peter Reininger, Tobias Zederbauer, Technische Univ. Wien (Austria); Hermann Detz, Austrian Academy of Sciences (Austria); Donald MacFarland, Aaron M. Andrews, Technische Univ. Wien (Austria) [10536-3]
- Development of chalcogenide glass fibers for mid-IR technologies** (*Invited Paper*), Bruno Bureau, Catherine Boussard, Virginie Nazabal, Johann Troles, Univ. de Rennes 1 (France) [10536-4]
- Development of quantum and interband cascade lasers on silicon** (*Invited Paper*), Charles D. Merritt, William W. Bewley, Chadwick L. Canedy, Chul Soo Kim, Igor Vurgaftman, Jerry R. Meyer, U.S. Naval Research Lab. (USA); Alexander Spott, Jon Peters, Eric J. Stanton, Michael L. Davenport, Alfredo Torres, John E. Bowers, Univ. of California, Santa Barbara (USA); Jeremy D. Kirch, Luke J. Mawst, Dan Botez, Univ. of Wisconsin-Madison (USA) [10536-5]
- Lunch Break Mon 12:35 pm to 1:35 pm

SESSION 2 MON 1:35 PM TO 3:25 PM

Metamaterials and Metasurfaces I

Session Chairs: **Jian Wang**, Huazhong Univ. of Science and Technology (China); **Natalia M. Litchinitser**, Univ. at Buffalo (USA)

Flat optics: from high-performance metalenses to structured light (*Keynote Presentation*), Federico Capasso, Harvard School of Engineering and Applied Sciences (USA) [10536-6]

- Broadband terahertz generation from metamaterials** (*Invited Paper*), Costas M. Soukoulis, Iowa State Univ. of Science and Technology (USA) and Institute of Electronic Structure and Lasers (Greece) [10536-7]
- Beam shaping using nonlinear and reconfigurable engineered materials** (*Invited Paper*), Natalia M. Litchinitser, Jingbo Sun, Wiktor Walasik, Salih Z. Silahli, Univ. at Buffalo (USA); Eric Johnson, Clemson Univ. (USA); Yun Xu, Univ. at Buffalo (USA); Apra Pandey, CST of America, Inc. (USA); Mikhail Shalaev, Univ. at Buffalo (USA); Jesse Frantz, Jason Myers, Jasbinder S. Sanghera, U.S. Naval Research Lab. (USA) [10536-8]
- High-efficiency and tunable metasurfaces in reflective and transmissive geometries** (*Invited Paper*), Lei Zhou, Qiong He, Shulin Sun, Fudan Univ. (China) [10536-9]

SESSION 3 MON 3:55 PM TO 6:20 PM

Metamaterials and Metasurfaces II

Session Chairs: **Jian Wang**, Huazhong Univ. of Science and Technology (China); **Lei Zhou**, Fudan Univ. (China)

- Plasmonic nanopatch metasurfaces as multifunctional components for photonics applications** (*Keynote Presentation*), David R. Smith, Duke Univ. (USA) [10536-10]
- Optical superoscillation technologies with metasurfaces: subdiffraction focusing and label-free imaging** (*Keynote Presentation*), Nikolay I. Zheludev, Edward T. F. Rogers, Optoelectronics Research Ctr. (United Kingdom); Guanghui Yuan, Nanyang Technological Univ. (Singapore) [10536-11]
- Plasmonic and dielectric metasurfaces for structured light manipulation** (*Invited Paper*), Jian Wang, Huazhong Univ. of Science and Technology (China) [10536-12]
- Near-field patterning with reflectionless designer ultrathin metasurfaces** (*Invited Paper*), Nasim Mohammadi Estakhri, Raphael Kastner, Nader Engheta, Univ. of Pennsylvania (USA) [10536-13]
- Threshold-less Cherenkov radiation in hyperbolic metamaterial** (*Invited Paper*), Fang Liu, Yidong Huang, Tsinghua Univ. (China) . . . [10536-14]

TUESDAY 30 JANUARY

Sessions 4-5 run concurrently with sessions 6-7.

SESSION 4.....TUE 8:20 AM TO 10:00 AM

Modulators I

Joint Session with Conferences 10536 and 10537

Session Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

High-speed pulse-amplitude modulation with femtojoule microring modulators (*Invited Paper*), Wei Shi, Raphaël Dubé-Demers, Sophie LaRochelle, Univ. Laval (Canada) [10536-15]

Advanced solutions in silicon photonics using traditional fabrication methods and materials of CMOS technologies (*Invited Paper*), Charles Baudot, Maurin Douix, Sylvain Guerber, Sébastien Crémer, Nathalie Vulliet, Jonathan Planchot, Romuald Blanc, Laurène Babaud, STMicroelectronics (France); Carlos Alonso-Ramos, Diego Pérez-Galacho, Ctr. de Nanosciences et de Nanotechnologies (France); Sonia Messaoudène, STMicroelectronics (France); Sébastien Kerdiles, CEA-LETI (France); Daniel Benedikovic, Ctr. de Nanosciences et de Nanotechnologies (France); Catherine Euvarde-Colnat, CEA-LETI (France); Eric Cassan, Delphine Marris-Morini, Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France); Pablo Acosta-Alba, CEA-LETI (France); Frédéric Boeuf, STMicroelectronics (France) [10537-14]

A wide bandwidth-tunable micro-ring filter based on multi-channel combination, Tingge Dai, Gencheng Wang, Jianfei Jiang, Yuehai Wang, Yubo Li, Hui Yu, Yinlei Hao, Xiaoqing Jiang, Jianyi Yang, Zhejiang Univ. (China) [10536-16]

Silicon modulators with optimized vertical PN junctions for high-modulation-efficiency in the O-band, Jason Ching E. Png, Thomas Y. L. Ang, Soon Thor Lim, Jun Rong Ong, A*STAR Institute of High Performance Computing (Singapore) [10537-15]

SESSION 5.....TUE 10:30 AM TO 12:10 PM

Modulators II

Joint Session with Conferences 10536 and 10537

Session Chair: **Sailing He**, KTH Royal Institute of Technology (Sweden)

High-speed Pockels effect in strained silicon waveguide (*Invited Paper*), Mathias Berciano, Guillaume Marcaud, Pedro Damas, Xavier Le Roux, Carlos Alonso-Ramos, Diego Pérez-Galacho, Vladyslav Vakarin, Paul Crozat, Daniel Benedikovic, Delphine Marris-Morini, Eric Cassan, Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) [10536-19]

Multilayer silicon-integrated photonic platforms for 3D photonic devices and circuits (*Invited Paper*), Joyce K. Poon, Univ. of Toronto (Canada) [10537-16]

Two-dimensional beam-steering using 1x16 silicon optical phased array with thermo-optic tunable grating radiators, Seong-Hwan Kim, Geumbong Kang, Jeongyoon Kim, Dae-Seong Lee, Nam-Hyun Kwon, Jong-Bum You, KAIST (Korea, Republic of); Dong-Eun Yoo, Dong-Wook Lee, National Nanofab Ctr. (Korea, Republic of); Yun-Gi Ha, Chan-Hyun Youn, Kyungsik Yu, Hyo-Hoon Park, KAIST (Korea, Republic of) [10537-17]

High-efficient mode-selective four-wave mixing using a length-optimized multimode silicon waveguide, Jiabi Xiong, Yu Yu, Weili Yang, Chunlei Sun, Wenhao Wu, Xinliang Zhang, Wuhan National Lab. for Optoelectronics (China) [10537-18]

Lunch/Exhibition Break Tue 12:10 pm to 1:25 pm

SESSION 6.....TUE 9:25 AM TO 10:15 AM

Lab-on-Fiber Technologies I

Session Chairs: **Heike Ebendorff-Heidepriem**, The Univ. of Adelaide (Australia); **Yinlan Ruan**, The Univ. of Adelaide (Australia)

Nodeless hollow-core fiber: a novel platform for lab-on-a-fiber (*Invited Paper*), Yingying Wang, Shoufei Gao, Beijing Univ. of Technology (China); Wei Ding, Institute of Physics, Chinese Academy of Sciences (China); Pu Wang, Beijing Univ. of Technology (China) [10536-17]

Is lab-on-fiber technology more than a simple vision? (*Invited Paper*), Andrea Cusano, Univ. degli Studi del Sannio (Italy) [10536-18]

SESSION 7.....TUE 10:45 AM TO 12:25 PM

Lab-on-Fiber Technologies II

Session Chairs: **Heike Ebendorff-Heidepriem**, The Univ. of Adelaide (Australia); **Yinlan Ruan**, The Univ. of Adelaide (Australia)

From fiber-optics to integrated waveguides: recent advancements in mid-infrared chem/bio sensors (*Invited Paper*), Boris Mizaikoff, Univ. Ulm (Germany) [10536-20]

Quantum dots integrated fiber devices for smart communication and sensing applications (*Invited Paper*), Ming Tang, Feng Gao, Yang Wang, Huan Liu, Liang Xu, Zhenhua Feng, Songnian Fu, Deming Liu, Huazhong Univ. of Science and Technology (China) [10536-21]

Pushing the limits in sensing through the use of microstructured optical fibers (*Invited Paper*), Heike Ebendorff-Heidepriem, The Univ. of Adelaide (Australia) [10536-22]

Advanced functional semiconductor fibers for optoelectronic and thermoelectric applications (*Invited Paper*), Lei Wei, Nanyang Technological Univ. (Singapore) [10536-23]

Lunch/Exhibition Break Tue 12:25 pm to 1:25 pm

CONFERENCE 10536

SESSION 8.....TUE 1:25 PM TO 3:45 PM

Smart Plasmonics and Metamaterials

Session Chairs: **Stefan A. Maier**, Imperial College London (United Kingdom); **Sailing He**, KTH Royal Institute of Technology (Sweden)

Refractory plasmonics without refractory materials (*Invited Paper*), Harald Giessen, Gelon Albrecht, Mario Hentschel, Stefan Kaiser, Univ. Stuttgart (Germany)[10536-24]

Linear and nonlinear optoelectronics in plasmonic nanogaps (*Invited Paper*), Ruben Esteban, Donostia International Physics Ctr. (Spain); Garikoitz Aguirregabiria, Ctr. de Fisica de Materiales (Spain); Dana-Codruta Marinica, Institut des Sciences Moléculaires d'Orsay (France); Andrey K. Kazansky, Donostia International Physics Ctr. (Spain); Javier Aizpurua, Ctr. de Fisica de Materiales (Spain); Andrei Borissov, Institut des Sciences Moléculaires d'Orsay (France)[10536-25]

Electrically-driven metamaterials (*Invited Paper*), Pan Wang, Alexey V. Krasavin, Mazhar Nasir, Anatoly V. Zayats, King's College London (United Kingdom)[10536-26]

Tunable plasmonic resonance in wide wavelength range for smart photonic and optoelectronic applications (*Invited Paper*), Koichi Okamoto, Kyushu Univ. (Japan)[10536-27]

Dielectric and hybrid plasmonic/dielectric nanocavities for low-loss nanophotonics (*Invited Paper*), Stefan A. Maier, Imperial College London (United Kingdom)[10536-28]

Ultra-compact plasmonic-oxide electro-optic modulator, Qian Gao, Erwen Li, Alan X. Wang, Oregon State Univ. (USA)[10536-29]

SESSION 9.....TUE 4:05 PM TO 6:30 PM

Metamaterials and Metasurfaces III

Session Chairs: **Jian Wang**, Huazhong Univ. of Science and Technology (China); **Natalia M. Litchinitser**, Univ. at Buffalo (USA)

Non-equilibrium metamaterials: self-adaptive and self-healed (*Keynote Presentation*), Xiang Zhang, Univ. of California, Berkeley (USA)[10536-30]

Plasmonic metamaterials reimaged (*Keynote Presentation*), Vladimir M. Shalaev, Purdue Univ. (USA)[10536-31]

Subwavelength engineered dielectric metamaterial structures for silicon photonic devices (*Invited Paper*), Jens H. Schmid, Pavel Cheben, Dan-Xia Xu, Siegfried Janz, Jean Lapointe, Shurui Wang, Martin Vachon, National Research Council Canada (Canada); Robert Halir, Alejandro Ortega-Moñux, Gonzalo Wangüemert-Pérez, Iñigo Molina-Fernández, Alejandro Sánchez-Postigo, José Manuel Luque-González, José Darío Sarmiento-Merenguel, Univ. de Málaga (Spain)[10536-32]

External cloaking and illusion with metasurfaces (*Invited Paper*), Jensen Li, The Univ. of Birmingham (United Kingdom)[10536-33]

Thermal metasurfaces (*Invited Paper*), Zubin Jacob, Purdue Univ. (USA)[10536-34]

WEDNESDAY 31 JANUARY

SESSION 10.....WED 8:10 AM TO 9:50 AM

Smart Photonic Components and Optical Sensing

Session Chair: **Ashok Maliakal**, LGS Innovations Inc. (USA)

Optical sensing with dual-comb spectroscopy (*Invited Paper*), Nathalie Picqué, Max-Planck-Institut für Quantenoptik (Germany)[10536-35]

Variable resolution infrared chemical imaging with a quantum cascade laser of breast cancer microarrays (*Invited Paper*), Kevin L. Yeh, Shachi Mittal, Rohit Bhargava, Univ. of Illinois (USA)[10536-36]

Chalcogenide glass photonics for infrared sensing (*Invited Paper*), Pierre Lucas, The Univ. of Arizona (USA)[10536-37]

Silicon photonics for computing, interconnects, and sensing (*Invited Paper*), Ray Chen, The Univ. of Texas at Austin (USA)[10536-38]

SESSION 11.....WED 10:20 AM TO 12:25 PM

Smart Structures for Photonic Integration

Session Chair: **Pavel Cheben**, National Research Council Canada (Canada)

Towards integrated devices for ultrafast all-optical signal processing in optical networks (*Invited Paper*), Ivan Glesk, Univ. of Strathclyde (United Kingdom); Zifei Wang, Lawrence R. Chen, McGill Univ. (Canada)[10536-39]

Nonlinear plasmonic metasurfaces (*Invited Paper*), Antonino Calà Lesina, Behnood Ghamsari, Lora Ramunno, Pierre Berini, Univ. of Ottawa (Canada)[10536-40]

Leveraging photonic integration to enhance performance in datacom optical links (*Invited Paper*), Benjamin G. Lee, IBM Thomas J. Watson Research Ctr. (USA)[10536-41]

Integrated photonic circuits for data-center applications (*Invited Paper*), Roman Bruck, Yannick De Koninck, Kam-Yan Hon, Peng Sun, Marc Savanier, Subal Sahni, Gianlorenzo Masini, Scott Denton, Laurent Planchon, Thierry Pinguet, Nathaniel Rudnick, Gene Armijo, Joseph Balardeta, Brian Chase, Yuemeng Chi, Anders Dahl, Mehmet Eker, Sama Fathpour, Dennis Foltz, Steve Hovey, Steven Jackson, Wei Li, Yee Liang, Michael Mack, Gary McGee, Simon Pang, Mark Peterson, Kevin Roberson, Jeff Schramm, Chang Sohn, Kirk Stechschulte, George Vastola, Shawn Wang, Gary Wong, Kosei Yokoyama, Shuhuan Yu, Richard Zhou, Attila Mekis, Peter De Dobbelaere, Luxtera, Inc. (USA)[10536-42]

Mid-infrared materials and devices on a Si platform (*Invited Paper*), Anuradha Agarwal, Massachusetts Institute of Technology (USA)[10536-43]
Lunch/Exhibition BreakWed 12:25 pm to 1:30 pm

SESSION 12.....WED 1:30 PM TO 3:10 PM

Integration of Microwave Photonic Devices and Systems I

Session Chair: **Jianji Dong**, Huazhong Univ. of Science and Technology (China)

Microwave photonic filtering using a resonance-split loop on silicon (*Invited Paper*), Yikai Su, Shanghai Jiao Tong Univ. (China)[10536-44]

Ultrahigh-resolution optical vector analysis for characterization of photonic integrated circuits (*Invited Paper*), Shilong Pan, Nanjing Univ. of Aeronautics and Astronautics (China)[10536-45]

Manipulation of microwave signals with photonic approaches (*Invited Paper*), Junqiang Sun, Huazhong Univ. of Science and Technology (China)[10536-46]

Integrated analog signal processing (*Invited Paper*), Ming Li, Institute of Semiconductors, Chinese Academy of Sciences (China)[10536-47]

SESSION 13.....WED 3:40 PM TO 6:10 PM

Integration of Microwave Photonic Devices and Systems II

Session Chairs: **Jianji Dong**, Huazhong Univ. of Science and Technology (China); **Shilong Pan**, Nanjing Univ. of Aeronautics and Astronautics (China)

Advances on integrated microwave photonics (*Invited Paper*), Jianji Dong, Siqi Yan, Huazhong Univ. of Science and Technology (China); Yunhong Ding, Sanshui Xiao, Technical Univ. of Denmark (Denmark)[10536-48]

Integrated microwave photonic signal processing devices and subsystems (*Invited Paper*), Xiaoke Yi, Suen Xin Chew, Shijie Song, Linh Nguyen, Liwei Li, Robert Minasian, The Univ. of Sydney (Australia)[10536-49]

Microwave photonic signal processing using silicon photonic Bragg gratings (*Invited Paper*), José Azaña, Institut National de la Recherche Scientifique (Canada); Maurizio Burla, ETH Zurich (Switzerland); Lukas Chrostowski, The Univ. of British Columbia (Canada); Ming Li, Institute of Semiconductors, Chinese Academy of Sciences (China)[10536-50]

Recent progress in nano-optomechanical devices at microwave frequencies (*Invited Paper*), Zejie Yu, Wen Zhou, Hon Ki Tsang, Xiankai Sun, The Chinese Univ. of Hong Kong (Hong Kong, China)[10536-51]

Programmable optical filters based on a matrix of silicon dual-ring assisted MZIs (*Invited Paper*), Linjie Zhou, Zhanzhi Guo, Liangjun Lu, Jianping Chen, Shanghai Jiao Tong Univ. (China)[10536-52]

Nanoantenna perfect absorber integrated thermal detectors towards infrared gas sensing (*Invited Paper*), Fei Yi, Xiaochao Tan, Ao Yang, Junyu Li, Ruilei Gan, Huan Liu, Huazhong Univ. of Science and Technology (China)[10536-53]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Development of a wearable for oximetry and patient physical activity correlation, Daniela Margarito, Mathieu Hautefeuille, Erika González, Univ. Nacional Autónoma de México (Mexico); Moisés Selman, Ivette Buendía, Instituto Nacional de Enfermedades Respiratorias Ismael Cosío Villegas (Mexico)[10536-76]

Effects of fog attenuation on LIDAR data in urban environment, Imran Ashraf, Yongwan Park, Yeungnam Univ. (Korea, Republic of)[10536-77]

Virtual prototyping of complex photonic components and integrated circuits for polymer-based integration platform, Andrzej Polatynski, VPIphotonics GmbH (Germany); David de Felipe, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); André Richter, VPIphotonics GmbH (Germany); Sergei Mingaleev, VPI Development Ctr. (Belarus); Eugene Sokolov, VPIphotonics (USA); Hauke Conradi, Moritz Kleinert, Crispin Zawadzki, Norbert Keil, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany)[10536-78]

MZI-based monolithic passive SOI photonic temperature sensor, Muhammad Zakwan, Suat Kurt, Nurperi Yavuz, Ali Serpengüzel, Koç Univ. (Turkey)[10536-79]

Electrically-tunable subwavelength grating using transparent conductive oxide, Erwen Li, Qian Gao, Alan X. Wang, Oregon State Univ. (USA)[10536-80]

THURSDAY 1 FEBRUARY

SESSION 14 THU 8:00 AM TO 9:40 AM

Integration of Microwave Photonic Devices and Systems III

Session Chair: **Jianji Dong**,
Huazhong Univ. of Science and Technology (China)

Electro-photonics: an emerging field for photonic integrated circuits (*Invited Paper*), Leimeng Zhuang, Monash Univ. (Australia) [10536-54]

Photonic approaches to microwave communication and detection (*Invited Paper*), Xihua Zou, Southwest Jiaotong Univ. (China) [10536-55]

Reconfigurable photonic integrated circuits on silicon (*Invited Paper*), Daoxin Dai, Zhejiang Univ. (China) [10536-56]

Ultra-silicon-rich nitride devices for high nonlinear figure of merit optical signal processing (*Invited Paper*), Dawn T. H. Tan, Singapore Univ. of Technology & Design (Singapore) [10536-57]

SESSION 15 THU 10:10 AM TO 12:30 PM

Smart Optical Sensing

Session Chairs: **Alan X. Wang**, Oregon State Univ. (USA);
Sailing He, KTH Royal Institute of Technology (Sweden)

Optofluidic cell and tissue lasers and their novel biomedical applications (*Invited Paper*), Xudong Fan, Yu-Cheng Chen, Qiushu Chen, Univ. of Michigan (USA) [10536-58]

On-chip surface-enhanced infrared absorption for gas sensing (*Invited Paper*), Xinyuan Chong, Erwen Li, Oregon State Univ. (USA); Ki-Joong Kim, National Energy Technology Lab. (USA); Yujing Zhang, Oregon State Univ. (USA); Paul R. Ohodnicki, National Energy Technology Lab. (USA); Chih-Hung Chang, Alan X. Wang, Oregon State Univ. (USA) [10536-59]

Resonant coupling from photonic crystal surfaces to plasmonic nanoantennas: principles, detection instruments, and applications in digital resolution biosensing (*Invited Paper*), Brian T. Cunningham, Univ. of Illinois (USA) [10536-60]

Electrokinetic manipulation of Raman nanosensors for ultrasensitive photonic-plasmonic hybrid biodetection and tunable biochemical release (*Invited Paper*), Donglei (Emma) Fan, The Univ. of Texas at Austin (USA) [10536-61]

Toward miniature multifunctional photonic sensing systems (*Invited Paper*), Miao Yu, Yongyao Chen, Hyun-Tae Kim, Univ. of Maryland, College Park (USA) [10536-62]

On-chip integration of black phosphorus photodetector with photonic circuits and nanoplasmonics, Che Chen, Daehan Yoo, Sang-Hyun Oh, Mo Li, Univ. of Minnesota, Twin Cities (USA) [10536-63]

Lunch/Exhibition Break Thu 12:30 pm to 1:30 pm

SESSION 16 THU 1:30 PM TO 3:10 PM

Smart Fabrication and Photonic Integration

Session Chair: **Daoxin Dai**, Zhejiang Univ. (China)

Femtosecond laser inscribed color centers, microfluidics, and photonics in single-crystal diamond (*Invited Paper*), Shane M. Eaton, Vibhav Bharadwaj, Belen Sotillo, Argyro N. Giakoumaki, Thien Le Phu, Maria Ramos, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Ottavia Jedrkiewicz, Consorzio Nazionale Interuniversitario per la Scienze Fisiche della Materia (Italy) and CNR-Istituto di Fotonica e Nanotecnologie (Italy); Roberto Osellame, Toney T. Fernandez, CNR-Istituto di Fotonica e Nanotecnologie (Italy); J.P. Hadden, Institute for Quantum Science and Technology, Univ. of Calgary (Canada); Andrea Chiappini, CNR-Istituto di Fotonica e Nanotecnologie (Italy) and CSMFO Lab. (Italy) and Ctr. Materiali e Microsistemi, Fondazione Bruno Kessler (Italy); Maurizio Ferrari, Roberta Ramponi, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Paul E. Barclay, Institute for Quantum Science and Technology, Univ. of Calgary (Canada); Patrick S. Salter, Univ. of Oxford (United Kingdom) [10536-64]

Advancing silicon photonics by germanium ion implantation into silicon (*Invited Paper*), Graham T. Reed, Optoelectronics Research Ctr. (United Kingdom) [10536-65]

Photoinduced functional materials by femtosecond laser direct writing (*Invited Paper*), Yasuhiko Shimotsuma, Kyoto Univ. Graduate School of Engineering (Japan); Masaaki Sakakura, Next Generation Laser Processing Technology Research Association (Japan); Kiyotaka Miura, Kyoto Univ. Graduate School of Engineering (Japan) [10536-66]

High-speed silicon Mach-Zehnder optical modulators with large optical bandwidths (*Invited Paper*), Lin Yang, Jianfeng Ding, Sizhu Shao, Lingchen Zheng, Institute of Semiconductors, Chinese Academy of Sciences (China) [10536-67]

SESSION 17 THU 3:40 PM TO 5:45 PM

Smart PIC and Optical Fiber Communication

Session Chairs: **Anhui Liang**, Guangdong Univ. of Technology (China);
Yi Cai, ZTE USA (USA)

Smart and advanced PIC on human retina and optical fibers in animal bodies (*Invited Paper*), Anhui Liang, Guangdong Univ. of Technology (China) [10536-68]

Opto-electronic conversion devices based on hot-carrier internal photoemission and anomalous light-trapping enhancement (*Invited Paper*), Liu Yang, Mengzhu Hu, Nan He, Zhejiang Univ. (China) [10536-69]

Data center links beyond 100 Gbit/s per wavelength (*Invited Paper*), Jose Krause Perin, Anujit Shastri, Joseph Kahn, Stanford Univ. (USA) [10536-70]

Advance modulation formats for large-capacity data-center networks (*Invited Paper*), Xin Jiang, College of Staten Island (USA) [10536-71]

Forward error correction in probabilistic shaping systems (*Invited Paper*), Yi Cai, ZTE USA (USA) [10536-72]

SESSION 18 THU 5:45 PM TO 6:30 PM

LIDAR Technologies

Session Chair: **Sailing He**,
KTH Royal Institute of Technology (Sweden)

Design of pulsed scanning lidar without mutual interferences, Gungunzong Kim, Jeongsook Eom, Yongwan Park, Yeungnam Univ. (Korea, Republic of) [10536-73]

Analyzing the impact of incidence angle on LIDAR intensity data, Imran Ashraf, Yongwan Park, Yeungnam Univ. (Korea, Republic of) [10536-74]

Enhanced pedestrian safety awareness at crosswalks via networked LiDAR, thermal imaging, and sensors, Luke J. Nichols, Zachary A. Weingarten, Faezeh Haghighat Mesbahi, Michelle Holzemer, Marshall Bassford, Joseph Prine, R. Integlia, Florida Polytechnic Univ. (USA) [10536-75]

Silicon Photonics XIII

Conference Chairs: **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom); **Andrew P. Knights**, McMaster Univ. (Canada)

Program Committee: **Martijn J. R. Heck**, Aarhus Univ. (Denmark); **Siegfried Janz**, National Research Council Canada (Canada); **Goran Z. Mashanovich**, Univ. of Southampton (United Kingdom); **Jurgen Michel**, Massachusetts Institute of Technology (USA); **Ching Eng Jason Png**, A*STAR Institute of High Performance Computing (Singapore); **Andrew W. Poon**, Hong Kong Univ. of Science and Technology (Hong Kong, China); **Haisheng Rong**, Intel Corp. (USA); **Dries Van Thourhout**, Univ. Gent (Belgium); **Laurent Vivien**, Institut d'Électronique Fondamentale (France); **William Whelan-Curtin**, Tyndall National Institute (Ireland); **Jeremy Witzens**, RWTH Aachen Univ. (Germany); **Shui-Qing Yu**, Univ. of Arkansas (USA); **Zhiping Zhou**, Peking Univ. (China); **Aaron J. Zilkie**, Rockley Photonics (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM	
OPTO PLENARY SESSION	
8:00 am:	Welcome and Opening Remarks Connie J. Chang-Hasnain , Univ. of California, Berkeley (USA); Graham T. Reed , Optoelectronics Research Ctr. (United Kingdom)
8:05 am:	Silicon Photonics: Bigger is Better Andrew G. Rickman , Rockley Photonics Ltd. (United Kingdom)
8:45 am:	III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range Pallab K. Bhattacharya , Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
9:25 am:	Photonics beyond the diffraction limit Min Gu , Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:20 PM

Fabrication and Manufacturing

Session Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

Challenges and solutions for high-volume testing of silicon photonics (*Invited Paper*), Robert Polster, Liang Yuan Dai, Qixiang Cheng, Keren Bergman, Columbia Univ. (USA) [10537-1]

A self-aligned dry etching method for mechanical strain enhancement of germanium and its uniformity improvement for photonic applications, Yiding Lin, Nanyang Technological Univ. (Singapore); Danhao Ma, Jurgen Michel, Massachusetts Institute of Technology (USA); Chuan Seng Tan, Nanyang Technological Univ. (Singapore) [10537-2]

An accelerated wafer level testing of photonics components using Raspberry Pi, Ashesh Sasidharan, GLOBALFOUNDRIES Singapore (Singapore) [10537-3]

Optimization of H₂ thermal annealing process for the fabrication of ultra-low loss sub-micron silicon-on-insulator rib waveguides, Cyril Bellegarde, Lab. des Technologies de La Microélectronique, Univ. Grenoble Alpes (France); Erwine Pargon, Corrado Sciancalepore, Camille Petit-Etienne, Daniel Robin-Brosse, Jean-Michel Hartmann, Philippe Lyan, Lab. des Technologies de La Microélectronique, Univ. Grenoble Alpes (France) [10537-4]

200mm full CMOS-compatible hybrid III-V/Si laser process integration on a mature silicon-photonic platform, Bertrand Szelag, Karim Hassan, CEA-LETI (France); Elodie Ghegin, STMicroelectronics (France); Philippe Rodriguez, Salma Bensalem, Fabrice Nemouchi, Laetitia Adelmini, Toufiq Bria, Mélisa Brihoum, Pierre Brianceau, Elisa Vermande, Olivier Pesenti, Antoine Schembri, Marie-Christine Roure, Brigitte Montmayeul, Loïc Sanchez, Romain Crochemore, CEA-LETI (France); Sebastien Dominguez, STMicroelectronics (France); Christophe Jany, CEA-LETI (France) [10537-5]

Lunch Break Mon 12:20 pm to 1:50 pm

SESSION 2 MON 1:50 PM TO 3:20 PM

Waveguides

Session Chair: **Jason Ching Eng Png**,

A*STAR Institute of High Performance Computing (Singapore)

Subwavelength grating metamaterial waveguides for silicon photonics (*Invited Paper*), Pavel Cheben, National Research Council Canada (Canada) [10537-6]

A hybrid SOI/SiN photonic platform for high-speed and temperature-insensitive CWDM optical transceivers, Quentin Wilmart, David Fowler, Corrado Sciancalepore, Karim Hassan, Simon Plantier, Laetitia Adelmini, Stéphanie Garcia, Daniel Robin-Brosse, Stéphane Malhouitre, Ségolène Olivier, MINATEC (France) [10537-7]

2D material-enabled reconfigurable Si photonics for optical interconnects, Joaquin Faneca, Elias Torres Alonso, Monica Craciun, Anna Baldycheva, Univ. of Exeter (United Kingdom) [10537-8]

Silicon nitride photonics: from visible to mid-infrared wavelengths, Pascual Muñoz, Univ. Politècnica de València (Spain) and VLC Photonics (Spain); Jose David Domenech, VLC Photonics (Spain); Carlos Domínguez, Ctr. Nacional de Microelectrónica, Instituto de Microelectrónica de Barcelona (Spain) and Consejo Superior de Investigaciones Científicas (Spain); Ana Sánchez, Ctr. Nacional de Microelectrónica, Institut de Microelectrónica de Barcelona (Spain) and Consejo Superior de Investigaciones Científicas (Spain); Gloria Micó, Luis A. Bru, Univ. Politècnica de València (Spain); Daniel Pérez, Univ. Politècnica de Valencia (Spain); Daniel Pastor, Univ. Politècnica de València (Spain); Juan Fernández, Bernardo Gargallo, VLC Photonics (Spain) [10537-9]

SESSION 3 MON 3:50 PM TO 5:30 PM

Novel Applications and Processes I

Session Chair: **Pavel Cheben**,

National Research Council Canada (Canada)

Lensless imaging using silicon photonics optical phased arrays receivers (*Invited Paper*), Ali Hajimiri, California Institute of Technology (USA) [10537-10]

How coherent Ising machines push circuit design in silicon photonics to its limits (*Invited Paper*), Thomas Van Vaerenbergh, Ranojoy Bose, David Kielpinski, Gabriel J. Mendoza, Jason S. Pelc, Nikolas Tezak, Charles Santori, Raymond G. Beausoleil, HP, Inc. (USA) [10537-11]

Silicon-photonics-based carry-ripple adder towards future optical computing, Zheng Wang, Zhoufeng Ying, Shounak Dhar, Zheng Zhao, David Z. Pan, Ray T. Chen, The Univ. of Texas at Austin (USA) [10537-12]

Optical measurement of the thermal-properties of InP nanocavities encapsulated in ZnO-based material, Dorian Sanchez, Lab. de Photonique et de Nanostructures (France) and Ctr. de Nanosciences et de Nanotechnologies (France); Olivier Dalstein, Ecole Nationale Supérieure de Chimie de Paris (France) and Ctr. de Nanosciences et de Nanotechnologies (France); Quentin Chateiller, Sophie Bouchoule, Gregoire Beaudoin, Isabelle Sagnes, Rama Raj, Ctr. de Nanosciences et de Nanotechnologies (France); Marco Faustini, Lab. de Chimie de la Matière Condensée de Paris (France) and Univ. Pierre et Marie Curie (Finland); Andrea Cattoni, Ctr. de Nanosciences et de Nanotechnologies (France); Fabrice Raineri, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris 7-Diderot (France) [10537-13]

TUESDAY 30 JANUARY

SESSION 4 TUE 8:20 AM TO 10:00 AM

Modulators I

Joint Session with Conferences 10536 and 10537

Session Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

High-speed pulse-amplitude modulation with femtojoule microring modulators (*Invited Paper*), Wei Shi, Raphaël Dubé-Demers, Sophie LaRochelle, Univ. Laval (Canada) [10536-15]

Advanced solutions in silicon photonics using traditional fabrication methods and materials of CMOS technologies (*Invited Paper*), Charles Baudot, Maurin Douix, Sylvain Guerber, Sébastien Crémer, Nathalie Vulliet, Jonathan Planchot, Romuald Blanc, Laurène Babaud, STMicroelectronics (France); Carlos Alonso-Ramos, Diego Pérez-Galacho, Ctr. de Nanosciences et de Nanotechnologies (France); Sonia Messaoudène, STMicroelectronics (France); Sébastien Kerdiles, CEA-LETI (France); Daniel Benedikovic, Ctr. de Nanosciences et de Nanotechnologies (France); Catherine Euvard-Colnat, CEA-LETI (France); Eric Cassan, Delphine Marris-Morini, Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France); Pablo Acosta-Alba, CEA-LETI (France); Frédéric Boeuf, STMicroelectronics (France) [10537-14]

A wide bandwidth-tunable micro-ring filter based on multi-channel combination, Tingge Dai, Gencheng Wang, Jianfei Jiang, Yuehai Wang, Yubo Li, Hui Yu, Yinlei Hao, Xiaoqing Jiang, Jianyi Yang, Zhejiang Univ. (China) [10536-16]

Silicon modulators with optimized vertical PN junctions for high-modulation-efficiency in the O-band, Jason Ching E. Png, Thomas Y. L. Ang, Soon Thor Lim, Jun Rong Ong, A*STAR Institute of High Performance Computing (Singapore) [10537-15]

SESSION 5 TUE 10:30 AM TO 12:10 PM

Modulators II

Joint Session with Conferences 10536 and 10537

Session Chair: **Sailing He**, KTH Royal Institute of Technology (Sweden)

High-speed Pockels effect in strained silicon waveguide (*Invited Paper*), Mathias Berciano, Guillaume Marcaud, Pedro Damas, Xavier Le Roux, Carlos Alonso-Ramos, Diego Pérez-Galacho, Vladyslav Vakarin, Paul Crozat, Daniel Benedikovic, Delphine Marris-Morini, Eric Cassan, Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) [10536-19]

Multilayer silicon-integrated photonic platforms for 3D photonic devices and circuits (*Invited Paper*), Joyce K. Poon, Univ. of Toronto (Canada) [10537-16]

Two-dimensional beam-steering using 1x16 silicon optical phased array with thermo-optic tunable grating radiators, Seong-Hwan Kim, Geumbong Kang, Jeongyoon Kim, Dae-Seong Lee, Nam-Hyun Kwon, Jong-Bum You, KAIST (Korea, Republic of); Dong-Eun Yoo, Dong-Wook Lee, National Nanofab Ctr. (Korea, Republic of); Yun-Gi Ha, Chan-Hyun Youn, Kyungsik Yu, Hyo-Hoon Park, KAIST (Korea, Republic of) [10537-17]

High-efficient mode-selective four-wave mixing using a length-optimized multimode silicon waveguide, Jiabi Xiong, Yu Yu, Weili Yang, Chunlei Sun, Wenhao Wu, Xinliang Zhang, Wuhan National Lab. for Optoelectronics (China) [10537-18]

Lunch/Exhibition Break Tue 12:10 pm to 1:40 pm

SESSION 6 TUE 1:40 PM TO 3:20 PM

Silicon Photonic Systems

Session Chair: **Joyce K. Poon**, Univ. of Toronto (Canada)

Application of quantum-dot multi-wavelength lasers and silicon photonic ring resonators to data-center optical interconnects (*Invited Paper*), Douglas J. S. Beckett, Ryan Hickey, Dylan F. Logan, RANOVUS, Inc. (Canada); Andrew P. Knights, McMaster Univ. (Canada); Rong Chen, Bin Cao, Jeffery F. Wheelodon, RANOVUS, Inc. (Canada) [10537-19]

Packaging of silicon photonic devices: from prototypes to production (*Invited Paper*), Peter O'Brien, Tyndall National Institute (Ireland) ... [10537-20]

Hybrid InP-on-silicon photonic-crystal-based nanoamplifier, Francesco Manegatti, Dimitrios Fitsios, Dorian Sanchez, Rama Raj, Ctr. de Nanosciences et de Nanotechnologies (France); Fabrice Raineri, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris 7-Diderot (France) [10537-21]

A hybrid integrated single-wavelength laser with silicon micro-ring reflector, Min Ren, Jing Pu, Vivek Krishnamurthy, Leonard Gonzaga, Yeow Teck Toh, Febiana Tjiptoharsono, Qian Wang, A*STAR - Data Storage Institute (Singapore) [10537-22]

INDUSTRY EVENT 3:30 PM TO 4:30 PM

Silicon Photonics and Photonic Integrated Circuits: 2018 Industry Perspective

See page 20 for details.

WEDNESDAY 31 JANUARY

SESSION 7 WED 8:20 AM TO 10:00 AM

Germanium Integration

Session Chair:

Graham T. Reed, Optoelectronics Research Ctr. (United Kingdom)

Ge-based photonic devices for CMOS integration (*Invited Paper*), Jurgen Michel, Ruitao Wen, Danhao Ma, Gianluca Roscioli, Xueying Zhao, Massachusetts Institute of Technology (USA) [10537-23]

Comparative study of the effects of doping and Sn-alloying on the band structure of Ge (*Invited Paper*), Jose Menendez, Chi Xu, John Kouvetakos, Arizona State Univ. (USA) [10537-24]

Optimization of defect-enhanced epitaxial Ge quantum dots for Si-based optoelectronics, Lukas Spindlberger, Julia Freund, Thomas Fromherz, Friedrich Schäffler, Johannes Kepler Univ. Linz (Austria); Antonio Polimeni, Sapienza Univ. di Roma (Italy); Mark Lusk, Colorado School of Mines (USA); Martyna Grydlik, Moritz Brehm, Johannes Kepler Univ. Linz (Austria) [10537-25]

Ge-rich graded-index Si_{1-x}Ge_x devices for Mid-IR integrated photonics, Joan Manel Ramirez, Vladyslav Vakarin, Qiankun Liu, Univ. Paris-Sud 11 (France); Andrea Ballabio, Xavier Le Roux, Politecnico di Milano (Italy); Daniel Benedikovic, Carlos Alonso-Ramos, Univ. Paris-Sud 11 (France); Giovanni Isella, Politecnico di Milano (Italy); Laurent Vivien, Delphine Marris-Morini, Univ. Paris-Sud 11 (France); Jacopo Frigerio, Politecnico di Milano (Italy) [10537-26]

CONFERENCE 10537

SESSION 8 WED 10:30 AM TO 12:10 PM

Light-Emitting Structures

Session Chair: **Joan Manel Ramírez**,
Ctr. de Nanosciences et de Nanotechnologies (France)

GeSn lasers for mid-infrared silicon photonics (*Invited Paper*), Alexei Chelnokov, CEA-LETI (France); Nicolas Pauc, CEA-INAC (France); Jauris Aubin, CEA-LETI (France); Quang Minh Thai, CEA-INAC (France); Laurent Milord, Mathieu Bertrand, CEA-LETI (France); Alban Gassenq, Kevin Guillouy, CEA-INAC (France); Thomas Karl-Heinz Zabel, Hans Sigg, Paul Scherrer Institut (Switzerland); Jean-Michel Hartmann, CEA-LETI (France); Vincent Calvo, CEA-INAC (France); Vincent Reboud, CEA-LETI (France) [10537-27]

Athermal photonic crystal lasers (*Invited Paper*), Liam O'Faolain, Cork Institute of Technology (Ireland) [10537-28]

Quantum-well laser diodes operating at 1.28 μ m monolithically integrated on Ge substrate, Jukka Viheriälä, Antti T. Aho, Riku Isoaho, Arto Aho, Antti Tukiainen, Mircea Guina, Tampere Univ. of Technology (Finland) [10537-29]

3D hybrid integrated lasers for silicon photonics, Bowen Song, Univ. of California, Santa Barbara (USA) [10537-30]

Lunch/Exhibition Break Wed 12:10 pm to 1:40 pm

SESSION 9 WED 1:40 PM TO 3:20 PM

Hybrid Silicon Optical Systems and Devices I

Joint Session with Conferences 10537 and 10538

Session Chair: **Henning Schröder**, Fraunhofer-Institut für
Zuverlässigkeit und Mikrointegration (Germany)

Chalcogenide glass-on-2D-materials photonics (*Invited Paper*), Hongtao Lin, Yi Song, Yizhong Huang, Derek Kita, Skylar Deckoff-Jones, Kaiqi Wang, Lan Li, Junying Li, Hanyu Zheng, Zhengqian Luo, Massachusetts Institute of Technology (USA); Spencer Novak, Anupama Yadav, Univ. of Central Florida (USA); Chung-Che Huang, Univ. of Southampton (United Kingdom); Haozhe Wang, Ren-Jye Shiue, Dirk Englund, Tian Gu, Massachusetts Institute of Technology (USA); Daniel Hewak, Univ. of Southampton (United Kingdom); Kathleen Richardson, Univ. of Central Florida (USA); Jing Kong, Juejun Hu, Massachusetts Institute of Technology (USA) [10537-31]

Optical interconnects based on VCSELs and low-loss silicon photonics (*Invited Paper*), Timo Aalto, Mikko Harjanne, Mikko Karppinen, Matteo Cherchi, VTT Technical Research Ctr. of Finland Ltd. (Finland); Antonio Malacarne, Scuola Superiore Sant'Anna (Italy); Christian Neumeyer, Vertilas GmbH (Germany) [10538-43]

Degradation mechanisms of heterogeneous III-V/silicon 1.55- μ m DBR laser diodes, Matteo Buffolo, Matteo Meneghini, Carlo De Santi, Univ. degli Studi di Padova (Italy); Michael L. Davenport, John E. Bowers, Univ. of California, Santa Barbara (USA); Gaudenzio Meneghesso, Enrico Zanoni, Univ. degli Studi di Padova (Italy) [10537-32]

Direct coupling of coherent emission from site-selectively grown III-V nanowire lasers into proximal silicon waveguides, Thomas Stettner, Tobias Kostenbader, Daniel Ruhstorfer, Jochen Bissinger, Hubert Riedl, Walter Schottky Institut (Germany); Michael Kaniber, Gregor Koblmüller, Jonathan J. Finley, Walter Schottky Institut (Germany) and Nanosystems Initiative Munich (Germany) [10538-44]

SESSION 10 WED 3:50 PM TO 5:10 PM

Hybrid Silicon Optical Systems and Devices II

Joint Session with Conferences 10537 and 10538

Session Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

Hybrid integration of carbon nanotube emitters into silicon photonic nanoresonators (*Invited Paper*), Eric Cassan, Weiwei Zhang, Elena Durán-Valdeiglesias, Xavier Le Roux, Samuel Serna, Ctr. de Nanosciences et de Nanotechnologies (France); Niccolò Caselli, LENS - Lab. Europeo di Spettroscopia Non-Lineari (Italy); Francesco Biccari, Univ. degli Studi di Firenze (Italy); Carlos Alonso-Ramos, Ctr. de Nanosciences et de Nanotechnologies (France); Arianna Filoramo, Commissariat à l'Énergie Atomique (France); Massimo Gurioli, Univ. degli Studi di Firenze (Italy); Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) [10537-33]

Comb and hybrid laser-driven WDM silicon photonic interconnects for exascale and HPC applications (*Invited Paper*), Ashkan Seyedi, Di Liang, Géza Kurczveil, Zhihong Huang, Marco Fiorentino, Ray Beausoleil, Hewlett Packard Enterprise (USA) [10538-45]

Design of phase change Ge₂Sb₂Te₅ based on-off electro-optic switch, Nikhil Dhingra, Univ. of Delhi South Campus (India); Junchao Song, Souvik Ghosh, City, Univ. of London (United Kingdom); Linjie Zhou, Shanghai Jiao Tong Univ. (China); B.M.A. Rahman, City, Univ. of London (United Kingdom) [10537-34]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Silicon single-mode waveguide modulator based upon switchable Bragg reflector, Jonathan Azogui, Yonathan Ramon, Zeev Zalevsky, Bar-Ilan Univ. (Israel) [10537-43]

All-optical direct phase and amplitude digitalization based on free-space interferometry, Vladimir Kleiner, Arkady Rudnitsky, Zeev Zalevsky, Bar-Ilan Univ. (Israel) [10537-44]

Cascaded all-optical Boolean processing devices realized by applying intra-bit phase encoding, Amihai Meiri, Zeev Zalevsky, Bar-Ilan Univ. (Israel) [10537-45]

Photonic molecules for application in silicon-on-insulator optical sensors, Luis A. M. Barea, Univ. Federal de São Carlos (Brazil); Mario C. M. M. Souza, André L. Moras, Univ. Estadual de Campinas (Brazil); Álvaro R. G. Catellani, Giuseppe A. Cirino, Univ. Federal de São Carlos (Brazil); Antônio A. G. Von Zuben, Jose W. M. Bassani, Newton C. Frateschi, Univ. Estadual de Campinas (Brazil) [10537-46]

Silicon-nitride/oxynitride wavelength demultiplexer and resonators for quantum photonics, Soon Thor Lim, A*STAR Institute of High Performance Computing (Singapore) [10537-47]

Development of silicon hybrid SPAD 1D arrays for lidar and spectrometer applications, Shunsuke Adachi, Takashi Baba, Hamamatsu Photonics K.K. (Japan) [10537-48]

Strain analysis of SiGe microbridges, Ross Anthony, Ashley Gilbank, McMaster Univ. (Canada); Iain Crowe, The Univ. of Manchester (United Kingdom); Andrew Knights, McMaster Univ. (Canada) [10537-50]

Ring-patterned plasmonic photonic crystal thermal light source for miniaturized near-infrared spectrometers, Shady R. Labib, Ahmed A. Elsayed, Ain Shams Univ. (Egypt); Yasser M. Sabry, Diaa Khalil, Ain Shams Univ. (Egypt) and Si-Ware Systems (Egypt) [10537-51]

Silicon slot waveguide dispersion analysis and engineering through carrier injection, Hosameldin I. Mekawey, Yehea Ismail, The American Univ. in Cairo (Egypt) and Zewail City of Science and Technology (Egypt); Mohamed Swillam, The American Univ. in Cairo (Egypt) [10537-52]

CMOS-compatible and fabrication-tolerant polarization rotator based on oxide cladding partially etching, Wenhao Wu, Yu Yu, Jiabi Xiong, Xinliang Zhang, Wuhan National Lab. for Optoelectronics (China) .. [10537-53]

THURSDAY 1 FEBRUARY

SESSION 11 THU 8:30 AM TO 10:10 AM

Advanced Communication

Session Chair: **Graham T. Reed**,
Optoelectronics Research Ctr. (United Kingdom)

Integrated silicon photonics for quantum optical communications (*Invited Paper*), Shayan Mookherjee, Univ. of California, San Diego (USA) [10537-35]

New dynamic silicon photonic components enabled by MEMS technology (*Invited Paper*), Kristinn B. Gylfason, KTH Royal Institute of Technology (Sweden) [10537-36]

Ultra-narrow-linewidth erbium-doped lasers on a silicon photonics platform, Nanxi Li, Massachusetts Institute of Technology (USA) and Harvard Univ. (USA); Purnawirman Purnawirman, Emir Magden, Gurpreet Singh, Anna Baldycheva, Ehsan Hosseini, Jie Sun, Michele Moresco, Massachusetts Institute of Technology (USA); Thomas Adam, Gerald Leake, Douglas Coolbaugh, College of Nanoscale Science and Engineering, Univ. at Albany (USA); Michael Watts, Massachusetts Institute of Technology (USA); Jonathan Bradley, Massachusetts Institute of Technology (USA) and McMaster Univ. (Canada) [10537-37]

Redshift of lasing modes in time-resolved spectra for GaAs-AlGaAs core-shell nanowires lasers on silicon, Juan Salvador Dominguez Morales, Cork Institute of Technology (Ireland) and Tyndall National Institute (Ireland); Thomas Stettner, Walter Schottky Institut (Germany); Shumithira Gandan, David P. Williams, Cork Institute of Technology (Ireland) and Tyndall National Institute (Ireland); Gregor Koblmüller, Jonathan J. Finley, Walter Schottky Institut (Germany); Tomasz J. Ochalski, Cork Institute of Technology (Ireland) and Tyndall National Institute (Ireland) [10537-38]

SESSION 12 THU 10:40 AM TO 12:10 PM

Novel Applications and Processes II

Session Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

Silicon photonic integrated devices for mode-/polarization-manipulations (*Invited Paper*), Daoxin Dai, Zhejiang Univ. (China) . . [10537-39]

Impacts of SiO₂ sidewall roughness on light-coupling efficiency for silicon photonics ICs, Keizo Kinoshita, Photonics Electronics Technology Research Association (Japan); Tsuyoshi Horikawa, National Institute of Advanced Industrial Science and Technology (Japan) and Photonics Electronics Technology Research Association (Japan); Masataka Noguchi, Takahiro Nakamura, Tohru Mogami, Photonics Electronics Technology Research Association (Japan) [10537-40]

CMOS-compatible laser based on defect-enhanced Ge quantum dots on Si, Martyna Grydlik, Florian Hackl, Lukas Spindlberger, Thomas Fromherz, Friedrich Schäffler, Moritz Brehm, Johannes Kepler Univ. Linz (Austria) [10537-41]

Compact silicon photonics-based multi laser module for sensing, Simon Ayotte, François Costin, André Babin, Gabriel Paré-Olivier, Michel Morin, Benoît Fillion, Kéven Bédard, Philippe Chrétien, Ghislain Bilodeau, Émile Girard-Deschênes, Louis-Philippe Perron, Charles-André Davidson, Dominique D'amato, Mathieu Laplante, Jocelyn Blanchet-Létourneau, TeraXion Inc. (Canada) [10537-42]

Design of hybrid laser structures with QD-RSOA and silicon photonic mirrors, Mariangela Gioannini, Paolo Bardella M.D., Alessio Benedetti, Politecnico di Torino (Italy); Matt Traverso, Dominic Siriani, Prakash Gothoskar, Cisco Systems, Inc. (USA) [10537-54]

Telecom photon emission rate enhancement for single SiGe quantum dots by precise CMOS-compatible positioning in photonic crystal cavities, Thomas Fromherz, Florian Hackl, Magdalena Schatzl, Lukas Spindlberger, Patrick Rauter, Moritz Brehm, Friedrich Schäffler, Johannes Kepler Univ. Linz (Austria) [10537-55]

Room-temperature electroluminescence from defect-enhanced group-IV quantum dots, Patrick Rauter, Friedrich Schäffler, Thomas Fromherz, Lukas Spindlberger, Florian Hackl, Moritz Brehm, Johannes Kepler Univ. Linz (Austria) [10537-56]

Optimized optical devices for edge-coupling-enabled silicon photonics platform, Jason Ching E. Png, Thomas Y. L. Ang, Jun Rong Ong, Soon Thor Lim, A*STAR Institute of High Performance Computing (Singapore); Ezgi Sahin, George F. R. Chen, Dawn T. H. Tan, Singapore Univ. of Technology & Design (Singapore); Tina Guo, Hong Wang, Nanyang Technological Univ. (Singapore) [10537-57]

Monolithic integration of SOI waveguide photodetectors and transimpedance amplifiers, Shuxia Li, Garry Tarr, Winnie Ye, Carleton Univ. (Canada) [10537-58]

Waveguide-integrated mid-infrared graphene photodetector, Zhibo Qu, Milos Nedeljkovic, Jordi Soler-Penadés, Ali Z. Khokhar, Wei Cao, Yangbo Wu, Ahmed Osman, Yanli Qi, Nikolaos Aspiotis, Katrina Morgan, Kevin Chung-Che Huang, Goran Z. Mashanovich, Univ. of Southampton (United Kingdom) [10537-59]

Experimental verification of layout physical verification of silicon photonics, Raghi S. El Shamy, Mohamed Swillam, The American Univ. in Cairo (Egypt) [10537-60]

Mutual coupling and interaction of Anapole states in silicon nanoparticles, Valerio Mazzone, Juan Sebastian Totero Gongora, Andrea Fratallocchi, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10537-61]

High-level model for exploring grating coupler design space, Tyler Bravo, Christi K. Madsen, Texas A&M Univ. (USA) [10537-62]

Wide-angle and low-power beam steering with a 1x16 silicon optical phased array based on photonic-crystal nanobeam radiators, Jong-Bum You, Hyeokbin Kwon, Hyo-Hoon Park, Kyoungsik Yu, KAIST (Korea, Republic of) [10537-63]

Broadband athermal waveguides and devices for datacom and telecom applications, Liuqing He, Yuhao Guo, Tianjin Univ. (China); Zhaohong Han, Massachusetts Institute of Technology (USA); Kazumi Wada, The Univ. of Tokyo (Japan); Lionel C. Kimerling, Jurgen Michel, Anuradha Murthy Agarwal, Guifang Li, Massachusetts Institute of Technology (USA); Lin Zhang, Tianjin Univ. (China) [10537-64]



CONFERENCE 10538

Monday-Wednesday 29-31 January 2018 • Proceedings of SPIE Vol. 10538

Optical Interconnects XVIII

Conference Chairs: **Henning Schröder**, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Ray T. Chen**, The Univ. of Texas at Austin (USA)

Program Committee: **Darrell Childers**, US Conec Ltd. (USA); **Alan F. Evans**, Corning Incorporated (USA); **Alexei L. Glebov**, OptiGrate Corp. (USA); **Ruth Houbertz**, Multiphoton Optics GmbH (Germany); **Marika P. Immonen**, TTM Technologies, Inc. (Finland); **Takaaki Ishigure**, Keio Univ. (Japan); **Wei Jiang**, Nanjing Univ. (China); **Mikko Karppinen**, VTT Technical Research Ctr. of Finland (Finland); **Christian Koos**, Karlsruher Institut für Technologie (Germany); **Tobias Lamprecht**, vario-optics ag (Switzerland); **Christopher T. Middlebrook**, Michigan Technological Univ. (USA); **Bert-Jan Offrein**, IBM Research – Zürich (Switzerland); **Hyo-Hoon Park**, KAIST (Korea, Republic of); **Nikos Pleros**, Aristotle Univ. of Thessaloniki (Greece); **Richard C. Pitwon**, Xyratex Technology Ltd. (United Kingdom); **Brandon W. Swatowski**, Dow Corning Corp. (USA); **David J. Thomson**, Univ. of Southampton (United Kingdom); **Alan X. Wang**, Oregon State Univ. (USA); **Michael R. Wang**, Univ. of Miami (USA); **Ian H. White**, Univ. of Cambridge (United Kingdom); **Chris Q. Wu**, Corning Incorporated (USA); **Xiaochuan Xu**, Omega Optics, Inc. (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:10 PM

Optical Interconnect Systems I

- Silicon photonic networks for exascale computers** (*Invited Paper*), Marco Fiorentino, HP, Inc. (USA) [10538-1]
- Microresonator-based electro-optic full adder for optical computing in integrated photonics**, Zhoufeng Ying, Zheng Wang, Shounak Dhar, Zheng Zhao, David Z. Pan, Ray T. Chen, The Univ. of Texas at Austin (USA) [10538-2]
- Universal test system for system embedded optical interconnect**, Richard C. Pitwon, Seagate Systems (UK) Ltd. (United Kingdom) . . . [10538-3]
- A low-latency high-port count optical switch with optical delay line buffering for disaggregated data centers** (*Invited Paper*), Miltiadis Moralis-Pegios, Nikos Terzenidis, George Mourgias-Alexandris, Konstantinos Vyrsokinos, Nikos Pleros, Aristotle Univ. of Thessaloniki (Greece) . . . [10538-4]
- Lunch/Exhibition Break Mon 12:10 pm to 1:30 pm

SESSION 2 MON 1:30 PM TO 3:30 PM

Optical Interconnect Systems II

- Has the time come for optical switching in data centers? A cloud operator perspective** (*Invited Paper*), Paolo Costa, Microsoft Research Cambridge (United Kingdom) [10538-5]
- Optical datacenter network employing slotted (TDMA) operation for dynamic resource allocation** (*Invited Paper*), Paraskevas Bakopoulos, National Technical Univ. of Athens (Greece) and Mellanox Technologies, Inc. (Israel); Konstantinos Tokas, Christos Spatharakis, National Technical Univ. of Athens (Greece); Ioannis Patronas, Angelos Kyriakos, Dionysios Reisis, National and Kapodistrian Univ. of Athens (Greece) and National Technical Univ. of Athens (Greece); Hercules Avramopoulos, National Technical Univ. of Athens (Greece) [10538-6]

A low-latency optical switch architecture using integrated μm SOI-based contention resolution and switching, George Mourgias-Alexandris, Miltiadis Moralis-Pegios, Nikos Terzenidis, Aristotle Univ. of Thessaloniki (Greece); Matteo Cherchi, Mikko Harjanne, Timo Aalto, VTT Technical Research Ctr. of Finland Ltd. (Finland); Konstantinos Vyrsokinos, Nikos Pleros, Aristotle Univ. of Thessaloniki (Greece) [10538-7]

On-off keying transmitter design for navigation by visible light communication, Paula Louro, Instituto Superior de Engenharia de Lisboa (Portugal) [10538-8]

Visible light communication technology for fine-grained indoor localization, Manuela Vieira, Manuel Augusto Vieira, Paula Louro, Instituto Superior de Engenharia de Lisboa (Portugal); Alessandro Fantoni, Instituto Superior de Engenharia de Lisboa (Portugal) and UNINOVIA (Portugal); Pedro Vieira, Instituto Superior de Engenharia de Lisboa (Portugal) and Instituto de Telecomunicações (Portugal) and Instituto Superior Técnico (Portugal) [10538-9]

SESSION 3 MON 4:00 PM TO 5:40 PM

Hybrid Integrated Optical Link Modules

- Towards co-packaging of photonics and microelectronics in existing manufacturing facilities** (*Invited Paper*), Alexander Janta-Polczynski, Elaine Cyr, Jerome Bougie, IBM Canada Ltd. (Canada); Alain Drouin, IBM Canada Ltd (Canada); Richard Langlois, IBM Canada Ltd. (Canada); Darrell Childers, US Conec Ltd. (USA); Shotaro Takenobu, Asahi Glass Co., Ltd. (Japan); Yoichi Taira, IBM Research - Tokyo (Japan); Ted W. Lichoulas, AFL (USA); Swetha Kamlapurkar, Sebastian Engelmann, IBM Thomas J. Watson Research Ctr. (USA); Paul P. Fortier, Nicolas Boyer, IBM Canada Ltd. (Canada); Tymon Barwicz, IBM Thomas J. Watson Research Ctr. (USA) [10538-10]
- Multichannel VCSEL-based optical transceiver employing multicore fibers at 6x25 Gbps/fiber**, Mikko Karppinen, Antti Tanskanen, Jyrki Ollila, VTT Technical Research Ctr. of Finland Ltd. (Finland); Johan Gustavsson, Anders Larsson, Chalmers Univ. of Technology (Sweden); Minsu Ko, IHP GmbH (Germany); Dietmar Kissinger, IHP GmbH (Germany) and Technische Univ. Berlin (Germany); Lars Grüner-Nielsen, Christian Larsen, OFS Fitel Denmark ApS (Denmark); Rashid Safaisini, Philips GmbH U-L-M Photonics (Germany); Anaëlle Maho, Michel Sotom, Thales Alenia Space (France); Leontios Stampoulidis, Gooch and Housego Systems Technology Group (United Kingdom) [10538-11]
- Demonstration of glass-based photonic interposer for mid-board optical engines and electrical-optical circuit board (EOCB) integration strategy**, Henning Schröder, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) [10538-12]
- Optical and electrical interconnect structures for chip-scale silicon photonic transceivers** (*Invited Paper*), Koichi Takemura, Yasuhiro Ibusuki, Akio Ukita, Mitsuru Kurihara, Yasuhiko Hagihara, Kazuhiko Kurata, Photonics Electronics Technology Research Association (Japan) [10538-13]

TUESDAY 30 JANUARY

SESSION 4..... TUE 8:20 AM TO 9:50 AM

Electrical-Optical PCB Technologies

Organic-inorganic hybrid material SUNCONNECT® for photonic integrated circuit (*Invited Paper*), Hideyuki Nawata, Juro Oshima, Tsubasa Kashino, Nissan Chemical Industries, Ltd. (Japan) [10538-14]

Silicon photonic IC embedded optical-PCB for high-speed interconnect application, Rakshita Kalleaga, Siddharth Nambiar, Abhai Kumar, Praveen Ranganath, Shankar Kumar Selvaraja, Indian Institute of Science (India) [10538-15]

Direct fabrication for single-mode and multimode polymer waveguides on FR-4 substrates toward high bandwidth density O-PCB, Chinami Marushima, Keio Univ. (Japan); Marika P. Immonen, TTM Technologies, Inc. (Finland); Takaaki Ishigure, Keio Univ. (Japan) ... [10538-16]

Fabrication for Y-branched polymer optical waveguides using the mosquito method, Tomoki Nakayama, Takaaki Ishigure, Keio Univ. (Japan) [10538-17]

SESSION 5..... TUE 10:20 AM TO 12:10 PM

Novel Optical Waveguide and Interconnect Technologies

High-precision 3D printing as a versatile tool for integrated photonics (*Invited Paper*), Benedikt Stender, Alexander Krupp, Valentin Ratz, Fabian Hilbert, Ruth Houbertz, Multiphoton Optics GmbH (Germany) [10538-18]

Direct optical-wire bonding for optical interconnection, Chong Cook Kim, RIST (Korea, Republic of) and Pohang Univ. of Science and Technology (Korea, Republic of); Namho Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Jong-Moo Lee, Jung-Jin Ju, Electronics and Telecommunications Research Institute (Korea, Republic of); Jung Ho Je, Pohang Univ. of Science and Technology (Korea, Republic of) [10538-19]

Improved light-emitting optical waveguides based on UV-curable PbS quantum-dots/polymer composite, Kai Shen, Sarfaraz Baig, Univ. of Miami (USA); Young-hun Paik, Univ. of Miami (USA); Sung Jin Kim, Michael R. Wang, Univ. of Miami (USA) [10538-20]

Control of randomly scattered surface plasmon polaritons for multiple-input and multiple-output plasmonic switching devices, Wonjun Choi, YongHyeon Jo, Q-Han Park, Wonshik Choi, Korea Univ. (Korea, Republic of) [10538-21]

Flexible multimode polymer waveguides for high-speed short-reach communication links, Nikos Bamiedakis, Fengyuan Shi, Daping Chu, Richard V. Penty, Ian H. White, Univ. of Cambridge (United Kingdom) [10538-22]

Lunch/Exhibition Break Tue 12:10 pm to 1:30 pm

SESSION 6..... TUE 1:30 PM TO 3:30 PM

Nanophotonics for Optical Interconnects

The InP integrated photonics revolution (*Invited Paper*), Jeroen Duis, SMART Photonics (Netherlands) [10538-23]

A silicon reconfigurable optical processor based on a self-coupled optical waveguide, Liangjun Lu, Lin Shen, Zhanzhi Guo, Qiankun Sun, Linjie Zhou, Jianping Chen, Shanghai Jiao Tong Univ. (China) [10538-24]

Heatsink-free cw operation of injection III-V microdisk lasers directly grown on Si substrate with emission wavelength beyond 1.2 μm, Natalia V. Kryzhanovskaya, Eduard Moiseev, Yulia Polubavkina, Mikhail Maximov, St. Petersburg Academic Univ. (Russian Federation); Andrey Lipovskii, Ioffe Institute (Russian Federation); Yulia Guseva, Ioffe Institute (Russian Federation) and St. Petersburg Academic Univ. (Russian Federation); Alexandr Dubinov, Institute of Applied Physics of the Russian Academy of Sciences (Russian Federation); Zakhary Krasilnik, Dmitry Yurasov, Institute for Physics of Microstructures Russian Academy of Sciences (Russian Federation) and N.I. Lobachevsky State Univ. of Nizhni Novgorod (Russian Federation); Huiyun Liu, Univ. College London (United Kingdom); Alexey Zhukov, St. Petersburg Academic Univ. (Russian Federation) [10538-25]

Simulation of monolithically-integrated Ga(Al)As-InGaAs core-multishell nanowire lasers on silicon waveguides, Jochen Bissinger, Thomas Stettner, Daniel Ruhstorfer, Gregor Koblmüller, Jonathan J. Finley, Walter Schottky Institut (Germany) [10538-26]

Low-power high-speed photodiodes (*Invited Paper*), Andreas Beling, University of Virginia (USA) [10538-27]

SESSION 7..... TUE 4:00 PM TO 6:10 PM

Fiber Optics and Micro-Optics Integration

Low-profile fiber connector for co-packaged optics (*Invited Paper*), Lars Brusberg, Corning, Incorporated (USA); Douglas L Butler, Corning Incorporated (USA); Michael DeJong, Corning Optical Communications LLC (USA); Jeffrey S. Clark, Clifford G. Sutton, Corning, Incorporated (USA) [10538-28]

Noiseless and pluggable simple interconnect by high-bandwidth GI POF (*Invited Paper*), Yasuhiro Koike, Keio Univ (Japan) [10538-29]

Free-space reconfigurable optical add-drop multiplexer for multicore fiber, Mahmoud Gadalla, Véronique François, École de Technologie Supérieure (ÉTS) (Canada); Bora Ung, École de Technologie Supérieure (Canada) [10538-30]

Automated and model-based assembly of an anamorphic telescope, Martin Holters, RWTH Aachen Univ. (Germany); Sebastian Dirks, Lehrstuhl für Technologie Optischer Systeme (Germany); Peter Loosen, Fraunhofer-Institut für Lasertechnik (Germany); Jochen Stollenwerk, RWTH Aachen Univ. (Germany) [10538-31]

Reduced diameter optical fibers for high-density interconnects (*Invited Paper*), Scott R. Bickham, Corning Optical Communications LLC (USA) [10538-32]

WEDNESDAY 31 JANUARY

SESSION 8..... WED 8:00 AM TO 10:00 AM

Optical Interconnect Devices and Modulators

Energy-efficient silicon photonic crystal nanobeam electro-optical modulator with transparent conductive oxide, Erwen Li, Qian Gao, Oregon State Univ. (USA); Ray T. Chen, The Univ. of Texas at Austin (USA); Alan X. Wang, Oregon State Univ. (USA) [10538-33]

Compact silicon thermo-optic MMI switch with n-i-n-i-n direct heater structure designed for asymmetric control of interference modes, Seong-Hwan Kim, Harin Lee, Geumbong Kang, Dae-Seong Lee, Hyunwoo Rhee, KAIST (Korea, Republic of); Dong-Eun Yoo, Dong-Wook Lee, National Nanofab Ctr. (Korea, Republic of); Hyo-Hoon Park, KAIST (Korea, Republic of) [10538-34]

Group IV optical modulators (*Invited Paper*), Callum G. Littlejohns, Nanyang Technological Univ. (Singapore); Milos Nedeljkovic, Wei Cao, Univ. of Southampton (United Kingdom); David E. Hagan, Jason J. Ackert, McMaster Univ. (Canada); Mohamed-Said Rouified, Zecen Zhang, Haodong Qiu, Tina Guo Xin, Nanyang Technological Univ. (Singapore); Ali Z. Khokhar, Stevan Stanković, Colin J. Mitchell, Mehdi Banakar, Jordi Soler-Penadés, Xia Chen, Scott A. Reynolds, Univ. of Southampton (United Kingdom); Andrew P. Knights, McMaster Univ. (Canada); Frederic Y. Gardes, Graham T. Reed, Goran Z. Mashanovich, Univ. of Southampton (United Kingdom); Hong Wang, Nanyang Technological Univ. (Singapore); David J. Thomson, Univ. of Southampton (United Kingdom) [10538-35]

Energy efficient nano-VCSELs for optical interconnects (*Invited Paper*), Dennis G. Deppe, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) [10538-36]

Temperature stable electro-optic polymer modular on hybrid silicon Mach-Zehnder interferometer, Shiyoshi Yokoyama, Hiroki Miura, Feng Qiu, Andrew M. Spring, Kyushu Univ. (Japan) [10538-37]

SESSION 9..... WED 10:30 AM TO 12:20 PM

PICs for Optical Interconnects

Bridging silicon photonics with polymer photonics for system-level assembly (*Invited Paper*), Charles Caër, Antonio La Porta, Roger F. Dangel, Daniel Jubin, Norbert Meier, Folkert Horst, IBM Research - Zürich (Switzerland) [10538-38]

Laser-printed glass planar lightwave circuits with integrated fiber alignment structures, Andres Desmet, Photonics Research Group (Belgium); Dries Van Thourhout, Geert Van Steenberge, Univ. Gent (Belgium); Jeroen Missine, Photonics Research Group (Belgium) [10538-39]

Comparison of microring and microdisk for high-speed optical modulation in silicon photonics, Zhoufeng Ying, Zheng Wang, Shounak Dhar, Zheng Zhao, David Z. Pan, Ray T. Chen, The Univ. of Texas at Austin (USA) [10538-40]

CONFERENCE 10538

Wide dispersive beam-steering of silicon optical phased array with fine wavelength tuning employing large optical path difference, Dae-Seong Lee, Geumbong Kang, Jeongyoon Kim, Seong-Hwan Kim, Sanggu Yeo, KAIST (Korea, Republic of); Dong-Eun Yoo, Dong-Wook Lee, National Nanofab Ctr. (Korea, Republic of) [10538-41]

Internode interconnection optical platform based on fs-laser written vertical waveguides, Rebeca Martínez Vázquez, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Stefano Tirelli, InPhoTec (Italy); Diogo Pereira Lopes, Politecnico di Milano (Italy); Fabio D'Agano, Scuola Superiore Sant'Anna (Italy); Jose Angel Ayucar, Univ. Politècnica de València (Spain); Luigi Tallone, InPhoTec - TeCIP Institute (Italy); Roberto Osellame, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Marco Romagnoli, Consorzio Nazionale Interuniversitario per le Telecomunicazioni (Italy) [10538-42]

Lunch/Exhibition Break Wed 12:20 pm to 1:40 pm

SESSION 10 WED 1:40 PM TO 3:20 PM

Hybrid Silicon Optical Systems and Devices I

Joint Session with Conferences 10537 and 10538

Session Chair: **Henning Schröder**, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany)

Chalcogenide glass-on-2D-materials photonics (*Invited Paper*), Hongtao Lin, Yi Song, Yizhong Huang, Derek Kita, Skylar Deckoff-Jones, Kaiqi Wang, Lan Li, Junying Li, Hanyu Zheng, Zhengqian Luo, Massachusetts Institute of Technology (USA); Spencer Novak, Anupama Yadav, Univ. of Central Florida (USA); Chung-Che Huang, Univ. of Southampton (United Kingdom); Haozhe Wang, Ren-Jye Shiue, Dirk Englund, Tian Gu, Massachusetts Institute of Technology (USA); Daniel Hewak, Univ. of Southampton (United Kingdom); Kathleen Richardson, Univ. of Central Florida (USA); Jing Kong, Juejun Hu, Massachusetts Institute of Technology (USA) [10537-31]

Optical interconnects based on VCSELs and low-loss silicon photonics (*Invited Paper*), Timo Aalto, Mikko Harjanne, Mikko Karppinen, Matteo Cherchi, VTT Technical Research Ctr. of Finland Ltd. (Finland); Antonio Malacarne, Scuola Superiore Sant'Anna (Italy); Christian Neumeyer, Vertilas GmbH (Germany) [10538-43]

Degradation mechanisms of heterogeneous III-V/silicon 1.55- μ m DBR laser diodes, Matteo Buffolo, Matteo Meneghini, Carlo De Santi, Univ. degli Studi di Padova (Italy); Michael L. Davenport, John E. Bowers, Univ. of California, Santa Barbara (USA); Gaudenzio Meneghesso, Enrico Zanoni, Univ. degli Studi di Padova (Italy) [10537-32]

Direct coupling of coherent emission from site-selectively grown III-V nanowire lasers into proximal silicon waveguides, Thomas Stettner, Tobias Kostenbader, Daniel Ruhstorfer, Jochen Bissinger, Hubert Riedl, Walter Schottky Institut (Germany); Michael Kaniber, Gregor Koblmüller, Jonathan J. Finley, Walter Schottky Institut (Germany) and Nanosystems Initiative Munich (Germany) [10538-44]

SESSION 11 WED 3:50 PM TO 5:10 PM

Hybrid Silicon Optical Systems and Devices II

Joint Session with Conferences 10537 and 10538

Session Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

Hybrid integration of carbon nanotube emitters into silicon photonic nanoresonators (*Invited Paper*), Eric Cassan, Weiwei Zhang, Elena Durán-Valdeiglesias, Xavier Le Roux, Samuel Serna, Ctr. de Nanosciences et de Nanotechnologies (France); Niccolò Caselli, LENS - Lab. Europeo di Spettroscopia Non-Lineari (Italy); Francesco Biccari, Univ. degli Studi di Firenze (Italy); Carlos Alonso-Ramos, Ctr. de Nanosciences et de Nanotechnologies (France); Arianna Filoramo, Commissariat à l'Énergie Atomique (France); Massimo Gurioli, Univ. degli Studi di Firenze (Italy); Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) [10537-33]

Comb and hybrid laser-driven WDM silicon photonic interconnects for exascale and HPC applications (*Invited Paper*), Ashkan Seyedi, Di Liang, Géza Kurczveil, Zhihong Huang, Marco Fiorentino, Ray Beausoleil, Hewlett Packard Enterprise (USA) [10538-45]

Design of phase change Ge₂Sb₂Te₅ based on-off electro-optic switch, Nikhil Dhingra, Univ. of Delhi South Campus (India); Junchao Song, Souvik Ghosh, City, Univ. of London (United Kingdom); Linjie Zhou, Shanghai Jiao Tong Univ. (China); B.M.A. Rahman, City, Univ. of London (United Kingdom) [10537-34]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Atto-joule low-loss high-speed plasmonic optical modulator based on adiabatic waveguides, Rui Wang, The Univ. of Texas at Austin (USA); Hamed Dalir, Omega Optics, Inc. (USA); Volker J. Sorger, The George Washington Univ. (USA); Ray T. Chen, The Univ. of Texas at Austin (USA) [10538-46]

Maximal energy coupling to complex plasmonic devices by injecting light into eigenchannels, YongHyeon Jo, Wonjun Choi, Korea Univ. (Korea, Republic of); Eunsung Seo, Korea Univ. College of Medicine (Korea, Republic of); Junmo Ahn, Ctr. for Molecular Spectroscopy and Dynamics, Institute for Basic Science, Seoul National Univ. (Korea, Republic of); Q-Han Park, Korea Univ. (Korea, Republic of); Young Min Jhon, Korea Institute of Science and Technology (Korea, Republic of); Wonshik Choi, Korea Univ. (Korea, Republic of) [10538-47]

Add-drop filters based on microring structures with fine-tuning capability for WDM optical interconnects, Joaquin Faneca, Anna Baldycheva, Univ. of Exeter (United Kingdom); Geoff Nash, Univ. of Exeter (United Kingdom) [10538-48]

Modelling of novel engineering tools for spatial optomechantronics assemblies in 3D-CAD systems, Jochen Zeitler, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) [10538-49]

Polarization division multiplexing for optical data communications, Darko Ivanovich, Sam B. Powell, Roger D. Chamberlain, Washington Univ. in St. Louis (USA); Viktor Gruev, Univ. of Illinois at Urbana-Champaign (USA) [10538-50]

High-speed silicon-organic hybrid modulator enabled by sub-wavelength grating waveguide, Zeyu Pan, The Univ. of Texas at Austin (USA); Xiaochuan Xu, Omega Optics, Inc. (USA); Chi-Jui Chung, The Univ. of Texas at Austin (USA); Hamed Dalir, Omega Optics, Inc. (USA); Yaguo Wang, Ray T. Chen, The Univ. of Texas at Austin (USA) [10538-51]

CONFERENCE 10539

Tuesday–Thursday 30 January–1 February 2018 • Proceedings of SPIE Vol. 10539

Photonic Instrumentation Engineering V

Conference Chair: **Yakov G. Soskind**, Apple Inc. (USA)

Conference Co-Chair: **Craig Olson**, L-3 Communications (USA)

Program Committee: **Daniel Asoubar**, LightTrans International UG (Germany); **James B. Breckinridge**, California Institute of Technology (USA); **Lynda E. Busse**, U.S. Naval Research Lab. (USA); **James T. A. Carriere**, Ondax, Inc. (USA); **John D. Corless**, Verity Instruments, Inc. (USA); **David G. Fischer**, NASA Glenn Research Ctr. (USA); **Daniel Herrmann**, Synopsys Inc. (USA); **Chris Hessenius**, College of Optical Sciences, The Univ. of Arizona (USA); **Gary B. Hughes**, California Polytechnic State Univ., San Luis Obispo (USA); **Filipp V. Ignatovich**, Lumetrics, Inc. (USA); **Jacob B. Khurgin**, Johns Hopkins Univ. (USA); **Matthew P. Lumb**, U.S. Naval Research Lab. (USA); **Patrick C. Mock**, Ziva Corp. (USA); **Darryl Naidoo**, CSIR National Laser Ctr. (South Africa); **Nada A. O'Brien**, Oculus Research (USA); **Lucas Redlarski**, Mitutoyo Research Ctr. Europe B.V. (Netherlands); **Jeff Throckmorton**, Avo Photonics, Inc. (USA); **Mariano Troccoli**, AdTech Optics, Inc. (USA)

TUESDAY 30 JANUARY

SESSION 1 TUE 1:30 PM TO 3:00 PM

Innovative Photonics Instrumentation I

Session Chair: **Yakov Soskind**, Apple Inc. (USA)

Variable focus TAG lenses for advanced imaging and measurement (Invited Paper), Christian Theriault, David Amrhein, TAG Optics, Inc. (USA); Craig B. Arnold, Princeton Univ. (USA) [10539-1]

Time-of-flight range imaging for underwater applications, Hannes Merbold, Gion-Pol Catregg, Tobias Leutenegger, Hochschule für Technik und Wirtschaft Chur (Switzerland) [10539-2]

Applications of a reconfigurable SPAD line imager, Samuel Burri, Claudio Bruschini, Edoardo Charbon, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10539-3]

Experimental simulation of ranging action using Si photonic crystal modulator and optical antenna, Yuya Furukado, Hiroshi Abe, Yosuke Hinakura, Toshihiko Baba, Yokohama National Univ. (Japan) [10539-4]

SESSION 2 TUE 3:30 PM TO 5:10 PM

Innovative Photonics Instrumentation II

Session Chair: **Lynda E. Busse**, U.S. Naval Research Lab. (USA)

Large depth high-precision tomography using a distributed feedback laser array, Thomas DiLazaro, U.S. Army Night Vision & Electronic Sensors Directorate (USA); George Nehmetallah, The Catholic Univ. of America (USA) [10539-5]

Frequency locking of compact laser-diode modules at 633 nm, Christian Nölleke, TOPTICA Photonics AG (Germany); Gunnar Blume, Ferdinand-Braun-Institut (Germany); Daniel Jedrzejczyk, TOPTICA Photonics AG (Germany); Johannes Pohl, David Feise, Alexander Sahn, Ferdinand-Braun-Institut (Germany); Patrick Leisching, TOPTICA Photonics AG (Germany); Katrin Paschke, Ferdinand-Braun-Institut (Germany) [10539-6]

Temperature-controller-free FDML laser based on adaptive sweep rate tuning by KTN scanner, Mingchen Chen, NTT Device Technology Labs. (Japan); Seiji Toyoda, Masahiro Ueno, Tadashi Sakamoto, NTT Device Innovation Ctr. (Japan) [10539-7]

Frequency-modulated laser ranging sensor with closed-loop control, Fabian Müller, Gunnar Böttger, Christian Janeczka, Norbert Arndt-Staufenbiel, Henning Schröder, Martin Schneider-Ramelow, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) [10539-8]

Refractive waveguide non-mechanical beam steering in the MWIR, Jason D. Myers, Jesse Frantz, Christopher Spillmann, U.S. Naval Research Lab. (USA); Robel Bekele, Univ. Research Foundation (USA); Jakub Kolacz, Henry Gotjen, Jawad Naciri, Brandon Shaw, Jas Sanghera, U.S. Naval Research Lab. (USA) [10539-9]

WEDNESDAY 31 JANUARY

SESSION 3 WED 8:20 AM TO 10:00 AM

Photonics Sensors I

Session Chair: **Patrick C. Mock**, TetraVue (USA)

Highly-efficient router-based readout algorithm for single-photon-avalanche-diode imagers for time-correlated experiments, Alessandro Cominelli, Giulia Acconcia, Francesco Caldi, Pietro Peronio, Massimo Ghioni, Ivan Rech, Politecnico di Milano (Italy) [10539-10]

Monitoring pressure profiles across an airfoil section with a fibre Bragg grating sensor array, Anthony W. Papageorgiou, Andrew R Karas, Luke A. Parkinson, John W. Arkwright, Flinders Univ. (Australia) ... [10539-11]

A distributed fluid level sensor suitable for monitoring fuel load on board a moving fuel tank, John W. Arkwright, Luke A. Parkinson, Anthony W. Papageorgiou, Flinders Univ. (Australia) [10539-12]

Advances in combustor temperature and strain sensing with femtosecond laser written fiber Bragg gratings, Robert B. Walker, Sangsig Yun, Dan Grobnc, Cyril Hnatovsky, Huimin Ding, Nanthan Ramachandran, Michel Charbonneau, Stephen J. Mihailov, National Research Council Canada (Canada) [10539-13]

E-field fiber tip sensors by exploiting the electro-optic tunability of lithium niobate photonic crystals, Bruno Robert, Venancio Calero, Roland Salut, FEMTO-ST (France); Miguel Suárez, Laurence Galtier, Gwenaél Gaborit, Kapteos S.A.S. (France); Fadi Baida, Nadège Courjal, Etienn Fizaine, Tristan Faure, Florent Behague, Alexis Caspar, FEMTO-ST (France); Lionel Duvillaret, Kapteos S.A.S. (France); Maria-Pilar Bernal, FEMTO-ST (France) [10539-14]

SESSION 4 WED 10:30 AM TO 11:50 AM

Photonics Sensors II

Session Chair: **Patrick C. Mock**, TetraVue (USA)

Development of a diamond waveguide sensor for sensitive protein analysis using IR quantum cascade lasers, Pierre Piron, Uppsala Univ. (Sweden); Julian Haas, Univ. Ulm (Germany); Ernesto Vargas Catalan, Uppsala Univ. (Sweden); Fredrik Nikolajeff, Lars Österlund, Per Ola Andersson, Uppsala Univ. (Sweden) and Molecular Fingerprint Sweden AB (Sweden); Joakim Bergström, Uppsala Univ. (Sweden); Boris Mizaikoff, Univ. Ulm (Germany); Mikael Karlsson, Uppsala Univ. (Sweden) and Molecular Fingerprint Sweden AB (Sweden) [10539-15]

Flow immune photoacoustic sensor for real-time and fast sampling of trace gases, Jan Conrad Petersen, Mikael Lassen, David Balslev Harder, Danish Fundamental Metrology Institut (Denmark); Nikola Pelevic, VSL Dutch Metrology Institute (Netherlands) [10539-16]

A passive optical fibre hydrophone array utilising fibre Bragg grating sensors, Andrew R. Karas, Anthony W. Papageorgiou, Peter R. Cook, Flinders Univ. (Australia); Scott B. Foster, Joanne Harrison, Defence Science and Technology Group (Australia); John W. Arkwright, Flinders Univ. (Australia) [10539-17]

Fast and broadband detector for laser radiation, Davide Scorticati, Sergio Pellegrino, LaserPoint Srl (Italy) [10539-18]

Lunch/Exhibition Break Wed 11:50 am to 1:30 pm

OPTO

CONFERENCE 10539

SESSION 5..... WED 1:30 PM TO 3:30 PM

Spectroscopic Photonic Instruments I

Session Chair: **James T. A. Carriere**, Ondax, Inc. (USA)

Detection of low-concentration ammonia using differential laser-induced fluorescence on vapochromic coordination polymers, Dawei Yin, Glenn Chapman, Daniel Leznoff, Simon Fraser Univ. (Canada) [10539-19]

A compressive-sensing Fourier-transform on-chip Raman spectrometer, Hugh Podmore, York Univ. (Canada); Alan Scott, Honeywell Aerospace (Canada); Regina Lee, York Univ. (Canada) [10539-21]

Versatile multispectral imaging camera made with off-the-shelf components, Andrea L. Dunbar, Pedram Pad, Nemanja Niketic, Amina Chebira, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); Ross Stanley, Optiross Sàrl (Switzerland) [10539-22]

System calibration method of CMOS-based hyperspectral camera for pathology slide scanning, Julien Pichette, IMEC (Belgium); Thomas Goossens, KU Leuven (Belgium); Kathleen Vunckx, Andy Lambrechts, IMEC (Belgium) [10539-23]

Fluorescence excitation-emission matrix spectroscopy for degradation monitoring of machinery lubricants, Oleg Sosnovski, Pooja Suresh, Alex Dudelzak, Richard Dupuis, Benjamin Green, GasTOPS Ltd. (Canada) [10539-24]

Hollow-core fiber sensing technique for pipeline leak detection, William A. Challener, Ansas M. Kasten, Jason Karp, GE Global Research (USA) [10539-25]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Spectral imaging spreads into new industrial applications, Clémentine Bouyé, Benoît d'Humières, Thierry Robin, TEMATYS (France) [10539-20]

Rough surface measurement by using grazing incidence method, Linghua Zhang, Univ. of Shanghai for Science and Technology (China) and Suzhou Univ. of Science and Technology (China); Sen Han, Univ. of Shanghai for Science and Technology (China) and Suzhou Hui Li Instrument Co., Ltd. (China); Xueyuan Li, Shouhong Tang, Suzhou Hui Li Instrument Co., Ltd. (China); Quanying Wu, Suzhou Univ. of Science and Technology (China) [10539-45]

Multiple-aperture optical design for micro-level cameras using 3D-printing method, Wei-Jei Peng, Wei-Yao Hsu, Yuan-Chieh Cheng, Wen-Lung Lin, Instrument Technology Research Ctr. (Taiwan); Chien-Chung Fu, National Tsing Hua Univ. (Taiwan) [10539-46]

Photonic-based liquid level transmitter using Mach-Zehnder Interferometer for industrial application, Yadvendra Singh, Manish Kumar, Sanjeev K. Raghuvanshi, Indian Institute of Technology (Indian School of Mines), Dhanbad (India) [10539-47]

Implementation of webcam-based hyperspectral imaging system, Ali Balooch, Majid Nazeri, Univ. of Kashan (Iran, Islamic Republic of); Hamed Abbasi, Univ. Basel (Switzerland) [10539-48]

Tunable powerful UV laser system with UV noise eater, Sergey M. Kobtsev, Daba Radnatarov, Sergey Khripunov, Yurii Zarudnev, Novosibirsk State Univ. (Russian Federation) [10539-49]

THURSDAY 1 FEBRUARY

SESSION 6..... THU 8:00 AM TO 10:00 AM

Photonic Metrology Instrumentation I

Session Chair: **Lucas Redlarski**,

Mitutoyo Research Ctr. Europe B.V. (Netherlands)

Piezo-based motion stages for heavy-duty operation in clean environments, Nir Karasikov, Gal Peled, Roman Yasinov, Michael Gissin, Alan Feinstein, Nanomotion Inc. (USA) [10539-26]

Light scattering by ultrasonically-controlled small particles: system design, calibration, and measurement results, Ivan Kassamakov, Göran Maconi, Maria Gritsevich, Antti Penttilä, Petteri Helander, Tuomas Puranen, Ari Salmi, Edward Hæggrström, Karri Muinonen, Univ. of Helsinki (Finland) [10539-27]

An alternative optical metrology system to classical interferometer for complex optical components, Isabelle Serre, Imagine Optic SA (France) [10539-28]

A three degree-of-freedom parallel-optical-path heterodyne laser speckle interferometer, Bo-Yen Sun, Hung-Lin Hsieh, National Taiwan Univ. of Science and Technology (Taiwan) [10539-29]

A fibre-fed laser interferometer for optical metrology at cryogenic temperatures, David A. Naylor, Ian Veenendaal, Brad Gom, Adam Christiansen, Univ. of Lethbridge (Canada) [10539-30]

SHARPeR: a non contact 2D profiling instrument at the nanoradian scale, Guillaume Dovillaire, Rafael Mayer, Imagine Optic SA (France) [10539-31]

SESSION 7..... THU 10:30 AM TO 12:10 PM

Photonic Metrology Instrumentation II

Session Chair: **Lucas Redlarski**,

Mitutoyo Research Ctr. Europe B.V. (Netherlands)

Nanoscale hydrogenography of magnesium nanostructures with near-field optical microscopy, Heiko Linnenbank, Florian Sterl, Tobias Steinle, Florian Mörz, Univ. Stuttgart (Germany) [10539-32]

Magnetic field detection using magnetorheological optical resonators, Edoardo Rubino, Univ. of Wisconsin-Platteville (USA); Tindaro Ioppolo, Southern Methodist Univ. (USA) [10539-33]

Model-based estimation and control for off-axis parabolic mirror alignment, Joyce Fang, Dmitry Savransky, Cornell Univ. (USA) [10539-34]

Measurement and alignment of linear variable filters, Sarah Locknar, Timothy D. Upton, Tom Rahmlow, Sheetal K. Chanda, Gregg Jarvis, Markus Fredell, Florin Grosu, Terry Finnell, Robert Johnson, Omega Optical, Inc. (USA) [10539-35]

Comparative analysis of methods and optical-electronic equipment to control the form parameters of spherical mirrors, Alexander N. Nikitin, Active Optics Night N Ltd. (Russian Federation); Nikolay Baryshnikov, Dmitrii Denisov, Valerii Karasik, Alexey Sakharov, Bauman Moscow State Technical Univ. (Russian Federation); Pavel Romanov, Alexis Kudryashov, Active Optics Night N Ltd. (Russian Federation) [10539-36]

Lunch/Exhibition Break Thu 12:10 pm to 1:40 pm

SESSION 8.....THU 1:40 PM TO 3:00 PM

Innovative Photonics Instrumentation III

Session Chair: **Lynda E. Busse**, U.S. Naval Research Lab. (USA)

Polarization analysis of space-variant birefringent plates based on subwavelength gratings, Pierre Piron, Ernesto Vargas Catalan, Uppsala Univ. (Sweden); Julian Haas, Univ. Ulm (Germany); Mikael Karlsson, Uppsala Univ. (Sweden)[10539-37]

Parallel polarization state generation and measurement with a single metasurface, Noah A. Rubin, Harvard John A. Paulson School of Engineering and Applied Sciences (USA); Aun Zaidi, Massachusetts Institute of Technology (USA); Ruo Ping Li, Univ. of Waterloo (Canada); Michael Juhl, Jan Phillipp Balthasar Mueller, Univ. of Iceland (Iceland); Robert C. Devlin, Harvard Univ. (USA); Kristjan Leosson, Univ. of Iceland (Iceland); Federico Capasso, Harvard John A. Paulson School of Engineering and Applied Sciences (USA)[10539-38]

Wide field-of-view 3D label-free super-resolution imaging, Ivan Kassamakov, Anton Nolvi, Univ. of Helsinki (Finland); Jyrki Heinämäki, Univ. of Tartu (Estonia); Kim Grundström, Kimmy Photonics (Finland); Edward Hæggström, Univ. of Helsinki (Finland)[10539-39]

Curved sensors for compact high-resolution wide-field designs: prototype demonstration and optical characterization, Bertrand Chambion, Christophe Gaschet, CEA-LETI (France); Emmanuel Hugot, Lab. d'Astrophysique de Marseille (France); Stéphane Gétin, CEA-LETI (France); Thibault Behaghel, Wilfried Jahn, Lab. d'Astrophysique de Marseille (France); Stéphane Caplet, Aurélie Vandeneynde, David Henry, CEA-LETI (France)[10539-40]

SESSION 9..... THU 3:30 PM TO 4:50 PM

Innovative Photonics Instrumentation IV

Session Chair: **Craig Olson**, L-3 Sonoma EO (USA)

C-RED One and C-RED Two: SWIR high-performance cameras using Saphira e-APD and Snake InGaAs detectors, Jean-Luc Gach, Philippe Feautrier, Thomas Carmignani, Fabien Clop, Stéphane Lemarchand, Eric Stadler, Yann Wanwanscappel, David Boutolleau, First Light Imaging S.A.S. (France)[10539-41]

Circularly-symmetric apodized photon sieves for high-contrast imaging, Olha Asmolova, U.S. Air Force Academy (USA); Geoff Andersen, HUA, Inc. (USA); Elizabeth Young, Rhodes College (USA); Jason Kay, Princeton Univ. (USA); Michael Dearborn, The MITRE Corp. (USA)[10539-42]

Authentication via wavefront-shaped optical responses, Hergen Eilers, Benjamin R. Anderson, Ray Gunawidjaja, Washington State Univ. (USA)[10539-43]

A portable non-contact displacement sensor and its application of lens centration error measurement, Zong-Ru Yu, Wei-Jei Peng, Jung-Hsing Wang, Po-Jui Chen, Hua-Lin Chen, Yi-Hao Lin, Jun-Cheng Chen, Wei-Yao Hsu, Instrument Technology Research Ctr. (Taiwan)[10539-44]

OPTO

CONFERENCE 10540

Sunday-Thursday 28-1 February 2018 • Proceedings of SPIE Vol. 10540

Quantum Sensing and Nano Electronics and Photonics XV

Conference Chair: **Manijeh Razeghi**, Northwestern Univ. (USA)

Conference Co-Chairs: **Gail J. Brown**, Air Force Research Lab. (USA); **Jay S. Lewis**, Defense Advanced Research Projects Agency (USA); **Giuseppe Leo**, Univ. Paris 7-Denis Diderot (France)

Program Committee: **Steven B. Brown**, Space Dynamics Lab. (USA); **David A. Cardimona**, Air Force Research Lab. (USA); **Vincent M. Cowan**, Air Force Research Lab. (USA); **Paolo De Natale**, Istituto Nazionale di Ottica (Italy); **Jérôme Faist**, ETH Zürich (Switzerland); **Michael D. Gerhold**, U.S. Army Research Office (USA); **Robert J. Grasso**, EOIR Technologies (USA); **Frédéric Grillot**, Télécom ParisTech (France); **Yasar Gurbuz**, Sabanci Univ. (Turkey); **Sven Höfling**, Univ. of St. Andrews (United Kingdom); **John E. Hubbs**, Ball Aerospace & Technologies Corp. (USA); **Jean-Pierre Huignard**, Jphopto (France); **Woo-Gwang Jung**, Kookmin Univ. (Korea, Republic of); **Tsukuru Katsuyama**, Sumitomo Electric Industries, Ltd. (Japan); **Giti A. Khodaparast**, Virginia Polytechnic Institute and State Univ. (USA); **Michel Krakowski**, Thales Research & Technology (France); **Kwok Keung Law**, Naval Air Warfare Ctr. Weapons Div. (USA); **Craig M. Lennon**, U.S. Army Night Vision & Electronic Sensors Directorate (USA); **Amy W. K. Liu**, IQE Inc. (USA); **Jerry R. Meyer**, U.S. Naval Research Lab. (USA); **Maya Mikhaliyova**, Ioffe Physico-Technical Institute (Russian Federation); **Jan Misiewicz**, Wroclaw Univ. of Technology (Poland); **Oleg Mitrofanov**, Univ. College London (United Kingdom); **Shanee Pacley**, Air Force Research Lab. (USA); **Dimitris Pavlidis**, Boston Univ. (USA); **Jean-Luc Pelouard**, Joint Research Lab. of Micro and Nano Optics (MiNaO) (France); **Narasimha S. Prasad**, NASA Langley Research Ctr. (USA); **Edward H. Sargent**, Univ. of Toronto (Canada); **Gaetano Scamarcio**, Univ. degli Studi di Bari Aldo Moro (Italy); **Elizabeth H. Steenbergen**, Air Force Research Lab. (USA); **Marija Strojnik Scholl**, Ctr. de Investigaciones en Óptica, A.C. (Mexico); **Meimei Tidrow**, U.S. Army Night Vision & Electronic Sensors Directorate (USA); **Cunzhu Tong**, Changchun Institute of Optics, Fine Mechanics and Physics (China); **Luisa Torsi**, Univ. degli Studi di Bari Aldo Moro (Italy); **Miriam Serena Vitiello**, Consiglio Nazionale delle Ricerche (Italy)

SUNDAY 28 JANUARY

OPENING REMARKS 8:30 AM TO 8:45 AM

Manijeh Razeghi, Northwestern Univ. (USA)

SESSION 1 SUN 8:45 AM TO 10:15 AM

Keynote Session

Session Chairs: **Jay S. Lewis**, Defense Advanced Research Projects Agency (USA); **Jerry R. Meyer**, U.S. Naval Research Lab. (USA)

Application of IR thermometry to understanding brain function (*Keynote Presentation*), Todd Parrish, Northwestern Univ. (USA) . [10540-1]

A brief history of infrared detector materials (*Keynote Presentation*), Gail J. Brown, Air Force Research Lab. (USA) . [10540-2]

Type-II InAs/GaSb/AlSb superlattice-based heterojunction phototransistors: back to the future (*Keynote Presentation*), Abbas Haddadi, Romain Chevallier, Arash Dehzangi, Thomas Yang, Manijeh Razeghi, Northwestern Univ. (USA) . [10540-3]

SESSION 2 SUN 10:45 AM TO 11:50 AM

Advanced Sensing Technology

Session Chair: **Guanxi Andy Chen**, The Boding Co. (USA); **Giuseppe Leo**, Univ. Paris 7-Diderot (France)

Understanding fundamental limitations of materials to enable advanced design (*Keynote Presentation*), Meredith L. Reed, Jagmohan Bajaj, Jonathan Schuster, Philip Perconti, U.S. Army Research Lab. (USA); Enrico Bellotti, Boston Univ. (USA) . [10540-4]

Sensing with semiconductor quantum dots (*Invited Paper*), Julien Claudon, Commissariat à l'Énergie Atomique (France) . [10540-5]

Dark current reduction in microjunction-based compound electron barrier type-II InAs_{1-x}Sb_x superlattice-based long-wavelength infrared photodetectors, Romain Chevallier, Abbas Haddadi, Manijeh Razeghi, Northwestern Univ. (USA) . [10540-6]

Lunch Break Sun 11:50 am to 1:00 pm

SESSION 3 SUN 1:15 PM TO 3:00 PM

Quantum Cascade Lasers I

Session Chairs: **Todd B. Parrish**, Northwestern Univ. (USA); **Toshihiko Baba**, Yokohama National Univ. (Japan)

Nanoscale vacuum electronics and large-scale silicon nanowire array fabrication for various applications (*Keynote Presentation*), Meyya Meyyappan, NASA Ames Research Ctr. (USA) . [10540-7]

Interband cascade vertical-cavity surface-emitting lasers and light-emitting devices (*Invited Paper*), Jerry R. Meyer, William W. Bewley, Charles D. Merritt, U.S. Naval Research Lab. (USA); Mijin Kim, Sotera Defense Solutions, Inc. (USA); Chul Soo Kim, Michael V. Warren, Chadwick L. Canedy, Igor Vurgaftman, U.S. Naval Research Lab. (USA) . [10540-8]

High-performance monolithic broadly-tunable mid-infrared quantum cascade lasers (*Invited Paper*), Wenjia Zhou, Ryan McClintock, Manijeh Razeghi, Northwestern Univ. (USA) . [10540-9]

Gain modeling and thermal management of optically pumped semiconductor lasers (*Invited Paper*), Yanbo Bai, Jeffrey Wisdom, Christian Scholz, Juan L. Chilla, Coherent, Inc. (USA) . [10540-10]

Interband cascade laser based quartz-enhanced photoacoustic sensor for multiple hydrocarbons detection, Vincenzo Spagnolo, Politecnico di Bari (Italy); Angelo Sampaolo, Pietro Patimisco, Univ. degli Studi di Bari Aldo Moro (Italy); Sebastian Csutak, Aramco Services Co. (USA); Marilena Giglio, Univ. degli Studi di Bari Aldo Moro (Italy); Giansergio Menduni, Vittorio M. N. Passaro, Politecnico di Bari (Italy); Max Deffenbaugh, Aramco Services Co. (USA); Frank K. Tittel, Rice Univ. (USA) . [10540-11]

SESSION 4 SUN 3:30 PM TO 5:05 PM

Detectors and Sensors

Session Chairs: **Cengiz Besikci**, Middle East Technical Univ. (Turkey); **Meyya Meyyappan**, NASA Ames Research Ctr. (USA)

Photonic crystal nanolaser biosensors (*Keynote Presentation*), Toshihiko Baba, Yokohama National Univ. (Japan) . [10540-12]

Interband cascade IR photodetectors with electrical gain (*Invited Paper*), Rui Q. Yang, The Univ. of Oklahoma (USA) . [10540-13]

Advances in intersubband polariton devices: short-wave infrared operation and immunity to inhomogeneous broadening (*Invited Paper*), Raffaele Colombelli, J.M. Manceau, P. Laffaille, N.L. Tran, A. Bousseksou, Institut d'Électronique Fondamentale (France); I. Carusotto, Bose-Einstein Condensation Ctr., Istituto Nazionale di Ottica (Italy); G. Biasiol, Lab. Nazionale TASC (Italy); R. Teissier, Inst d'Electronique et des Systèmes, Univ. Montpellier (France) . [10540-14]

A minimized ultra-sensitive MIR hollow waveguide (HWG) isotope ratio analyzer for environmental and industrial applications (*Invited Paper*), Zhenyou Wang, Sheng Wu, Yan Zhuang, Andrei Deev, Arrow Grand Technologies (USA) [10540-15]

New breakthroughs in short-wavelength infrared imaging (*Invited Paper*), Hooman Mohseni, Northwestern Univ. (USA) [10540-16]

Sofradir vertical industrial model for high-image-quality MCT detectors, Laurent Rubaldo, Pierre Guinedor, Alexandre Brunner, Vincent Destefanis, Paul Fougères, Nicolas Péré-Laperne, Diane Sam-Giao, Loïc Dargent, Alexandre Kerlain, Augustin Cathignol, SOFRADIR (France); François Boulard, Olivier Gravrand, CEA-LETI (France) [10540-17]

High-performance visible/e-SWIR heterojunction photodetectors based on type-II InAs/GaSb/AlSb superlattices, Thomas Yang, Abbas Haddadi, Romain Chevallier, Arash Dehzangi, Manijeh Razeghi, Northwestern Univ. (United States) [10540-102]

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 5 **MON 10:30 AM TO 12:10 PM**

Imaging Science and Technology I

Session Chairs: **Shanee Paclay**, Air Force Research Lab. (USA); **Thomas Strahl**, Fraunhofer-Institut für Physikalische Messtechnik (Germany)

Bridging the basic-applied dichotomy and the cycles of invention and discovery (*Keynote Presentation*), Venkatesh Narayanamurti, Harvard Univ. (USA) [10540-18]

Development of an InGaAs SPAD 2D array for Flash LIDAR (*Keynote Presentation*), Takashi Baba, Yoshihito Suzuki, Kenji Makino, Takuya Fujita, Tatsuya Hashi, Shunsuke Adachi, Shigeyuki Nakamura, Koei Yamamoto, Hamamatsu Photonics K.K. (Japan) [10540-19]

Bio-inspired uncooled multi-spectral infrared imaging with mK range temperature resolution (*Invited Paper*), Debashis Chanda, Univ. of Central Florida (USA) [10540-20]

Subwavelength THz imaging with near-field probe nanodevices (*Invited Paper*), Maria Caterina Giordano, CNR-NANO (Italy); Oleg Mitrofanov, Univ. College London (United Kingdom); Leonardo Viti, Daniele Ercolani, Miriam Serena Vitiello, Lucia Sorba, CNR-NANO (Italy) [10540-21]

Lunch Break Mon 12:10 pm to 1:40 pm

SESSION 6 **MON 1:40 PM TO 3:00 PM**

Imaging Science and Technology II

Session Chairs: **Toshihiko Baba**, Yokohama National Univ. (Japan); **Venkatesh Narayanamurti**, Harvard Univ. (USA)

Imaging of the local density of states at the nanometer scale (*Invited Paper*), Valentina Krachmalnicoff, Dorian Bouchet, Rémi Carminati, Sébastien Bidault, Ignacio Izeddin, Yannick De Wilde, Institut Langevin (France) [10540-22]

Extended SWIR FPA technology: status and trends (*Invited Paper*), Cengiz Besikci, Middle East Technical Univ. (Turkey) [10540-23]

Development technology of principle prototype of high-resolution quantum remote sensing imaging (*Invited Paper*), Siwen Bi, Institute of Remote Sensing and Digital Earth (China) [10540-24]

Far-field wide-field label-free nanoscale imaging based on full-angle evanescent wave illumination (*Invited Paper*), Qing Yang, Zhejiang Univ. (China) [10540-25]

SESSION 7 **MON 3:30 PM TO 5:40 PM**

Plasmonics and 2D Systems

Session Chairs: **Giti A. Khodaparast**, Virginia Polytechnic Institute and State Univ. (USA); **Stefan A. Maier**, Imperial College London (United Kingdom)

Hot electron photovoltages in nanogap structures (*Keynote Presentation*), Douglas Natelson, Pavlo Zolotavin, Charlotte I. Evans, Rice Univ. (USA) [10540-26]

Investigation of thermal radiation from single plasmonic antennas (*Invited Paper*), Yannick De Wilde, Institut Langevin (France) [10540-27]

Competing second and third order nonlinear effects in plasmonic nanoantennas (*Invited Paper*), Costantino De Angelis, Univ. degli Studi di Brescia (Italy); Michele Celebrano, Lavinia Ghirardini, Giovanni Pellegrini, Paolo Biagioni, Politecnico di Milano (Italy); Xiaofei Wu, Swen Grossmann, Julius-Maximilians-Univ. Würzburg (Germany); Luca Carletti, Andrea Locatelli, Univ. degli Studi di Brescia (Italy); Lamberto Duò, Politecnico di Milano (Italy); Bert Hecht, Julius-Maximilians-Univ. Würzburg (Germany); Marco Finazzi, Politecnico di Milano (Italy) [10540-28]

Efficient light emission and absorption in monolayer 2D semiconductors using plasmonic nanostructures (*Invited Paper*), Koray Aydin, Northwestern Univ. (USA) [10540-29]

Optical and chemical sensor devices based on two-dimensional transition metal dichalcogenides (*Invited Paper*), Patrick Kung, Sourav Garg, Joseph L. Waters, Abu Shahab Mollah, Seongsin M. Kim, The Univ. of Alabama (USA) [10540-30]

Optimization of interface between plasmonic nanostructure and semiconductor (*Invited Paper*), Sharmin Haq, Terefe G. Habteyes, The Univ. of New Mexico (USA) [10540-31]

TUESDAY 30 JANUARY

SESSION 8 **TUE 8:10 AM TO 10:00 AM**

Emerging Photonic Devices I

Session Chairs: **Gail J. Brown**, Air Force Research Lab. (USA); **David A. B. Miller**, Stanford Univ. (USA)

Highly stable forced optoelectronic oscillators and roadmap to integrated clocks (*Keynote Presentation*), Afshin S. Daryoush, Drexel Univ. (USA) [10540-32]

Electrically-driven optical antennas for novel light-emission processes (*Invited Paper*), Claire Deeb, Ctr. National de la Recherche Scientifique (France) [10540-33]

One quantum sensor for all gases: cavity-enhanced Raman spectroscopy for food-chain monitoring (*Invited Paper*), Vincenz Sandfort, Univ. of Freiburg (Germany); Jürgen Wöllenstein, Univ. of Freiburg (Germany) and Fraunhofer-Institut für Physikalische Messtechnik (Germany); Stefan Palzer, Univ. of Freiburg (Germany) [10540-34]

Plasmon-enhanced light emission from an optically pumped bias-controlled tunneling junction (*Invited Paper*), Alfred J. Meixner, Kai Braun, Frank Wackenhut, Eberhard Karls Univ. Tübingen (Germany) [10540-35]

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Ge-rich SiGe photonic-integrated circuits for mid-IR spectroscopy (*Invited Paper*), Delphine Marris-Morini, Vladyslav Vakarin, Qiankun Liu, Joan-Manel Ramirez, Ctr. de Nanosciences et de Nanotechnologies (France); Andrea Ballabio, Jacopo Frigerio, Politecnico di Milano (Italy); Xavier Le Roux, Samuel Serna, Daniel Benedikovic, Carlos A. Alonso-Ramos, Ctr. de Nanosciences et de Nanotechnologies (France); Giovanni Isella, Politecnico di Milano (Italy); Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) [10540-36]

SESSION 9 TUE 10:30 AM TO 12:10 PM

Emerging Photonic Devices II

Session Chairs: **Mehdi Alouini**, Institut de Physique de Rennes (France); **Claire Deeb**, Lab. de Photonique et de Nanostructures (France)

Electrically-driven optical antennas (*Invited Paper*), René Kulloek, Bert Hecht, Maximilian Ochs, Julius-Maximilians-Univ. Würzburg (Germany) [10540-37]

Characterization of actively-quenched SPADs in 90nm bulk CMOS at cryogenic temperatures (*Invited Paper*), Daniel Kramnik, Massachusetts Institute of Technology (USA); Karan Mehta, ETH Zurich (Switzerland); Rajeev Ram, Massachusetts Institute of Technology (USA) [10540-38]

Optical wireless power transfer between an optical antenna and a paired transducing rectenna (*Invited Paper*), Alexandre Bouhelier, Arindam Dasgupta, Marie-Maxime Mennemanteuil, Univ. de Bourgogne (France) [10540-39]

Fast response CdS-CdTe hybrid nanobelt photodetector (*Invited Paper*), Mingwei Tang, Qing Yang II, Zhejiang Univ. (China) [10540-40]

Incident femtosecond pulse chirp influence on nonlinear localization of laser energy in 2D photonic crystal (*Invited Paper*), Vyacheslav A. Trofimov, Tatiana Lysak, Evgeny Trykin, M.V. Lomonosov Moscow State Univ. (Russian Federation) [10540-42]

Lunch/Exhibition Break Tue 12:10 pm to 1:40 pm

SESSION 10 TUE 1:40 PM TO 3:10 PM

Nanophotonics

Session Chairs: **Douglas Natelson**, Rice Univ. (USA); **Mohsen Rahmani**, The Australian National Univ. (Australia)

Self-configuring complex optics (*Keynote Presentation*), David A. B. Miller, Stanford Univ. (USA) [10540-43]

Plasmonic and dielectric nanocavities for surface-enhanced spectroscopies, nonlinear optics, and nanolocalized chemistry (*Invited Paper*), Stefan A. Maier, Imperial College London (United Kingdom) [10540-44]

Optical frequency conversion at the nanoscale: metallic, dielectric, and semiconductor nanostructures (*Invited Paper*), Lei Xu, Mohsen Rahmani, Dragomir N. Neshev, Yuri S. Kivshar, The Australian National Univ. (Australia) [10540-45]

Enhancing or inhibiting spontaneous emission from fluorescent molecules in the near-field of silicon nanoantennas (*Invited Paper*), Dorian Bouchet, Institut Langevin (France); Mathieu Mivelle, Institut Langevin (France) and Univ. Pierre et Marie Curie (France) and Ctr. National de la Recherche Scientifique (France); Julien Proust, Aix-Marseille Univ. (France) and Institut Fresnel (France); Bruno Gallas, Univ. Pierre et Marie Curie (France) and Institut des NanoSciences de Paris (France); Igor Ozerov, Aix-Marseille Univ. (France) and CINaM - Ctr. Interdisciplinaire de Nanoscience de Marseille (France); Maria F. Garcia-Parajo, ICFO - Institut de Ciències Fotòniques (Spain) and The Barcelona Institute of Science and Technology (Spain); Yannick De Wilde, Institut Langevin (France); Nicolas Bonod, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (France) and Institut Fresnel (France); Valentina Krachmalnicoff, Sébastien Bidault, Institut Langevin (France) [10540-46]

SESSION 11 TUE 3:40 PM TO 5:40 PM

Optoelectronic Devices

Session Chairs: **Alexandre Bouhelier**, Univ. de Bourgogne (France); **René Kulloek**, Julius-Maximilians-Univ. Würzburg (Germany)

Multi-functional sensing: the lab-in-fiber (*Invited Paper*), Peter R. Herman, Kevin Joseph, Erden Ertorer, Gligor Djogo, Moez Haque, Jianzhao Li, Univ. of Toronto (Canada) [10540-47]

Microcavity III-V lasers monolithically grown on silicon (*Invited Paper*), Kirsten Moselund, Benedikt Mayer, Stephan Wirths, Svenja Mauthe, Yannick Baumgartner, Joel Winniger, Heinz Schmid, Marilyne Souza, Lukas Czornomaz, IBM Research - Zürich (Switzerland) [10540-48]

Minority carrier lifetime in strain-balanced InAs/InAsSb superlattices grown with and without Bi surfactant (*Invited Paper*), Preston T. Webster, Air Force Research Lab. (USA); Stephen T. Schaefer, Arizona State Univ. (USA); Elizabeth H. Steenbergen, Air Force Research Lab. (USA); Shane R. Johnson, Arizona State Univ. (USA) [10540-49]

InP-on SOI nanophotonic optoelectronic devices (*Invited Paper*), Fabrice Raineri, Lab. de Photonique et de Nanostructures (France); Guillaume Crosnier, STMicroelectronics (France); Dimitris Fitsios, Francesco Manegatti, Rama Raj, Nhung Vu, Dorian Sanchez, Ctr. de Nanosciences et de Nanotechnologies (France) [10540-50]

Novel cubic phase III-nitride complementary metal-oxide-semiconductor transistor technology (*Invited Paper*), Can Bayram, Ryan Grady, Kihoon Park, Univ. of Illinois (USA) [10540-51]

The Kerr phase-interrogator: exploiting the nonlinear Kerr-effect for overcoming fundamental limitations in linear sensing approaches (*Invited Paper*), Chams Baker, Liang Chen, Xiaoyi Bao, Univ. of Ottawa (Canada) [10540-52]

LATE-BREAKING RESULTS AND INNOVATION AWARDS 7:30 PM TO 9:00 PM

Late-Breaking Results and Innovation Awards in Quantum Sensing and Nano Electronics and Photonics

Session Chair: **Manijeh Razeghi**, Northwestern Univ. (USA)

SPIE announces the Innovation Award in Quantum Sensing and Nano Electronics and Photonics at SPIE Photonics West OPTO 2018. These awards will recognize the outstanding scientific contribution of students and early career professionals who present the most notable recent discoveries with broad impact in the areas of quantum sensing and nano electronics and photonics. These discoveries should be innovative in that they represent a new paradigm or way of thinking which will have a broad impact in their respective field. Participants will be required to give a 15-minute presentation in this Tuesday evening session chaired by Prof. Manijeh Razeghi. The winner(s) will be announced at the end of the session. Winner(s) will be awarded a commemorative plaque as well as a cash prize.

To submit your work for consideration/participation in this awards session, contact Prof. Manijeh Razeghi at razeghi@eecs.northwestern.edu with a two-page abstract (containing working title, author(s)/affiliation(s), description, and references) by Friday 1 December 2017.

WEDNESDAY 31 JANUARY

SESSION 12..... WED 8:00 AM TO 10:10 AM

Quantum Cascade Lasers II

Session Chairs: **John Dallesasse**, Univ. of Illinois (USA);
Kirsten Moselund, IBM Research - Zürich (Switzerland)

Controlling QCLs for frequency metrology from the infrared to the THz range (*Keynote Presentation*), Paolo De Natale, Istituto Nazionale di Ottica (Italy) [10540-53]

Development of THz light sources based on QCL technology (*Invited Paper*), Kazuue Fujita, Akio Ito, Masahiro Hitaka, Tatsuo Dougakiuchi, Tadataka Edamura, Hamamatsu Photonics K.K. (Japan) [10540-54]

Recent advances of external cavity QCLs with MOEMS diffraction gratings (*Invited Paper*), Ralf Ostendorf, Stefan Hugger, Lorenz Butschek, Jan-Philip Jarvis, Marko Härtelt, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); André Dreyhaupt, Jan Grahmann, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Marcel Rattunde, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) [10540-55]

Quantum-cascade lasers based upon metasurfaces (*Invited Paper*), Benjamin S. Williams, Luyao Xu, Christopher A. Curwen, Dagan Chen, Univ. of California, Los Angeles (USA); John L. Reno, Sandia National Labs. (USA) and The Ctr. for Integrated Nanotechnologies (USA); Tatsuo Itoh, Univ. of California, Los Angeles (USA) [10540-56]

Talbot coupling of an array of quantum cascade lasers (*Invited Paper*), Frédéric Grillot, Télécom ParisTech (France); Tim Newell, Air Force Research Lab. (USA); Tom Gavrielides, The Univ. of New Mexico (USA); Olivier Spitz, Télécom ParisTech (France); Mathieu Carras, mirSense (France) . . . [10540-57]

Temperature dependence of the phase-space dynamics of a mid-infrared quantum cascade laser with external optical feedback (*Invited Paper*), Olivier Spitz, Kevin Schires, Télécom ParisTech (France); Mathieu Carras, mirSense (France); Chee Wei Wong, Mesoscopic Optics and Quantum Electronics Lab., Univ. of California, Los Angeles (USA); Frédéric Grillot, Télécom ParisTech (France) and Ctr for High Technology Materials, Univ. of New Mexico (USA) [10540-58]

SESSION 13..... WED 10:40 AM TO 12:00 PM

Quantum Cascade Lasers III

Session Chairs: **Sven Höfling**, Julius-Maximilians-Univ. Würzburg (Germany); **Patrick Kung**, The Univ. of Alabama (USA)

Compact and low power-consumption MIR DFB-QCL with To-CAN Package for portable sensor (*Invited Paper*), Makoto Murata, Hiroyuki Yoshinaga, Masaki Migita, Hiroki Mori, Yukihiro Tsuji, Takashi Kato, Jun-ichi Hashimoto, Mitsuru Ekawa, Yasuhiro Iguchi, Tsukuru Katsuyama, Sumitomo Electric Industries, Ltd. (Japan) [10540-59]

Progress on the transistor-injected quantum cascade laser (*Invited Paper*), John Dallesasse, Kanuo Chen, Fu-Chen Hsiao, Univ. of Illinois (USA) [10540-60]

Compact and low-noise quartz-enhanced photoacoustic sensor for sub-ppm ethylene detection in atmosphere (*Invited Paper*), Pietro Patimisco, Angelo Sampaolo, Univ. degli Studi di Bari Aldo Moro (Italy); Hubert Rossmadl, Verena Mackowiak, Thorlabs GmbH (Germany); Alex E. Cable, Thorlabs GmbH (USA); Vincenzo Spagnolo, Politecnico di Bari (Italy) [10540-61]

Different cladding materials employed in metal-metal waveguides for terahertz quantum cascade lasers (*Invited Paper*), Anna Szerling, Kamil Kosiel, Institute of Electron Technology (Poland); Michał O. Szymański, Warsaw Univ. of Life Sciences SGGW (Poland); Piotr Prokaryn, Artur Trajnerowicz, Mariusz Pluska, Maciej Sakowicz, Institute of Electron Technology (Poland); Zbigniew R. Wasilewski, Univ. of Waterloo (Canada); Norbert Patka, Wojskowa Akademia Techniczna im. Jaroslawa Dabrowskiego (Poland); Maciej Kuc, Tomasz G. Czyszczanowski, Lodz Univ. of Technology (Poland) [10540-62]

Lunch/Exhibition Break Wed 12:00 pm to 1:30 pm

SESSION 14..... WED 1:30 PM TO 3:20 PM

Advances in Laser Technology

Session Chairs: **Jan Misiewicz**, Wroclaw Univ. of Science and Technology (Poland); **Anna Szerling**, Institute of Electron Technology (Poland)

Bases and experimental validation of a novel VSPIN model: towards functional spin-controlled VCSELs (*Keynote Presentation*), Mehdi Alouini, Institut de Physique de Rennes (France); Julien Frougier, Unité Mixte de Physique CNRS/Thales (France); Alexandre Joly, Daniel Dolfi, Thales Research & Technology (France); Jean-Marie George, Unité Mixte de Physique CNRS/Thales (France) [10540-63]

Recent advances in InAs/GaAs quantum-dot lasers in the near-IR and its efficient conversion to the visible region (*Invited Paper*), Edik U. Rafailov, Ksenia A. Fedorova, Aston Univ. (United Kingdom) [10540-64]

Water-wave lasers (*Invited Paper*), Shai Maayani, Samuel Kaminski, Leopoldo L. Martin, Tal Carmon, Technion-Israel Institute of Technology (Israel) [10540-65]

Polariton-lasing in microcavities filled with fluorescent proteins (*Invited Paper*), Sven Höfling, Simon Betzold, Christof P. Dietrich, Monika Emmerling, Julius-Maximilians-Univ. Würzburg (Germany); Laura Tropic, Marcel Schubert, Nils M. Kronenberg, Univ. of St. Andrews (United Kingdom); Jürgen Ohmer, Utz Fischer, Julius-Maximilians-Univ. Würzburg (Germany) [10540-66]

Super-resonant coherent perfect absorption (*Invited Paper*), Pietro Malara, Istituto Nazionale di Ottica (Italy); Carlo Edoardo Campanella, QOPSys s.r.l.s. (Italy); Antonio Giorgini, Saverio Avino, Paolo De Natale, Gianluca Gagliardi, Istituto Nazionale di Ottica (Italy) [10540-67]

SESSION 15..... WED 3:50 PM TO 6:10 PM

Terahertz and Nonlinear Spectroscopy

Session Chairs: **Jérôme Faist**, ETH Zurich (Switzerland); **Makoto Murata**, Sumitomo Electric Industries, Ltd. (Japan)

Terahertz detection in 2D materials (*Invited Paper*), Thomas E. Murphy, M. Mehdi Jadidi, Martin Mittendorf, Andrei B. Sushkov, H. Dennis Drew, Univ. of Maryland, College Park (USA); Michael S. Fuhrer, Monash Univ. (Australia) [10540-68]

Multi-THz sideband generation on an optical telecom carrier at room temperature (*Invited Paper*), Sarah Houver, Armand Lebreton, Juliette Mangeney, Jerome Tignon, Sukhdeep Dhillon, Lab. Pierre Aigrain (France) [10540-69]

Monolithic echoless photoconductive switches for high-resolution terahertz time-domain spectroscopy (*Invited Paper*), Kenneth Maussang, José Palomo, Lab. Pierre Aigrain (France); Jean-Michel Manceau, Raffaele Colombelli, Isabelle Sagnes, Ctr. de Nanosciences et de Nanotechnologies (France); Lianhe H. Li, Edmund H. Linfield, Giles A. Davies, Univ. of Leeds (United Kingdom); Juliette Mangeney, Jerome Tignon, Sukhdeep Dhillon, Lab. Pierre Aigrain (France) [10540-70]

Acoustic coherent phonon propagation in ferromagnetic GaMnAs in the presence of external magnetic fields (*Invited Paper*), Giti A. Khodaparast, Brenden A. Magill, Virginia Polytechnic Institute and State Univ. (USA); Gary D. Sanders, Chris J. Stanton, Univ. of Florida (USA); H. MuneKata, Tokyo Institute of Technology (Japan); Joshua Holleman, Steve A. McGill, National High Magnetic Field Lab. (USA) [10540-71]

Resonant scattering probes for terahertz near-field microscopy (*Invited Paper*), Tom Siday, Michele Natrella, Jiang Wu, Huiyun Liu, Oleg Mitrofanov, Univ. College London (United Kingdom) [10540-72]

Nonlinear optical frequency conversion and light generation using GaN-based nanoantennas and microcavities (*Invited Paper*), Arup Neogi, Univ. of North Texas (USA) [10540-73]

Levitation optomechanics: Taming the dynamics of a levitated nanoparticle (*Invited Paper*), Romain Quidant, ICFO - Institut de Ciències Fotòniques (Spain) [10540-94]

OPTO

CONFERENCE 10540

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Enhanced Raman scattering with dielectrics, Ivano Alessandri, Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali (Italy) and Univ. degli Studi di Brescia (Italy) [10540-95]

CO₂ isotope analyzer for breath analysis using a fiber-coupled ICL, Zhen Wang, Ke Xu, Chang Liu, Wei Ren, The Chinese Univ. of Hong Kong (Hong Kong, China) [10540-96]

Hot-electron-induced modification of plasmonic nanoantennas below the diffraction limit, Stefan A. Maier, Imperial College London (United Kingdom) [10540-97]

Sideband cooling of water waves, Shai Maayani, Leopoldo L. Martin, Samuel Kaminski, Tal Carmon, Technion-Israel Institute of Technology (Israel) [10540-98]

Optical spectroscopy of GaSb-based resonant interband tunneling structures in the mid-infrared spectral range, Mateusz Dyksik, Wroclaw Univ. of Science and Technology (Poland) [10540-99]

Photothermal spectroscopy of CH₄ at 7.2 μm in an interferometric multipass configuration, Arkadiusz J. Hudzikowski, Aleksander K. Gluszek, Karol Krzempek, Wroclaw Univ. of Science and Technology (Poland); Michal Nikodem, Wroclaw Research Ctr. EIT+ (Poland); Grzegorz Dudzik, Wroclaw Univ. of Science and Technology (Poland); Gerard Wysocki, Princeton Univ. (USA); Krzysztof M. Abramski, Wroclaw Univ. of Science and Technology (Poland) [10540-100]

Toward short-wave infrared (SWIR) imagers with single-photon sensitivity operating at high temperature, Mohsen Rezaei, Min-Su Park, Chee Leong Tan, Cobi Rabinowitz, Simone Bianconi, Skylar Wheaton, Hooman Mohseni, Northwestern Univ. (USA) [10540-101]

THURSDAY 1 FEBRUARY

SESSION 16 THU 8:20 AM TO 10:00 AM

Frequency Combs and Nonlinear Processes I

Session Chairs: **Afshin S. Daryoush**, Drexel Univ. (USA); **Steven B. Brown**, Space Dynamics Lab. (USA)

Optical frequency combs and photonic integrated circuits: tools for high-speed communications and advanced distance metrology (*Invited Paper*), Christian Koos, Karlsruhe Institut für Technologie (Germany) [10540-74]

High-Q optical comb based on a photonic harmonic potential (*Invited Paper*), Sylvain Combré, Gaëlle Lehoucq, Thales Research & Technology (France); Grégory Moille, Thales Research & Technology (France) and National Institute of Standards and Technology (USA); Aude Martin, Alfredo De Rossi, Thales Research & Technology (France) [10540-75]

High-dimensional optical quantum states from integrated frequency combs and their coherent control (*Invited Paper*), Stefania Sciarra, Michael Kues, Christian Reimer, Piotr Roztock, Luis Romero Cortés, Institut National de la Recherche Scientifique (Canada); Alfonso Cino, Univ. degli Studi di Palermo (Italy); Benjamin Wetzler, Univ. of Sussex (United Kingdom); Yanbing Zhang, Institut National de la Recherche Scientifique (Canada); Sai T. Chu, City Univ. of Hong Kong (China); Brent E. Little, Xi'an Institute of Optics and Precision Mechanics, CAS (China); David J. Moss, Swinburne Univ. of Technology (Australia); Lucia Caspani, Univ. of Strathclyde (United Kingdom); José Azaña, Roberto Morandotti, Institut National de la Recherche Scientifique (Canada) [10540-76]

Discrete spatial entanglement in multimode nonlinear waveguides (*Invited Paper*), Michal Jachura, Michal Karpinski, Konrad Banaszek, Univ. of Warsaw (Poland); Divya Bharadwaj, Jasleen Lugani, Krishna Thyagarajan, Indian Institute of Technology Delhi (India) [10540-77]

Entangled photon generation in AlGaAs waveguides (*Invited Paper*), Stewart J. Aitchison, Univ. of Toronto (Canada) [10540-78]

SESSION 17 THU 10:30 AM TO 12:10 PM

Frequency Combs and Nonlinear Processes II

Session Chairs: **Christian Koos**, Karlsruhe Institut für Technologie (Germany); **Sarah Houver**, Lab. Pierre Aigrain (France)

Nonlinear dynamics in multimode optical fibers (*Invited Paper*), Stefan Wabnitz, Univ. degli Studi di Brescia (Italy); Alessandro Tonello, XLIM Institut de Recherche, Univ. de Limoges (France); Vincent Couderc, XLIM Institut de Recherche, Univ. de Limoges (France); Alain Barthelemy, Univ. de Limoges (France); Guy Millot, Univ. de Bourgogne (France); Katarzyna Krupa, Univ. degli Studi di Brescia (Italy) [10540-79]

Engineering second-harmonic generation at the nanoscale using AlGaAs optical nanoantennas (*Invited Paper*), Lavinia Ghirardini, Politecnico di Milano (Italy); Valerio F. Gili, Univ. Paris 7-Diderot (France); Davide Rocco, Univ. degli Studi di Brescia (Italy); Giovanni Pellegrini, Politecnico di Milano (Italy); Luca Carletti, Univ. degli Studi di Brescia (Italy); Lamberto Duò, Marco Finazzi, Politecnico di Milano (Italy); Andrea Locatelli, Univ. degli Studi di Brescia (Italy); Ivan Favero, Giuseppe Leo, Univ. Paris 7-Diderot (France); Aristide Lemaître, Ctr. de Nanosciences et de Nanotechnologies (France); Costantino De Angelis, Univ. degli Studi di Brescia (Italy); Michele Celebrano, Politecnico di Milano (Italy) [10540-80]

Hybrid photonic nanomaterials for nanoscale nonlinear interactions (*Invited Paper*), Thomas Pertsch, Friedrich-Schiller-Univ. Jena (Germany) [10540-81]

Comb generation of second and third harmonics at high-intensive femtosecond pulse in medium with quadratic and cubic nonlinearities (*Invited Paper*), Vyacheslav A. Trofimov, Dmitry M. Kharitonov, Mikhail V. Fedotov, M.V. Lomonosov Moscow State Univ. (Russian Federation) [10540-82]

Results of very long time ageing tests of DFB ridge laser diodes emitting at 852 nm and 894 nm for Cesium atomic clocks (*Invited Paper*), Michel Krakowski, Patrick Resneau, Nicolas von Bandel, Michel Garcia, Eric Vinet, Yannick Robert, Olivier Parillaud, III-V Lab. (France) [10540-83]

Lunch/Exhibition Break Thu 12:10 pm to 1:40 pm

SESSION 18 THU 1:40 PM TO 3:00 PM

Infrared Detectors I

Session Chairs: **Thomas Pertsch**, Friedrich-Schiller-Univ. Jena (Germany); **Sylvain Combré**, Thales Research & Technology (France)

Significantly extended cutoff wavelength of very long-wave infrared detectors based on InAs/GaSb/InSb/GaSb superlattices (*Invited Paper*), Dongwei Jiang, Institute of Semiconductors, Chinese Academy of Sciences (China) [10540-84]

SPAD-based flash LiDAR sensor with high ambient light rejection for automotive applications (*Invited Paper*), Maik Beer, Jennifer Ruskowski, Olaf M. Schrey, Werner Brockherde, Fraunhofer-Institut für Mikroelektronische Schaltungen und Systeme (Germany); Bedrich J. Hosticka, Rainer Kokozinski, Fraunhofer-Institut für Mikroelektronische Schaltungen und Systeme (Germany) and Univ. Duisburg-Essen (Germany) [10540-85]

Room-temperature 9μm photodetectors and GHz heterodyne receivers (*Invited Paper*), Carlo Sirtori, Daniele Palaferri, Yanko Todorov, Azzura Biglioli, Angela Vasanelli, Djamel Gacemi, Univ. Paris 7-Diderot (France); Lianhe H. Li, Edmund H. Linfield, Univ. of Leeds (United Kingdom) [10540-86]

Compact low-power mid-IR supercontinuum for sensing applications (*Invited Paper*), Peter Morten Moselund, Patrick Bowen, NKT Photonics A/S (Denmark); Laurent Huot, NKT Photonics A/S (Denmark) and Technical Univ. of Denmark (Denmark); Joanna Carthy, Ross Powell, Lucy E. Hooper, NKT Photonics (United Kingdom) [10540-88]

SESSION 19.....THU 3:30 PM TO 5:20 PM

Infrared Detectors II

Session Chairs: **Linda Höglund**, IRnova AB (Sweden);
Maik Beer, Fraunhofer-Institut für Mikroelektronische Schaltungen
 und Systeme (Germany)

Remote detection of leakages of non-IR-active gases by laser spectroscopy (*Invited Paper*), Johannes Herbst, Armin Lambrecht, Thomas Strahl, Eric Maier, Sven Rademacher, Fraunhofer-Institut für Physikalische Messtechnik (Germany)[10540-89]

Tapered hollow-core fibers providing single-mode output in the 3.5µm-7.8µm spectral range, Vincenzo Spagnolo, Politecnico di Bari (Italy); Marilena Giglio, Angelo Sampaolo, Pietro Patimisco, Pietro P. Calabrese, Univ. degli Studi di Bari Aldo Moro (Italy); Jason M. Kriesel, Opto-Knowledge Systems, Inc. (USA); Frank K. Tittel, Rice Univ. (USA)[10540-90]

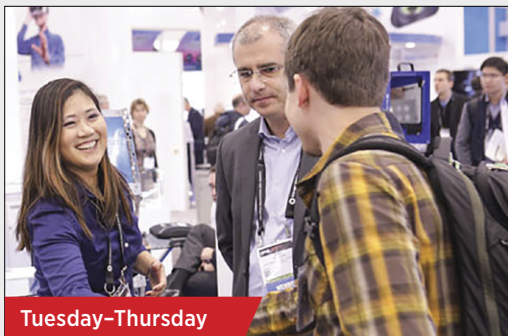
Ultrafast uncooled THz optomechanical bolometers (*Invited Paper*), Yanko Todorov, Allegra Calabrese, Chérif Belacel, Djamel Gacemi, Stefano Barbieri, Ivan Favero, Angela Vasanelli, Carlo Sirtori, Univ. Paris 7-Diderot (France).....[10540-91]

Purcell effect for emitters located at singularities of opalic metallic gratings (*Invited Paper*), Guillaume Binard, Clotilde M. Lethiec, Katia Ouaret, Céline Bourdillon, Univ. Pierre et Marie Curie (France); Fabrice Charra, Commissariat à l'Énergie Atomique (France); Catherine Schwob, Laurent Coolen, Univ. Pierre et Marie Curie (France); Ludovic Douillard, CEA-IRAMIS (France); Agnès Maître, Univ. Pierre et Marie Curie (France)[10540-103-]

Recent advances in quartz-enhanced photoacoustic sensing, Vincenzo Spagnolo, Politecnico di Bari (Italy); Pietro Patimisco, Angelo Sampaolo, Marilena Giglio, Univ. degli Studi di Bari Aldo Moro (Italy); Lei Dong, Shanxi Univ. (China); Frank K. Tittel, Rice Univ. (USA) . . . [10540-92]

Mid-wavelength infrared nBn detectors monolithically integrated with microlens (*Invited Paper*), Alexander Soibel, Sam A. Keo, Anita M. Fisher, Cory J. Hill, Edward M. Luong, Daviz Z. Ting, Sarath D. Gunapala, Jet Propulsion Lab. (USA)[10540-93]

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Tuesday–Thursday

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CONFERENCE 10541

Monday–Thursday 29 January–1 February 2018 • Proceedings of SPIE Vol. 10541

Photonic and Phononic Properties of Engineered Nanostructures VIII

Conference Chairs: **Ali Adibi**, Georgia Institute of Technology (USA); **Shawn-Yu Lin**, Rensselaer Polytechnic Institute (USA); **Axel Scherer**, California Institute of Technology (USA)

Program Committee: **Andrea Alù**, The Univ. of Texas at Austin (USA); **William L. Barnes**, Univ. of Exeter (United Kingdom); **Ali Asghar Eftekhar**, Georgia Institute of Technology (USA); **Reginald K. Lee**, California Institute of Technology (USA); **Marko Loncar**, Harvard School of Engineering and Applied Sciences (USA); **Arka Majumdar**, Univ. of Washington (USA); **Susumu Noda**, Kyoto Univ. (Japan); **Masaya Notomi**, NTT Basic Research Labs. (Japan); **Ekmel Özbay**, Bilkent Univ. (Turkey); **Yong Xu**, Virginia Polytechnic Institute and State Univ. (USA); **Eli Yablonovitch**, Univ. of California, Berkeley (USA); **Rashid Zia**, Brown Univ. (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 **MON 10:30 AM TO 12:00 PM**

Recent Advances in Engineered Nanostructures

Session Chair: **Ali Adibi**, Georgia Institute of Technology (USA)

Optofluidics of plants: lessons from biology (*Invited Paper*), Demetri Psaltis, Ecole Polytechnique Fédérale de Lausanne (Switzerland) ... [10541-1]

Tunable and topological metasurfaces (*Invited Paper*), Harry A. Atwater Jr., California Institute of Technology (USA) [10541-2]

2D valleytronics: from material exploration to device engineering (*Invited Paper*), Xiang Zhang, Univ. of California, Berkeley (USA) ... [10541-3]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 2 **MON 1:30 PM TO 3:00 PM**

Light Emission in Photonic Nanostructures

Progress in photonic crystal lasers (*Invited Paper*), Susumu Noda, Kyoto Univ Graduate School of Engineering (Japan) [10541-4]

Bound states in the continuum lasers, Ashok Kodigala, Thomas Lepetit, Qing Gu, Babak Bahari, Yeshaiahu Fainman, Boubacar Kanté, Univ. of California, San Diego (USA) [10541-5]

Ultrafast single-photon spontaneous emission from an array of quantum-emitters along a photonic waveguide, Yao Zhou, Zihao Chen, Jung-Tsung Shen, Washington Univ. in St. Louis (USA) [10541-6]

Reverse layered transfer technology as an innovative manufacturing process for high-efficiency OLED lightings, Yonung Yoo, Yoonsoo Choi, Yeong Jin Lim, Duksan Hi-Metal Co., Ltd. (Korea, Republic of); Jin-Young Na, Kyung Hee Univ. (Korea, Democratic Peoples Republic of); Sun-Kyung Kim, Kyung Hee Univ. (Korea, Republic of); Jae-Ho Kim, Tae-Yeon Seong, Korea Univ. (Korea, Republic of) [10541-7]

SESSION 3 **MON 3:30 PM TO 5:40 PM**

Photonic Metasurfaces

Flat optics with dielectric metasurfaces (*Invited Paper*), Amir Arbabi, Mahdad Mansouree, University of Massachusetts Amherst (USA); Ehsan Arbabi, Seyedeh Mahsa Kamali, Yu Horie, Andrei Faraon, California Institute of Technology (USA) [10541-8]

All-optical control of resonant semiconductor metasurfaces for nonlinear mid-IR nanophotonics, Maxim R. Shcherbakov, Cornell Univ. (USA); Kevin Werner, Noah Talisa, Enam Chowdhury, The Ohio State Univ. (USA); Gennady Shvets, Cornell Univ. (USA) [10541-9]

<270° phase shift in aluminum gate tunable conducting oxide metasurfaces for continuous optical beam steering at 1550 nm, Ghazaleh Kafaie Shirmanesh, California Institute of Technology (USA) [10541-10]

Nonlinear metasurface lens for imaging with instantaneous frequency conversion, Thomas Zentgraf, Christian Schlickriede, Bernhard Reineke, Philip Georgi, Univ. Paderborn (Germany); Naomi Waterman, The Univ. of Birmingham (United Kingdom); Guixin Li, Southern Univ. of Science and Technology of China (China) [10541-11]

Local optimization of nonlinear luminescence in random gold metasurfaces by far-field wavefront control, Gauthier Roubaud, Pierre Bondareff, Institut Langevin (France); Giorgio Volpe, Lab. Kastler Brossel (France) and Univ. College London (United Kingdom); Sébastien Bidault, Institut Langevin (France); Sylvain Gigan, Lab. Kastler Brossel (France); Samuel Gresillon, Institut Langevin (France) [10541-12]

Ultra-broadband achromatic components with optical metasurfaces, Mu-Ku Chen, National Taiwan Univ. (Taiwan); Shuming Wang, Nanjing Univ. (China) and Collaborative Innovation Ctr. of Advanced Microstructures, Nanjing Univ. (China); Pin Chieh Wu, Academia Sinica (Taiwan) and National Taiwan Univ. (Taiwan); Vin-Cent Su, National Taiwan Univ. (Taiwan); Yi-Chieh Lai, National Cheng Kung Univ. (Taiwan); Cheng Hung Chu, Academia Sinica (Taiwan); Jia-Wern Chen, Yu Han Chen, Ren Jie Lin, Tsung Lin Chung, Shen-Hung Lu, National Taiwan Univ. (Taiwan); Beibei Xu, Ji Chen, Nanjing Univ. (China) and Collaborative Innovation Ctr. of Advanced Microstructures, Nanjing Univ. (China); Chieh-Hsiung Kuan, National Taiwan Univ. (Taiwan); Tao Li, Shining Zhu, Nanjing Univ. (China) and Collaborative Innovation Ctr. of Advanced Microstructures, Nanjing Univ. (China); Din Ping Tsai, National Taiwan Univ. (Taiwan) and Academia Sinica (Taiwan); Wei Hou Lee, National Taiwan Univ. (Taiwan) [10541-13]

TUESDAY 30 JANUARY

SESSION 4..... TUE 8:00 AM TO 10:00 AM

Phase Change Materials for Optoelectronics I

Optical switching in nanostructured phase-change materials (*Invited Paper*), Behrad Gholipour, Davide Piccinotti, Jin Yao, Artemios Karvounis, Kevin F. MacDonald, Brian E Hayden, Univ of Southampton (United Kingdom); Nikolay I Zheludev, Univ of Southampton (United Kingdom) and Nanyang Technological University (Singapore) [10541-14]

Phase-change materials by design: how to realize fast optical switches (*Invited Paper*), Matthias Wuttig, RWTH Aachen Univ. (Germany) ... [10541-15]

Broadband low-loss optical phase change materials and devices (*Invited Paper*), Yifei Zhang, Massachusetts Institute of Technology (USA); Jeffery Chou, MIT Lincoln Lab. (USA); Junying Li, Qingyang Du, Qihang Zhang, Huikai Zhong, Massachusetts Institute of Technology (USA); Anupama Yadav, Myungkoo Kang, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Zhuoran Fang, Hanyu Zheng, Mikhail Shalaginov, Tian Gu, Massachusetts Institute of Technology (USA); Kathleen Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Vladimir Liberman, MIT Lincoln Lab. (USA); Juejun Hu, Massachusetts Institute of Technology (USA) [10541-16]

On-chip photonic memory and non-von Neumann computations using phase-change materials (*Invited Paper*), Harish Bhaskaran, Univ. of Oxford (United Kingdom) [10541-17]

SESSION 5..... TUE 10:30 AM TO 11:50 AM

Phase Change Materials for Optoelectronics II

Defect engineering of phase-change materials for ultralow-power electronics and optoelectronics (*Invited Paper*), Ritesh Agarwal, Univ of Pennsylvania (USA) [10541-18]

Optical signal modulation in hybrid silicon-vanadium dioxide photonic structures (*Invited Paper*), Sharon M. Weiss, Vanderbilt Univ. (USA) [10541-19]

Reconfigurable metasurfaces in a hybrid material platform through integration of plasmonic nanostructures with phase-change materials, Sajjad Abdollahramezani, Hossein Taghinejad, Ali A. Eftekhar, Ali Adibi, Georgia Institute of Technology (USA) [10541-20]

Lunch/Exhibition Break Tue 11:50 am to 1:30 pm

SESSION 6..... TUE 1:30 PM TO 3:00 PM

Photonic Crystal Structures

Photonic crystal solar cells: toward thermodynamic power conversion efficiency (*Invited Paper*), Sajeev John, Univ. of Toronto (Canada) . [10541-21]

Fabrication and characterization of a three-dimensional core-shell photonic-crystal lattice capable of negative refraction in the mid-infrared, Victoria F. Chernov, Ryan C. Ng, Siying Peng, Julia R. Greer, California Institute of Technology (USA) [10541-22]

Local self-uniformity and photonic bandgaps in amorphous gyroid structures, Marian Florescu, Steven Sellers, Univ. of Surrey (United Kingdom) [10541-23]

Optical beam-steering device using double-periodic Si-photonic-crystal slow-light waveguide, Hiroshi Abe, Moe Takeuchi, Keisuke Kondo, Hiroyuki Ito, Goro Takeuchi, Yuya Furukado, Tomoki Yokokawa, Toshihiko Baba, Yokohama National Univ. (Japan) [10541-24]

SESSION 7..... TUE 3:30 PM TO 6:00 PM

Light-Matter Interaction in Engineered Nanostructures

Engineering light scattering with low-loss dielectric nanostructures (*Invited Paper*), Luca Dal Negro, Boston Univ (USA) [10541-25]

Unusual scattering features of bound states in the continuum in open structures, Younes Radi, Alex Krasnok, Andrea Alù, The Univ. of Texas at Austin (USA) [10541-26]

Exploiting coupling of epsilon near-zero modes in deep sub-λ nanofilms to gap plasmon modes for strong light-matter interactions, Shiva Vangala, Air Force Research Lab. (USA) and Azimuth Corp. (USA); Joshua Hendrickson, Chandriker K. Dass, Ricky Gibson, John Goldsmith, Kevin Leedy, Dennis Walker Jr., Justin Cleary, Air Force Research Lab. (USA); Junpeng Guo, The Univ. of Alabama in Huntsville (USA) [10541-27]

Ultra-sharp and tunable lattice plasmons in film-coupled metallic nanostructures, Mohammad Taghinejad, Hossein Taghinejad, Ali Adibi, Georgia Institute of Technology (USA) [10541-28]

Engineering all-dielectric nanoparticles for tuning the electric and magnetic dipole resonances and enhancing magnetic dipole emission, Jiaqi Li, Niels Verellen, Pol Van Dorpe, IMEC (Belgium) [10541-29]

Surface acoustic-wave regulated single-photon emission of a coupled quantum-dot nanocavity system, Matthias Weiss, Stephan Kapfinger, Univ. Augsburg (Germany); Thorsten Reichert, Jonathan J. Finley, Walter Schottky Institut (Germany); Achim Wixforth, Univ. Augsburg (Germany); Michael Kaniber, Walter Schottky Institut (Germany); Hubert J. Krenner, Univ. Augsburg (Germany) [10541-30]

FDTD study of solar cell performance enhancement using nano coating, Salah Eldin Hassab Elnaby, Cairo Univ. (Egypt) [10541-31]

WEDNESDAY 31 JANUARY

SESSION 8..... WED 8:30 AM TO 10:00 AM

Photonic Metamaterials

Electronic nonlinear optical metamaterials (*Invited Paper*), Yehaiahu Fainman, Univ. of California, San Diego (USA) [10541-32]

Monolithic CMOS-compatible zero-index metamaterials, Daryl I. Vulis, Yang Li, Harvard John A. Paulson School of Engineering and Applied Sciences (USA); Orad Reshef, Univ. of Ottawa (Canada); Philip Camayd-Muñoz, Mei Yin, Harvard John A. Paulson School of Engineering and Applied Sciences (USA); Shota Kita, NTT Basic Research Labs. (Japan); Marko Loncar, Eric Mazur, Harvard John A. Paulson School of Engineering and Applied Sciences (USA) [10541-33]

Experimental demonstration of broadband perfect invisibility cloak composed of all-dielectric materials, Zeki Hayran, TOBB Univ. of Economics and Technology (Turkey); Ramon Herrero, Muriel Botey, Univ. Politècnica de Catalunya (Spain); Hamza Kurt, TOBB Univ. of Economics and Technology (Turkey); Kestutis Stalunus, Univ. Politècnica de Catalunya (Spain) and Institutó Catalana de Recerca i Estudis Avançats (Spain) [10541-34]

An all-silicon-based metamaterial for mid-IR energy harvesting, Mai Desouky, Ahmed Mahmoud, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10541-35]

SESSION 9..... WED 10:30 AM TO 12:00 PM

Optoelectronics in 2D Materials

Optical properties of graphene: from the THz to the UV (*Invited Paper*), Tony F. Heinz, Stanford Univ. (USA) [10541-36]

Hybrid graphene modulator on CMOS-compatible platform for integrated photonic applications, Tianren Fan, Amir Hossein Hosseinnia, Georgia Institute of Technology (USA); Hesam Moradinejad, Skorpis Technologies, Inc (USA); Ali A Eftekhar, Ali Adibi, Georgia Institute of Technology (USA) [10541-37]

Alloying-induced biaxial strain in ternary alloys of transition-metal dichalcogenides (TMDs), Hossein Taghinejad, Ali Eftekhar, Philip Campbell, Mohammad Taghinejad, Yao Zhou, Evan Reed, Eric Vogel, Ali Adibi, Georgia Institute of Technology (USA) [10541-38]

The effect of 2D metallic photonic crystals on GaSb TPV diode performance, Abigail S. Licht, Emily Carlson, Dante DeMeo, Nicole Pfister Latham, Lisa Fantini, Tufts Univ. (USA); Corey Shemelya, Technische Univ. Kaiserslautern (Germany); Thomas Vandervelde, Tufts Univ. (USA) . [10541-39]

Lunch/Exhibition Break Wed 12:00 pm to 1:30 pm

SESSION 10..... WED 1:30 PM TO 3:00 PM

Plasmonic Nanostructures

Plasmonics and geometry (*Invited Paper*), John B. Pendry, Imperial College London (United Kingdom) [10541-40]

Nonlinear hybrid plasmonics, Harald Giessen, Univ Stuttgart (Germany) [10541-41]

Plasmonic grating geometries and wavelength-dependent focus depth in IR detectors, Patrick Kennedy, Tod Laurvick, Air Force Institute of Technology (USA) [10541-42]

Superchiral light generation on achiral nanostructured surfaces, Abraham Vázquez-Guardado, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Debashis Chanda, Daniel Franklin, Univ. of Central Florida (USA) [10541-43]

OPTO

CONFERENCE 10541

SESSION 11 WED 3:30 PM TO 6:00 PM

Novel Materials and Phenomena in Engineered Nanostructures

Nonreciprocal nanophotonics with dielectric and plasmonic metasurfaces (*Invited Paper*), Jennifer A. Dionne, Mark Lawrence, David R. Barton III, Stanford Univ. (USA) [10541-44]

Spectral and polarimetric light-sorting with a wide-angle snapshot subwavelength-size device, Yasin Buyukalp, Peter B. Catrysse, Stanford Univ. (USA); Wonseok Shin, Massachusetts Institute of Technology (USA); Shanhui Fan, Stanford Univ. (USA) [10541-45]

Characterization of tunable longwave infrared filters using quantum cascade lasers, Neelam Gupta, U.S. Army Research Lab. (USA); Mark S. Mirotnik, Univ. of Delaware (USA) [10541-46]

Crystalline silicon carbide on insulator (SCOI) material platform for integrated photonic applications, Tianren Fan, Georgia Institute of Technology (USA); Hesam Moradinejad, Skorpios Technologies, Inc (USA); Xi Wu, Ali A Eftekhari, Ali Adibi, Georgia Institute of Technology (USA) . [10541-47]

Guided mode resonances in ultra-thin amorphous Si nanopillar arrays for polarization-independent hyperspectral filters in the near-IR, Ryan C. Ng, Julia R. Greer, California Institute of Technology (USA); Katherine T. Fountaine, Northrop Grumman Aerospace Systems (USA) [10541-48]

Photon antibunching generation in an atom-ring-resonator-waveguide QED system, Zihao Chen, Yao Zhou, Jung-Tsung Shen, Washington Univ. in St. Louis (USA) [10541-49]

Four-wave mixing in hybrid InGaP on SOI multimodal nanocavities, Gabriel Marty, Dorian Sanchez, Ctr. de Nanosciences et de Nanotechnologies (France); Sylvain Combré, Alfredo De Rossi, Thales Research & Technology (France); Fabrice Raineri, Ctr. de Nanosciences et de Nanotechnologies (France) [10541-50]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Plasmon-enhanced photoluminescence of fullerene C60 thin film in Au nanoparticles monolayer-C60 film-Al film nanostructure, Oleg A. Yeshchenko, Viktor Kozachenko, Nataliya Berezovska, Yuriy Liakhov, Taras Shevchenko National Univ. of Kyiv (Ukraine) [10541-71]

Light-harvesting capabilities of multilayers of semiconductor spheres, Damien Baron, Ctr. Spatial de Liège (Belgium); Jennifer Dewalque, Catherine Henrist, Univ. de Liège (Belgium); Jérôme Loicq, Ctr. Spatial de Liège (Belgium) [10541-72]

Artifacts in fluorescence lifetime imaging of gold step-like nanostructures, Shao-Pai Chen, National Chiao Tung Univ. (Taiwan); Shu-Wei Chang, Chi-Ti Hsieh, Pi-Ju Cheng, Academia Sinica (Taiwan) [10541-73]

Coupling of optical Mie resonances with magneto-optic Kerr effects, Dongha Kim, KAIST (Republic of Korea); Ho-Jin Jeong, Min-Kyo Seo, KAIST (Korea, Republic of) [10541-74]

Giant phase rotation of terahertz waves by resonant hyperbolic metasurfaces, Seojoon Lee, Korea Univ. (Korea, Republic of); Won Tae Kim, KAIST (Korea, Republic of); Ji-Hun Kang, Korea Univ. (Korea, Republic of); Bong Joo Kang, KAIST (Korea, Republic of); Q-Han Park, Korea Univ. (Korea, Republic of) [10541-75]

Raman lasing at nanoscale with refractory plasmonic titanium nitride, Anton Kharitonov, Kazan Federal Univ. (Russian Federation); Sergey Kharintsev, Myakzium Salakhov, Kazan Federal Univ. (Russian Federation) and Tatarstan Academy of Sciences (Russian Federation) [10541-76]

Efficient pattern modeling of plasmonic nanostructures probed by nanoscale near-field scanning microscope tips with different polarized outputs, Pi-Ju Cheng, Academia Sinica (Taiwan); Ruei-Han Jiang, Academia Sinica (Taiwan) and National Tsing Hua Univ. (Taiwan) and Industrial Technology Research Institute (Taiwan); Shu-Wei Chang, Chi Chen, Academia Sinica (Taiwan); Ta-Jen Yen, National Tsing Hua Univ. (Taiwan) [10541-77]

Ultra-broadband highly-efficient anomalous reflection enabled by stacked metasurfaces, Song Gao, Sang-Shin Lee, Eun-Soo Kim, Kwangwoon Univ. (Korea, Republic of); Duk-Yong Choi, The Australian National Univ. (Australia) [10541-78]

Self-organized nanoparticles on defective titanium dioxide for photo-induced enhanced Raman spectroscopy, Rakesh Arul, Michel Nieuwoudt, Junzhi Ye, Wei Gao, M. Cather Simpson, The Univ. of Auckland (New Zealand) [10541-80]

Surface-enhanced Raman scattering using silicon nanowires decorated with plasmonic nanoparticles, Mohamed Y. El Sayed, Abdelaziz Gouda, Yehea Ismail, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10541-81]

Polarization-selective suppression and enhancement of forward stimulated Brillouin scattering in silica-glass subwavelength elliptical-core optical waveguides, Dae Seok Han, KAIST (Korea, Republic of); Il-Min Lee, Kyung Hyun Park, Electronics and Telecommunications Research Institute (Korea, Republic of); Myeong Soo Kang, KAIST (Korea, Republic of) [10541-82]

Enhanced hydrogen generation with scalable epsilon-near-zero plasmonic photocatalyst, Yi Tian, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10541-83]

Complex epsilon-near-zero network material achieves broadband ultra-high absorption, Marcella Bonifazi, Valerio Mazzzone, Yi Tian, Zhaohui Liu, Andrea Fratallocchi, King Abdullah Univ. of Science and Technology (Saudi Arabia) [10541-84]

Tunable band-pass plasmonic filters using phase-change materials, Liam Trimby, David Wright, Anna Baldycheva, Univ. of Exeter (United Kingdom) [10541-85]

Characterization of phase transitions and parameter retrieval in three-dimensional dielectric helix structures, Ho-Ting Tung, Yu-Chueh Hung, National Tsing Hua Univ. (Taiwan) [10541-86]

Optical response of plasmonic metamaterials with quantum cascade structure for loss compensation, Yezhezi Zhang, Wentao Fan, Princeton Univ. (USA); Alex Y. Song, Stanford Univ. (USA) and Princeton Univ. (USA); Deborah L. Sivco, Claire F. Gmachl, Princeton Univ. (USA) [10541-87]

Two-octave dispersion flattening with five zero-dispersion wavelenghts in the mid-IR, Zeinab Jafari, Shiraz Univ. (Iran, Islamic Republic of); Anu M. Agarwal, Lionel C. Kimerling, Massachusetts Institute of Technology (USA); Guifang Li, Tianjin Univ. (China) and CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Jurgen Michel, Massachusetts Institute of Technology (USA); Lin Zhang, Tianjin Univ. (China) and Massachusetts Institute of Technology (USA); Yuhao Guo, Tianjin Univ. (China) [10541-88]

Single-photon sources in 3C SiC photonic devices, Matteo Bosi, Istituto dei Materiali per l'Elettronica ed il Magnetismo (Italy); Stella Stella, The Univ. of Melbourne (Australia); Stefania Castelletto, RMIT Univ. (Australia); Brett C. Johnson, The Univ. of Melbourne (Australia); Takeshi Ohshima, National Institutes for Quantum and Radiological Science and Technology (Japan) [10541-89]

Novel effects and functionalities in subwavelength photonic and plasmonic (nano)structures: theoretical and numerical studies, Ivan Richter, Czech Technical Univ. in Prague (Czech Republic) [10541-90]

Effect of aerogel's low refractive index property in plasmonic sensor, Yeon Hong Kim, Yonsei Univ. (Korea, Republic of) [10541-91]

Fine controlling for luminescence color of carbon dots through charged-beam irradiation, Hojin Lee, Seokho Kim, Dong Hyuk Park, Inha Univ (Korea, Republic of); Sunjong Lee, KITECH (Korea, Republic of) [10541-92]

Plasmon-activate effective photodetector based on organic crystals, Jinho Choi, Seokho Kim, Dong Hyuk Park, Inha Univ (Korea, Republic of); Sunjong Lee, KITECH (Korea, Republic of) [10541-93]

A novel method for detecting PM2.5 concentration based on refractive index sensing of hollow-core Bragg fiber with high sensitivity, Jianchun Yang, College of Optoelectronic Engineering, Chongqing University, Chongqing 400044, China (China); Rui Shen, College of Optoelectronic Engineering, Chongqing University (China); Can Wang, College of Optoelectronic Engineering, Chongqing University, Chongqing 400044, China (China); Xueming Li, College of Chemistry and Chemical Engineering, Chongqing University, Chongqing 401331, China (China); Yunhong Liu, College of Optoelectronic Engineering, Chongqing University, Chongqing 400044, China (China); Ke Xu, Department of Chemistry and Biochemistry, University of California, Santa Cruz, CA 95064, U.S.A (USA); Weimin Chen, College of Optoelectronic Engineering, Chongqing University, Chongqing 400044, China (China) [10541-94]

Tunable unidirectional coupling of Bloch surface waves controlled by the magnetic field of light, Mengjia Wang, Hongyi Zhang, Tatiana Kovalevich, Roland Salut, CNRS (France); Myun-Sik Kim, EPFL (Switzerland); Miguel-Angel Suarez, Maria-Pilar Bernal, CNRS (France); Hans Peter Herzig, EPFL (Switzerland); Thierry Grosjean, CNRS (France) [10541-95]

Directing nanoscale optical flows by coupling photon spin to plasmon extrinsic angular momentum, Yannick Lefier, Roland Salut, Miguel-Angel Suarez, Thierry Grosjean, CNRS (France) [10541-96]

THURSDAY 1 FEBRUARY

SESSION 12..... THU 8:00 AM TO 10:10 AM

Modeling and Simulation of Nanophotonic Structures

Wave platforms for solving integral equations in spatial domains (*Invited Paper*), Mario J Mencagli, Nasim Mohammadi Estakhri, Brian Edwards, Nader Engheta, Univ of Pennsylvania (USA) [10541-51]

High order exceptional points of degeneracy in coupled resonators optical waveguides, Mohamed Y. Nada, Mohamed A. K. Othman, Filippo Capolino, Univ. of California, Irvine (USA) [10541-52]

Optical magnetism in core-satellite structures excited by vector beams, John Parker, Norbert Scherer, The Univ. of Chicago (USA); Stephen Gray, Argonne National Lab. (USA); Tian-Song Deng, The Univ. of Chicago (USA) [10541-53]

Rapid nanophotonic structure design and optimization using a coupled dipole approach, Euan McLeod, College of Optical Sciences, The Univ. of Arizona (USA); Weilin Liu, The Univ. of Arizona (USA) [10541-54]

Reverse engineering of optical resonators: propose the state and obtain the structure that supports the state, Robert C. Gauthier, Carleton Univ. (Canada) [10541-55]

Enhanced super-prism effect with self-collimation by dispersion management in C₂ symmetric photonic crystals, Melike Gümüş, Ibrahim Halil Giden, Hamza Kurt, TOBB Univ. of Economics and Technology (Turkey) [10541-79]

SESSION 13..... THU 10:30 AM TO 12:20 PM

Nanophotonic Structures for Sensing

Metamaterial-based nanobiosensors and nanophotodetectors (*Invited Paper*), Ekmel Özbay, Bilkent Univ (Turkey) [10541-57]

Analysis of highly sensitive surface plasmon photonic crystal fiber biosensor, Mohammad Azab, Mansoura Univ. (Egypt); Mohamed Farahat, Ahmed Heikal, Zewail City of Science and Technology (Egypt); Mohamed A. Swillam, The American Univ. in Cairo (Egypt); Salah Obayya, Zewail City of Science and Technology (Egypt) [10541-58]

Mid-infrared plasmonic gas sensor, Mohamed A. Swillam, Raghi El Shamy, The American Univ. in Cairo (Egypt); Qiaoqiang Gan, Univ. at Buffalo (USA); Diaa Khalil, Ain Shams Univ. (Egypt) [10541-59]

Tin oxide nanowires decorated with Ag nanoparticles for plasmon-driven chemical sensing at room temperature, Camilla Baratto, Istituto Nazionale di Ottica (Italy); Nicola Cattabiani, Istituto Nazionale di Ottica (Italy) and Consiglio Nazionale delle Ricerche (Italy) and Univ. degli Studi di Brescia (Italy); Maurizio Donarelli, Univ. degli Studi di Brescia (Italy) and Consiglio Nazionale delle Ricerche (Italy) and Istituto Nazionale di Ottica (Italy); Andrea Ponzoni, Istituto Nazionale di Ottica (Italy); Dario Zappa, Elisabetta Comini, Guido Faglia, Univ. degli Studi di Brescia (Italy) and Istituto Nazionale di Ottica (Italy) [10541-60]

Optical modulators and biochemical sensors based on low-symmetric nanophotonic structures with interferometric configurations, Utku Gorkem Yasa, Ibrahim Halil Giden, Hamza Kurt, TOBB Univ. of Economics and Technology (Turkey) [10541-61]

Lunch/Exhibition Break Thu 12:20 pm to 1:30 pm

SESSION 14..... THU 1:30 PM TO 3:10 PM

Novel Phononic and Optomechanic Structures I

Optomechanics in guided wave structures: photonic control of phonons and phononic control of photons (*Invited Paper*), Amir Safavi-Naeini, Stanford Univ. (USA) [10541-62]

Precision measurements in cavity optomechanics (*Invited Paper*), Chee Wei Wong, Jaime Flor Flores, Wenting Wang, Yongjun Huang, Jiagui Wu, Jinghui Yang, Jinkang Lim, Brandon R. Busbee, Univ. of California, Los Angeles (USA) [10541-63]

Optomechanical properties of GaAs/AIAs micropillars resonators operating in the 18-GHz range, Fabrice R. Lamberti, Ctr. National de la Recherche Scientifique (France); Qifeng Yao, Loïc Lanco, D.T. Nguyen, Univ. Paris 7-Diderot (France); Martin Esmann, Ctr. National de la Recherche Scientifique (France); Alejandro Fainstein, Pablo Sesin, Sebastian Anguiano, Viviana Villafane, Axel Bruchhausen, Ctr. Atómico Bariloche (Argentina); Pascale Senellart, Ctr. National de la Recherche Scientifique (France); Ivan Favero, Univ. Paris 7-Diderot (France); Daniel Lanzillotti-Kimura, Ctr. National de la Recherche Scientifique (France) [10541-64]

Phase stochastic resonance in an nanomechanical photonic crystal membrane with integrated electrical actuation, Avishek Chowdhury, Ctr. National de la Recherche Scientifique (France); Sylvain Barbay, Ctr. de Nanosciences et de Nanotechnologies (France); Marcel G. Clerc, Univ. de Chile (Chile); Isabelle Robert-Philip, Rémy Braive, Ctr. de Nanosciences et de Nanotechnologies (France) [10541-65]

SESSION 15..... THU 3:30 PM TO 5:40 PM

Novel Phononic and Optomechanic Structures II

3D mechanical metamaterials with a twist (*Invited Paper*), Tobias Frenzel, Muamer Kadic, Martin Wegener, Karlsruher Institut für Technologie (Germany) [10541-66]

Time-resolved two-dimensional imaging of gigahertz acoustic waves in phononic crystals and related structures (*Invited Paper*), Osamu Matsuda, Hokkaido Univ. (Japan) [10541-67]

Diamond cavity and waveguide optomechanics (*Invited Paper*), Paul E. Barclay, Univ of Calgary (Canada) [10541-68]

Beyond the Fabry Perot resonator: new strategies to confine acoustic phonons, Martin Esmann, Omar Ortiz Cabello, Fabrice R. Lamberti, Pascale Senellart, Ctr. National de la Recherche Scientifique (France); Loïc Lanco, Ivan Favero, Univ. Paris 7-Diderot (France); Aristide Lemaître, Daniel Lanzillotti-Kimura, Ctr. National de la Recherche Scientifique (France) [10541-69]

Hyperuniform disordered phononic structures, Marian Florescu, George Gkantzounis, Timothy Amoah, Univ. of Surrey (United Kingdom) [10541-70]

OPTO

CONFERENCE 10542

Monday –Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10542

High Contrast Metastructures VII

Conference Chairs: **Connie J. Chang-Hasnain**, Univ. of California, Berkeley (USA); **Andrei Faraon**, California Institute of Technology (USA); **Fumio Koyama**, Tokyo Institute of Technology (Japan); **Weimin Zhou**, U.S. Army Research Lab. (USA)

Program Committee: **Markus-Christian Amann**, Walter Schottky Institut (Germany); **Il-Sug Chung**, Technical Univ. of Denmark (Denmark); **Mikhail A. Kats**, Univ. of Wisconsin-Madison (USA); **Arseniy I. Kuznetsov**, A*STAR - Data Storage Institute (Singapore); **Philippe Lalanne**, Institut d'Optique Graduate School (France); **John R. Lawall**, National Institute of Standards and Technology (USA); **Tien-Chang Lu**, National Chiao Tung Univ. (Taiwan); **Rainer F. Mahrt**, IBM Research – Zürich (Switzerland); **Arka Majumdar**, Univ. of Washington (USA); **Bala Pesala**, CSIR Madras Complex (India); **Jon A. Schuller**, Univ. of California, Santa Barbara (USA); **Pierre Viktorovitch**, Ecole Centrale de Lyon (France); **Alan E. Willner**, The Univ. of Southern California (USA); **Ming C. Wu**, Univ. of California, Berkeley (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 1:30 PM TO 3:20 PM

Harnessing Light I

Session Chair: **Weimin Zhou**, U.S. Army Research Lab. (USA)

- High-contrast metastructures and photonic crystals** (*Invited Paper*), **Connie J. Chang-Hasnain**, Univ. of California, Berkeley (USA) [10542-1]
- High-contrast gratings as generalized Fabry-Perot interferometers** (*Invited Paper*), **Renato Orta**, **Alberto Tibaldi**, **Pierluigi Debernardi**, Consiglio Nazionale delle Ricerche (Italy) [10542-2]
- Transition metamaterials for local-field enhancement** (*Invited Paper*), **Yang Li**, **Philip Camayd-Muñoz**, **Daryl Vulis**, **Peter Saeta**, **Yu Peng**, **Orad Reshef**, **Olivia Mello**, **Haoning Tang**, **Marko Loncar**, **Eric Mazur**, Harvard Univ. (USA) [10542-3]
- Excitation of high-order multipoles in Si metasurface**, **Pavel D. Terekhov**, ITMO Univ. (Russian Federation) and Ben-Gurion Univ. of the Negev (Israel); **Kseniia V. Baryshnikova**, ITMO Univ. (Russian Federation); **Andrey B. Evlyukhin**, Laser Zentrum Hannover e.V. (Germany) and ITMO Univ. (Russian Federation); **Alexander S. Shalin**, ITMO Univ. (Russian Federation); **Alina Karabchevsky**, Ben-Gurion Univ. of the Negev (Israel) [10542-4]

SESSION 2 MON 3:50 PM TO 5:50 PM

Harnessing Light II

Session Chair: **Connie J. Chang-Hasnain**, Univ. of California, Berkeley (USA)

- Metagratings: tailoring light over a surface with large efficiency** (*Invited Paper*), **Younes Radi**, **Dimitrios Sounas**, **Andrea Alù**, The Univ. of Texas at Austin (USA) [10542-5]
- High-contrast metastructures based on hybrid dielectric materials for visible and near-IR ranges** (*Invited Paper*), **Wei Wu**, **Yuhan Yao**, The Univ. of Southern California (USA) [10542-6]
- Low-loss bianisotropic metamaterials for time reversal** (*Invited Paper*), **Nitish Chandra**, The Univ. of North Carolina at Charlotte (USA) [10542-7]
- In-phase combination of optimized metasurfaces**, **Thaibao Q. Phan**, **Jianji Yang**, **David Sell**, **Sage Doshay**, **Jonathan A. Fan**, Stanford Univ. (USA) [10542-8]
- Two-and-a-half dimensional high-contrast metagratings**, **Sage Doshay**, **Jianji Yang**, **David Sell**, **Jonathan A. Fan**, Stanford Univ. (USA) [10542-9]

TUESDAY 30 JANUARY

SESSION 3 TUE 8:00 AM TO 10:00 AM

Metasurfaces I

Session Chair: **Andrei Faraon**, California Institute of Technology (USA)

- Tailoring spontaneous emission with semiconductor metasurfaces** (*Invited Paper*), **Isabelle Staude**, **Friedrich-Schiller-Univ. Jena** (Germany) [10542-10]
- Metasurfaces with extreme electromagnetic properties** (*Invited Paper*), **Sergei A. Tretyakov**, **Viktar Asadchy**, **Xuchen Wang**, **Ana Díaz-Rubio**, Aalto Univ. (Finland) [10542-11]
- Angle-multiplexed metasurfaces**, **Seyedeh Mahsa Kamali**, **Ehsan Arbabi**, California Institute of Technology (USA); **Amir Arbabi**, Univ. of Massachusetts Amherst (USA); **Yu Horie**, **MohammadSadegh Faraji-Dana**, **Andrei Faraon**, California Institute of Technology (USA) [10542-12]
- Robust design of multi-wavelength freeform dielectric metasurfaces**, **David Sell**, **Jianji Yang**, **Sage Doshay**, **Rui Yang**, **Jonathan A. Fan**, Stanford Univ. (USA) [10542-13]
- Ultra-thin high-efficiency mid-infrared transmissive Huygens metasurface optics**, **Hanyu Zheng**, Univ. of Electronic Science and Technology of China (China) and Massachusetts Institute of Technology (USA); **Jun Ding**, Univ. of Massachusetts Lowell (USA); **Li Zhang**, Univ. of Electronic Science and Technology of China (China) and Massachusetts Institute of Technology (USA); **Sensong An**, Univ. of Massachusetts Lowell (USA); **Hongtao Lin**, Massachusetts Institute of Technology (USA); **Bowen Zheng**, Univ. of Massachusetts Lowell (USA); **Qingyang Du**, **Gufan Yin**, **Jerome Michon**, **Yifei Zhang**, **Zhuoran Fang**, Massachusetts Institute of Technology (USA); **Longjiang Deng**, Univ. of Electronic Science and Technology of China (China); **Tian Gu**, Massachusetts Institute of Technology (USA); **Hualiang Zhang**, Univ. of Massachusetts Lowell (USA); **Juejun Hu**, Massachusetts Institute of Technology (USA) [10542-14]

SESSION 4.....TUE 10:30 AM TO 12:20 PM

Metasurfaces II

Session Chair: **Isabelle Staude**,
Friedrich-Schiller-Univ. Jena (Germany)

Flat optics with sub-wavelength high-contrast grating metasurfaces (*Invited Paper*), Andrei Faraon, Seyedeh Mahsa Kamali, Ehsan Arbabi, Yu Horie, California Institute of Technology (USA); Amir Arbabi, Univ. of Massachusetts Amherst (USA); MohammadSadegh Faraji-Dana, California Institute of Technology (USA)..... [10542-15]

Metasurfaces for applications in polarization optics (*Invited Paper*), Federico Capasso, Noah A. Rubin, Harvard Univ. (USA); Jan Philipp Balthasar Mueller, Univ. of Iceland (Iceland); Robert C. Devlin, Harvard Univ. (USA); Aun Zaidi, Massachusetts Institute of Technology (USA); Ruo Ping Li, Univ. of Waterloo (Canada); Michael Juhl, Kristjan Leosson, Univ. of Iceland (Iceland)..... [10542-16]

High-contrast metasurfaces for thermal emission control (*Invited Paper*), Peter Bermel, Enas Sakr, Purdue Univ. (USA)..... [10542-17]

On the design of random metasurfaces, Matthieu Dupre, Junhee Park, LiYi Hsu, Boubacar Kanté, Univ. of California, San Diego (USA) [10542-18]

Lunch/Exhibition Break Tue 12:20 pm to 1:50 pm

SESSION 5.....TUE 1:50 PM TO 3:30 PM

Metastructure Waveguides

Session Chair: **Sergei A. Tretyakov**, Aalto Univ. (Finland)

Freestanding microfiber arrays for accessible highly-confined optical modes (*Invited Paper*), Stefan A. Maier, Imperial College London (United Kingdom)..... [10542-19]

Subwavelength grating waveguide devices in silicon photonics (*Invited Paper*), Lawrence R. Chen, McGill Univ. (Canada)..... [10542-20]

High-contrast metastructure waveguide delay lines for integrated RF-photonics beamforming circuit, Stephen Anderson, U.S. Army Research Lab. (USA) and Rensselaer Polytechnic Institute (USA); Karen Grutter, Lab. for Physical Sciences (USA); Lingjun Jiang, Zhaoran R Huang, Rensselaer Polytechnic Institute (USA); Weimin Zhou, U.S. Army Research Lab. (USA)..... [10542-21]

Resonant waveguide gratings for color-selective beam-steering, Giorgio Quaranta, Guillaume Basset, Benjamin Gallinet, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland)..... [10542-22]

SESSION 6.....TUE 4:00 PM TO 6:10 PM

Metastructure Planar Optics and VCSELs

Session Chair: **Lawrence R. Chen**, McGill Univ. (Canada)

Ultrawide thermo-optic tuning of high-contrast metastructures (*Invited Paper*), Jon A. Schuller, Univ. of California, Santa Barbara (USA) . . . [10542-23]

Microelectromechanically tunable metasurface lens, Ehsan Arbabi, California Institute of Technology (USA); Amir Arbabi, Univ. of Massachusetts Amherst (USA); Seyedeh Mahsa Kamali, Yu Horie, MohammadSadegh Faraji-Dana, Andrei Faraon, California Institute of Technology (USA) [10542-24]

Optimization of the vertical-cavity surface-emitting laser incorporating a monolithic high-contrast grating mirror, Marcin Gebiski, Magdalena Marciniak, Lodz Univ. of Technology (Poland); Majid Riaziat, OEPic Semiconductors Inc. (USA); Maciej Dems, Michal Wasiak, Lodz Univ. of Technology (Poland); James A. Lott, Technische Univ. Berlin (Germany); Tomasz Czyszczanowski, Lodz Univ. of Technology (Poland)..... [10542-25]

Electrically driven GaAs-based photonic crystal lasers with ITO cladding layers, Shen-Che Huang, Kuo-Bin Hong, Shao-Wun Lan, Han-Lun Chiu, Tien-Chang Lu, National Chiao Tung Univ. (Taiwan)..... [10542-26]

Large-scale optical devices with elasto-optic metamaterials of aerogels, Dongheok Shin, Changuk Kim, Kyoungsik Kim, Yonsei Univ. (Korea, Republic of)..... [10542-27]

GaN vertical-cavity surface-emitting laser with a high-contrast grating reflector, Tsu-Chi Chang, Shuo-Yi Kuo, National Chiao Tung Univ. (Taiwan); Ehsan Hashemi, Åsa Haglund, Chalmers Univ. of Technology (Sweden); Tien-Chang Lu, National Chiao Tung Univ. (Taiwan)..... [10542-28]

WEDNESDAY 31 JANUARY

SESSION 7.....WED 8:00 AM TO 10:00 AM

Plasmonic Metastructures

Session Chair: **Uriel Levy**, The Hebrew Univ. of Jerusalem (Israel)

Ultrafast tuning of a Fabry-Perot nanocavity using active metal-oxides (*Invited Paper*), Jongbum Kim, Purdue Univ. (USA); Enrico Giuseppe, Heriot-Watt Univ. (United Kingdom); Clayton T. DeVault, Network for Computational Nanotechnology (USA); Danielle Faccio, Heriot-Watt Univ. (United Kingdom); Vladimir M. Shalaev, Alexander V. Kildishev, Purdue Univ. (USA); Marcello Ferrera, Heriot-Watt Univ. (United Kingdom); Alexandra Boltasseva, Purdue Univ. (USA)..... [10542-29]

Plasmonic nanostructures array with correlated disorder for augmented reality, Hervé F. Bertin, Ctr. de Nanosciences et de Nanotechnologies (France); Yoann Brûlé, Aix-Marseille Univ. (France) and Institut Fresnel (France); Giovanni Magno, Thomas Lopez, Philippe Gogol, Ctr. de Nanosciences et de Nanotechnologies (France); Laetitia Pradere, Groupe PSA Ctr. Technique de V Lizy a Accueil Principal (France); Boris Gralak, Aix-Marseille Univ. (France) and Institut Fresnel (France); David Barat, Groupe PSA Ctr. Technique de V Lizy a Accueil Principal (France); Guillaume Demésy, Aix-Marseille Univ. (France) and Institut Fresnel (France); Beatrice Dagens, Ctr. de Nanosciences et de Nanotechnologies (France) [10542-30]

Enabling giant circular dichroism by plasmonic graded-height split-rings, Mohsen Rajaei, Jinwei Zeng, Mohammad Albooyeh, Mohammad Kamandi, Mina Hanifeh, Filippo Capolino, Hemantha Kumar Wickramasinghe, Univ. of California, Irvine (USA)..... [10542-31]

Electrically switchable gratings and metastructures with metal-insulator phase transitions in VO₂, Nikita A. Butakov, Univ. of California, Santa Barbara (USA); Ilya Valmianski, Christian Urban, Javier Del Valle Granda, Juan Trastoy Quintela, Ivan K. Schuller, Univ. of California, San Diego (USA); Jon A. Schuller Sr., Univ. of California, Santa Barbara (USA) . [10542-32]

Dynamic plasmonic metasurface holograms (*Invited Paper*), Na Liu, Max-Planck-Institut für Intelligente Systeme (Germany)..... [10542-33]

SESSION 8.....WED 10:30 AM TO 12:00 PM

Metasurface Imaging and Holograms

Session Chair: **Alexandra Boltasseva**, Purdue Univ. (USA)

Dielectric metasurfaces: advanced concepts and fabrication methods (*Invited Paper*), Uriel Levy, Jonathan Bar David, Jacob Engelberg, Noa Mazurski, Yossi Staif, The Hebrew Univ. of Jerusalem (Israel) . . [10542-34]

Sensitivities of large-aperture multi-element plasmonic metasurface lenses, Bryan Adomanis, Michael A. Marciniak, Air Force Research Lab. (USA)..... [10542-35]

Original simulation method for large subwavelength devices in infrared imaging systems and comparison with experiment, Quentin Abadie, Luc André, Johan Rothman, Commissariat à l'Énergie Atomique (France)..... [10542-36]

Flat optical concentrators for a mid-wavelength infrared spectral range, Alexander Soibel, Jet Propulsion Lab. (USA); Shuyan Zhang, Harvard Univ. (USA); Sam Keo, Daniel Wilson, Sir Rafol, Cory Hill, Edward Luong, Jet Propulsion Lab. (USA); Alan She, Harvard Univ. (USA); David Z. Ting, Jet Propulsion Lab. (USA); Federico Capasso, Harvard Univ. (USA); Sarath Gunapala, Jet Propulsion Lab. (USA) [10542-37]

Lunch/Exhibition Break Wed 12:00 pm to 1:30 pm

OPTO

CONFERENCE 10542

SESSION 9 WED 1:30 PM TO 3:30 PM

Metastructure Technology and Applications

Session Chair: **Wei Wu**, The Univ. of Southern California (USA)

Metastructures technology and applications (*Invited Paper*),
Yeshaiahu Fainman, Univ. of California, San Diego (USA) [10542-38]

High-contrast-grating-based intrinsic fluorescence enhancing substrates for water contamination detection, Surendra Gupta, Ameen Elikkottil, CSIR-Central Electronics Engineering Research Institute (India) and Academy of Scientific & Innovative Research (AcSIR) (India); Varun Raghunathan, Indian Institute of Science (India); Bala Pesala, CSIR-Central Electronics Engineering Research Institute (India) and Academy of Scientific & Innovative Research (AcSIR) (India) [10542-39]

Nanophotonic design of semiconductor nanopillar arrays: fundamentals and applications, Katherine T. Fountaine, Northrop Grumman Aerospace Systems (USA); Ryan Ng, Sophia Cheng, Harry Atwater, California Institute of Technology (USA) [10542-40]

Silicon nanostructures for structural colors and optical antennas (*Invited Paper*), Nicolas Bonod, Institut Fresnel (France) [10542-41]

High-contrast-grating-based thermal emitters for portable thermophotovoltaic systems, Surendra Gupta, Ameen Elikkottil, CSIR-Central Electronics Engineering Research Institute (India) and Academy of Scientific & Innovative Research (AcSIR) (India); Ananthanarayanan Veeraragavan, The Univ. of Queensland (Australia); Bala Pesala, CSIR-Central Electronics Engineering Research Institute (India) and Academy of Scientific & Innovative Research (AcSIR) (India) [10542-42]

SESSION 10 WED 4:00 PM TO 5:50 PM

Design Simulation of Metastructure Materials and Devices

Session Chair: **Fumio Koyama**, Tokyo Institute of Technology (Japan)

On the confusions in the classification of chirality for 2D material, Mohammad Albooyeh, Jinwei Zeng, Mina Hanifeh, Mahsa Darvishzadeh-Varcheie, Mohammad Kamandi, Mohsen Rajaei, Hemantha Kumar Wickramasinghe, Filippo Capolino, Univ. of California, Irvine (USA) [10542-43]

Lattice Kerker effect in nanoparticle arrays with electric and magnetic dipole resonances, Viktoriia E. Babicheva, Georgia State Univ. (USA); Andrey B. Evlyukhin, Laser Zentrum Hannover e.V. (Germany) and ITMO Univ. (Russian Federation) [10542-44]

Multipole excitations in all-dielectric metamolecules and in organic molecules, Yuriy Artemyev, Alexander S. Shalin, ITMO Univ. (Russian Federation); Alina Karabchevsky, Ben-Gurion Univ. of the Negev (Israel) [10542-45]

Switchable and stackable color filters for a full-color reflective display, Wei Wu, He Liu, Hao Yang, Yuanrui Li, Jongseung Yoon, Haneol Lim, The Univ. of Southern California (USA) [10542-46]

Dynamic infrared metasurfaces (*Invited Paper*), Jason G. Valentine, Vanderbilt Univ. (USA) [10542-47]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Polarization-independent dielectric metasurface for mid-infrared applications, Mostafa Abdelsalam, Ahmed M. Mahmoud, Mohamed Swillam, The American Univ. in Cairo (Egypt) [10542-48]

Transparent metafilm electrodes for high-efficiency light absorption and emission devices, Jin-Young Na, Sun-Kyung Kim, Kyung Hee Univ. (Korea, Republic of) [10542-49]

Design method for a metasurface-based holographic stereogram, Yun-Seok Choi, Min-Kyo Seo, KAIST (Korea, Republic of) [10542-50]

Efficient finite-element-based numerical modelling of large sub-wavelength patterned optical structures, Martin Hammerschmidt, JCMwave GmbH (Germany) and Zuse Institute Berlin (Germany); Jakub Pabisiak, Ana Cristina Perez-Gea, Nicolas Julian, Sean Hon, Zuse Institute Berlin (Germany); Sven Burger, Zuse Institute Berlin (Germany) and JCMwave GmbH (Germany) [10542-51]

CONFERENCE 10543

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10543

Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XV

Conference Chairs: **Diana L. Huffaker**, Univ. of California, Los Angeles (USA); **Holger Eisele**, Technische Univ. Berlin (Germany)

Program Committee: **Baolai L. Liang**, Univ. of California, Los Angeles (USA); **Huiyun Liu**, Univ. College London (United Kingdom); **Zetian Mi**, McGill Univ. (Canada); **Jeffrey C. Owrutsky**, U.S. Naval Research Lab. (USA); **Qi Hua Xiong**, Nanyang Technological Univ. (Singapore)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 1:30 PM TO 3:30 PM

Nanowire: Lasers and Emitters

Session Chair: **Holger Eisele**, Technische Univ. Berlin (Germany)

Challenges in the monolithic integration and epitaxial gain control of III-V nanowire lasers on silicon (*Invited Paper*), Gregor Koblmüller, Thomas Stettner, Jochen Bissinger, Daniel Ruhstorfer, Michael Kaniber, Benedikt Mayer, Jonathan J. Finley, Walter Schottky Institut (Germany) [10543-1]

Recent progress in nanowire quantum-dot lasers (*Invited Paper*), Jun Tatebayashi, Osaka Univ. (Japan); Yasuhiko Arakawa, The Univ. of Tokyo (Japan) [10543-2]

Single-mode lasing in InGaAs nanopillars on SOI, Juan Salvador Dominguez Morales, Cork Institute of Technology (Ireland) and Tyndall National Institute (Ireland); Hyunseok Kim, Univ. of California, Los Angeles (USA); Shumithira Gandan, David P. Williams, Cork Institute of Technology (Ireland) and Tyndall National Institute (Ireland); Wook-Jae Lee, Cardiff Univ. (United Kingdom); Diana L. Huffaker, California NanoSystems Institute (USA) and Cardiff Univ. (United Kingdom); Tomasz J. Ochalski, Cork Institute of Technology (Ireland) and Tyndall National Institute (Ireland) [10543-3]

Bright entangled photon pairs from a nanowire quantum dot, Sara Hosseini, Univ. of Waterloo (Canada) [10543-4]

Exploring time-resolved photoluminescence for free-standing nanowires with nanowire-substrate heterointerfaces, Dingkun Ren, Zixuan Rong, Adam C. Scofield, Alan C. Farrell, Michael A. Haddad, Ramesh B. Laghumavarapu, Univ. of California, Los Angeles (USA); Baolai Liang, Univ. of California, Los Angeles (USA) and California NanoSystems Institute (USA); Diana L. Huffaker, Univ. of California, Los Angeles (USA) and California NanoSystems Institute (USA) and Cardiff Univ. (United Kingdom) [10543-5]

SESSION 2 MON 4:00 PM TO 5:40 PM

Nanostructures: Growth and Analysis

Session Chair: **Juan Salvador Dominguez Morales**, Tyndall National Institute (Ireland)

Growth of pure zinc-blende GaAs(P) core-shell nanowires with highly-regular morphology, Yunyan Zhang, Univ. College London (United Kingdom) [10543-6]

Photoluminescence investigation for InAs quantum dots capped by GaAs_{1-x}Sb_x layer with different Sb-composition, Baolai Liang, Diana L. Huffaker, California NanoSystems Institute (USA); Yuriy I. Mazur, Morgan E. Ware, Gregory J. Salamo, Univ. of Arkansas (USA); Ying Wang, Qinglin Guo, Shufang Wang, Guangsheng Fu, Hebei Univ. (China) ... [10543-7]

Impact of phosphorus ion implantation on the material and optical properties of InAs/GaAs quantum dots, Sourabh Upadhyay, Arjun Mandal, Vinayak Chavan, Indian Institute of Technology Bombay (India); N.B.V. Subrahmanyam, Pramod Bhagwat, Bhabha Atomic Research Ctr. (India); Subhananda Chakrabarti, Indian Institute of Technology Bombay (India) [10543-8]

Electrical characteristics of silicon nanowires solar cells with surface roughness, Mohamed Hussein, Zewail City of Science and Technology (Egypt); Mohamed A. Swillam, The American Univ. in Cairo (Egypt); Mohamed Farahat, Salah Obayya, Zewail City of Science and Technology (Egypt) [10543-9]

A unified model for sensitivity limit of nanowire photon detectors, Mohsen Rezaei, Hooman Mohseni, Northwestern Univ. (USA) [10543-10]

TUESDAY 30 JANUARY

SESSION 3 TUE 8:00 AM TO 10:30 AM

Nanowires: Growth and Characterization

Session Chair: **Jun Tatebayashi**, Osaka Univ. (Japan)

Dislocations and non-radiative defects in semiconductor nanowires (*Invited Paper*), Ana M. Sanchez, The Univ. of Warwick (United Kingdom) [10543-11]

Fabrication of stable metal halide perovskite nanowire arrays for optoelectronic devices (*Invited Paper*), Zhiyong Fan, Leilei Gu, Aashir Waleed, Mohammad Mahdi Tavakoli, Daquan Zhang, Qianpeng Zhang, Hong Kong Univ. of Science and Technology (Hong Kong, China) .. [10543-12]

Designing geometric superlattices and asymmetry in silicon nanowires: encoding emergent electronic and photonic properties through morphology (*Invited Paper*), James Cahoon, Univ. of North Carolina at Chapel Hill (USA) [10543-14]

Characterization of silicon nanowires with infrared near-field optical microscopy (*Invited Paper*), Joanna M. Atkin, Univ. of Colorado Boulder (USA) [10543-15]

GaN, InGaN, and AlGaN nanowire heterostructures for optoelectronic applications: from growth to electrical transport (*Invited Paper*), Alexandra-Madalina Siladie, M. Gruart, Univ. Grenoble Alpes (France) and Commissariat à l'Énergie Atomique (France); L. Tizei, Mathieu Kociak, Lab. de Physique des Solides (France); Ana Cros, Nuria Garro, Univ. de València (Spain); Bruno Gayral, Univ. Grenoble Alpes (France) and Commissariat à l'Énergie Atomique (France); Fabrice Donatini, Julien Pernot, Univ. Grenoble Alpes (France) and Institut NEEL (France); Bruno Daudin, Univ. Grenoble Alpes (France) and Commissariat à l'Énergie Atomique (France) [10543-13]

OPTO

CONFERENCE 10543

SESSION 4. TUE 11:00 AM TO 1:00 PM

Nanowires: Optoelectronics and Plasmonics

Session Chair: **Hannah J. Joyce**,
Univ. of Cambridge (United Kingdom)

Scalable infrared plasmonics (*Invited Paper*), Michael A. Filler, Georgia Institute of Technology (USA). [10543-16]

Engineering III-V nanowires for optoelectronics: from epitaxy to terahertz photonics (*Invited Paper*), Hannah J. Joyce, Univ. of Cambridge (United Kingdom) [10543-17]

Large-scale study for functional nanowire optimization (*Invited Paper*), Patrick Parkinson, Juan Arturo Alanis, The Univ. of Manchester (United Kingdom); Dhruv Saxena, Australian National Univ. (Australia); Sudha Mokkapatil, Cardiff Univ. (United Kingdom); Nian Jiang, Kun Peng, The Australian National Univ. (Australia); Xiaoyan Tang, The Univ. of Manchester (United Kingdom); Lan Fu, Hark Hoe Tan, Chennupati Jagadish, The Australian National Univ. (Australia) [10543-18]

High-responsivity photodetection using a single p-type GaAs nanowire (*Invited Paper*), Hassan Ali, Institute of Physics, Chinese Academy of Sciences (China); Yunyan Zhang, Univ. College London (United Kingdom); Ana M. Sanchez, The Univ. of Warwick (United Kingdom); Huiyun Liu, Univ. College London (United Kingdom); Xiulai Xu, Institute of Physics, Chinese Academy of Sciences (China). [10543-19]

Lunch/Exhibition Break Tue 1:00 pm to 2:10 pm

SESSION 5. TUE 2:10 PM TO 4:00 PM

Quantum Dots: Epitaxy to Application

Session Chair: **Baolai Liang**, California NanoSystems Institute (USA)

Mechanisms and applications of droplet etching during semiconductor epitaxy (*Invited Paper*), Christian Heyn, Univ. Hamburg (Germany) . [10543-20]

Tensile-strained self-assembly of quantum dots for entangled photon sources and band-structure engineering (*Invited Paper*), Paul J. Simmonds, Boise State Univ. (USA) [10543-21]

Ultrafast and nonlinear dynamics of InAs/GaAs quantum-dot lasers (*Invited Paper*), Frédéric Grillot, Télécom ParisTech (France) and Ctr. for High Technology Materials, Univ. of New Mexico (USA); Dejan Arsenijevic, Technische Univ. Berlin (Germany); Dieter H. Bimberg, Technische Univ. Berlin (Germany) and King Abdulaziz Univ. (Saudi Arabia) [10543-22]

Plasmonic induced transparency in graphene oxide quantum dots, Arup Neogi, Yuri Rostovtsev, Univ. of North Texas (USA); Meg Mahat, Univ. North Texas (USA) [10543-23]

Co-relation of theoretical simulation with experimental results for InAs quantum-dot heterostructures with different capping material, Hemant Ghadi, Indian Institute of Technology Bombay (India); Prakhhar Kumar Singh, Indian Institute of Technology Roorkee (India); Shobhit Dubey, Malaviya National Institute of Technology, Jaipur (India); Mahimn Bhatt, Sardar Vallabhbhai National Institute of Technology, Surat (India); Subhananda Chakrabarti, Indian Institute of Technology Bombay (India). [10543-29]

Highly efficient InAs/InGaAs quantum dot-in-a-well heterostructure validated with theoretically simulated model, Hemant Ghadi, Indian Institute of Technology Bombay (India); Shobhit Dubey, Malaviya National Institute of Technology, Jaipur (India); Prakhhar Kumar Singh, Indian Institute of Technology Roorkee (India); Mahimn Bhatt, Sardar Vallabhbhai National Institute of Technology, Surat (India); Subhananda Chakrabarti, Indian Institute of Technology Bombay (India) [10543-30]

Shape-engineered GaN quantum structures formed on curved SiN/Si surface, Sangmoon Han, Ilgyu Choi, Jihoon Song, Cheul-Ro Lee, Chonbuk National Univ. (Korea, Republic of); Mee-Yi Ryu, Il-Wook Cho, Kangwon National Univ. (Korea, Republic of); Seoung-Ki Lee, Kangmin Kim, Korea Institute of Science and Technology (Korea, Republic of); Jin Soo Kim, Chonbuk National Univ. (Korea, Republic of) [10543-31]

Effect of various capping layer on the hydrostatic and biaxial strain of InAs QDs in x (100) and z (001) direction, Jhuma Saha, Debiprasad Panda, Debabrata Das, Vinayak Chavan, Subhananda Chakrabarti, Indian Institute of Technology Bombay (India) [10543-32]

The influence of the individual particles on the ensemble quantum yield of elongated CdSe/CdS core/shell nanoparticles, Alexandra Hinsch, Christian Strelow, Tobias Kipp, Univ. Hamburg (Germany); Christian Würth, Daniel Geissler, Ute Resch-Genger, Bundesanstalt für Materialforschung und -prüfung (Germany); Alf Mews, Univ. Hamburg (Germany). [10543-33]

Application of silver nanostructures deposited on silicon in SERS for detection of pyridine, Sara H. Abel Razeq Mohamed, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10543-34]

Polymer-coated silicon nanoparticle synthesis for optical applications, Christen T. Aziz, The American Univ. in Cairo (Egypt). [10543-35]

Optical design of efficient integrated single-photon sources, Philipp-Immanuel Schneider, Martin Hammerschmidt, Xavier Garcia Santiago, Lin Zschiedrich, JCMwave GmbH (Germany) [10543-36]

Nanoscale luminescence characteristics of multi-dimensional organic nanocrystals, Seokho Kim, Do-hyeong Kim, Inha Univ (Korea, Republic of); Bo-hyun Kim, DGIST (Korea, Republic of); Dong Hyuk Park, Inha Univ (Korea, Republic of). [10543-37]

WEDNESDAY 31 JANUARY

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Advanced time-resolved analysis of room-temperature cascade emission from single quantum dots, Toshiyuki Ihara, Takahiro Kaji, Toshiki Yamada, Akira Otomo, National Institute of Information and Communications Technology (Japan) [10543-25]

High-absorption silver nanotrees on silicon substrate, Sara H. Abel Razeq Mohamed, Ahmad B. Ayoub, Mohamed A. Swillam, The American Univ. in Cairo (Egypt) [10543-26]

Plasmonic devices based on metal-carbyne structures, Stella V. Kutrovskaia, Vladimir State Univ. (Russian Federation). . . [10543-27]

Optical properties of alkali alloy clusters, Hal S. Gokturk, Ecken (USA) [10543-28]

CONFERENCE 10544

Sunday–Wednesday 28–31 January 2018 • Proceedings of SPIE Vol. 10544

Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI

Conference Chairs: **Georg von Freymann**, Technische Univ. Kaiserslautern (Germany); **Winston V. Schoenfeld**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Raymond C. Rumpf**, The Univ. of Texas at El Paso (USA)

Program Committee: **Cornelia Denz**, Münster Univ. (Germany); **Ruth Houbertz**, Multiphoton Optics GmbH (Germany); **Saulius Juodkasis**, Swinburne Univ. of Technology (Australia); **Stephen M. Kuebler**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Akhlesh Lakhtakia**, The Pennsylvania State Univ. (USA); **Mangirdas Malinauskas**, Vilnius Univ. (Lithuania); **Robert R. McLeod**, Univ. of Colorado at Boulder (USA); **Hernán R. Míguez**, Institute of Materials Science of Seville (Spain); **Dennis W. Prather**, Univ. of Delaware (USA); **Aaron J. Pung**, Clemson Univ. (USA); **John A. Rogers**, Univ. of Illinois at Urbana–Champaign (USA); **Thomas J. Suleski**, The Univ. of North Carolina at Charlotte (USA); **Michael Thiel**, Nanoscribe GmbH (Germany); **Sandra Wolff**, Technische Univ. Kaiserslautern (Germany)

SUNDAY 28 JANUARY

SESSION 1 SUN 8:00 AM TO 10:00 AM

Nanoplasmonics

Session Chair: **Georg von Freymann**, Technische Univ. Kaiserslautern (Germany)

Modular generation of arbitrary plasmonic orbital angular momentum (*Invited Paper*), Grisha Spector, Meir Orenstein, Technion-Israel Institute of Technology (Israel); Anna-Katharina Mahro, Michael Hartelt, Eva Prinz, Martin Aeschlimann, Technische Univ. Kaiserslautern (Germany) . . . [10544-1]

Single atom scale manipulation of matter by scanning transmission electron microscopy (*Invited Paper*), Stephen Jesse, Bethany Hudak, Miguel Fuentes-Cabrera, Panchapakesan Ganesh, Andrew Lupini, Albina Borisevich, Sergei Kalinin, Oak Ridge National Lab. (USA) . . . [10544-2]

Assembling plasmonic nanoantennas with DNA, Sébastien Bidault, Institut Langevin (France) . . . [10544-3]

Inkjet printing for nano- and micro optical applications, Fabian Lütolf, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); Pius Theiler, Luc Duempelmann, ETH Zurich (Switzerland); Judith Müller, Univ. Basel (Switzerland); Benjamin Gallinet, Rolando Ferrini, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) . . . [10544-4]

The fabrication of plasmonic metasurface by covalent bonding assisted nanotransfer, SoonHyung Hwang, Sohee Jeon, Jun-Ho Jeong, Korea Institute of Machinery & Materials (Korea, Republic of); Jae Ryoung Youn, Seoul National Univ. (Korea, Republic of) . . . [10544-5]

SESSION 2 SUN 10:30 AM TO 12:10 PM

Fiber Optical Elements

Session Chair: **Stephen Jesse**, Oak Ridge National Lab. (USA)

Endoscopic light delivery for advanced manufacturing (*Invited Paper*), Christophe Moser, Paul Delrot, Damien Loterie, Georgia Konstantinou, Eirini Kakkava, Demetri Psaltis, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . [10544-6]

Laser written mode selective photonics: Future proofing multimode optical fibre communications (*Invited Paper*), Michael J. Withford, Simon Gross, Macquarie Univ. (Australia); Nicolas Riesen, Univ. of South Australia (Australia) . . . [10544-7]

Photonics on a fiber for wavefront manipulation, Alexander Koshelev, Giuseppe Calafiore, Carlos Pina-Hernandez, Abeam Technologies, Inc. (USA); Frances I. Allen, Biomolecular Nanotechnology Ctr. (USA); Scott Dhuey, Simone Sassolini, Edward Wong, The Molecular Foundry (USA); Paul Lum, Biomolecular Nanotechnology Ctr. (USA); Stefano Cabrini, The Molecular Foundry (USA); Keiko Munechika, Abeam Technologies, Inc. (USA) . . [10544-8]

Near infrared operation of femtosecond laser micro-machined in-fiber Mach Zehnder interferometers (uIMZI) for refractive index sensing, Monika Janik, Tinko Eftimov, Univ. du Québec en Outaouais (Canada); Marcin Koba, National Institute of Telecommunications (Poland) and Warsaw Univ. of Technology (Poland); Mateusz J. Śmietana, Warsaw Univ. of Technology (Poland); Wojtek J. Bock, Univ. du Québec en Outaouais (Canada) . . . [10544-9]

Lunch/BIOS Exhibition Break Sun 12:10 pm to 1:40 pm

SESSION 3 SUN 1:40 PM TO 3:10 PM

Printed Micro- and Nano-Optics

Session Chair: **Mangirdas Malinauskas**, Vilnius Univ. (Lithuania)

Novel photonic architectures by nanoimprinting unconventional materials (*Invited Paper*), Agustin Mihi, Institut de Ciència de Materials de Barcelona (Spain) . . . [10544-10]

Fabrication of infrared broadband polarized emitting metasurfaces using microsphere photolithography, Chuang Qu, Edward C. Kinzel, Missouri Univ. of Science and Technology (USA) . . . [10544-11]

Analysis and fabrication of anisotropic Bragg gratings fabricated in lithium niobate via femtosecond laser micromachining, Sundeep Jolly, Nickolaos Savidis, Bianca Datta, MIT Media Lab. (USA); Thrasyvoulos Karydis, William Langford, Neil Gershenfeld, MIT Ctr. for Bits and Atoms (USA); V. Michael Bove Jr., MIT Media Lab. (USA) . . . [10544-12]

Modeling and measurement of moldable surface texture to control light output using silicones, Nicholas Powell, Dow Corning Corp. (USA); Harold Brunt Jr., Waylin Wing, LumenFlow Corp. (USA); Jacob Steinbrecher, Dow Corning Corp. (USA) . . . [10544-13]

SESSION 4 SUN 3:40 PM TO 5:10 PM

Light Extraction and Guiding

Session Chair: **Bastian E. Rapp**, Karlsruher Institut für Technologie (Germany)

Backscattering and surface plasmon enhanced light absorption by the natural nano-structure of the back electrode in perovskite solar cells (*Invited Paper*), Jordi Martorell, Hui Zhang, Maria Kramarenko, Johann Toudert, ICFO - Institut de Ciències Fotòniques (Spain) . . . [10544-14]

Graphene bolometer for VIS-IR spectral range on nano/micro SiN membranes, Tania Moein, Swinburne Univ. of Technology (Australia); Darius Gailevicius, Vilnius Univ. (Lithuania); Tomas Katkus, David J. Moss, Swinburne Univ. of Technology (Australia); Mangirdas Malinauskas, Vilnius Univ. (Lithuania); Saulius Juodkasis, Swinburne Univ. of Technology (Australia) . . . [10544-15]

Can we control the extrinsic losses of hollow core slow light silicon waveguides by the fabrication process?, Eric Cassan, Samuel Serna, Xavier Le Roux, Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France) . . . [10544-16]

Platinum plasmonic antennae fabricated on exposed core optical fibres, Ashleigh H. Heffernan, Daniel Stavrevski, Ivan Maksymov, RMIT Univ. (Australia); Roman Kostecki, Heike Ebendorff-Heidepriem, The Univ. of Adelaide (Australia); Andrew Greentree, Brant Gibson, RMIT Univ. (Australia) . . . [10544-17]

OPTO

CONFERENCE 10544

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 5 MON 10:30 AM TO 12:10 PM

Large Area Fabrication

Session Chair: **Hans Zappe**, Univ. of Freiburg (Germany)

Ultrafast roll-to-plate production of micro-optics, Markus Rawert, temicon GmbH (Germany) [10544-18]

Substrate effects on the microsphere photolithography process, Chuang Qu, Edward C. Kinzel, Missouri Univ. of Science and Technology (USA) [10544-19]

Surface adaptive fast axis ultra precision turning, Matthias Brozio, Dominik Sensen, Fraunhofer-Institut für Produktionstechnologie IPT (Germany); Christian Wenzel, Innolite GmbH (Germany); Christian Brecher, Fraunhofer-Institut für Produktionstechnologie IPT (Germany) [10544-20]

Critical dimension limits of positive tone i-line photoresist, David B. Miller, Univ. of Colorado Boulder (USA); Adam M. Jones, Sandia National Labs. (USA); Robert R. McLeod, Univ. of Colorado Boulder (USA) [10544-21]

Fabrication of optical diffusers with randomized periodic units using ultraprecision machining, Toru Inomata, Daisuke Seki, Masato Okano, Kazuya Yamamoto, Yukinobu Nishio, Yuya Nakamura, Atsuhiko Nishihara, Seiichiro Kitagawa, Nalux Co., Ltd. (Japan) [10544-22]

Lunch Break Mon 12:10 pm to 1:30 pm

SESSION 6 MON 1:30 PM TO 3:30 PM

Advanced Manufacturing using DMD or other SLM

Joint Session with Conferences 10544 and 10546

Session Chairs: **Georg von Freymann**, Technische Univ. Kaiserslautern (Germany); **Alfred Jacobsen**, Vititech Engineering GmbH (Germany)

Programmable CGH on photochromic material using DMD generated masks, Romain Alata, Frédéric Zamkotsian, Patrick Lanzoni, Lab. d'Astrophysique de Marseille (France); Giorgio Pariani, Andrea Bianco, INAF - Osservatorio Astronomico di Brera (Italy); Chiara Bertarelli, Politecnico di Milano (Italy) [10544-5]

Parallel two-photon lithography for 3D printing of millimeter scale parts with submicron features, Sourabh Saha, Vu H. Nguyen, Lawrence Livermore National Lab. (USA); Dien Wang, The Chinese Univ. of Hong Kong (Hong Kong, China); James S. Oakdale, Lawrence Livermore National Lab. (USA); Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China) [10544-23]

3D printed lens on optical fiber tip, Heming Wei, Abhishek K. Amrithanath, Sridhar Krishnaswamy, Northwestern Univ. (USA) [10546-6]

Aerosol printed 2D PZT scanning imaging device, Wei-Chih Wang, Univ. of Washington (USA) [10544-24]

Micro-CLIP fabrication speed dependence on feature size and material composition, Henry Oliver T. Ware, Xiangfan Chen, Cheng Sun, Northwestern Univ. (USA) [10546-7]

Renewable materials as 3D photostructurable resins employing 405 nm tabletop dynamic projection lithography, Edvinas Skliutas, Vilnius Univ. (Lithuania); Sigita Kašetaite, Kaunas Univ. of Technology (Lithuania); Linas Jonušauskas, Vilnius Univ. (Lithuania); Jolita Ostrauskaite, Kaunas Univ. of Technology (Lithuania); Mangirdas Malinauskas, Vilnius Univ. (Lithuania) [10544-25]

SESSION 7 MON 4:00 PM TO 5:20 PM

3D Metrology

Joint Session with Conferences 10544 and 10546

Session Chairs: **Alex Lyubarsky**, Texas Instruments Inc. (USA); **Roland Höfling**, ViALUX GmbH (Germany)

Superfast 3D shape measurement of a flapping flight process with motion based segmentation, Beiwen Li, Iowa State Univ. of Science and Technology (USA) [10546-8]

Universal phase unwrapping for phase measuring profilometry using geometric analysis, Kai Liu, Jianwen Song, Sichuan Univ. (China); Yo-Sung Ho, Gwangju Institute of Science and Technology (Korea, Democratic Peoples Republic of); Daniel Leo Lau, Univ. of Kentucky (USA) [10546-9]

Optimal carrier frequency selection for high-speed 3D shape measurement with double-pattern pulse width modulation techniques, Chufan Jiang, Purdue Univ. (USA); Yajun Wang, China Academy of Engineering Physics (China); Song Zhang, Purdue Univ. (USA) [10546-10]

Open-source software and hardware design for real-time structured light 3D scanning, Jakob Wilm, Eythor Eiriksson, Technical Univ. of Denmark (Denmark) [10546-11]

TUESDAY 30 JANUARY

SESSION 8 TUE 8:00 AM TO 10:20 AM

3D Laser Lithography I

Joint Session with Conferences 10523 and 10544

Session Chair: **Georg von Freymann**, Technische Univ. Kaiserslautern (Germany)

Fabrication of hyperuniform disordered photonic network materials (*Invited Paper*), Nicolas Muller, Univ. de Fribourg (Switzerland); Jakub Haberko, AGH Univ. of Science and Technology (Poland); Stefan Aeby, Catherine Marichy, Luis-Salvador Froufe-Pérez, Frank Scheffold, Univ. de Fribourg (Switzerland) [10544-26]

Multiphoton processing technologies for applications in biology and tissue engineering (*Invited Paper*), Aleksandr Ovsianikov, Technische Univ. Wien (Austria) [10544-27]

2PP-DLW in hydrogels for excitation and immobilization of living cells, Wolfgang Horn, Frederik Hasselmann, Michael Hackmann, Cornelia Denz, Westfälische Wilhelms-Univ. Münster (Germany) [10544-28]

Towards a cellulose-based photoresist, Marie-Christin Angermann, Technische Univ. Kaiserslautern (Germany); Maximilian Rothhammer, Cordt Zollfrank, Technische Univ. München (Germany); Georg von Freymann, Technische Univ. Kaiserslautern (Germany) [10544-29]

Printing structural colors via direct laser writing, Gordon Zyla, Ruhr-Univ. Bochum (Germany); Alexander Kovalev, Christian-Albrechts-Univ. zu Kiel (Germany); Evgeny L. Gurevich, Cemal Esen, Andreas Ostendorf, Ruhr-Univ. Bochum (Germany); Stanislav Gorb, Christian-Albrechts-Univ. zu Kiel (Germany) [10544-30]

3D microfabrication of mouse and human variants of serum albumin by femtosecond laser multiphoton cross-linking, Daniela Serien, Katsumi Midorikawa, Koji Sugioka, RIKEN (Japan) [10523-18]

SESSION 9.....TUE 10:50 AM TO 12:20 PM

3D Laser Lithography II

Joint Session with Conferences 10523 and 10544

Session Chair: **Frank Scheffold**, Univ. de Fribourg (Switzerland)

Direct laser writing of electromagnetic metasurfaces for infra-red frequency range (*Invited Paper*), Vyngantas Mizeikis, Ihar Fanyaeu Faniayeu, Shizuoka Univ. (Japan)[10544-31]

Femtosecond laser-induced optical properties in silver-containing gallo-germinate heavy metal oxide glasses, Yannick G. Petit, Institut de Chimie de la Matière Condensée de Bordeaux (France); Arthur Le Camus, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada) and Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France); Sylvain Danto, Tea Skopak, Institut de Chimie de la Matière Condensée de Bordeaux (France); Jean-Philippe Bérubé, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada); Thierry Cardinal, Institut de Chimie de la Matière Condensée de Bordeaux (France); Réal Vallée, Ctr. d'Optique, Photonique et Laser, Univ. Laval (Canada); Lionel Canioni, Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France)[10544-32]

Metal and metal-composite micro-structures via direct laser writing, Erik H. Waller, Technische Univ. Kaiserslautern (Germany)[10544-33]

Optical lithography using stimulated emission depletion, Paul Somers, Sanjoy Mukherjee, Brandon Franz, Bryan Boudouris, Xiaolong He, Liang Pan, Xianfan Xu, Purdue Univ. (USA)[10523-19]

Lunch/Exhibition Break Tue 12:20 pm to 1:50 pm

SESSION 10.....TUE 1:50 PM TO 3:20 PM

3D Laser Lithography III

Session Chair: **Christophe Moser**, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Femtosecond laser 3D nanoprinting for functional devices (*Invited Paper*), Hong-Bo Sun, Yong-Lai Zhang, Jilin Univ. (China)[10544-34]

Additive manufacturing for the production of micro-optics, Michael Thiel, Yann Tanguy, Nicole Lindenmann, Benjamin Zimmer, Alok Tungal, Fabian Niesler, Mareike Schmitt, Alexander Quick, Nanoscribe GmbH (Germany)[10544-35]

Two-photon laser lithography in metrology, Julian Hering, Matthias Eifler, Jörg Seewig, Technische Univ. Kaiserslautern (Germany); Georg von Freymann, Technische Univ. Kaiserslautern (Germany) and Fraunhofer-Institut für Techno-und Wirtschaftsmathematik (Germany)[10544-36]

Comparison of fabrication strategies for diffractive optical elements using two-photon polymerization, Fabian Hilbert, Benedikt Stender, Multiphoton Optics GmbH (Germany)[10544-37]

SESSION 11.....TUE 3:50 PM TO 5:50 PM

3D Laser Lithography IV

Session Chair: **Hong-Bo Sun**, Jilin Univ. (China)

Next generation 3D printing of glass: The emergence of enabling materials (*Invited Paper*), Bastian E. Rapp, Frederik Kotz, Nico Keller, Kai Sachsenheimer, Nadine Kirschner, Tobias Nargang, Christiane Richter, Karlsruher Institut für Technologie (Germany)[10544-38]

Polymer optics for tunable and printable optical systems (*Invited Paper*), Hans Zappe, Univ. of Freiburg (Germany)[10544-39]

Fabrication of 3D glass-ceramic micro-/nano-structures by direct laser writing lithography and pyrolysis, Mangirdas Malinauskas, Darius Gailevicius, Vilnius Univ. (Lithuania); Linas Jonušauskas, Vilnius Univ. (Lithuania) and Femtika Ltd. (Lithuania); Simas Sakirzanovas, Vilnius Univ. (Lithuania); Roaldas Gadonas, Vilnius Univ. (Lithuania) and Femtika Ltd. (Lithuania); Kestutis Stalunas, Univ. Politècnica de Catalunya (Spain); Vyngantas Mizeikis, Shizuoka Univ. (Japan); Saulius Juodkazis, Swinburne Univ. of Technology (Australia)[10544-40]

Two-photon absorption lithography for nanofabrication of 3D x-ray compound refractive lenses, Natalia Kokareva, Ksenia Abrashitova, Vladimir Bessonov, M.V. Lomonosov Moscow State Univ. (Russian Federation); Alexander Petrov, Immanuel Kant Baltic Federal Univ. (Russian Federation) and M.V. Lomonosov Moscow State Univ. (Russian Federation); Kirill Safronov, M.V. Lomonosov Moscow State Univ. (Russian Federation); Alexander Barannikov, Petr Ershov, Natali Klimova, Ivan Lyatun, Immanuel Kant Baltic Federal Univ. (Russian Federation); Vyacheslav Yunkin, Institute of Microelectronics Technology and High Purity Materials (Russian Federation); Maxim Polikarpov, Duetsches Elektronen-Synchrotron (Germany); Irina Snigireva, ESRF - The European Synchrotron (France); Andrey Fedyanin, M.V. Lomonosov Moscow State Univ. (Russian Federation); Anatoly Snigirev, Immanuel Kant Baltic Federal Univ. (Russian Federation)[10544-41]

The optical damage threshold of 3D nanolithography produced microstructures under intense femtosecond irradiation, Linas Jonušauskas, Vilnius Univ. (Lithuania), Femtika Ltd. (Lithuania); Gabrielius Rimšelis, Vilnius Univ. (Lithuania); Darius Gailevicius, Vilnius Univ. (Lithuania), Femtika Ltd. (Lithuania); Roaldas Gadonas, Vilnius Univ. (Lithuania); Andrius Melninkaitis, Vilnius Univ. (Lithuania), LIDARIS Ltd. (Lithuania); Mangirdas Malinauskas, Vilnius Univ. (Lithuania)[10544-42]

WEDNESDAY 31 JANUARY

PANEL DISCUSSION.....:8:30 AM TO 10:00 AM

3D Printing: The Next Challenges To Come

Market analysts valued the global 3D printing market at \$2.3B in 2013 and are projecting global revenues of \$8.6B by 2020—an impressive compound annual growth rate of more than 20% over seven years! At the same time, Siemens estimates that 3D printing will become 50% less expensive and 400% faster over the next five years.

However, 3D printing can only reach its economic potential and fulfill its promise of revolutionizing manufacturing across multiple industries if a number of significant real-world structural challenges are addressed. Hurdles to widespread implementation of 3D printing include implementation of a proper regulatory framework, provisions to protect intellectual property, and establishment of appropriate standards and certification, to name a few.

Join us for a panel discussion about these hurdles and how they might be overcome.

See page 22 for details.

WEDNESDAY POSTER SESSION.....WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Investigation of the dynamic response performance for the liquid-filled variable focus lens, Lihui Wang, Masatoshi Ishikawa, The Univ. of Tokyo (Japan)[10544-43]

Complex fiber micro-knots, Moti Fridman, Shir Shahal, Bar-Ilan Univ. (Israel)[10544-44]

Non-planar calibration phantoms for optical coherence tomography, Yang Lu, Neil Gordon, Aston Univ. (United Kingdom); David Robinson, Arden Photonics Ltd. (United Kingdom); Ben Coldrick, Optimec Ltd. (United Kingdom); Vladimir Mezentsev, Francesco Menduni, Antonio Fratini, Kate Sugden, Aston Univ. (United Kingdom)[10544-45]

High-speed fabrication of random micro-holograms using acousto-optic deflectors, Yeonghwa Ryu, Jonghyuk Park, Seok Ho Song, Hanyang Univ. (Korea, Republic of)[10544-46]

Reduction of stitching gaps in a grating cell array fabricated by laser interference, Hyung Ju Rah, Seok Ho Song, Hanyang Univ. (Korea, Republic of)[10544-47]

Fabrication of flexible microporous 3D scaffolds via stereolithography and optimization of their biocompatibility, Giedre Grigaleviciute, Daiva Baltrikiene, Evaldas Balciunas, Linas Jonušauskas, Mangirdas Malinauskas, Vilnius Univ. (Lithuania)[10544-48]

A new method of fabricating the liquid lenticular lens array with Pyrex glass chamber, Junsik Lee, Junoh Kim, CheolJoong Kim, DooSeub Shin, Gyohyun Koo, Jee Hoon Sim, Yong Hyub Won, KAIST (Korea, Republic of)[10544-49]

A new method for electrode deposition using a SU-8 shadow mask in a 3-dimensional electro-wetting lenticular lens chamber structure, DooSeub Shin, Yong Hyub Won, KAIST (Korea, Republic of)[10544-50]

CONFERENCE 10545

Tuesday–Wednesday 30–31 January 2018 • Proceedings of SPIE Vol. 10545

MOEMS and Miniaturized Systems XVII

Conference Chairs: **Wibool Piyawattanametha**, King Mongkut's Institute of Technology Ladkrabang (Thailand); **Yong-Hwa Park**, KAIST (Korea, Republic of); **Hans Zappe**, Univ. of Freiburg (Germany)

Program Committee: **Caglar Ataman**, Univ. of Freiburg (Germany); **Wyatt O. Davis**, MicroVision, Inc. (USA); **David L. Dickensheets**, Montana State Univ. (USA); **Jean-Christophe Eloy**, Yole Développement (France); **Jan Grahmann**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); **Ulrich Hofmann**, Fraunhofer-Institut für Siliziumtechnologie (Germany); **Il-Woong Jung**, Argonne National Lab. (USA); **David G. Lishan**, Plasma-Therm LLC (USA); **Jonathan T. C. Liu**, Univ. of Washington (USA); **Veljko Milanovic**, Mirrorcle Technologies, Inc. (USA); **Zhen Qiu**, Michigan State Univ. (USA); **Niels Quack**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Harald Schenk**, Fraunhofer Institute for Photonic Microsystems (Germany); **Jason B. Stewart**, MIT Lincoln Lab. (USA); **Hamdi Torun**, Bogaziçi Univ. (Turkey); **Wanjun Wang**, Louisiana State Univ. (USA); **Frédéric Zamkotsian**, Lab. d'Astrophysique de Marseille (France); **Guangya Zhou**, National Univ. of Singapore (Singapore)

TUESDAY 30 JANUARY

SESSION 1..... TUE 8:00 AM TO 10:00 AM

Fabrication

Session Chair: **Hans Zappe**, Univ. of Freiburg (Germany)

Fabrication and application of polymer based photonics networks and sensors (*Invited Paper*), Maik Rahlves, Maher Rezem, Axel Günther, Christian Kelb, Muhammad S. Khan, Eduard Reithmeier, Bernhard Roth, Leibniz Univ. Hannover (Germany). [10545-1]

Integration of metasurfaces onto micro electro mechanical systems for active control of visible and IR light (*Invited Paper*), Daniel Lopez, Argonne National Lab. (USA). [10545-2]

Direct laser writing of tunable diffractive micro-optics on graphene oxide film, Hyub Lee, Chin Huat Joel Lim, Mun Ji Low, Vadakke Matham Murukeshan, Young-Jin Kim, Nanyang Technological Univ. (Singapore) [10545-3]

New way to realize miniaturized complex optical systems in high volume, Heinrich Gröger, Jens Knobbe, Tino Pügner, Peter Reinig, Sebastian Meyer, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) [10545-4]

All-optical probing of GHz multiferroic MOEMS, Derek Bas, Air Force Research Lab. (USA) and Azimuth Corp. (USA); Hwaider Lin, Northeastern Univ. (USA); Piyush Shah, Air Force Research Lab. (USA); Nian X. Sun, Northeastern Univ. (USA); Timothy J. Bunning, Michael E. McConney, Air Force Research Lab. (USA) [10545-5]

SESSION 2..... TUE 10:30 AM TO 12:20 PM

Cameras and Imagers

Session Chair: **Maik Rahlves**, Leibniz Univ. Hannover (Germany)

Lightweight smart autofocusing eyeglasses (*Invited Paper*), Carlos Mastrangelo, Univ. of Utah (USA). [10545-6]

A miniaturized camera objective with 2X optical zoom, Pengpeng Zhao, Caglar Ataman, Hans Zappe, Univ. of Freiburg (Germany). [10545-7]

Compact array camera using hybrid technology for automotive application, Andreas Brückner, Alexander Oberdörster, Martin Hubold, Frank C. Wippermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10545-8]

Folded multi-aperture camera system for thin mobile devices, Alexander Oberdörster, Frank C. Wippermann, Andreas Brückner, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10545-9]

Compact wide-angle array camera for presence detection, Christin Gassner, Jens Dunkel, Alexander Oberdörster, Andreas Brückner, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10545-10]

Lunch/Exhibition Break Tue 12:20 pm to 1:50 pm

SESSION 3..... TUE 1:50 PM TO 3:20 PM

Spectrometers I

Session Chair: **Wibool Piyawattanametha**, King Mongkut's Institute of Technology Ladkrabang (Thailand)

Handheld spectrometers in 2018 and beyond: MOEMS, photonics, and smartphones (*Invited Paper*), Richard A. Crocombe, Crocombe Spectroscopic Consulting (USA). [10545-11]

Tunable bandpass filter for mid-infrared wavelengths using liquid crystal elastomer actuators, Ziyu Wang, Yannick Folwill, Phuong-Ha Cu-Nguyen, Hans Zappe, Univ. of Freiburg (Germany) . . [10545-12]

MEMS FTIR spectrometer with enhanced resolution for low cost gas sensing in the NIR, Islam Samir, Ain Shams Univ. (Egypt); Yasser M. Sabry, Ain Shams Univ. (Egypt) and Si-Ware Systems (Egypt); Mazen Erfan, Niveen Badra, Ain Shams Univ. (Egypt); Diaa Khalil, Ain Shams Univ. (Egypt) and Si-Ware Systems (Egypt) [10545-13]

Bringing NIR spectrometers into mobile phones, Heinrich Gröger, Jens Knobbe, Tino Pügner, Peter Reinig, Sebastian Meyer, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) [10545-14]

SESSION 4..... TUE 3:50 PM TO 5:50 PM

MOEMS Devices

Session Chair: **Yong-Hwa Park**, KAIST (Korea, Republic of)

A low-cost, 25-actuator electrostatic deformable mirror with polyimide membrane for adaptive optics microscopy, Kaustubh Banerjee, Pouya Rajaeipour, Caglar Ataman, Hans Zappe, Univ. of Freiburg (Germany) [10545-15]

Novel micro-fabricated Fabry-Perrot filters in the infrared, Branislav D. Timotijevic, Arno Hoogerwerf, Nemanja Niketic, Andrea Dunbar, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) . . [10545-16]

MEMS-based widely tunable external cavity diode laser, Alvaro Jimenez, Sacher Lasertechnik GmbH (Germany) and Univ. Carlos III de Madrid (Spain); Tobias Milde, Hervé Tatenguem, Sacher Lasertechnik GmbH (Germany); Martin Honsberg, Sensor Photonics (Germany); Guillermo Carpintero, Univ. Carlos III de Madrid (Spain); James O'Gorman, Sensor Photonics (Germany); Joachim Sacher, Sacher Lasertechnik GmbH (Germany) [10545-17]

Fluorescence lifetime determination by miniaturized LED ns-pulsed and ASIC detector unit, Christian Möller, Hans-Georg Ortlepp, CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH (Germany); Wolfram Altermann, Dagmar Buchweitz, Tobias Schildbach, Markus Winkler, Marco Götz, DMOS GmbH (Germany); Thomas Ortlepp, CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH (Germany) [10545-18]

Optical MEMS notch filter based on the multi-mode interference in a butterfly metallic waveguide, Mohamed Kilany, Ain Shams Univ. (Egypt); Yasser M. Sabry, Ain Shams Univ. (Egypt) and Si-Ware Systems (Egypt); Mazen Erfan, Ahmed M. Othman, Ain Shams Univ. (Egypt); Sébastien Nazeer, Si-Ware Systems (Egypt); Diaa Khalil, Ain Shams Univ. (Egypt) and Si-Ware Systems (Egypt) [10545-19]

Silicon photonics based on-chip vibrometer, Vipretuo Mere, Rakshitha Kallega, Akshay Naik, Rudra Pratap, Shankar Kumar Selvaraja, Indian Institute of Science (India). [10545-20]

WEDNESDAY 31 JANUARY

SESSION 5 WED 8:00 AM TO 9:50 AM

Medical Applications

Session Chair: **Caglar Ataman**, Univ. of Freiburg (Germany)

MEMS based multi-spectral dual-axis confocal microendoscope for clinical applications (*Invited Paper*), Zhen Qiu, Michigan State Univ. (USA); Nathan Loewke, Stanford Univ. (USA); Wibool Piyawattanametha, King Mongkut's Institute of Technology Ladkrabang (Thailand); Il-woong Jung, Argonne National Lab. (USA); Tarn Teraphongphom, Robert Ertsey, Stanford Univ. (USA); Frank Schonig, Stanford Univ. (USA); Stephan Rogalla, Shai Friedland, Michael Mandella, Stanford Univ. (USA); Daniel Lopez, Argonne National Lab. (USA); Eben Rosenthal, Stanford Univ. (USA); Christopher Contag, Michigan State Univ. (USA) [10545-21]

Every aspect of advanced retinal imaging laser eyewear: Principle, free focus, resolution, safety, and medical welfare applications (*Invited Paper*), Mitsuru Sugawara, Makoto Suzuki, Manabu Ishimoto, Kinya Hasegawa, Hironori Miyauchi, QD Laser, Inc. (Japan) [10545-22]

Design of MEMS based handheld multi-photon and second harmonic generation imaging system for early detection and imaging guided surgery of oral cancer (*Invited Paper*), Tomoko Marumo, Michigan State Univ. (USA) and Tokyo Dental College (Japan); Gabrielle Murashova, Dalen Agnew, Frank Schonig, Michael J. Mandella, Michigan State Univ. (USA); Wibool Piyawattanametha, King Mongkut's Institute of Technology Ladkrabang (Thailand); Zhen Qiu, Marcos Dantus, Christopher H. Contag, Michigan State Univ. (USA) [10545-23]

Integration and biocompatible packaging of multi-modal endoscopic imagers using 3D glass micro structuring, Simon Kretschmer, Jan Jäger, Caglar Ataman, Hans Zappe, Univ. of Freiburg (Germany) [10545-24]

SESSION 6 WED 10:20 AM TO 12:00 PM

Hyperspectral Imaging

Session Chair: **Guangya Zhou**, National Univ. of Singapore (Singapore)

Hand-held MEMS hyperspectral imager for VNIR mobile applications (*Invited Paper*), Anna Rissanen, Antti Näsälä, Roberts Trops, Harri Ojanen, Ingmar Stuns, Tahvo Havia, Heikki Saari, VTT Technical Research Ctr. of Finland Ltd. (Finland) [10545-25]

Portable LWIR hyperspectral imager based on MEMS Fabry-Perot interferometer and broadband microbolometric detector array (*Invited Paper*), Patrice Topart, David Béland, Hélène Spisser, Denis Dufour, Loïc Le Noc, Francis Picard, INO (Canada) [10545-26]

Application of tunable Fabry-Pérot interferometers with two movable reflectors in miniaturized spectral imaging systems, Marco Meinig, Julia Wecker, Steffen Kurth, Fraunhofer-Institut für Elektronische Nanosysteme (Germany); Mario Seifert, Technische Univ. Chemnitz (Germany); Karla Hiller, Technische Univ. Chemnitz (Germany); Martin Ebermann, Norbert Neumann, InfraTec GmbH (Germany) . . . [10545-27]

Wide-band large-aperture Ag surface-micro-machined MEMS Fabry-Perot interferometers (AgMFPIs) for miniaturized hyperspectral imaging, Anna Rissanen, Bin Guo, Heikki Saari, Tahvo Havia, Ingmar Stuns, Harri Ojanen, VTT Technical Research Ctr. of Finland Ltd. (Finland) . [10545-28]

Lunch/Exhibition Break Wed 12:00 pm to 1:30 pm

SESSION 7 WED 1:30 PM TO 3:00 PM

Spectrometers II

Session Chair: **Frédéric Zamkotsian**, Lab. d'Astrophysique de Marseille (France)

Ultra-compact micro-optical system for multispectral imaging (*Invited Paper*), Martin Hubold, René Berlich, Christin Gassner, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Robert Brüning, Robert Brunner, Ernst-Abbe-Hochschule Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [10545-29]

Translatory MEMS actuator with wafer level vacuum package for miniaturized NIR Fourier transform spectrometers, Thilo Sandner, Erik Gaumont, Thomas Grasshoff, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Gerald Auböck, Andreas Kenda, CTR Carinthian Tech Research AG (Austria); Thomas Gisler, Metrohm AG (Switzerland); Jan Grahmann, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) [10545-30]

A MEMS Hadamard transform spectrometer, Yu Du, Guangya Zhou, National Univ. of Singapore (Singapore) [10545-31]

MEMS-based Fourier transform spectrometer using pulsed infrared light source, Ahmed M. Othman, Ain Shams Univ. (Egypt); Hussein E. Kottb, National Telecommunication Institute (Egypt); Yasser M. Sabry, Diaa Khalil, Ain Shams Univ. (Egypt) and Si-Ware Systems (Egypt) [10545-32]

SESSION 8 WED 3:30 PM TO 5:50 PM

Micro-Mirrors

Session Chair: **Harald Schenk**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany)

Digital mirror array for harsh environment, Sebastien Lani, Yves Pétremand, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); Frédéric Zamkotsian, Lab. d'Astrophysique de Marseille (France) [10545-33]

A single-coil driven two-axis water-immersible micro scanning mirror, Song Xu, Jun Zou, Xiaoyu Duan, Texas A&M Univ. (USA) [10545-34]

Repetitive nonlinear control for linear scanning micro mirrors, Richard Schroedter, Markus Schwarzenberg, Jan Grahmann, Thilo Sandner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Klaus Janschek, TU Dresden (Germany) [10545-35]

Design and fabrication of capacitive micromachined optical focusing deformable MEMS mirrors for ultrafast tunable focusing, Afshin Kashani Ilkhechi, Benjamin Greenlay, Christopher Cercoici, Mohammad Maadi, Parsin Hajireza, Roger Zemp, Univ. of Alberta (Canada) [10545-36]

Iterative learning control (ILC) algorithm for greatly increased bandwidth and linearity of MEMS mirrors in LiDAR and related imaging applications, Veljko Milanović Abhishek Kasturi, James Yang, Frank Hu, Mirrorcle Technologies, Inc. (USA) [10545-37]

Digital micromirror array enabled integral field spectroscopy for far-ultraviolet astronomy, Brian T. Fleming, Univ. of Colorado Boulder (USA); Eric Schindhelm, Ball Aerospace & Technologies Corp. (USA); Rachel M. Tyler, Emily M. Witt, Kevin C. France, Univ. of Colorado Boulder (USA); Amanda R. Hendrix, Planetary Science Institute (USA); Arika Egan, James Wiley, Univ. of Colorado Boulder (USA) [10545-38]

MEMS tunable-finesse slotted micromirror resonator, Muhammad A. Othman, Yasser M. Sabry, Ain Shams Univ. (Egypt); Mohamed Sadek, Si-Ware Systems (Egypt); Ismail M. Nassar, Diaa Khalil, Ain Shams Univ. (Egypt) [10545-39]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Effects of liquid property and substrate roughness on the response time of an electrowetting liquid lens, Gyu Suk Jung, Jin Su Lee, Yong Hyub Won, KAIST (Korea, Republic of) [10545-40]

Mach-Zehnder interferometer applied to the study polymers Relative Humidity response, Sergio Calixto-Carrera, Centro de Investigaciones en Óptica, A.C. (Mexico); Maria Elena Calixto Olalde, Jose Hernandez-Barajas, Omar Vazquez Espitia, Instituto Tecnológico Superior de Irapuato (Mexico) [10545-41]

Coupled multiphysics circuital modelling of micro-opto-mechanical pressure sensor systems, Benedetto Troia, Chih-Hsien Huang, Shengping Mao, Hang Gao, Roelof Jansen, Veronique Rochus, Xavier Rottenberg, IMEC (Belgium) [10545-42]

CONFERENCE 10546

Monday–Tuesday 29–30 January 2018 • Proceedings of SPIE Vol. 10546

Emerging Digital Micromirror Device Based Systems and Applications X

Conference Chairs: **Michael R. Douglass**, Texas Instruments Inc. (USA); **Benjamin L. Lee**, Texas Instruments Inc. (USA)

Program Committee: **Roland Höfling**, ViALUX GmbH (Germany); **Alfred Jacobsen**, Visitech Engineering GmbH (Germany); **Yuval Kapellner Rabinovitz**, EKB Technologies Ltd. (Israel); **Badia Koudsi**, Optecks, LLC (USA); **Daniel L. Lau**, Univ. of Kentucky (USA); **Jinyang Liang**, Institut National de la Recherche Scientifique (Canada); **Alex Lyubarsky**, Texas Instruments Inc. (USA); **Sanjeev Kumar M**, Texas Instruments (India) Pvt. Ltd. (India); **Jorge Moguel**, Digital Light Innovations (USA); **Michael W. O’Keefe**, Greenlight Optics, LLC (USA); **Hakki H. Refai**, Optecks, LLC (USA); **Song Zhang**, Purdue Univ. (USA); **Karel J. Zuzak**, Univ. of Texas Southwestern Medical Ctr. (USA), The Lab. of Biomedical Imaging and Engineering, LBI-51, LLC (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600–1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

WELCOME AND OPENING REMARKS 10:30 AM TO 10:40 AM

Michael R. Douglass, Texas Instruments Inc. (USA) and **Benjamin L. Lee**, Texas Instruments Inc. (USA)

SESSION 1 MON 10:40 AM TO 12:10 PM

Computational Imaging for Advanced Applications

Session Chairs: **Jinyang Liang**, Institut National de la Recherche Scientifique (Canada); **Daniel L. Lau**, Univ. of Kentucky (USA)

Where fewer pixels give you more image (*Invited Paper*), Miles J. Padgett, Matthew Edgar, Graham Gibson, Univ. of Glasgow (United Kingdom) [10546-1]

Single pixel imaging in mid-wave IR spectrum using a compressive-sensing camera, Ian M. McMackin, Tyler Weston, Matthew Herman, Lenore McMackin, InView Technology Corp. (USA) [10546-2]

Single-pixel imaging using balanced detection and a digital micromirror device, Fernando Soldevila, Pere Clemente, Enrique Tajahuerce, Univ. Jaume I (Spain); Néstor Uribe-Patarroyo, Wellman Ctr. for Photomedicine (USA); Pedro Andrés, Univ. de València (Spain); Jesús Lancis, Univ. Jaume I (Spain) [10546-3]

Time-resolved single-shot phase imaging with a dynamic coded aperture, Ruibo Shang, Geoffrey Luke, Thayer School of Engineering at Dartmouth (USA) [10546-4]

Lunch Break Mon 12:10 pm to 1:30 pm

SESSION 2 MON 1:30 PM TO 3:30 PM

Advanced Manufacturing using DMD or other SLM

Joint Session with Conferences 10544 and 10546

Session Chairs: **Georg von Freymann**, Technische Univ. Kaiserslautern (Germany); **Alfred Jacobsen**, Visitech Engineering GmbH (Germany)

Programmable CGH on photochromic material using DMD generated masks, Romain Alata, Frédéric Zamkotsian, Patrick Lanzoni, Lab. d’Astrophysique de Marseille (France); Giorgio Pariani, Andrea Bianco, INAF - Osservatorio Astronomico di Brera (Italy); Chiara Bertarelli, Politecnico di Milano (Italy) [10546-5]

Parallel two-photon lithography for 3D printing of millimeter scale parts with submicron features, Sourabh Saha, Vu H. Nguyen, Lawrence Livermore National Lab. (USA); Dien Wang, The Chinese Univ. of Hong Kong (Hong Kong, China); James S. Oakdale, Lawrence Livermore National Lab. (USA); Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China) [10544-23]

3D printed lens on optical fiber tip, Heming Wei, Abhishek K. Amrithanath, Sridhar Krishnaswamy, Northwestern Univ. (USA) [10546-6]

Aerosol printed 2D PZT scanning imaging device, Wei-Chih Wang, Univ. of Washington (USA) [10544-24]

Micro-CLIP fabrication speed dependence on feature size and material composition, Henry Oliver T. Ware, Xiangfan Chen, Cheng Sun, Northwestern Univ. (USA) [10546-7]

Renewable materials as 3D photostructurable resins employing 405 nm tabletop dynamic projection lithography, Edvinas Skliutas, Vilnius Univ. (Lithuania); Sigita Kašetaite, Kaunas Univ. of Technology (Lithuania); Linas Jonušauskas, Vilnius Univ. (Lithuania); Jolita Ostrauskaite, Kaunas Univ. of Technology (Lithuania); Mangirdas Malinauskas, Vilnius Univ. (Lithuania) [10544-25]

SESSION 3 MON 4:00 PM TO 5:20 PM

3D Metrology

Joint Session with Conferences 10544 and 10546

Session Chairs: **Alex Lyubarsky**, Texas Instruments Inc. (USA); **Roland Höfling**, ViALUX GmbH (Germany)

Superfast 3D shape measurement of a flapping flight process with motion based segmentation, Beiwen Li, Iowa State Univ. of Science and Technology (USA) [10546-8]

Universal phase unwrapping for phase measuring profilometry using geometric analysis, Kai Liu, Jianwen Song, Sichuan Univ. (China); Yo-Sung Ho, Gwangju Institute of Science and Technology (Korea, Democratic Peoples Republic of); Daniel Leo Lau, Univ. of Kentucky (USA) [10546-9]

Optimal carrier frequency selection for high-speed 3D shape measurement with double-pattern pulse width modulation techniques, Chufan Jiang, Purdue Univ. (USA); Yajun Wang, China Academy of Engineering Physics (China); Song Zhang, Purdue Univ. (USA) [10546-10]

Open-source software and hardware design for real-time structured light 3D scanning, Jakob Wilm, Eythor Eiríksson, Technical Univ. of Denmark (Denmark) [10546-11]

TUESDAY 30 JANUARY

SESSION 4..... TUE 8:40 AM TO 10:00 AM

Biomedical Imaging with Advanced Microscopy using a DMD or other MEMS Array

Session Chairs: **Benjamin L. Lee**, Texas Instruments Inc. (USA); **Jorge Moguel**, Digital Light Innovations (USA)

DMD-based random-access scanner for ultrafast 3D two-photon imaging, Qiang Geng, Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China).....[10546-12]

Use of digital micromirror devices as dynamic pinhole arrays for adaptive confocal fluorescence microscopy, Paolo Pozzi, Dean Wilding, Oleg Soloviev, Gleb Vdovin, Michel Verhaegen, Technische Univ. Delft (Netherlands).....[10546-13]

DMD-based quantitative phase microscopy and optical diffraction tomography, Renjie Zhou, The Chinese Univ. of Hong Kong (Hong Kong, China) and Massachusetts Institute of Technology (USA); Di Jin, Zahid Yaqoob, Peter So, Massachusetts Institute of Technology (USA) . . . [10546-14]

Exploiting a digital micromirror device for a multimodal approach combining optical diffraction tomography and three-dimensional structured illumination microscopy, Seungwoo Shin, Doyeon Kim, YongKeun Park, KAIST (Korea, Republic of).....[10546-15]

SESSION 5..... TUE 10:30 AM TO 11:30 AM

Biomedical Imaging using a DMD or other Light Structuring Devices for Ophthalmological Applications

Session Chairs: **Michael R. Douglass**, Texas Instruments Inc. (USA); **Robert C. Leif**, Newport Instruments (USA)

Confocal retinal imaging using a digital light projector with a near infrared VCSEL source, Matthew S. Muller, Aeon Imaging, LLC (USA); Ann E. Elsner, Aeon Imaging, LLC (USA) and Indiana Univ. (USA) . . . [10546-16]

DMD based ophthalmoscope with concentric circle scanning for fixation, Mathi Damodaran, Kari V. Vienola, Boy Braaf, Vrije Univ. Amsterdam (Netherlands); Koenraad A. Vermeer, Rotterdam Ophthalmic Institute (Netherlands) and Rotterdam Eye Hospital (Netherlands); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands).....[10546-17]

Structured polarized light microscopy (SPLM) for mapping collagen fiber orientation of ocular tissues, Bin Yang, Bryn Brazile, Ning-Jiun Jan, Ian Sigal, Univ. of Pittsburgh (USA) [10546-18]

Lunch/Exhibition Break Tue 11:30 am to 1:00 pm

SESSION 6..... TUE 1:00 PM TO 2:30 PM

Novel and Advanced Applications

Session Chairs: **Yuval Kapellner Rabinovitz**, EKB Technologies Ltd. (Israel); **Song Zhang**, Purdue Univ. (USA)

A few photon compressed sensing LIDAR (Invited Paper), Yoni Sher, Lior Cohen, Daniel Istrati, Hagai Eisenberg, The Hebrew Univ. of Jerusalem (Israel) [10546-19]

Headlamp innovations: Optical concepts for fully adaptive light distributions, Marvin Knöchelmann, Gerolf Kloppenburg, Roland Lachmayer, Leibniz Univ. Hannover (Germany).....[10546-20]

Cryogenic operation of DMDs for multi-object near-infrared spectrographs in astronomy, Stephen A. Smee, Stephen Hope, Robert Barkhouser, Massimo Robbeto, Johns Hopkins Univ. (USA)[10546-21]

Automatic real-time tilt correction of DMD-based displays for augmented reality applications, David Castells-Rufas, Univ. Autònoma de Barcelona (Spain); Francesc Bravo-Montero, MACSA ID, S.A. (Spain); Byron Quezada-Benalcazar, Jordi Carrabina, Univ. Autònoma de Barcelona (Spain) [10546-22]



CONFERENCE 10547

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10547

Advances in Photonics of Quantum Computing, Memory, and Communication XI

Conference Chairs: **Zameer UI Hasan**, Temple Univ. (USA); **Philip R. Hemmer**, Texas A&M Univ. (USA); **Alan E. Craig**, Montana State Univ. (USA); **Alan L. Migdall**, National Institute of Standards and Technology (USA)

Program Committee: **Dmitry Budker**, Univ. of California, Berkeley (USA); **Jonathan P. Dowling**, Louisiana State Univ. (USA); **Gurudev Dutt**, Univ. of Pittsburgh (USA); **Tayyaba Hasan**, Wellman Ctr. for Photomedicine (USA); **David H. Hughes**, Air Force Research Lab. (USA); **Fedor Jelezko**, Univ. Stuttgart (Germany); **Marko Loncar**, Harvard School of Engineering and Applied Sciences (USA); **Olivier Pfister**, Univ. of Virginia (USA); **Geoff J. Pryde**, Griffith Univ. (Australia); **Aleksander K. Rebane**, Montana State Univ. (USA); **Matthew J. Sellars**, The Australian National Univ. (Australia); **Selim M. Shahriar**, Northwestern Univ. (USA); **Alan E. Willner**, The Univ. of Southern California (USA); **Jörg Wrachtrup**, Univ. Stuttgart (Germany); **Horace P. Yuen**, Northwestern Univ. (USA); **M. Suhail Zubairy**, Texas A&M Univ. (USA)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 **MON 1:30 PM TO 3:30 PM**

Nano Materials for Biomedical and Imaging Applications I

Joint Session with Conferences 10508 and 10547

Session Chairs: **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA); **Philip R. Hemmer**, Texas A&M Univ. (USA)

Intraneuronal transport abnormalities revealed by optically active photostable nanoparticle tracking (*Invited Paper*), François Treussart, Ecole Normale Supérieure de Paris-Saclay (France) [10547-1]

Delivery of nanoparticles inside the cytosol of live cells for the monitoring of cellular processes (*Invited Paper*), Xizhen Lian, Alfredo Erazo-Oliveras, Hong-Cai Zhou, Jean-Philippe Pellois, Texas A&M Univ. (USA) [10547-2]

Fluorescent multidye copolymerized silica nanoparticles for bioanalytical applications (*Invited Paper*), Gabor Patonay, Gala Chapman, Maged M. Henary, Walid Abdelwahab, Georgia State Univ. (USA) ... [10547-9]

Surface-coated fluorescent nanodiamonds for biomedical applications (*Invited Paper*), Shingo Sotoma, Feng-Jen Hsieh, Yen-Wei Chen, Jason Chen, Kartika Wardhani, Pei-Chang Tsai, Huan-Cheng Chang, Academia Sinica (Taiwan) [10547-3]

SESSION 2 **MON 4:00 PM TO 5:40 PM**

Nano Materials for Biomedical and Imaging Applications II

Joint Session with Conferences 10508 and 10547

Session Chairs: **Philip R. Hemmer**, Texas A&M Univ. (USA); **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA)

The clinical translation of nanodiamonds (*Invited Paper*), Dean Ho, University of California, Los Angeles (USA) [10547-4]

A pinch of sugar does the trick: Addressing the stability conundrum of fluorescent quantum clusters for cellular imaging

, Soumik Siddhanta, Santosh K. Paidi, Ishan Barman, Johns Hopkins Univ. (USA) [10508-10]

Theranostic GNR@Ag nanoparticles for photoacoustic imaging and therapy of bacterial infections, Taeho Kim, Qiangzhe Zhang, Liangfang Zhang, Jesse Jokerst, Univ. of California, San Diego (USA) [10508-11]

Developing nanodiamond-based hybrid quantum sensors (*Invited Paper*), Quan Li, Ting Zhang, Xi Feng, Ning Wang, Gangqin Liu, Wenghang Leong, Chufeng Liu, Renbao Liu, The Chinese Univ. of Hong Kong (Hong Kong, China) [10547-5]

TUESDAY 30 JANUARY

SESSION 3 **TUE 8:30 AM TO 10:20 AM**

Nano Materials for Biomedical and Imaging Applications III

Joint Session with Conferences 10508 and 10547

Session Chairs: **Philip R. Hemmer**, Texas A&M Univ. (USA); **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA)

Nanodiamond-enhanced MRI: towards multimodality imaging of nanodiamond (*Invited Paper*), David Waddington, The University of Sydney (Australia); Mathieu Sarraceanie, Martinos Center for Biomedical Imaging, Massachusetts General Hospital (USA); Huiliang Zhang, Harvard University (USA); Najat Salameh, Martinos Center for Biomedical Imaging, Massachusetts General Hospital (USA); David Glenn, Harvard University (USA); Ewa rej, Torsten Gaebel, Thomas Boele, The University of Sydney (Australia); Ronald Walsworth, Harvard University (USA); David Reilly, The University of Sydney (Australia); Matthew Rosen, Martinos Center for Biomedical Imaging (USA) [10547-6]

Spin magnetic resonance spectroscopy from billions of molecules to single molecule (*Invited Paper*), Jiangfeng Du, Univ of Science and Technology of China (China) [10547-7]

Heterogeneous polymer-based nanoparticles for phototheranostics, Tymish Y. Ohulchanskyy, Shenzhen Univ. (China) [10508-12]

NV nanodiamond for cellular biosensing: formation by CVD techniques (*Invited Paper*), Milos Nesladek, Univ Hasselt (Belgium) [10547-8]

SESSION 4.....TUE 10:50 AM TO 12:20 PM

Hyperentanglement of Photons and Communication I

Session Chair: **Matthew J. Sellars**,
The Australian National Univ. (Australia)

Towards high-dimensional quantum communication in space (*Invited Paper*), Fabian Steinlechner, Institut für Quantenoptik und Quanteninformation (Austria) [10547-9]

Superdense coding over optical fiber links (*Invited Paper*), Travis S. Humble, Brian P. Williams, Oak Ridge National Lab. (USA). [10547-10]

Hyperentangled photons from quantum dots (*Invited Paper*), Ana Predojevic, Stockholm Univ. (Sweden). [10547-11]

Lunch/Exhibition Break Tue 12:20 pm to 1:50 pm

SESSION 5.....TUE 1:50 PM TO 3:30 PM

Hyperentanglement of Photons and Communication II

Session Chair: **Matthew J. Sellars**,
The Australian National Univ. (Australia)

High-dimensional entanglement in quantum frequency combs (*Invited Paper*), Chee Wei Wong, Univ. of California, Los Angeles (USA); Zhenda Xie, Nanjing Univ. (China); Xuan Cui, Alvin Peizhe Li, Yoo Seung Lee, Univ. of California, Los Angeles (USA) [10547-12]

Progress towards implementing superdense teleportation in Space (*Invited Paper*), Joseph Chapman, Kristina Meier, Univ. of Illinois (USA); Trent Graham, Univ. of Illinois (USA) and Univ. of Wisconsin-Madison (USA); Chris Zeitler, Paul Kwiat, Univ. of Illinois (USA) [10547-13]

Off-axis performance of Lyot filters in multi-access quantum communication receivers, Vladimir V. Nikulin, Rushui Fang, Binghamton Univ. (USA); David H. Hughes, Air Force Research Lab. (USA); Stephen C. Huerster, Binghamton Univ. (USA) [10547-14]

Quantum coherent frequency-shift keying beyond the standard quantum limit, Ivan Burenkov, Joint Quantum Institute, National Institute of Standards and Technology (USA); Sergey V. Polykov, National Institute of Standards and Technology (USA) [10547-15]

SESSION 6.....TUE 4:00 PM TO 6:00 PM

Hyperentanglement of Photons and Communication III

Session Chair: **Trent M. Graham**, Univ. of Illinois (USA)

Manipulation of two-photon interference by entanglement (*Invited Paper*), Polina Sharapova, Kai-Hong Luo, Harald Herrmann, Matthias Reichelt, Christine Silberhorn, Torsten Meier, Univ. Paderborn (Germany) [10547-16]

Integrated sources of non-classical light for quantum information processing on chip (*Invited Paper*), Amr S. Helmy, Ryan Marchildon, Aharon Brodutch, Daniel Giovannini, Dongpeng Kang, Haoyu He, Univ. of Toronto (Canada) [10547-17]

Fiber coupled acousto-optic modulators for near-UV and blue-wavelength applications, Mia Swain, Magnus Christie, Mark Farries, Gooch & Housego (Torquay) Ltd. (United Kingdom); Christopher J. Ballance, Steven Kolthammer, Univ. of Oxford (United Kingdom); Paul C. Gow, Optoelectronics Research Ctr., Univ. of Southampton (United Kingdom); Dominic C. O'Brien, Univ. of Oxford (United Kingdom) [10547-18]

Analysis of entanglement in multi-access quantum optical circuits, Vladimir V. Nikulin, Binghamton Univ. (USA) [10547-19]

Secure quantum clock synchronization, Antia Lamas-Linares, Texas Advanced Computing Ctr., The Univ. of Texas at Austin (USA); James Troupe, The Univ. of Texas at Austin (USA) [10547-20]

WEDNESDAY 31 JANUARY

SESSION 7.....WED 8:30 AM TO 10:10 AM

Single-Photon Sources and Solid-State Quantum Memories I

Session Chair: **Chee Wei Wong**,
Univ. of California, Los Angeles (USA)

Integrating quantum photonics and microwaves in a rare-earth ion on-chip architecture (*Invited Paper*), John G. Bartholomew, Jake Rochman, Tian Zhong, Jonathan M. Kindem, Raymond Lopez-Rios, Ioana Craiciu, Evan Miyazono, Chuting Wang, Andrei Faraon, California Institute of Technology (USA) [10547-21]

Telecom-compatible quantum memory storage material with over one second coherence time (*Invited Paper*), Matthew J. Sellars, Milos Rancic, Rose L. Ahlefeldt, Morgan P. Hedges, The Australian National Univ. (Australia) [10547-22]

Towards optically addressable single rare-earth qubits in a nanophotonic cavity (*Invited Paper*), Tian Zhong, California Institute of Technology (USA) and The Univ. of Chicago (USA); Jonathan M. Kindem, John G. Bartholomew, Jake Rochman, Andrei Faraon, California Institute of Technology (USA) [10547-23]

A generalized second-order single-photon detector model and its experimental verification, Sergey V. Polyakov, National Institute of Standards and Technology (USA); Michael Wayne, Univ. of Illinois (USA); Joshua Bienfang, National Institute of Standards and Technology (USA) [10547-24]

SESSION 8.....WED 10:40 AM TO 12:10 PM

Single-Photon Sources and Solid-State Quantum Memories II

Session Chair: **Alan L. Migdall**,
National Institute of Standards and Technology (USA)

Generating entangled photons on monolithic chips (*Invited Paper*), Dongpeng Kang, Harbin Institute of Technology (China); Nima Zareian, Amr S. Helmy, Univ. of Toronto (Canada) [10547-25]

Freestanding optical micro-disk resonators in single-crystal diamond by reactive ion etching and multidirectional focused ion-beam milling, Teodoro Graziosi, Sichen Mi, Marcell Kiss, Niels Quack, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10547-26]

State-engineered photon pair generation in graded-index multimode optical fibers, Hamed Pourbeyram, Arash Mafi, The Univ. of New Mexico (USA) [10547-27]

New frontiers for light storage at room temperature, Ofer Firstenberg, Ran Finkelstein, Eion Poem, Ohad Michel, Ohr Lahad, Or Katz, Weizmann Institute of Science (Israel) [10547-28]

Lunch/Exhibition Break Wed 12:10 pm to 1:40 pm

OPTO

CONFERENCE 10547

SESSION 9 WED 1:40 PM TO 3:30 PM

Single-Photon Sources and Solid-State Quantum Memories III

Session Chair: **Amr S. Helmy**, Univ. of Toronto (Canada)

Generating non-classical correlations between photons and spins in a crystal (*Invited Paper*), Cyril Laplane, Pierre Jobez, Jean Etesse, Nicolas Gisin, Mikael Afzelius, Univ. de Genève (Switzerland) [10547-29]

Self-induced transparency and soliton formation in ruby: simulations and experiment, Aleksander K. Rebane, Montana State Univ. (USA); Hans Riesen, The Univ. of New South Wales (Australia); Steffen Ganschow, Leibniz-Institut für Kristallzüchtung (Germany); Alex Szabo, Institute for Microstructural Sciences, National Research Council Canada (Canada); Wayne Hutchison, Rajitha Rajan, The Univ. of New South Wales (Australia) [10547-30]

Lasers pumped quantum dynamics in nanostructured arrays for computing, Ariela Donval, Noam Gross, Moshe Oron, KiloLambda Technologies, Ltd. (Israel) [10547-31]

Room-temperature single photon sources using solid-state emitters and open-access microcavities, Sanmi Adekanye, Philip Dolan, Sam Johnson, Aurelien A. P. Trichet, Jason M. Smith, Univ. of Oxford (United Kingdom) [10547-32]

Versatile integrated source of entangled photons at telecom wavelength in femtosecond-laser-written circuits, Simone Atzeni, Politecnico di Milano (Italy) and CNR-Istituto di Fotonica e Nanotecnologie (Italy); Giacomo Corrielli, CNR-Istituto di Fotonica e Nanotecnologie (Italy) and Politecnico di Milano (Italy); Andrea Crespi, Politecnico di Milano (Italy) and CNR-Istituto di Fotonica e Nanotecnologie (Italy); Roberto Osellame, CNR-Istituto di Fotonica e Nanotecnologie (Italy) and Politecnico di Milano (Italy); Adil Rab, Emanuele Polino, Mauro Valeri, Nicolò Spagnolo, Paolo Mataloni, Fabio Sciarrino, Sapienza Univ. di Roma (Italy) [10547-33]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Dynamic topology resilience for quantum networks, Laszlo Gyongyosi, Budapest Univ. of Technology and Economics (Hungary) and Univ. of Southampton (United Kingdom) and Hungarian Academy of Sciences (Hungary); Sandor Imre, Budapest Univ. of Technology and Economics (Hungary) [10547-34]

Waveguide geometry and quantum correlations, Hamed Pourbeyram, Arash Mafi, The Univ. of New Mexico (USA) [10547-35]

Observation of the transient optical nutation effect in acetylene-filled hollow-core photonic crystal fibers, Manuel I. Ocegueda Miramontes, Serguei Stepanov, Nayelli Casillas, Eliseo Hernández, Ctr. de Investigación Científica y de Educación Superior de Ensenada B.C. (Mexico) [10547-36]

High-dimensional quantum communication via a multimode fiber, Liubov Amitonova, Univ. of Twente (Netherlands); Tristan Tentrup, Ivo Vellekoop, Pepijn Pinkse, Univ. Twente (Netherlands) [10547-37]

CONFERENCE 10548

Monday–Thursday 29 January–1 February 2018 • Proceedings of SPIE Vol. 10548

Steep Dispersion Engineering and Opto-Atomic Precision Metrology XI

Conference Chairs: **Selim M. Shahriar**, Northwestern Univ. (USA); **Jacob Scheuer**, Tel Aviv Univ. (Israel)

Program Committee: **Robert W. Boyd**, Univ. of Ottawa (Canada), Univ. of Rochester (USA); **Danielle A. Braje**, MIT Lincoln Lab. (USA); **John H. Burke**, Air Force Research Lab. (USA); **Brian D'Urso**, Univ. of Pittsburgh (USA); **Daniel J. Gauthier**, The Ohio State Univ. (USA); **Andrew Geraci**, Univ. of Nevada, Reno (USA); **Kohzo Hakuta**, The Univ. of Electro-Communications (Japan); **John C. Howell**, Univ. of Rochester (USA); **Jacob B. Khurgin**, Johns Hopkins Univ. (USA); **John E. Kitching**, National Institute of Standards and Technology (USA); **Michael S. Larsen**, Northrop Grumman Navigation Systems (USA); **Uriel Levy**, The Hebrew Univ. of Jerusalem (Israel); **Frank A. Narducci**, Naval Air Systems Command (USA); **Irina Novikova**, The College of William & Mary (USA); **Gour S. Pati**, Delaware State Univ. (USA); **Stefania Residori**, Institut Non Linéaire de Nice Sophia Antipolis (France); **Monika H. Schleier-Smith**, Stanford Univ. (USA); **David D. Smith**, NASA Marshall Space Flight Ctr. (USA); **Jennifer Strabley**, Honeywell Technology (USA); **Misha Sumetsky**, Aston Univ. (United Kingdom); **Sharon M. Weiss**, Vanderbilt Univ. (USA); **Yanhong Xiao**, Fudan Univ. (China); **Avinoram Zadok**, Bar-Ilan Univ. (Israel)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 **MON 10:30 AM TO 12:35 PM**

Photonic Crystals

- Wide steering of sharp beam from photonic crystal slow-light waveguide** (*Invited Paper*), Toshihiko Baba, Yokohama National Univ. (Japan) ... [10548-1]
- Investigation of Fano-type resonances in nanofiber-based photonic crystal cavity** (*Invited Paper*), Kohzo Hakuta, The Univ. of Electro-Communications (Japan) [10548-2]
- Adaptive detection of optical phase modulation using phase memory of acetylene in HC-PCF cell** (*Invited Paper*), Serguei I. Stepanov, Ctr. de Investigación Científica y de Educación Superior de Ensenada B.C. (Mexico) [10548-3]
- Title to be determined** (*Invited Paper*), Zheng Wang, The Univ. of Texas at Austin (USA) [10548-4]
- Controllable low-loss slow light in photonic crystals** (*Invited Paper*), Sebastian Schulz, Cork Institute of Technology (Ireland); Changyu Hu, Univ. of St. Andrews (United Kingdom); Jeremy Upham, Robert W. Boyd, Univ. of Ottawa (Canada); Liam O'Faolain, Cork Institute of Technology (Ireland) [10548-5]
- Lunch Break Mon 12:35 pm to 2:00 pm

SESSION 2 **MON 2:00 PM TO 3:30 PM**

New Developments in Slow and Fast Light

- Slowing down and time-reversing light through dynamic modulation** (*Invited Paper*), Momchil Minkov, Shanhui Fan, Stanford Univ. (USA) . [10548-6]
- Experimental demonstration of nearly three orders of magnitude suppression in sensitivity using a subluminal laser**, Zifan Zhou, Joshua Yablon, Northwestern Univ. (USA); Nicholas J. Condon, U.S. Naval Research Lab. (USA); Devin Hileman, Digital Optics Technologies, Inc. (USA); Shih Tseng, Selim M. Shahriar, Northwestern Univ. (USA) [10548-7]
- Optimal interfacing with coupled-cavities slow-light waveguides: mimicking periodic structures with a compact device** (*Invited Paper*), Jacob Scheuer, Tel Aviv Univ. (Israel) [10548-8]
- Some new advances in slow and fast light** (*Invited Paper*), Robert W. Boyd, Univ. of Ottawa (Canada) [10548-9]

SESSION 3 **MON 4:00 PM TO 6:30 PM**

Steep Dispersion-based Sensing

- Recent results in high-precision temperature mapping along an optical fibre** (*Invited Paper*), Luc Thévenaz, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [10548-10]
- Brillouin scattering from gas- and superfluid-filled hollow-core fiber** (*Invited Paper*), William Renninger, Univ. of Rochester (USA) [10548-11]
- Femto-Doppler remote sensing through ultra-steep dispersion** (*Invited Paper*), John Howell, The Hebrew Univ. of Jerusalem (Israel) [10548-12]
- Ultra-sensitive sensors based on gain-loss indirectly coupled microcavities** (*Invited Paper*), Zhisong Xiao, Beihang Univ. (China) . [10548-13]
- A sensor based on steep dispersion distribution** (*Invited Paper*), Yundong Zhang, Huai Yin Su, Yong Feng Wu, Kai Ma, Ping Yuan, Harbin Institute of Technology (China) [10548-14]
- Dispersion and sensing enhancement in a microresonator coupled to a non-adiabatic tapered fiber** (*Invited Paper*), Albert T. Rosenberger, Oklahoma State Univ. (USA) [10548-15]

OPTO



CONFERENCE 10548

TUESDAY 30 JANUARY

SESSION 4..... TUE 8:00 AM TO 9:30 AM

Optical Computing, Delay Lines, and Storage

The characteristics and arithmetic of a novel structure based on add-drop resonator, Yundong Zhang, Kai Ma, Yong Feng Wu, Ping Yuan, Harbin Institute of Technology (China)..... [10548-16]

Optical signal processing via light pulse storage in electromagnetically induced transparency media (*Invited Paper*), Guoquan Zhang, Nankai Univ. (China)..... [10548-17]

RF photonic delay lines using space-division multiplexing (*Invited Paper*), Ivana Gasulla, Univ. Politécnica de Valencia (Spain)..... [10548-18]

Ultra-wide-band slow light in chip-integrated nanophotonic structures (*Invited Paper*), Antonio Badolato, Univ. of Ottawa (Canada) and National Institute of Standards and Technology (USA); Mohamed Sabry Mohamed, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Boshen Gao, Univ. of Rochester (USA); Momchil Minkov, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Robert W. Boyd, Univ. of Ottawa (Canada); Vincenzo Savona, Romuald Houdré, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Yiming Lai, Univ. of Ottawa (USA) and National Institute of Standards and Technology (USA)..... [10548-20]

SESSION 5..... TUE 9:30 AM TO 10:20 AM

Tutorial

Tutorial on epsilon near zero materials vs slow light and other resonance phenomena: anything new? (*Invited Paper*), Jacob B. Khurgin, Johns Hopkins Univ. (USA)..... [10548-21]

SESSION 6..... TUE 10:50 AM TO 12:05 PM

Plasmonics

Assembly, control, and rotation of plasmonic crystal structures using optical tweezers (*Invited Paper*), Yuval Yifat, The James Franck Institute (USA)..... [10548-22]

Sub-wavelength microscopy with surface plasmons (*Invited Paper*), M. Suhail Zubairy, Texas A&M Univ. (USA)..... [10548-23]

Ultrafast modulators of IR light based on EIT-type plasmonic metasurfaces integrated with single-layer graphene (*Invited Paper*), Gennady B. Shvets, Cornell Univ. (USA)..... [10548-24]

Lunch/Exhibition Break Tue 12:05 pm to 1:10 pm

SESSION 7..... TUE 1:10 PM TO 2:50 PM

Nanophotonic Devices

Levitated optomechanics as a platform for precision metrology (*Invited Paper*), A. Nick Vamivakas, Univ. of Rochester (USA)..... [10548-25]

Sub-angstrom precise resonant nanophotonic devices at the optical fiber surface (*Invited Paper*), Misha Sumetsky, Aston Univ. (United Kingdom)..... [10548-26]

Band structure with a twist: nanophotonics with resonant loss and dispersion (*Invited Paper*), N. Asger Mortensen, DTU Fotonik (Denmark)..... [10548-27]

Twin-ring optical gyroscopes using 3x3 couplers (*Invited Paper*), Matt Grant, Michel J. F. Digonnet, Stanford Univ. (USA)..... [10548-28]

SESSION 8..... TUE 3:20 PM TO 6:15 PM

Nonlinear Effects for Steep Dispersion

Mixing of Kerr effect and forward Brillouin scattering in four-wave mixing processes (*Invited Paper*), Avinoam Zadok, Bar-Ilan Univ. (Israel)..... [10548-29]

Dispersion engineering with stimulated Brillouin scattering and applications (*Invited Paper*), Thomas Schneider, Technische Univ. Braunschweig (Germany)..... [10548-30]

Brillouin scattering in tapered optical fibers (*Invited Paper*), Paulo C. Dainese, Univ. Estadual de Campinas (Brazil)..... [10548-31]

Steep optical dispersion observed by McCall-Hahn solitons (*Invited Paper*), Aleksander K. Rebane, Montana State Univ. (USA)..... [10548-32]

Effect of particular nonlinear dispersion in photorefractive four-wave mixing on slow and fast light (*Invited Paper*), Konstantin Shcherbin, Institute of Physics (Ukraine); Pierre Mathey, Univ. de Bourgogne (France); Dean Evans, Air Force Research Lab. (USA)..... [10548-33]

Nonlinear optics with room-temperature Rydberg atoms (*Invited Paper*), Robert Löw, Univ. Stuttgart (Germany)..... [10548-34]

Advances in optical delay technologies for signal processing (*Invited Paper*), Alan E. Willner, The Univ. of Southern California (USA)..... [10548-19]

WEDNESDAY 31 JANUARY

SESSION 9..... WED 8:00 AM TO 10:05 AM

Fast Light, Non-Reciprocity, PT Symmetry, and Related Topics

Ultrasensitive micro-scale parity-time-symmetric ring laser gyroscope (*Invited Paper*), Mercedeh Khajavikhan, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Mohammad Soltani, Raytheon BBN Technologies (USA); Demetrios Christodoulides, Jinhan Ren, Hossein Hodaie, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Gal Harari, Technion-Israel Institute of Technology (Israel); Weng Chow, Sandia National Labs. (USA)..... [10548-35]

Optical-nonlinearity-enabled nonreciprocal propagation: what works and what does not (*Invited Paper*), Jacob B. Khurgin, Johns Hopkins Univ. (USA)..... [10548-36]

Time cloak based on slow/fast light effects in fiber Mach-Zehnder interferometers (*Invited Paper*), Li Zhan, Shanghai Jiao Tong Univ. (China)..... [10548-37]

Cavity optomechanics and precision sensing with optically-levitated nanospheres (*Invited Paper*), Andrew Geraci, Univ. of Nevada, Reno (USA)..... [10548-38]

Closed-loop operation of a passive fast-light cavity (*Invited Paper*), David D. Smith, NASA Marshall Space Flight Ctr. (USA)..... [10548-39]

SESSION 10..... WED 10:30 AM TO 12:35 PM

Quantum Control Spin Squeezing and Related Technologies

Applying weak measurement to spectroscopy and spin squeezing (*Invited Paper*), Yanhong Xiao, Fudan Univ. (China)..... [10548-40]

Twists and gaps: cavity-mediated spin-exchange interactions on a mHz linewidth transition in strontium (*Invited Paper*), James K. Thompson, Univ. of Colorado Boulder (USA)..... [10548-41]

Spin squeezing: towards atom interferometry (*Invited Paper*), Onur Hosten, Univ. of Illinois (USA)..... [10548-42]

Quantum coherence control for collective phase manipulations of transient atoms (*Invited Paper*), Byoung S. Ham, Gwangju Institute of Science and Technology (Korea, Republic of)..... [10548-43]

Quantum control of ultracold diatomic strontium molecules (*Invited Paper*), Stanimir Kondov, Tanya Zelevinsky, JILA (USA)..... [10548-44]

Lunch/Exhibition Break Wed 12:35 pm to 2:00 pm

SESSION 11..... WED 2:00 PM TO 3:40 PM

Atomic Clocks, Atomic Interferometers, and Enabling Technologies

Photonic-chip frequency combs for optical synthesis and clock metrology (*Invited Paper*), Scott Papp, National Institute of Standards and Technology (USA)..... [10548-45]

Cold-atoms: a clean platform for compact atomic clocks and sensors (*Invited Paper*), Elizabeth A. Donley, National Institute of Standards and Technology (USA)..... [10548-46]

Surprisingly good frequency stability from tiny green lasers and iodine molecules (*Invited Paper*), Leo Hollberg, Stanford Univ. (USA)..... [10548-47]

Chip-scale atomic references at 1.5 microns interfaced with micro-combs and high-finesse cavities (*Invited Paper*), Liron Stern, The Hebrew Univ. of Jerusalem (Israel)..... [10548-48]

SESSION 12..... WED 4:10 PM TO 6:20 PM

Integrated and Nanotechnology for Precision Metrology and Dispersion Engineering

Magnetic resonance microscopy with diamond coverslips (*Invited Paper*), Victor M. Acosta, The Univ. of New Mexico (USA) [10548-49]

Photonic integration for precision spectroscopy of atomic vapors (*Invited Paper*), Matthew Hummon, John E. Kitching, National Institute of Standards and Technology (USA) [10548-50]

Ultra high-performance atomic magnetometers: from physics lab to clinical systems (*Invited Paper*), Vishal Shah, QuSpin, Inc. (USA) . . [10548-51]

Integrated atomic spectroscopy with photonic waveguides, Robert Löw, Univ. Stuttgart (Germany)..... [10548-52]

Advanced platforms for sensing and metrology applications (*Invited Paper*), Uriel Levy, The Hebrew Univ. of Jerusalem (Israel) . . [10548-53]

Photonically integrated spectroscopy platform using grating-to-grating coupling, Doug Bopp, Songbai Kang, Matthew T Hummon, John E. Kitching, Vladimir A. Aksyuk, Kartik A. Srinivasan, Sangsik Kim, Daron A. Westly, NIST (USA)..... [10548-54]

WEDNESDAY POSTER SESSION..... WED 6:00 PM TO 8:00 PM

Posters-Wednesday

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Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Atomic clock stability under dynamic excitation of coherent population trapping resonance in cells without buffer gas, Sergey M. Kobtsev, Daba Radnatarov, Sergey Khripunov, Ivan Popkov, Valerii Andryushkov, Tatiana Steschenko, Novosibirsk State Univ. (Russian Federation) . . [10548-71]

High-frequency characteristics of a single-beam optically pumped atomic magnetometer, Hikaru Nakatake, Shun Takeda, Hiroshi Kumagai, Satoru Nebuya, Kitasato Univ. (Japan) [10548-72]

Discovery of large group delay in a microwave metamaterial, Zohreh Vafapour, Johns Hopkins Univ. (USA)..... [10548-73]

THURSDAY 1 FEBRUARY

SESSION 13..... THU 8:00 AM TO 10:30 AM

Quantum Technologies for Precision Metrology and Sensing

Quantum astronomy: scientific background, technologies, achieved results, and future developments with adaptive optics (*Invited Paper*), Tommaso Occhipinti, Adaptica S.r.l. (Italy) [10548-55]

Biosensing with fluorescent nanodiamonds (*Invited Paper*), Philip R. Hemmer, Texas A&M Univ. (USA) [10548-56]

Chip-based quantum random number generator (*Invited Paper*), Alexander L. Gaeta, Columbia Univ. (USA) [10548-57]

Quantum nonlinear optics with structural slow light (*Invited Paper*), Ofer Firstenberg, Weizmann Institute of Science (Israel) [10548-58]

Schrodinger cat atom interferometer using direct detection of atomic states and prospect for testing the Penrose-Diosi theory for gravity induced collapse of quantum superposition (*Invited Paper*), Renpeng Fang, Resham Sarkar, Selim M. Shahriar, Northwestern Univ. (USA) [10548-59]

Frequency shift of an optical cavity mode due to a single atom motion (*Invited Paper*), Yuri V. Rostovtsev, Univ. of North Texas (USA) [10548-60]

SESSION 14..... THU 11:00 AM TO 1:05 PM

New Developments in Precision Metrology

Vibration-free laser via change of the cavity pulling sign (*Invited Paper*), Eugeny E. Mikhailov, The College of William & Mary (USA)..... [10548-61]

Photon metrology: a new need for even steeper dispersion (*Invited Paper*), Shayan Mookherjea, Univ. of California, San Diego (USA) [10548-62]

Interplay of CPT and CPO in phase-sensitive amplification in metastable helium at room temperature (*Invited Paper*), Fabien Bretenaker, Lab. Aimé Cotton (France)..... [10548-63]

Environmental sensitivity of saturated absorption resonances of Rb vapor (*Invited Paper*), Andrey B. Matsko, OEwaves, Inc. (USA) [10548-64]

Recent advances in tests of general relativity with cold atoms (*Invited Paper*), Philippe Bouyer, Lab. Photonique, Numérique et Nanosciences (France)..... [10548-65]

Lunch/Exhibition Break Thu 1:05 pm to 2:30 pm

SESSION 15..... THU 2:30 PM TO 4:35 PM

Atom Interferometry

Three-mode SU(2) atom interferometry using F=1 Dicke state (*Invited Paper*), Li You, Tsinghua Univ. (China) [10548-66]

Atom interferometry inside a hollow-core photonic crystal fiber (*Invited Paper*), Shau-Yu Lan, Nanyang Technological Univ. (Singapore) [10548-67]

Simple, precise, and versatile atom interferometer for field applications (*Invited Paper*), Xuejian Wu, Holger Mueller, Univ. of California, Berkeley (USA)..... [10548-68]

Raman spectroscopy in a continuous cold-atom beam (*Invited Paper*), Frank A. Narducci, Naval Air Systems Command (USA) [10548-69]

Atom-surface interaction in Rb filled HC-PCF (*Invited Paper*), Fetah Benabid, XLIM Institut de Recherche (France)..... [10548-70]



CONFERENCE 10549

Tuesday–Thursday 30 January–1 February 2018 • Proceedings of SPIE Vol. 10549

Complex Light and Optical Forces XII

Conference Chairs: **Enrique J. Galvez**, Colgate Univ. (USA); **David L. Andrews**, Univ. of East Anglia (United Kingdom); **Jesper Glückstad**, Technical Univ. of Denmark (Denmark)

Program Committee: **Robert R. Alfano**, The City College of New York (USA); **Cornelia Denz**, Westfälische Wilhelms-Univ. Münster (Germany); **Kishan Dholakia**, Univ. of St. Andrews (United Kingdom); **Wolfgang A. Ertmer**, Leibniz Univ. Hannover (Germany); **Andrew Forbes**, Univ. of the Witwatersrand (South Africa), CSIR National Laser Ctr. (South Africa); **Jörg B. Götte**, Nanjing Univ. (China); **David G. Grier**, New York Univ. (USA); **Rüdiger Grunwald**, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); **Simon Hanna**, Univ. of Bristol (United Kingdom); **Jandir M. Hickmann**, Univ. Federal do Rio Grande do Sul (Brazil); **Ting-Hua Lu**, National Taiwan Normal Univ. (Taiwan); **Lorenzo Marrucci**, Univ. degli Studi di Napoli Federico II (Italy); **Giovanni Milione**, NEC Labs. America, Inc. (USA); **Miles J. Padgett**, Univ. of Glasgow (United Kingdom); **Darwin Palima**, Technical Univ. of Denmark (Denmark); **Daryl Preece**, Univ. of California, San Diego (USA); **Monika Ritsch-Marte**, Medizinische Univ. Innsbruck (Austria); **Halina H. Rubinsztein-Dunlop**, The Univ. of Queensland (Australia); **Marat S. Soskin**, Institute of Physics (Ukraine); **Grover A. Swartzlander Jr.**, Rochester Institute of Technology (USA); **Nirmal K. Viswanathan**, Univ. of Hyderabad (India)

TUESDAY 30 JANUARY

SESSION 1 TUE 8:00 AM TO 10:10 AM

Fundamental Aspects of Complex Light

Session Chair: **Enrique J. Galvez**, Colgate Univ. (USA)

Unified theory of conservation laws in light-matter interactions (*Invited Paper*), Ivan Fernandez-Corbaton, Carsten Rockstuhl, Karlsruhe Institut für Technologie (Germany) [10549-1]

Partially coherent vortex beams (*Invited Paper*), Greg Gbur, The Univ. of North Carolina at Charlotte (USA) [10549-2]

A light-ray picture of structured Gaussian beams (*Invited Paper*), Mark R. Dennis, Univ. of Bristol (United Kingdom); Miguel A. Alonso, Univ. of Rochester (USA) [10549-3]

Localization of light: beginning of a new optics, Ernesto Jimenez Villar, Instituto de Pesquisas Energeticas e Nucleares (Brazil); Mario Cesar S. Xavier, Univ. Estadual da Paraíba (Brazil) and Univ. Federal da Paraíba (Brazil); Valdeci Mestre, Univ. Estadual da Paraíba (Brazil); Weliton S. Martins, Univ. Federal de Pernambuco (Brazil); Jorge Gabriel G. S. Ramos, Univ. Federal da Paraíba (Brazil); Niklaus U. Wetter, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10549-4]

Angular-momentum selection rules for photo-excitation of ions with twisted light, Maria Solyanik, Andrei Afanasev, The George Washington Univ. (USA) [10549-5]

SESSION 2 TUE 10:40 AM TO 12:00 PM

Quantum Effects

Session Chair: **David L. Andrews**, Univ. of East Anglia (United Kingdom)

Quantum angular-momentum selection rules for absorption of twisted light by bound electrons (*Invited Paper*), Andrei Afanasev, The George Washington Univ. (USA) [10549-6]

Orbital angular momentum for testing quantum causality (*Invited Paper*), Jacqueline Romero, Kaumudibikash Goswami, Christina Giarmatzi, Fabio Costa, The Univ. of Queensland (Australia); Cyril Branciard, Institut NÉEL (France); Andrew White, The Univ. of Queensland (Australia) [10549-7]

Creating the first Bose-Einstein condensate in space, Wolfgang A. Ertmer, Laser Zentrum Hannover e.V. (Germany) and Leibniz Univ. Hannover (Germany); Stephan T. Seidel, Holger Ahlers, Dennis Becker, Maïke D. Lachmann, Thijs Wendrich, Leibniz Univ. Hannover (Germany); Jens Grosse, ZARM Technik AG (Germany) and Univ. Bremen (Germany); Hauke Müntinga, ZARM Technik AG (Germany); Aline Dinkelaker, Vladimir Schkolnik, Humboldt-Univ. zu Berlin (Germany); Benjamin Wesp, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); André Wenzlawski, Johannes Gutenberg Univ. Mainz (Germany); Ortwin Hellmig, Univ. Hamburg (Germany); Waldemar Herr, Naceur Gaaloul, Ernst M. Rasel, Leibniz Univ. Hannover (Germany) [10549-8]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 3 TUE 1:30 PM TO 3:00 PM

Optical Modes

Advances and challenges in free-space spatial division multiplexing (*Invited Paper*), Martin P. J. Lavery, Univ. of Glasgow (United Kingdom) [10549-9]

Generation of fractal structured eigenmodes from lasers, Hend Sroor, Univ. of the Witwatersrand, Johannesburg (South Africa); Darryl Naidoo, CSIR National Laser Ctr. (South Africa); Johannes Courtial, Univ. of Glasgow (United Kingdom); Andrew Forbes, Univ. of the Witwatersrand, Johannesburg (South Africa) [10549-10]

Using Hermite-Gaussian modes for free-space optical communication, Giovanni Milione, NEC Labs. America, Inc. (USA); Bienvenu Ndagano, Nokwazi Mphuthi, Andrew Forbes, Univ. of the Witwatersrand, Johannesburg (South Africa) [10549-11]

Core-shell (TiO₂@Silica) nanoparticles for random laser, Ernesto Jimenez Villar, Instituto de Pesquisas Energeticas e Nucleares (Brazil); Valdeci Mestre, Univ. Estadual da Paraíba (Brazil); Gilberto F. de Sá, Univ. Federal de Pernambuco (Brazil); Niklaus U. Wetter, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [10549-12]

SESSION 4 TUE 3:30 PM TO 6:00 PM

Spin-Orbit Complex Light

Complex light-assisted optical metrology techniques (*Invited Paper*), Carmelo Rosales-Guzmán, Univ. of the Witwatersrand, Johannesburg (South Africa); Juan P. Torres, ICFO - Institut de Ciències Fotòniques (Spain); Aniceto Belmonte Molina, Univ. Politècnica de Catalunya (Spain) . . . [10549-13]

Spectral anomaly of ultrashort vortex pulses with axially oscillating twist, Max Liebmann, Alexander Treffer, Martin Bock, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Thomas E. Seiler, FernUniv. in Hagen (Germany); Thomas Elsässer, Rüdiger Grunwald, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) [10549-14]

Femtosecond laser with intracavity controlled higher-order Poincaré sphere beams and total E-field reconstruction of the pulses, Tiancheng Huo, Beckman Laser Institute and Medical Clinic (USA); Li Qi, Southern Medical Univ. (China); Yusi Miao, Zhonglie Piao, Buyun Zhang, Jiang Zhu, Yan Li, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) [10549-15]

Arbitrary spin-to-orbital angular momentum conversion of light, Robert Devlin, Harvard Univ. (USA); Noah Rubin, Harvard John A. Paulson School of Engineering and Applied Sciences (USA); Antonio Ambrosio, Harvard Univ. (USA); J.P. Balthasar Mueller, Federico Capasso, Harvard John A. Paulson School of Engineering and Applied Sciences (USA) . . . [10549-16]

Spin and orbital angular momentum control of polarized optical vortex beams using a computer-generated hologram with structural birefringence, Ryotaro Suzuki, Hiroshi Nagayama, Daisuke Barada, Utsunomiya Univ. (Japan) [10549-17]

Experimental demonstration of broadband generation of optical vortices using asymmetrically spliced fibers, Zhe Xu, Wuhan National Lab. for Optoelectronics (China); Shuhui Li, RuiXuan Zhao, Li Shen, Huazhong Univ. of Science and Technology (China); Cheng Du, FiberHome Telecommunication Technologies Co., Ltd. (China); Jian Wang, Huazhong Univ. of Science and Technology (China) [10549-18]

Realization of the spin-dependent manipulation of structured light by tailoring the polarization, Hailu Luo, Hunan Univ. (China); Junxiao Zhou, Hunan Univ. (China) and Univ. of California, San Diego (USA) [10549-57]

WEDNESDAY 31 JANUARY

SESSION 5 **WED 8:00 AM TO 9:50 AM**

Complex Light Sensing

Polarization state vector beam spectrum analyzer using Q-plates encoded onto a spatial light modulator (*Invited Paper*), Jeffrey A. Davis, San Diego State Univ. (USA); Ignacio Moreno, Univ. Miguel Hernández de Elche (Spain); Katherine Badham, San Diego State Univ. (USA); María M. Sánchez-López, Univ. Miguel Hernández de Elche (Spain); Joseph E. Holland, Don M. Cottrell, San Diego State Univ. (USA) . . . [10549-19]

Multiple-star systems optical vortex coronagraphy, Artur Aleksanyan, Nina Kravets, Etienne Brasselet, Univ. Bordeaux 1 (France) [10549-20]

Determination of the topological charge of a Laguerre-Gauss beam by shearing interference from a wedged optical flat, Behzad Khajavi, Enrique J. Galvez, Colgate Univ. (USA) [10549-21]

A femtometer-resolved all-fiber speckle wavemeter, Graham D. Bruce, Mingzhou Chen, Kishan Dholakia, Univ. of St. Andrews (United Kingdom) [10549-22]

Parallelized SSTF-overlapping foci in space and time, Patrick S. Salter, Univ. of Oxford (United Kingdom); Bangshan Sun, Clemens Roeder, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Alexander Jesacher, Medizinische Univ. Innsbruck (Austria); Johannes Strauß, Johannes Heberle, Michael Schmidt, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Martin J. Booth, Univ. of Oxford (United Kingdom) [10549-23]

SESSION 6 **WED 10:20 AM TO 12:00 PM**

Spatially-Variable Polarization

Generation of arbitrary axisymmetrically polarized pulses with a broadband spectrum (*Invited Paper*), Ryuji Morita, Masato Suzuki, Keisaku Yamane, Hokkaido Univ. (Japan); Yasunori Toda, Hokkaido Univ. (Japan); Kazuhiko Oka, Hiroasaki Univ. (Japan) [10549-24]

Complex polarization topologies in nanostructured light (*Invited Paper*), Peter Banzer, Max-Planck-Institut für die Physik des Lichts (Germany) [10549-25]

Multitwist Mobius polarization in crossed complex light beams, Enrique J. Galvez, Saiyang Zhang, Colgate Univ. (USA) [10549-26]

Customized focal light landscapes and energy flow structures by complex vectorial fields for advanced optical trapping, Eileen Otte, Kemal Tekce, Eric Asché, Cornelia Denz, Westfälische Wilhelms-Univ. Münster (Germany) [10549-27]

Lunch/Exhibition Break Wed 12:00 pm to 1:30 pm

SESSION 7 **WED 1:30 PM TO 3:00 PM**

Waveguides

Generation of orbital angular momentum beams using all-fiber photonic lanterns (*Invited Paper*), Rodrigo Amezcua-Correa, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Sergio Leon-Saval, The Univ. of Sydney (Australia); Zahoor Sanjabi Eznaveh, Jose Enrique Antonio-Lopez, Juan Carlos Alvarado Zacarias, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Giovanni Milione, NEC Labs. America, Inc. (USA); Kai Shi, Benn Thomsen, Univ. College London (United Kingdom); David J. Richardson, Yongmin Jung, Univ. of Southampton (United Kingdom) [10549-28]

Experimental characterization of principal modes of multimode fiber using mode-dependent signal delay method, Thien An Nguyen, Corning, Incorporated (USA); Ioannis Roudas, Montana State Univ. (USA); Rostislav R. Khrapko, Corning, Incorporated (USA); Daniel A. Nolan, Corning Incorporated (USA) [10549-29]

Experimental demonstration of a broadband time-asymmetric waveguide architecture enabled by dynamically encircling an exceptional point in the optical domain, Jae Woong Yoon, Youngsun Choi, Choloong Hahn, Hanyang Univ. (Korea, Republic of); Ki Yeon Yang, Jeong Yub Lee, Samsung Advanced Institute of Technology (Korea, Republic of); Gunpyo Kim, Jong Kyun Hong, Yeonghwa Ryu, Seok Ho Song, Hanyang Univ. (Korea, Republic of); Pierre Berini, Univ. of Ottawa (Canada) [10549-30]

Power-difference conserving light propagation in anti-parity-time symmetric optical system, Youngsun Choi, Hanyang Univ. (Korea, Republic of); Choloong Hahn, Univ. of Ottawa (Canada); Jae Woong Yoon, Seok Ho Song, Hanyang Univ. (Korea, Republic of) [10549-31]

SESSION 8 **WED 3:30 PM TO 5:40 PM**

Optical Forces

Thermal physics, radiation pressure, and photon momentum (*Invited Paper*), Masud Mansuripur, College of Optical Sciences, The Univ. of Arizona (USA) [10549-32]

Dynamics of optically bound clusters in complex optical fields, Simon Hanna, Michael O'Donnell, Univ. of Bristol (United Kingdom) [10549-33]

Spin-controlled unconventional macroscopic optomechanics, Hernando Magallanes, Etienne Brasselet, Univ. Bordeaux 1 (France) [10549-34]

Polarization dependent dynamics in optical matter, Yuval Yifat, The James Franck Institute (USA) [10549-35]

Tip-enhanced thermal expansion and dipole interaction in tip-sample geometry, Junghoon Jahng, Korea Research Institute of Standards and Science (Korea, Republic of) [10549-36]

Observation of optomechanical strain in a cold atomic cloud, Noam Matzliah, Hagai Edri, Asif Sinay, Roei Ozeri, Nir Davidson, Weizmann Institute of Science (Israel) [10549-37]

WEDNESDAY POSTER SESSION **WED 6:00 PM TO 8:00 PM**

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Properties of the evanescent field produced by elliptical nanoholes, Raúl Antonio Lizardo Castro, Carlos Augusto Flores Meneses, Erwin J. Armando Martí Panameño, Benemérita Univ. Autónoma de Puebla (Mexico) [10549-56]

THURSDAY 1 FEBRUARY

SESSION 9 **THU 8:00 AM TO 10:00 AM**

Chirality in Light and Matter

Towards all-optical chiral resolution with achiral plasmonic and dielectric nanostructures (*Invited Paper*), Jennifer A. Dionne, Stanford Univ. (USA) [10549-38]

Optical vortex materials processing enables the fabrication of chiral structures (*Invited Paper*), Takashige Omatsu, Chiba Univ. (Japan) . [10549-39]

Enhancing the discriminatory trapping forces between enantiomers within an optical cavity, Kayn A. Forbes, David L. Andrews, Univ. of East Anglia (United Kingdom) [10549-40]

Nanoscale chirality detection using photo-induced force microscopy, Mohammad Kamandi, Mohammad Albooyeh, Jinwei Zeng, Mohsen Rajaei, Caner Guclu, Kumar Wickramasinghe, Filippo Capolino, Univ. of California, Irvine (USA) [10549-41]

Generation of helical microfibers by photopolymerization of UV curing resins through light fields possessing orbital angular momentum, Yoshihiko Arita, Univ. of St. Andrews (United Kingdom) and Chiba Univ. (Japan); Junhyung Lee, Shunsuke Toyoshima, Katsuhiko Miyamoto, Chiba Univ. (Japan); Kishan Dholakia, Univ. of St. Andrews (United Kingdom) and Chiba Univ. (Japan); Takashige Omatsu, Chiba Univ. (Japan) [10549-42]

CONFERENCE 10549

SESSION 10 THU 10:30 AM TO 12:00 PM

Spin-Orbit Control

Control and applications of fully structured light (*Invited Paper*), Alison Yao, Christopher Gibson, Patrick Bevington, Gian-Luca Oppo, Univ. of Strathclyde (United Kingdom); Robert Cameron, Univ. of Glasgow (United Kingdom) [10549-43]

Probing magnetic nanoprobe in structured light by a subtle soft touch, Jinwei Zeng, Mahsa Darvishzadeh-Varcheie, Mohsen Rajaei, Mohammad Albooyeh, Eric Potma, Filippo Capolino, H. Kumar Wickramasinghe, Univ. of California, Irvine (USA) [10549-44]

Pancharactnam-Berry phase used for realizing spin-dependent propagation and polarization measurement, Sheng Liu, Peng Li, Jianlin Zhao, Northwestern Polytechnical Univ. (China) [10549-45]

Levitated optomechanics of silica microparticles in vacuum placed in 2D and 3D optical potentials possessing orbital angular momentum, Yoshihiko Arita, Michael Mazilu, Mingzhou Chen, Tom Vettenburg, Juan M. Aunon, Univ. of St. Andrews (United Kingdom); Ewan M. Wright, College of Optical Sciences, The Univ. of Arizona (USA); Kishan Dholakia, Univ. of St. Andrews (United Kingdom) [10549-46]

Lunch/Exhibition Break Thu 12:00 pm to 1:30 pm

SESSION 11 THU 1:30 PM TO 3:20 PM

Enhanced Optical Trapping

Sculptured light and switching for complex systems (*Invited Paper*), Alexander B. Stilgoe, Halina Rubinsztein-Dunlop, Timo A. Nieminen, Anatolii V. Kashchuk, The Univ. of Queensland (Australia) [10549-47]

Light robotics: a new field of research, Jesper Glückstad, Technical Univ. of Denmark (Denmark) [10549-48]

High velocity micro- and nano-particle optical manipulation, Jeffrey E. Meizer, Euan McLeod, College of Optical Sciences, The Univ. of Arizona (USA) [10549-49]

Integrated plasmonic dimers: a platform for ultra-efficient trapping of nanoparticles, Aurore Ecarnot, Giovanni Magno, Vy Yam, Béatrice Dagens, Ctr. de Nanosciences et de Nanotechnologies (France) [10549-50]

Optical trapping and heating of ultrasmooth gold nanoparticles in liquid and air, Yoshihiko Arita, Georgiy Tkachenko, Naomi McReynolds, Nicolas Marro, William Edwards, Univ. of St. Andrews (United Kingdom); Euan R. Kay, Univ. of St Andrews (United Kingdom); Kishan Dholakia, Univ. of St. Andrews (United Kingdom) [10549-51]

SESSION 12 THU 3:50 PM TO 5:20 PM

Sorting

Session Chair: **Jesper Glückstad**,
Technical Univ. of Denmark (Denmark)

Optically driven plasmonic nanomotors (*Invited Paper*), Mikael Käll, Chalmers Univ. of Technology (Sweden) [10549-52]

Optical and magnetic sorting of nanoparticles in cryogenic conditions, Masaaki Ashida, Yosuke Minowa, Osaka Univ. (Japan); Mitsutaka Kumakura, Univ. of Fukui (Japan); Yoshiki Moriwaki, Univ. of Toyama (Japan) .. [10549-53]

Optical cell sorting using computer vision and machine learning, Stephen Daedalus Separa, OptoRobotix ApS (Denmark); Andrew Bañas, Jesper Glückstad, OptoRobotix ApS (Denmark) and Technical Univ. of Denmark (Denmark) [10549-54]

Holo-GPC for cell sorting, Andrew Bañas, DTU Fotonik (Denmark) and OptoRobotix ApS (Denmark); Stephen Daedalus Separa, OptoRobotix ApS (Denmark); Jesper Glückstad, Technical Univ. of Denmark (Denmark) and OptoRobotix ApS (Denmark) [10549-55]

CONFERENCE 10550

Tuesday–Wednesday 30–31 January 2018 • Proceedings of SPIE Vol. 10550

Optical and Electronic Cooling of Solids III

Conference Chairs: Richard I. Epstein, ThermoDynamic Films LLC (USA); Denis V. Seletskiy, Ecole Polytechnique de Montréal (Canada); Mansoor Sheik-Bahae, The Univ. of New Mexico (USA)

Program Committee: Gaurav Bahl, Univ. of Illinois at Urbana-Champaign (USA); Steven Bowman, U.S. Naval Research Lab. (USA); James G. Eden, Univ. of Illinois at Urbana-Champaign (USA); Joaquín Fernández, Univ. del País Vasco (Spain); Matthew Grayson, Northwestern Univ. (USA); Raman Kashyap, Ecole Polytechnique de Montréal (Canada); Paul D. LeVan, Air Force Research Lab. (USA); Ali Sayir, Air Force Office of Scientific Research (USA); Mauro Tonelli, Univ. di Pisa (Italy); Qihua Xiong, Nanyang Technological Univ. (Singapore)

TUESDAY 30 JANUARY

SESSION 1..... TUE 1:00 PM TO 3:20 PM

Cryogenic Cooling in Yb:host Systems

Session Chair: Peter J. Pauzauskie, Univ. of Washington (USA)

Laser refrigeration, alignment, and rotation of levitated Yb³⁺:YLF nanocrystals (*Invited Paper*), Peter F. Barker, Univ. College London (United Kingdom)..... [10550-1]

Cooling a device with an all solid-state optical refrigerator (*Invited Paper*), Junwei Meng, Alexander R. Albrecht, Aram Gragossian, Eric Lee, Mohammadreza Ghasemkhani, The Univ. of New Mexico (USA); Markus P. Hehlen, Los Alamos National Lab. (USA); Richard I. Epstein, ThermoDynamic Films LLC (USA)..... [10550-2]

Effect on cooling parameters of LiYF₄ co-doped with Yb³⁺ and Tm³⁺ (*Invited Paper*), Mauro Tonelli, Giovanni Cittadino D.D.S., Azzurra Volpi, Alberto Di Lieto, Univ. di Pisa (Italy)..... [10550-3]

Laser cooling of solids: latest achievements and prospects (*Invited Paper*), Galina Nemova, Raman Kashyap, Ecole Polytechnique de Montréal (Canada)..... [10550-4]

Investigation of temperature dependence of quantum efficiency and parasitic absorption in rare-earth doped crystals, Aram Gragossian, Azzurra Volpi, Junwei Meng, Alexander R. Albrecht, The Univ. of New Mexico (USA); Markus P. Hehlen, Los Alamos National Lab. (USA); Mansoor Sheik-Bahae, The Univ. of New Mexico (USA)..... [10550-5]

SESSION 2..... TUE 3:50 PM TO 6:10 PM

Radiation-balanced Lasers

Session Chair: Alexander R. Albrecht, The Univ. of New Mexico (USA)

Bridgman growth of fluoride crystals for radiation-balanced lasers (*Invited Paper*), Markus P. Hehlen, Los Alamos National Lab. (USA); Azzurra Volpi, Alexander R. Albrecht, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA)..... [10550-6]

Design strategies for athermal fiber lasers and amplifiers (*Invited Paper*), Arash Mafi, The Univ. of New Mexico (USA)..... [10550-7]

Non-contact thermometry of nanoscale materials for radiation-balanced lasers (*Invited Paper*), Peter J. Pauzauskie, Xuezhe Zhou, Anupum Pant, Xiaojing Xia, Univ. of Washington (USA)..... [10550-8]

Time, space, and spectral multiplexing for radiation-balanced operation of semiconductor lasers (*Invited Paper*), Jacob B. Khurgin, Zohreh Vafapour, Johns Hopkins Univ. (USA)..... [10550-9]

Investigation of radiation-balanced disk lasers, Zhou Yang, sAlexander R. Albrecht, Junwei Meng, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA)..... [10550-10]

WEDNESDAY 31 JANUARY

SESSION 3..... WED 8:20 AM TO 10:20 AM

Laser Cooling in Semiconductors

Session Chair: Jacob B. Khurgin, Johns Hopkins Univ. (USA)

Defect-mediated photoluminescence up-conversion in cadmium sulfide nanobelts (*Invited Paper*), Masaru K. Kuno, Yuri Morozov, Univ. of Notre Dame (USA)..... [10550-11]

Optomechanical thermometry of cadmium sulfide nanoribbon cantilevers, Anupum Pant, Bennett E. Smith, Xuezhe Zhou, Stuart Frazier, E. James Davis, Peter J. Pauzauskie, Univ. of Washington (USA)..... [10550-12]

Resolved-sideband Raman cooling of optical phonons in semiconductors (*Invited Paper*), Qihua Xiong, Nanyang Technological Univ. (Singapore)..... [10550-13]

Understanding the origin of parasitic absorption in GaAs double heterostructures, Nathan Giannini, Zhou Yang, Alexander R. Albrecht, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA)..... [10550-14]

Thermal dynamics in GaAs/GaN double heterostructures after tunable ultrafast excitation, Denis V. Seletskiy, Jan F. Lippmann, Timo Raab, Univ. Konstanz (Germany)..... [10550-15]

SESSION 4..... WED 10:50 AM TO 12:10 PM

Electroluminescence and Heat Conversion

Session Chair: Markus P. Hehlen, Los Alamos National Lab. (USA)

Thermodynamics on visible light-emitting diodes (*Invited Paper*), Jin Xue, Rajeev Ram, Massachusetts Institute of Technology (USA)..... [10550-16]

Thermally-enhanced photoluminescence solar conversion prototype design (*Invited Paper*), Nimrod Kruger, Matej Kurtulic Sr., Technion-Israel Institute of Technology (Israel); Assaf Manor, Technion-Israel Institute of Technology (Israel) and Univ. of Michigan (USA); Carmel Rotschild, Technion-Israel Institute of Technology (Israel)..... [10550-17]

Thermally-enhanced photoluminescence in low-bandgap materials for conversion of industrial waste heat to electricity, Tamilarasan Sabapathy, Nimrod Kruger, Carmel Rotschild, Technion-Israel Institute of Technology (Israel)..... [10550-18]

Lunch/Exhibition Break.....Wed 12:10 pm to 1:40 pm

CONFERENCE 10550

SESSION 5..... WED 1:40 PM TO 3:10 PM

System Modeling and Thermal Metrology

Session Chair: **Richard I. Epstein**, ThermoDynamic Films LLC (USA)

Model of anti-Stokes cooling in a Yb-doped fiber (*Invited Paper*),
Jenny Knall, Mina Esmaeelpour, Michel J. F. Digonnet, Stanford Univ.
(USA) [10550-19]

**A numerical study of laser cooling in a large mode area single-mode
photonic crystal Yb³⁺:ZBLAN glass fiber**, Behnam Abaie,
Esmaeil Mobini Souchelmaei, Mostafa Peysokhan, Arash Mafi,
The Univ. of New Mexico (USA) [10550-20]

**In-situ fiber temperature sensor for anti-Stokes cooling measurements
in doped fibers**, Arushi Arora, Mina Esmaeelpour, Stanford Univ. (USA);
Jean-Simon Frenière, Tommy Boilard, Martin Bernier, Univ. Laval (Canada);
Michel J. F. Digonnet, Stanford Univ. (USA) [10550-21]

**Temperature measurement of rare-earth-doped optical fibers using
a variant of the differential luminescence thermometry**, Mostafa
Peysokhan, Behnam Abaie, Esmaeil Mobini Souchelmaei, Arash Mafi, The
Univ. of New Mexico (USA) [10550-22]

SESSION 6..... WED 3:40 PM TO 4:40 PM

Novel Approaches to Radiation-balanced Lasers

Session Chair: **Azzurra Volpi**, Univ. di Pisa (Italy)

**Strategies for laser cooling of Yb-doped ZBLAN and silica single-mode
optical fiber**, Esmaeil Mobini Souchelmaei, Mostafa Peysokhan,
Behnam Abaie, Arash Mafi, The Univ. of New Mexico (USA) [10550-23]

**Advances in mid-IR solid-state optical cooling and radiation-balanced
lasers**, Saeid Rostami, Zhou Yang, Alexander R. Albrecht, Aram Gragossian,
Mohammadreza Ghasemkhani, The Univ. of New Mexico (USA); Azzurra Volpi,
Mauro Tonelli, Univ. di Pisa (Italy); Mansoor Sheik-Bahae, The Univ. of New
Mexico (USA) [10550-24]

**Bandgap engineering and prospects for radiation-balanced vertical-
cavity semiconductor lasers**, Zohreh Vafapour, Jacob B. Khurgin,
Johns Hopkins Univ. (USA) [10550-25]

WEDNESDAY POSTER SESSION..... WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

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**Photoluminescence transition into thermal emission far from radiative
limit**, Matej Kurtulik, Technion-Israel Institute of Technology (Israel);
Assaf Manor, Univ. of Michigan (USA); Bagrat Khachatryan, Rafi Weill,
Carmel Rotschild, Technion-Israel Institute of Technology (Israel) .. [10550-26]

Photoluminescence up-conversion in CsPbBr₃ quantum dots,
Yurii Morozov, Shubin Zhang, Masaru K. Kuno, Univ. of Notre Dame
(USA) [10550-27]

CONFERENCE 10551

Tuesday–Wednesday 30–31 January 2018 • Proceedings of SPIE Vol. 10551

Optical Data Science: Trends Shaping the Future of Photonics

Conference Chair: **Bahram Jalali**, Univ. of California, Los Angeles (USA)

Conference Co-Chairs: **Ken-ichi Kitayama**, The Graduate School for the Creation of New Photonics Industries (Japan); **Ata Mahjoubfar**, Univ. of California, Los Angeles (USA)

Program Committee: **Mehdi Asghari**, Mellanox Technologies, Inc. (USA); **Claire Lifan Chen**, Lumentum (USA); **Shahab Etemad**, Telcordia Technologies, Inc. (USA); **Yeshaiahu Fainman**, Univ. of California, San Diego (USA); **Cejo K. Lonappan**, Univ. of California, Los Angeles (India); **Masaya Notomi**, NTT Basic Research Labs. (Japan); **Nasser N. Peyghambarian**, College of Optical Sciences, The Univ. of Arizona (USA); **Paul R. Prucnal**, Princeton Univ. (USA); **Daniel R. Solli**, Univ. of California, Los Angeles (USA), Univ. Göttingen (Germany); **Madhuri Suthar**, Univ. of California, Los Angeles (India); **Naoya Wada**, National Institute of Information and Communications Technology (Japan)

TUESDAY 30 JANUARY

WELCOME AND OPENING REMARKS 8:20 AM TO 8:30 AM

Bahram Jalali, Univ. of California, Los Angeles (USA)

SESSION 1 TUE 8:30 AM TO 11:30 AM

Datacenters and Mobile Computing

Session Chair: **Cejo Konuparamban Lonappan**, Univ. of California, Los Angeles (USA)

Spectral efficiency limits in crosstalk-impaired multi-core fiber links, Ruben Soares Luis, Benjamin J. Puttnam, Georg Rademacher, Werner Klaus, National Institute of Information and Communications Technology (Japan); Erik Agrell, Chalmers Univ. of Technology (Sweden); Yoshinari Awaji, Naoya Wada, National Institute of Information and Communications Technology (Japan). [10551-1]

Ultrahigh-definition videos: convergence toward 100Gbps and beyond for digital A/V connectivity with fiber optics, Nguyen X. Nguyen, Cosemi Technologies, Inc. (USA). [10551-2]

An Introduction to automatic image alignment, Ali Ayazi, Daniel Solli, OcuNext Inc. (USA). [10551-3]

Advanced microphotonic oscillators for broadband communications, Andrey Matsko, Wei Liang, Danny Eliyahu, Vladimir Ilchenko, Anatoily Savchenkov, Lute Maleki, OEwaves, Inc. (USA) [10551-4]

Low-latency optical parallel adder based on a binary decision diagram with a wavelength division multiplexing scheme, Akihiko Shinya, NTT Basic Research Labs. (Japan); Tohru Ishihara, Kyoto Univ. (Japan); Koji Inoue, Kyushu Univ. (Japan); Kengo Nozaki, Shota Kita, Masaya Notomi, NTT Basic Research Labs. (Japan). [10551-5]

Silicon photonics for next-generation data-center applications, Arlon G. Martin, Mellanox Technologies, Inc. (USA). [10551-6]

Lunch/Exhibition Break Tue 11:30 am to 1:00 pm

SESSION 2 TUE 1:00 PM TO 3:05 PM

Artificial Intelligence

Session Chair: **Aydogan Ozcan**, Univ. of California, Los Angeles (USA)

Machine learning and computer vision in neuroimaging, Fabien Scalzo, Univ. of California, Los Angeles (USA). [10551-7]

RAISR: Rapid and Accurate Image Super Resolution, Yaniv Romano, Technion-Israel Institute of Technology (Israel); John Isidoro, Peyman Milanfar, Google (USA) [10551-8]

Supervised dynamic sampling using generative modeling, Yan Zhang, Nicola Ferrier, Argonne National Lab. (USA); Emine B. Gulsoy, Northwestern Univ. (USA); Charudatta Phatak, Argonne National Lab. (USA) [10551-9]

Artificial-intelligence label-free cell-analysis agents, Ata Mahjoubfar, Yueqin Li, Claire Lifan Chen, Bahram Jalali, Univ. of California, Los Angeles (USA) [10551-10]

Deep learning enhances microscopic imaging, Yair Rivenson, Zoltán Göröcs, Harun Günaydin, Yibo Zhang, Hongda Wang, Aydogan Ozcan, Univ. of California, Los Angeles (USA). [10551-11]

SESSION 3 TUE 3:40 PM TO 5:45 PM

Deep Learning Microscopy and Learning

Session Chair: **Ata Mahjoubfar**, Univ. of California, Los Angeles (USA)

Megahertz (MHz) OCT and multidimensional in-vivo imaging for augmented reality, Robert A. Huber, Wolfgang Draxinger, Tom Pfeiffer, Matthias Eibl, Jan Philip Kolb, Hubertus Hakert, Daniel Weng, Univ. zu Lübeck (Germany) [10551-12]

Lost in image data, Aydogan Ozcan, Univ. of California, Los Angeles (USA) [10551-13]

High-speed nonlinear microscopy, Sebastian Nino Karpf, Bahram Jalali, Univ. of California, Los Angeles (USA). [10551-14]

Big data in neurophotonics and brain mapping, Babak Kateb, Society For Brain Mapping & Therapeutics (USA) [10551-15]

Natural computational imaging, Madhuri Suthar, Univ. of California, Los Angeles (USA); Jonathan Mendelson, Brentwood School (USA); Ata Mahjoubfar, California NanoSystems Institute, Univ. of California, Los Angeles (USA); Cejo K. Lonappan, Univ. of California, Los Angeles (USA); Bahram Jalali, Univ. of California, Los Angeles (USA) and California NanoSystems Institute (USA). [10551-16]



CONFERENCE 10551

WEDNESDAY 31 JANUARY

SESSION 4 WED 8:45 AM TO 11:45 AM

Emerging Techniques

Session Chair: **Ken-ichi Kitayama**, The Graduate School for the Creation of New Photonics Industries (Japan)

Silicon-photonic physical unclonable functions, Mark A. Foster, Brian C. Grubel, Bryan T. Bosworth, Michael R. Kossey, Hongcheng Sun, Iskandar Atakhodjaev, Milad Alemohammed, A. Brinton Cooper, Amy C. Foster, Johns Hopkins Univ. (USA) [10551-17]

Timestretch spectral probing the transition dynamics from single soliton to soliton molecules, Ming Li, Shuqian Sun, Ning Hua Zhu, Institute of Semiconductors, Chinese Academy of Sciences (China) [10551-18]

Silicon photonics for neuromorphic information processing, Peter Bienstman, Joni Dambre, Andrew Katumba, Univ. Gent (Belgium); Matthias Freiburger, Univ Gent. (Belgium); Floris Laporte, Alessio Lugnan, Univ. Gent (Belgium) [10551-19]

Compact and cost-effective multi-channel optical spectrometer for fine FBG sensing in IoT technology, Tsuyoshi Konishi, Yu Yamasaki, Osaka Univ. (Japan) [10551-20]

Application of laser speckle to randomized numerical linear algebra, George C. Valley, Thomas J. Shaw, Andrew D. Stapleton, Adam C. Scofield, George A. Sefler, The Aerospace Corp. (USA); Leif Johannson, Freedom Photonics, LLC (USA) [10551-21]

Development of automated optical heterodyne detection system, Eudum Kim, Sun-Ho Kim, Jun-Hee Park, Su-Jin Jeon, Ji-Hoon Kim, Mi Jung, Young-Wan Choi, Chung-Ang Univ. (Korea, Republic of) [10551-22]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

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Universal mobile-phone camera-based colorimetry algorithm, Arseny Zhdanov, Jordan Keefe, Luis Franco-Waite, Anna Pyayt, Univ. of South Florida (USA) [10551-23]

CONFERENCE 10552

Wednesday–Thursday 31 January–1 February 2018 • Proceedings of SPIE Vol. 10552

Vertical-Cavity Surface-Emitting Lasers XXII

Conference Chairs: **Chun Lei**, Lumentum (USA); **Kent D. Choquette**, Univ. of Illinois at Urbana-Champaign (USA)

Program Committee: **Nicolae Chitica**, Finisar Corp. (Sweden); **Aaron James Danner**, National Univ. of Singapore (Singapore); **Martin Grabherr**, Philips Technologie GmbH U-L-M Photonics (Germany); **James K. Guenter**, Finisar Corp. (USA); **Anders Larsson**, Chalmers Univ. of Technology (Sweden); **James A. Lott**, Technische Univ. Berlin (Germany); **M. V. Ramana Murty**, Avago Technologies Ltd. (USA); **Krassimir Panajotov**, Vrije Univ. Brussel (Belgium); **Darwin K. Serkland**, Sandia National Labs. (USA); **Jean-Francois Seurin**, Princeton Optronics, Inc. (USA); **Noriyuki Yokouchi**, Furukawa Electric Co., Ltd. (Japan); **Jongseung Yoon**, The Univ. of Southern California (USA); **Mial E. Warren**, TriLumina Corp. (USA)

WEDNESDAY 31 JANUARY

SESSION 1..... WED 1:30 PM TO 3:20 PM

Data Comm VCSELS

Session Chair: **Kent D. Choquette**, Univ. of Illinois (USA)

50 Gb/s NRZ data transmission over OM5 fiber in the SWDM wavelength range (*Invited Paper*), Mikel Agustin, VI Systems GmbH (Germany) . . . [10552-1]

Beyond 100-Gbit/s QAM-OFDM transmission with VCSELS (*Invited Paper*), Gong-Ru Lin, National Taiwan Univ. (Taiwan) [10552-2]

Behavioral modeling of VCSELS for high-speed optical interconnects (*Invited Paper*), Krzysztof Szczerba, Chris Kocot, Finisar Corp. (USA) [10552-3]

VCSEL noise characterization for data rates beyond 25 Gb/s, M. V. Ramana Murty, Jingyi Wang, A.N. Cheng, Ann Harren, Broadcom Ltd. (USA); Z. W. Feng, Broadcom Ltd. (Singapore); C. Chu, Broadcom Ltd (Singapore); Laura M. Giovane, Broadcom Ltd. (USA) [10552-4]

SESSION 2..... WED 3:50 PM TO 5:40 PM

New VCSEL Phenomena

Session Chair: **Chun Lei**, Lumentum (USA)

Mode selection and tuning of single-frequency short-cavity VCSELS (*Invited Paper*), Darwin K. Serkland, Haley M. So, Gregory M. Peake, Michael G. Wood, Alejandro J. Griñe, Kent M. Geib, Gordon A. Keeler, Sandia National Labs. (USA) [10552-5]

Thermally stable surface-emitting tilted wave laser, Nikolay Ledentsov, Vitaly A. Shchukin, Nikolay Ledentsov Jr., Mikel Agustin, Joerg-Reinhardt Kropp, VI Systems GmbH (Germany); Yuri Shernyakov, Alexei Puyusov, Marina Kulagina, Nikita Gordeev, Mikhail Maximov, Ioffe Institute, Russian Academy of Sciences (Russian Federation) [10552-6]

Quantum-cascade vertical-cavity surface-emitting laser, Tomasz G. Czystanowski, Lodz Univ. of Technology (Poland) [10552-7]

Demonstrating ultrafast polarization dynamics in spin-VCSELS, Markus Lindemann, Ruhr-Univ. Bochum (Germany); Tobias Pusch, Rainer Michalzik, Univ. Ulm (Germany); Nils C. Gerhardt, Martin R. Hofmann, Ruhr-Univ. Bochum (Germany) [10552-8]

Electrical birefringence tuning of VCSELS, Tobias Pusch, Univ. Ulm (Germany); Markus Lindemann, Nils C. Gerhardt, Martin R. Hofmann, Ruhr-Univ. Bochum (Germany); Rainer Michalzik, Univ. Ulm (Germany) . . . [10552-9]

THURSDAY 1 FEBRUARY

SESSION 3..... THU 8:10 AM TO 10:00 AM

Pushing the Wavelength and Output Power

Session Chair: **James A. Lott**, Technische Univ. Berlin (Germany)

Room-temperature continuous-wave mid-infrared VCSEL operating at 3.35 μm , Vijaysekhar Jayaraman, Praevium Research, Inc. (USA); Stephen Segal, Thorlabs, Inc. (USA); Kevin Lascola, Thorlabs Quantum Electronics (USA); Christopher Burgner, Praevium Research, Inc. (USA); Fredrick Towner, Thorlabs Quantum Electronics (USA); Anthony Cazabat, Praevium Research, Inc. (USA); Garrett Cole, David Follman, Paula Heu, Crystalline Mirror Solutions, LLC (USA); Christoph Deutsch, Crystalline Mirror Solutions GmbH (Austria) [10552-10]

Characteristics of GaN-based subwavelength gratings for III-nitride VCSELS, Austin M. Slosberg, Wei Sun, Onoride N. Ogidi-Ekoko, Nelson Tansu, Lehigh Univ. (USA) [10552-11]

High-speed wavelength switching of tunable MEMS VCSEL by suppressing ringing, Shunya Inoue, Shun Nishimura, Masanori Nakahama, Takahiro Sakaguchi, Akihiro Matsutani, Fumio Koyama, Tokyo Institute of Technology (Japan) [10552-12]

Small-diameter VCSEL arrays for high-pulsed-power applications, Siew Li Tan, National Univ. of Singapore (Singapore); Yong Keong Yap, DSO National Labs. (Singapore); Shawn Y. Siew, Aaron J. Danner, National Univ. of Singapore (Singapore) [10552-13]

Low-divergence high-power VCSEL arrays for lidar application (*Invited Paper*), Neinyi Li, Li Wang, Mial E. Warren, Richard F. Carson, Matthew K. Block, Preethi Dacha, TriLumina Corp. (USA) [10552-14]

SESSION 4..... THU 10:30 AM TO 12:10 PM

New VCSEL Applications

Session Chair: **Darwin K. Serkland**, Sandia National Labs. (USA)

VCSELS in short-pulse operation for time-of-flight applications (*Invited Paper*), Holger Moench, Stephan Gronenborn, Philips GmbH Photonics Aachen (Germany); Xi Gu, Ralph Gudde, Philips Photonics (Netherlands); Markus Herper, Johanna Kolb, Philips GmbH Photonics Aachen (Germany); Michael Miller, Michael Smeets, Alexander Weigl, Philips GmbH U-L-M Photonics (Germany) [10552-15]

VCSEL photonics for optical sensing and laser processing (*Invited Paper*), Fumio Koyama, Tokyo Institute of Technology (Japan) [10552-16]

Wavelength tunable MEMS VCSELS for OCT imaging, Hitesh Kumar Sahoo, DTU Fotonik (Denmark); Thor Ansbæk, OCTLIGHT ApS (Denmark); Luisa Ottaviano, Elizaveta Semenova, DTU Fotonik (Denmark); Ole Hansen, DTU Nanotech (Denmark); Kresten Yvind, DTU Fotonik (Denmark) . . [10552-17]

The vertical-cavity surface-emitting laser incorporating high-contrast grating mirror as a sensing device, Magdalena Marciniak, Marcin Gebiski, Lodz Univ. of Technology (Poland), Technische Univ. Berlin (Germany); Lukasz Piskorski, Maciej Dems, Michał Wasiak, Lodz Univ. of Technology (Poland); Krassimir Panajotov, Vrije Univ. Brussel (Belgium), Institute of Solid State Physics (Bulgaria); James A. Lott, Technische Univ. Berlin (Germany); Tomasz G. Czystanowski, Lodz Univ. of Technology (Poland) [10552-18]

Lunch/Exhibition Break Thu 12:10 pm to 1:30 pm

OPTO

CONFERENCE 10552

SESSION 5.....THU 1:30 PM TO 3:10 PM

Modulation Properties

Session Chair: **James Guenter**, Finisar Corp. (USA)

Monolithic mutual injection-locked VCSEL arrays, Kent D. Choquette, Harshil Dave, Univ. of Illinois (USA) [10552-19]

Integration of electro-absorption modulator in a vertical-cavity surface-emitting laser, Ludovic Marigo-Lombart, Lab. d'Analyse et d'Architecture des Systèmes (France) and B-Phot, Vrije Univ. Brussel (Belgium) and Ctr. National de la Recherche Scientifique (France); Stéphane Calvez, Alexandre Arnoult, Alexandre Rumeau, Christophe Viallon, Lab. d'Analyse et d'Architecture des Systèmes (France) and Ctr. National de la Recherche Scientifique (France); Hugo Thienpont, Krassimir Panajotov, B-Phot, Vrije Univ. Brussel (Belgium); Guilhem Almuneau, Lab. d'Analyse et d'Architecture des Systèmes (France) and Ctr. National de la Recherche Scientifique (France) [10552-20]

The influence of the VCSEL design on its electrical modulation properties, Paulina Komar, Patrycja Śpiewak, Marcin Gębski, Lodz Univ. of Technology (Poland); Ricardo Rosales, Technische Univ. Berlin (Germany); Magdalena Marciniak, Tomasz G. Czyszanowski, Lodz Univ. of Technology (Poland); James A. Lott, Technische Univ. Berlin (Germany); Michał Wasiak, Lodz Univ. of Technology (Poland) [10552-21]

Simplicity VCSELs, James A. Lott, Technische Univ. Berlin (Germany) [10552-22]

Impact of the top DBR in GaAs-based VCSELs on the threshold current, oxide-aperture diameter, and the cavity photon lifetime, Patrycja Śpiewak, Marcin Gębski, Lodz Univ. of Technology (Poland); Ricardo Rosales, Technische Univ. Berlin (Germany); Paulina Komar, Jarosław Walczak, Marta Wieckowska, Robert P. Sarzała, Lodz Univ. of Technology (Poland); James A. Lott, Technische Univ. Berlin (Germany); Michał Wasiak, Lodz Univ. of Technology (Poland). [10552-23]

CONFERENCE 10553

Monday–Thursday 29 January–1 February 2018 • Proceedings of SPIE Vol. 10553

Novel In-Plane Semiconductor Lasers XVII

Conference Chairs: **Alexey A. Belyanin**, Texas A&M Univ. (USA); **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

Program Committee: **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan); **Mikhail A. Belkin**, The Univ. of Texas at Austin (USA); **Dan Botez**, Univ. of Wisconsin-Madison (USA); **Federico Capasso**, Harvard School of Engineering and Applied Sciences (USA); **Gary A. Evans**, Southern Methodist Univ. (USA); **Michael Kneissl**, Technische Univ. Berlin (Germany); **Luke F. Lester**, Virginia Polytechnic Institute and State Univ. (USA); **Shinji Matsuo**, NTT Photonics Labs. (Japan); **Luke J. Mawst**, Univ. of Wisconsin-Madison (USA); **Jerry R. Meyer**, U.S. Naval Research Lab. (USA); **Roberto Paiella**, Boston Univ. (USA); **Richard V. Penty**, Univ. of Cambridge (United Kingdom); **Johann Peter Reithmaier**, Univ. Kassel (Germany); **Haisheng Rong**, Intel Corp. (USA); **Gary M. Smith**, MIT Lincoln Lab. (USA); **Nelson Tansu**, Lehigh Univ. (USA); **Miriam Serena Vitiello**, Consiglio Nazionale delle Ricerche (Italy); **Qi Jie Wang**, Nanyang Technological Univ. (Singapore)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:00 PM

Developing Laser Materials

Session Chair: **Nelson Tansu**, Lehigh Univ. (USA)

- Characterization of (GaIn)As/Ga(AsSb)/(GaIn)As “W”-quantum well lasers at 1.3 μm**, Christian Fuchs, Anja Brüggemann, Maria J. Weseloh, Christian Berger, Christoph Möller, Stefan Reinhard, Philipps-Univ. Marburg (Germany); Jörg Hader, Nonlinear Control Strategies, Inc. (USA) and The Univ. of Arizona (USA); Ada Bäumner, Stephan W. Koch, Philipps-Univ. Marburg (Germany); Jerome V. Moloney, Nonlinear Control Strategies, Inc. (USA) and The Univ. of Arizona (USA) [10553-1]
- Toward edge-emitting 1550-nm InGaAsP laser diodes grown on (001) Si and SOI substrates by MOCVD**, Ludovico Megalini, Simone Tommaso Suran Brunelli, Bastien Bonafant, Hongwei Zhao, Aidan Taylor, Kunal Mukherjee, James S. Speck, John E. Bowers, Jonathan Klamkin, Univ. of California, Santa Barbara (United States) [10553-2]
- GaN-based F-P cavity and micro-cavity laser diodes grown on Si** (*Invited Paper*), Qian Sun, Key Lab. of Nano-Devices and Applications, Chinese Academy of Sciences (China) and Suzhou Institute of Nano-Tech and Nano-Bionics (SINAN) CAS (China) [10553-3]
- Cavity design based on scattering for reversibly wavelength tunable nanowire laser**, Minghua Zhuge, Qing Yang II, Zhejiang Univ. (China); Tawfique Hasan, Zongyin Yang, Univ. of Cambridge (United Kingdom); Chenlei Pang, Zhejiang Univ. (China) [10553-4]
- Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 2 MON 1:30 PM TO 3:10 PM

Nitrides/Visible Emitting Lasers

Session Chair: **Michael Kneissl**, Technische Univ. Berlin (Germany)

- Defect evolution during catastrophic optical damage in 450-nm emitting InGaN/GaN diode lasers** (*Invited Paper*), Jens W. Tomm, Robert Kernke, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Andreas Löffler, Bernhard Stojetz, Alfred Lell, OSRAM Opto Semiconductors GmbH (Germany) [10553-5]
- Band anticrossing model in dilute-Anion III-nitrides**, Justin Goodrich, Damir Borovac, Lehigh Univ. (USA); Chee-Keong Tan, Clarkson Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) [10553-6]
- 10th-order laterally coupled GaN-based DFB laser diodes with v-shaped surface gratings** (*Invited Paper*), Ji Hye Kang, Ferdinand-Braun-Institut (Germany) and Leibniz-Institut für Höchstfrequenztechnik (Germany); Hans Wenzel, Veit Hoffmann, Erik Freier, Ferdinand-Braun-Institut (Germany); Luca Sulmoni, Technische Univ. Berlin (Germany); Wilfred John, Sven Einfeldt, Ferdinand-Braun-Institut (Germany); Tim Wernicke, Michael Kneissl, Technische Univ. Berlin (Germany) [10553-7]
- Characteristics of dilute-As InGaAs quantum wells for laser active regions**, Wei Sun, Damir Borovac, Lehigh Univ. (USA); Chee-Keong Tan, Clarkson Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) [10553-8]

SESSION 3 MON 3:40 PM TO 4:40 PM

Antimonide-based Mid-IR Lasers

Session Chair: **Leon Shterengas**, Stony Brook Univ. (USA)

- New GaSb-based single-mode diode lasers in the NIR and MIR spectral regime for sensor applications**, Tobias Milde, Alvaro Jimenez, Hervé Tatenguem, Martin Honsberg, Sacher Lasertechnik GmbH (Germany); James O’Gorman, Sensor Photonics GmbH (Germany); Wolfgang Schade, Technische Univ. Clausthal (Germany); Joachim R. Sacher, Sacher Lasertechnik GmbH (Germany) [10553-9]
- Reliability of GaSb-based laser for space applications**, Mathieu Fradet, Ryan Briggs, Clifford F. Frez, Siamak Forouhar, Jet Propulsion Lab. (USA) [10553-10]
- Mid-infrared laser based on bound states in the continuum**, David E. Zelmon, Air Force Research Lab. (USA) [10553-11]

CONFERENCE 10553

TUESDAY 30 JANUARY

SESSION 4 TUE 8:10 AM TO 10:00 AM

Quantum Dot Lasers

Session Chair: **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

Effect of non-pinned carrier density above threshold on the output power of semiconductor lasers, Igor P. Marko, Alfred R. Adams, Stephen J. Sweeney, Univ. of Surrey (United Kingdom) [10553-12]

Quantum-dot anisotropic shape effects in quantum-dot lasers, Iain Butler, Univ. of Glasgow (United Kingdom); Wei Li, The Univ. of Sheffield (United Kingdom); Soroush Sobhani, Nasser Babazadeh, Univ. of Glasgow (United Kingdom); Ian M. Ross, The Univ. of Sheffield (United Kingdom); Kenichi Nishi, Keizo Takemasa, Mitsuru Sugawara, QD Laser, Inc. (Japan); David T. D. Childs, Richard A. Hogg, Univ. of Glasgow (United Kingdom) [10553-13]

High-temperature operation of 1.5 μm quantum-dot amplifiers (*Invited Paper*), Gadi Eisenstein, Technion-Israel Institute of Technology (Israel) [10553-14]

Low-threshold-current operation of ridge waveguide semiconductor laser at 1550 nm with highly stacked InAs quantum dot on InP(311) B substrate, Kouichi Akahane, National Institute of Information and Communications Technology (Japan); Masaki Inui, Aoyama Gakuin Univ. (Japan); Atsushi Matsumoto, Toshimasa Umezawa, Atsushi Kanno, Naokatsu Yamamoto, National Institute of Information and Communications Technology (Japan); Hideyuki Sotobayashi, Aoyama Gakuin Univ. (Japan) [10553-15]

Temperature dependence of spectral linewidth of InAs/InP quantum-dot distributed feedback quantum-dot lasers, Jianan Duan, Heming Huang, Kevin Schires, Télécom ParisTech (France); Philip J. Poole, National Research Council Canada (Canada); Frédéric Grillot, Télécom ParisTech (France) and The Univ. of New Mexico (USA) [10553-16]

SESSION 5 TUE 10:30 AM TO 12:10 PM

Temporal Effects and Mode Locked Lasers

Session Chair: **Johann Peter Reithmaier**, Univ. Kassel (Germany)

Pico- and nanosecond investigations of the lateral nearfield of broad area lasers under pulsed high-current excitation, Andreas Klehr, Armin Liero, Hans Wenzel, Anissa Zeghuzi, Jörg Fricke, Ralf Staske, Andrea Knigge, Ferdinand-Braun-Institut (Germany) [10553-17]

Spontaneous generation of frequency combs in QD lasers, Lorenzo L. Columbo, Paolo Bardella, Mariangela Gioannini, Politecnico di Torino (Italy) [10553-18]

Influence of different approaches for dynamical performance optimization of monolithic passive colliding-pulse mode-locked laser diodes emitting around 850 nm, Thomas Prziwarka, Andreas Klehr, Hans Wenzel, Jörg Fricke, Frank Bugge, Markus Weyers, Andrea Knigge, Ferdinand-Braun-Institut (Germany); Günther Tränkle, Ferdinand-Braun-Institut (Germany) [10553-19]

Passive, active, and hybrid mode-locking in a self-optimized ultrafast diode laser, Mohammad Ali Alloush, Rouven H. Pilny, Carsten Brenner, Ruhr-Univ. Bochum (Germany); Andreas Klehr, Andrea Knigge, Günther Tränkle, Ferdinand-Braun-Institut (Germany); Martin R. Hofmann, Ruhr-Univ. Bochum (Germany) [10553-20]

High-pulse energy-stabilized passively mode-locked external cavity inverse bow-tie 990nm laser diode for Space applications, Michel Krakowski, Patrick Resneau, Michel Garcia, E. Vinet, Y. Robert, M. Lecomte, O. Parillaud, Bruno P. Gérard, III-V Lab. (France); Stefan Kundermann, Nicolas Torcheboeuf, Dmitri L. Boiko, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) [10553-21]

Lunch/Exhibition Break Tue 12:10 pm to 1:40 pm

SESSION 6 TUE 1:40 PM TO 2:50 PM

Mid-IR QCLs and ICLs

Session Chair: **Gerard Wysocki**, Princeton Univ. (USA)

Power scaling and experimentally fitted model for broad-area quantum cascade lasers in continuous wave operation, Matthew M. Suttinger, Rowel Go, Pedro Figueiredo, Ankesh Todi, Hong Shu, Jason Leshin, Arkady Lyakh, Univ. of Central Florida (USA) [10553-22]

3.35- μm distributed feedback interband cascade lasers with top grating, Feng Xie, Michael P. Stocker, John Pham, Frederick J. Towner, Kun Shen, Thorlabs Quantum Electronics (USA); Jie Wang, Argonne National Lab. (USA); Kevin Lascola, Thorlabs Quantum Electronics (USA) [10553-23]

Impact of interface grading on performance of quantum cascade lasers grown by MOVPE (*Invited Paper*), Christine A. Wang, MIT Lincoln Lab. (USA) [10553-24]

SESSION 7 TUE 3:20 PM TO 4:50 PM

QCLs for Spectroscopy

Session Chair: **Feng Xie**, Thorlabs Quantum Electronics (USA)

Industrial gas sensing applications enabled by cascade lasers (*Invited Paper*), Peter Geiser, NEO Monitors AS (Norway) [10553-25]

Multiheterodyne spectroscopy of gases and solids with terahertz quantum cascade laser frequency combs, Gerard Wysocki, Jonas Westberg, Lukasz Sterczewski, Princeton Univ. (USA); Yang Yang, David Burghoff, Massachusetts Institute of Technology (USA); John L. Reno, Sandia National Labs. (USA); Qing Hu, Massachusetts Institute of Technology (USA) [10553-26]

Chirp-delay heterodyne infrared spectroscopy with quantum cascade lasers, Romain Blanchard, Daryoosh Vakhshoori, Tobias S. Mansuripur, Pendar Technologies (USA) [10553-27]

Monolithic quantum cascade laser arrays: an enabling technology for spectroscopic applications, Christian J. Pfluegl, Biao Li, Laurent Diehl, Romain Blanchard, Tobias S. Mansuripur, Daryoosh Vakhshoori, Pendar Technologies (USA) [10553-28]

WEDNESDAY 31 JANUARY

SESSION 8 WED 8:00 AM TO 10:00 AM

Photonic Bandgap and Cavity Effects

Session Chair: **Alexey A. Belyanin**, Texas A&M Univ. (USA)

Collective laser emission in coupled hybrid InP-on-SOI nanocavities, Quentin Chateiller, Ctr. de Nanosciences et de Nanotechnologies (France) and Univ. Paris Diderot (France); Dorian Sanchez, Rama Raj, Fabrice Raineri, Ctr. de Nanosciences et de Nanotechnologies (France) [10553-29]

Photonic crystal lasers on silicon substrates (*Invited Paper*), Kresten Yvind, Aurimas Sakanas, Yi Yu, Andrey Marchevsky, Kristoffer S. Mathiesen, Hitesh K. Sahoo, Dagmawi Bekele, Luisa Ottaviano, Elizaveta Semenova, Jesper Mork, Technical Univ. of Denmark (Denmark) [10553-30]

A thresholdless quantum-dot photonic-crystal nanocavity laser (*Invited Paper*), Yasutomo Ota, Satoshi Iwamoto, Yasuhiko Arakawa, The Univ. of Tokyo (Japan) [10553-31]

First-order coherence of semiconductor nanowire lasers, Günther Reithmaier, Michael Kaniber, Franz Langrieger, Thomas Stettner, Philipp Zimmermann, Gregor Koblmüller, Jonathan J. Finley, Walter Schottky Institut (Germany) [10553-32]

Reflectors and tuning elements for widely-tunable GaAs-based sampled grating DBR lasers, Olaf Brox, Hans Wenzel, Pietro Della Case, Mahmoud Tawfiq, Ferdinand-Braun-Institut (Germany) and Leibniz-Institut für Höchstfrequenztechnik (Germany); Bernd Sumpf, Ferdinand-Braun-Institut (Germany); Markus Weyers, Andrea Knigge, Ferdinand-Braun-Institut (Germany) and Leibniz-Institut für Höchstfrequenztechnik (Germany) [10553-33]

SESSION 9 WED 10:30 AM TO 12:20 PM

QCL Frequency Combs

Session Chair: **Sukhdeep Dhillon**, Lab. Pierre Aigrain (France)

High-power broadband quantum-cascade dual-optical frequency combs (*Invited Paper*), Jérôme Faist, ETH Zurich (Switzerland)[10553-34]

Beat spatial hole burning (*Invited Paper*), Marco Piccardo, Dmitry Kazakov, Noah A. Rubin, Paul Chevalier, Yongrui Wang, Harvard John A. Paulson School of Engineering and Applied Sciences (USA); Alexey A. Belyanin, Texas A&M Univ. (USA); Federico Capasso, Harvard John A. Paulson School of Engineering and Applied Sciences (USA)[10553-35]

Microresonator-based mid-infrared frequency combs (*Invited Paper*), Alexander L. Gaeta, Columbia Univ. (USA)[10553-36]

Theoretical modeling of harmonic frequency combs in quantum cascade lasers, Yongrui Wang, Alexey A. Belyanin, Texas A&M Univ. (USA) .[10553-37]

Lunch/Exhibition BreakWed 12:20 pm to 1:50 pm

SESSION 10 WED 1:50 PM TO 3:00 PM

Combs and Ultrafast Modulation

Session Chair: **Marco Piccardo**, Harvard John A. Paulson School of Engineering and Applied Sciences (USA)

Ultrafast modulation of mid-infrared buried heterostructure quantum cascade lasers (*Invited Paper*), Carlo Sirtori, Alireza Mottaghizadeh, Zahra Asghari, Djamel Gacemi, Angela Vasaneli, Yanko Todorov, Univ. Paris 7-Diderot (France)[10553-38]

Waveguide engineering for dispersion compensation in quantum cascade lasers frequency combs, Filippos Kapsalidis, Yves Bidaux, Pierre Jouy, Johanna M. Wolf, Matthias Beck, Jérôme Faist, ETH Zurich (Switzerland)[10553-39]

Monolithically integrated on-chip THz dual-color comb source spaced by one octave, Giacomo Scalari, Markus Roesch, Matthias Beck, Jérôme Faist, ETH Zurich (Switzerland)[10553-40]

SESSION 11 WED 3:30 PM TO 5:10 PM

Combs and Mode Locking

Session Chair: **Karl Unterrainer**, Technische Univ. Wien (Austria)

Short terahertz pulse generation from a dispersion compensated modelocked quantum cascade laser (*Invited Paper*), Sukhdeep Dhillon, Feihu Wang, Hanond Nong, Valentino Pistore, Sarah Houver, Juliette Mangeney, Jerome Tignon, Lab. Pierre Aigrain (France)[10553-41]

Passive mode-locking of 3.25 μ m GaSb-based type-I quantum-well cascade diode lasers, Tao Feng, Leon Shterengas, Gela Kipshidze, Takashi Hosoda, Meng Wang, Gregory Belenky, Stony Brook Univ. (USA)[10553-42]

Highly efficient frequency combs made from bi-functional quantum cascade laser/detector material (*Invited Paper*), Benedikt Schwarz, Technische Univ. Wien (Austria); Christine A. Wang, Leo J. Missaggia, MIT Lincoln Lab. (USA); Paul Chevalier, Tobias S. Mansuripur, Harvard Univ. (USA); Michael K. Connors, Daniel McNulty, Jeffrey Cederberg, MIT Lincoln Lab. (USA); Gotfried Strasser, Technische Univ. Wien (Austria); Federico Capasso, Harvard Univ. (USA)[10553-43]

Quasi-optical injection locking of a terahertz quantum cascade laser to a fiber-based frequency comb, Joshua R. Freeman, Univ. of Leeds (United Kingdom); Lalitha Ponnampalam, Haymen Shams, Univ. College London (United Kingdom); Reshma A. Mohandas, Univ. of Leeds (United Kingdom); Cyril C. Renaud, Univ. College London (United Kingdom); Paul Dean, Lianhe H. Li, A. Giles Davies, Univ. of Leeds (United Kingdom); Alwyn J. Seeds, Univ. College London (United Kingdom); Edmund H. Linfield, Univ. of Leeds (United Kingdom)[10553-44]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Angled facet waveguide quantum cascade laser for external cavity system, Yohei Matsuoka, Sylvain Mathonnière, Mykhaylo P. Semtsiv, W. Ted Masselink, Humboldt-Univ. zu Berlin (Germany)[10553-54]

Stability of the mode-locking regime in tapered quantum-dot lasers, Stefan Breuer, Technische Univ. Darmstadt (Germany); Paolo Bardella M.D., Mattia Rossetti, Politecnico di Torino (Italy); Christoph Weber, Lukas Drzewietzki, Technische Univ. Darmstadt (Germany)[10553-55]

THURSDAY 1 FEBRUARY

SESSION 12 THU 8:10 AM TO 10:00 AM

High Power/Brightness

Session Chair: **Gary M. Smith**, MIT Lincoln Lab. (USA)

Diffraction limited 1064nm monolithic DBR-master oscillator power amplifier with more than 7W output power, Christof Zink, André Müller, Jörg Fricke, Bernd Sumpf, Günther Tränkle, Ferdinand-Braun-Institut (Germany)[10553-45]

Comparison of distributed Bragg reflector ridge waveguide diode lasers and monolithic master oscillator power amplifiers, Nils Werner, Ferdinand-Braun-Institut (Germany); Gunnar Blume, David Feise, Frank Bugge, Katrin Paschke, Günther Tränkle, Ferdinand-Braun-Institut (Germany)[10553-46]

Root causes investigation of catastrophic optical bulk damage in high-power InGaAs-AlGaAs strained QW lasers (*Invited Paper*), Yongkun Sin, Zachary Lingley, Nathan Presser, Miles Brodie, Neil Ives, The Aerospace Corp. (USA)[10553-47]

5.5nm wavelength-tunable high-power MOPA diode laser system at 971 nm, Mahmoud Tawfiq, André Müller, Jörg Fricke, Pietro Della Casa, Peter Ressel, Arnim Ginolas, David Feise, Bernd Sumpf, Günther Tränkle, Ferdinand-Braun-Institut (Germany)[10553-48]

Comparison for 1030nm DBR-tapered diode lasers with 10W central lobe output power and different grating layouts for wavelength stabilization and lateral spatial mode filtering, André Müller, Christof Zink, Jörg Fricke, Frank Bugge, Götz Erbert, Bernd Sumpf, Günther Tränkle, Ferdinand-Braun-Institut (Germany)[10553-49]

SESSION 13 THU 10:30 AM TO 12:30 PM

THz QCLs

Session Chair: **Miriam S. Vitiello**, CNR-NANO (Italy)

High-performance and dynamics of THz quantum cascade lasers (*Invited Paper*), M. Kainz, S. Schönhuber, D. Bachmann, C. Derntl, Technische Univ. Wien (Austria); Markus Roesch, Matthias Beck, Giacomo Scalari, Jérôme Faist, ETH Zurich (Switzerland); A.M. Andrews, Gotfried Strasser, J. Darmo, Karl Unterrainer, Technische Univ. Wien (Austria)[10553-50]

Trends for terahertz quantum cascade lasers fabricated in different labs (*Invited Paper*), Andreas Wacker, David O. Winge, Lund Univ. (Sweden); Martin Franckie, ETH Zurich (Switzerland)[10553-51]

Phase-sensitive detector-less THz nano-imaging via self-mixing in quantum cascade lasers (*Invited Paper*), Gaetano Scamarcio, Univ. degli Studi di Bari Aldo Moro (Italy); Maria Caterina Giordano, CNR-NANO (Italy); Stefan Mastel, CIC nanoGUNE (Spain); Clemens Liewald, Ludwig-Maximilians-Univ. München (Germany); Lorenzo L. Columbo, Politecnico di Torino (Italy); Massimo Brambilla, Politecnico di Bari (Italy); Leonardo Viti, CNR-NANO (Italy); Antonio Politano, Univ. della Calabria (Italy); Kai Zhang, Suzhou Institute of Nano-Tech and Nano-Bionics (SINANANO) CAS (China); Lianhe H. Li, A. Giles Davies, Edmund H. Linfield, Univ. of Leeds (United Kingdom); Rainer Hillenbrand, CIC nanoGUNE (Spain); Fritz Keilmann, Ludwig-Maximilians-Univ. München (Germany); Miriam S. Vitiello, CNR-NANO (Italy)[10553-52]

Spatial filtering of radiation from wire lasers (*Invited Paper*), Ekaterina E. Orlova, Univ. of Leeds (United Kingdom)[10553-53]

CONFERENCE 10554

Monday-Wednesday 29-31 January 2018 • Proceedings of SPIE Vol. 10554

Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XXII

Conference Chairs: **Jong Kyu Kim**, Pohang Univ. of Science and Technology (Korea, Republic of); **Michael R. Krames**, Arkesso (USA); **Martin Strassburg**, OSRAM Opto Semiconductors GmbH (Germany); **Li-Wei Tu**, National Sun Yat-Sen Univ. (Taiwan)

Program Committee: **Yong-Hoon Cho**, KAIST (Korea, Republic of); **Mitch M. C. Chou**, National Sun Yat-Sen Univ. (Taiwan); **Aurelien David**, Soraa, Inc. (USA); **Kolja Haberland**, LayTec AG (Germany); **Michael Heuken**, AIXTRON SE (Germany); **Christoph Hoelen**, Philips Lighting B.V. (Netherlands); **Heonsu Jeon**, Seoul National Univ. (Korea, Republic of); **Satoshi Kamiyama**, Meijo Univ. (Japan); **Markus Klein**, OSRAM Opto Semiconductors GmbH (Germany); **Tien-Chang Lu**, National Chiao Tung Univ. (Taiwan); **Robert W. Martin**, Univ. of Strathclyde (United Kingdom); **Matteo Meneghini**, Univ. degli Studi di Padova (Italy); **Joongseo Park**, LG Electronics Inc. (Korea, Republic of); **Cyril Pernot**, Nikkiso Co., Ltd. (Japan); **Sungwon D. Roh**, LG Innotek (Korea, Republic of); **E. Fred Schubert**, Rensselaer Polytechnic Institute (USA); **Oleg B. Shchekin**, Philips Lumileds Lighting Co. (USA); **Klaus P. Streubel**, OSRAM AG (Germany); **Tetsuya Takeuchi**, Meijo Univ. (Japan); **Dong-Sing Wu**, National Chung Hsing Univ. (Taiwan); **Guo-yi Zhang**, Peking Univ. (China)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:00 PM

LED Applications and Solid-State Lighting I

Session Chair: **Michael R. Krames**, Arkesso, LLC (USA)

Development and progress of micro LED display technology (*Invited Paper*), Yun-Li Li, Tzu-Yang Lin, Yu-hung Lai, PlayNitride Inc. (Taiwan) [10554-1]

Highly efficient phosphor-free warm white-light-emitting diodes using gallium-nitride-based three-dimensional structures fabricated by growth and etching hybrid methods, Youngchul Sim, Seung-Hyuk Lim, Yang-Seok Yoo, Min-Ho Jang, Sunghan Choi, Kie Young Woo, Sangwon Lee, Yong-Hoon Cho, KAIST (Korea, Republic of) [10554-2]

Diffusion of light in white LEDs, Maryna L. Meretska, Ad Lagendijk, Henri Thyrestrup, Allard Mosk, Univ. Twente (Netherlands); Wilbert L. IJzerman, Philips Lighting B.V. (Netherlands); Willem L. Vos, Univ. Twente (Netherlands) [10554-3]

Analysis of LED arrangement in an array with respect to lens geometry, Peer-Phillip Ley, Marcel Philipp Held, Leibniz Univ. Hannover (Germany) [10554-4]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 2 MON 1:30 PM TO 3:10 PM

Novel Technologies for LED Design and Fabrication I

Session Chair: **Li-Wei Tu**, National Sun Yat-sen Univ. (Taiwan)

Fabrication of InGaN LEDs on flexible metal foils (*Invited Paper*), Vladimir Matias, Christopher J. Sheehan, iBeam Materials, Inc. (USA); Daniel D. Koleske, Brendan P. Gunning, Sandia National Labs. (USA); Ashwin K. Rishinaramangalam, Daniel Feezell, The Univ. of New Mexico (USA) [10554-5]

Improvement of hole injection efficiency for implementing thin p-type light-emitting diodes (*Invited Paper*), Chia-Ying Su, Chun-Han Lin, Chang-Gan Tu, Yu-Feng Yao, Wei-Heng Liu, Hsin-Chun Chiang, Ming-Yen Su, Meng-Che Tsai, Huang-Hui Lin, Keng-Ping Chou, Hao-Tsung Chen, Shaobo Yang, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) [10554-6]

Improved performance of GaN micro-light-emitting diodes using AlN rod-shaped glass electrodes, Kyung Rock Son, Sang Hoon Oh, Hyun Tae Kim, Tae Ho Lee, Byeong Ryong Lee, Tae Geun Kim, Korea Univ. (Korea, Republic of) [10554-7]

Strain compensation in InGaN-based multiple quantum wells with AlGaIn interlayers, Syed Ahmed Al Mueyed, Wei Sun, Xiongliang Wei, Renbo Song, Lehigh Univ. (USA); Daniel D. Koleske, Sandia National Labs. (USA); Nelson Tansu, Jonathan J. Wierer Jr., Lehigh Univ. (USA) [10554-8]

SESSION 3 MON 3:40 PM TO 5:40 PM

Measurements and Characterizations for LED Materials and Devices I

Session Chair: **Aurelien David**, Soraa, Inc. (USA)

Impact of defects on efficiency of light emitters (*Invited Paper*), Chris G. Van de Walle, Univ. of California, Santa Barbara (USA) [10554-9]

QCSE tuning in polar GaN/AlN heterostructures (*Invited Paper*), Markus R. Wagner, Sarah Schlichting, Technische Univ. Berlin (Germany); Gerald Hönig, Bundesanstalt für Materialforschung und -prüfung (Germany); Jan Müssener, Pascal Hille, Tim Grieb, Univ. Bremen (Germany); Jörg Teubert, Jörg Schörmann, Justus-Liebig-Universität Giessen (Germany); Andreas Rosenauer, Martin Eickhoff, Univ. Bremen (Germany); Axel Hoffmann, Gordon Callsen, Technische Univ. Berlin (Germany) [10554-10]

Raman, EPD, XRD, and TEM analysis of GaN on commercial patterned-sapphire substrates, Vin-Cent Su, National United Univ. (Taiwan); Po-Hsun Chen, Shang-Hsuan Wu, Chieh-Hsiung Kuan, National Taiwan Univ. (Taiwan) [10554-11]

Carrier localization in InGaN-based light-emitting diodes (*Invited Paper*), Felix Nippert, Technische Univ. Berlin (Germany); Sergey Yu. Karpov, STR Group-Soft Impact Ltd. (Russian Federation); Markus R. Wagner, Gordon Callsen, Thomas Kure, Technische Univ. Berlin (Germany); Bastian Galler, Hans-Jürgen Lugauer, Martin Strassburg, OSRAM Opto Semiconductors GmbH (Germany); Axel Hoffmann, Technische Univ. Berlin (Germany) [10554-12]

Application of localization landscape theory in modeling green LEDs and AlGaIn based UVLEDs (*Invited Paper*), Yuh-Renn Wu, Chi-Kang Li, Shuan Wang, Hung-Hsiang Chen, National Taiwan Univ. (Taiwan); James S. Speck, Univ. of California, Santa Barbara (USA); Marcel Filoche, Ecole Polytechnique (France); Claude Weisbuch, Ecole Polytechnique (France) and Univ. of California, Santa Barbara (USA) [10554-13]

TUESDAY 30 JANUARY

SESSION 4 TUE 8:00 AM TO 10:10 AM

UV/DUV LEDs and Applications I

Session Chair: **Jong Kyu Kim**, Pohang Univ. of Science and Technology (Korea, Republic of)

Challenges and prospects for AlGaIn-based deep UV LED technologies (*Invited Paper*), Michael Kneissl, Frank Mehnke, Christian Kuhn, C. Reich, Martin Guttman, Johannes Enslin, Tim Wernicke, N. Susilo, Technische Univ. Berlin (Germany); A. Knauer, Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany); S. Hagedorn, Ferdinand-Braun-Institut (Germany); U. Zeimer, T. Kolbe, Neysha Lobo-Ploch, Jens Rass, Sven Einfeldt, Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany) [10554-14]

AlGaIn nanowires heterostructures for deep UV emission: assets and challenges (*Invited Paper*), Alexandra-Madalina Siladie, Commissariat à l'Énergie Atomique (France); Luiz Tizei, Mathieu Kociak, Lab. de Physique des Solides, Univ. Paris-Sud 11 (France) and Ctr. National de la Recherche Scientifique (France); Ana Cros, Nuria Garro, Univ. de València (Spain); Bruno Gayral, Commissariat à l'Énergie Atomique (France); Fabrice Donatini, Julien Pernot, Institut NÉEL (France) and Ctr. National de la Recherche Scientifique (France); Bruno Daudin, Commissariat à l'Énergie Atomique (France) [10554-15]

III-nitride blue/UVA LEDs and laser diodes grown on Si (*Invited Paper*), Qian Sun, Suzhou Institute of Nano-Tech and Nano-Bionics (SINANO) CAS (China) [10554-16]

Deep-UV LEDs emitting at 232 nm featuring low contact resistance V-based electrodes on n-Al_{0.9}Ga_{0.1}N, Luca Sulmoni, Martin Guttman, Christian Kuhn, Frank Mehnke, Tim Wernicke, Technische Univ. Berlin (Germany); Michael Kneissl, Technische Univ. Berlin (Germany) and Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany) [10554-17]

High efficiency GaN-based near-UV light-emitting diodes with asymmetric triangular multiple quantum wells, Heng Li, Shiou-Yi Kuo, Chia-Jui Chang, National Chiao Tung Univ. (Taiwan); Jun-Rong Chen, Lextar Electronics Corp. (Taiwan); Tien-Chang Lu, National Chiao Tung Univ. (Taiwan) [10554-18]

SESSION 5 TUE 10:40 AM TO 12:30 PM

LED Manufacturing and Novel Substrates for LED Epistucture Growth

Session Chair: **Satoshi Kamiyama**, Meijo Univ. (Japan)

Next-generation MOCVD technology for high-yield high-volume LED manufacturing (*Invited Paper*), Eric Armour, Veeco Instruments Inc. (USA) [10554-19]

In-situ and ex-situ metrology solutions for production of LEDs, micro LEDs, and VCSELs (*Invited Paper*), Kolja Haberland, LayTec AG (Germany) [10554-20]

Strain release effect in full InGaIn structure for long wavelength emission (*Invited Paper*), Amélie Dussaigne, Armelle Even, Frederic Barbier, Matthieu Lafossas, Pierre Ferret, François Lévy, CEA-LETI (France) [10554-21]

The processing of AlGaInP LEDs grown on 200mm Si wafers and integration with CMOS, Bing Wang, Yue Wang, Kwang Hong Lee, Kenneth Eng Kian Lee, SMART-Singapore MIT Alliance for Research & Technology (Singapore); Chuan Seng Tan, Nanyang Technological Univ. (Singapore); Eugene A. Fitzgerald, Jurgen Michel, Massachusetts Institute of Technology (USA) [10554-22]

Lunch/Exhibition Break Tue 12:30 pm to 1:50 pm

SESSION 6 TUE 1:50 PM TO 3:00 PM

LED Applications and Solid-State Lighting II

Session Chair: **Michael R. Krames**, Arkesso, LLC (USA)

Advanced beam control techniques for LEDs (*Invited Paper*), Tigran Galstian, Ctr. d'Optique, Photonique et Laser (Canada); Karen Asatryan, LensVector (Canada); Vladimir Presniakov, Armen Zohrabyan, LensVector (Canada) [10554-23]

Estimating the modulation characteristics of white LEDs by their color temperature, Kai Richter, Christian-Alexander Bunge, Hochschule für Telekommunikation Leipzig (Germany) [10554-24]

Nanoparticle-based microstructures for light extraction enhancement in nitride LEDs, Yohan Desières, CEA-LETI (France) and KTH Royal Institute of Technology (Sweden); Ding Yuan Chen, Dennis Visser, Casper Schippers, Srinivasan Anand, KTH Royal Institute of Technology (Sweden) . . . [10554-25]

SESSION 7 TUE 3:30 PM TO 5:40 PM

Nanomaterials and Nanostructures for LEDs and NIR/IR-emitting LEDs

Session Chair: **Martin Strassburg**, OSRAM Opto Semiconductors GmbH (Germany)

Flexible nanowire light-emitting diodes (*Invited Paper*), Nan Guan, Lorenzo Mancini, Univ. Paris-Sud 11 (France); Valerio Piazza, Ctr. de Nanosciences et de Nanotechnologies (France); François H. Julien, Univ. Paris-Sud 11 (France); Lukas Halagacka, Martin Foldyna, Ecole Polytechnique (France); Vasily Astratov, The Univ. of North Carolina at Charlotte (USA); Alex V. Maslov, N.I. Lobachevsky State Univ. of Nizhni Novgorod (Russian Federation); Catherine Bougerol, Institut NÉEL (France); Akanksha Kapoor, Joël Eymery, Christophe Durand, CEA-INAC (France); Maria Tchernycheva, Univ. Paris-Sud 11 (France) [10554-26]

GaN/GaIn multi-quantum shells for high-performance optoelectronic devices (*Invited Paper*), Satoshi Kamiyama, Tetsuya Takeuchi, Motoaki Iwaya, Isamu Akasaki, Meijo Univ. (Japan) [10554-27]

Colloidal quantum-dot LED, QD-display, and QD-photoelectric applications (*Invited Paper*), Kyung-Sang Cho, Chan-Wook Baik, Yeonsang Park, Samsung Advanced Institute of Technology (Korea, Republic of) [10554-28]

InGaIn quantum nanodisks in nanopillars fabricated by dry etching of InGaIn/GaN MQWs, Wai Yuen Fu, Hoi Wai Choi, The Univ. of Hong Kong (Hong Kong, China) [10554-29]

High-power high-spectral purity superluminescent diodes operating from 2.0 to 2.65 μm in wavelength for environmental sensing, Jukka Viheriälä, Nouman Zia, Soile Suomalainen, Riku Koskinen, Mircea Guina, Tampere Univ. of Technology (Finland) [10554-30]

CONFERENCE 10554

WEDNESDAY 31 JANUARY

SESSION 8..... WED 8:00 AM TO 10:00 AM

UV/DUV LEDs and Applications II

Session Chair: **Michael Kneissl**, Technische Univ. Berlin (Germany)

Light-extraction technologies for high-power deep-UV LEDs (*Invited Paper*), Shin-ichiro Inoue, National Institute of Information and Communications Technology (Japan) [10554-31]

Control of surface morphology and defects in AlGaIn-layers for high-efficient deep-UV LEDs (*Invited Paper*), Marc Patrick Hoffmann, Mohammad Tollabi-Mazraehno, Christian Brandl, Matthew Davies, Roland Zeisel, Martin Strassburg, Hans-Jürgen Lugauer, OSRAM Opto Semiconductors GmbH (Germany) [10554-32]

Demands on high-power LED packaging for UVB and UVC emitters, Sabine Nieland, CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH (Germany) [10554-33]

Application of UVA1-LED for phototherapy in treatment skin diseases, Shunko Albano Inada, Hirosaki Univ. (Japan) [10554-34]

Impact of defect-generation and diffusion in deep-UV (In)AlGaIn-based LEDs submitted to constant current stress, Desiree Monti, Matteo Meneghini, Carlo De Santi, Silvia Da Ruos, Gaudenzio Meneghesso, Enrico Zanon, Univ. degli Studi di Padova (Italy); Johannes Glaab, Jens Rass, Sven Einfeldt, Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany); Frank Mehnke, Johannes Enslin, Tim Wernicke, Institut für Festkörperphysik, Technische Univ. Berlin (Germany); Michael Kneissl, Institut für Festkörperphysik, Technische Univ. Berlin (Germany) and Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany) [10554-35]

SESSION 9..... WED 10:30 AM TO 12:20 PM

2D Optoelectronic Materials

Session Chair: **Jong Kyu Kim**, Pohang Univ. of Science and Technology (Korea, Republic of)

Hexagonal boron nitride epilayers for photonic devices (*Invited Paper*), Hongxing Jiang, Jingyu Lin, Texas Tech Univ. (USA) [10554-36]

Room-temperature electron-hole liquid in monolayer MoS₂ (*Invited Paper*), Linyou Cao, North Carolina State Univ. (USA) [10554-37]

E-beam pumped ultraviolet light source from quasi-2D GaN MQWs (*Invited Paper*), Xinqiang Wang, X. Rong, Y. Wang, Peking Univ. (China); S.V. Ivanov, Ioffe Institute (Russian Federation); T. Schulz, M. Albrecht, Leibniz-Institut für Kristallzüchtung (Germany); V. N. Jmerik, A. A. Toropov, Ioffe Institute (Russian Federation); V. I. Kozlovsky, P.N. Lebedev Physical Institute (Russian Federation); F.J. Xu, B. Shen, Peking Univ. (China) [10554-38]

2D MoS₂ grown by MOCVD for optoelectronic applications, Michael Heuken, AIXTRON SE (Germany) and RWTH Aachen Univ. (Germany); M. Marx, A. Grundmann, A. Vescan, H. Kalisch, RWTH Aachen Univ. (Germany); D. Andrzejewski, T. Kuemmel, G. Bacher, Univ. Duisburg-Essen (Germany); Y.R. Lin, AIXTRON SE (Germany) and RWTH Aachen Univ. (Germany) [10554-39]

Lunch/Exhibition Break Wed 12:20 pm to 1:40 pm

SESSION 10..... WED 1:40 PM TO 3:10 PM

Measurements and Characterizations for LED Materials and Devices II

Session Chair: **Markus R. Wagner**, Technische Univ. Berlin (Germany)

Physics of SRH recombinations in III-nitride quantum-well LEDs (*Invited Paper*), Aurelien David, Soraa, Inc. (USA) [10554-40]

Investigation on evolution of electroluminescence of InGaIn green light-emitting diodes by introducing micro-hyperspectral imaging, Yue Lin, Yi Tu, Tingzhu Wu, Yijun Lu, Lihong Zhu, Zhong Chen, Xiamen Univ. (China) [10554-41]

YAG and greenYAG+nitride properties for white-light generation using a blue laser diode, Ada Czesnakowska, Gérald Ledru, Lab. Laplace (France); Benoit Glorieux, Institut de Chimie de la Matière Condensée de Bordeaux (France); Georges Zissis, Lab. Laplace (France) [10554-42]

P3 approximation in analytical modeling of light transport in scattering materials with strong absorption, Maryna L. Meretska, Ravitej Uppu, Univ. Twente (Netherlands); Gilles Vissenberg, Philips Lighting B.V. (Netherlands); Ad Lagendijk, Univ. Twente (Netherlands); Wilbert L. IJzerman, Philips Lighting B.V. (Netherlands); Willem L. Vos, Univ. Twente (Netherlands) [10554-43]

SESSION 11..... WED 3:40 PM TO 5:40 PM

Novel Technologies for LED Design and Fabrication II

Session Chair: **Vladimir Matias**, iBeam Materials, Inc. (USA)

Base template epilayers for improving quantum efficiencies of AlGaIn LEDs (*Invited Paper*), Dong-Sing Wu, National Chung Hsing Univ. (Taiwan) .. [10554-44]

Harnessing Eu³⁺ narrow band line emission for practical white LEDs (*Invited Paper*), Marie Anne van de Haar, Seaborough Research B.V. (Netherlands) [10554-45]

Thermocompression bonding for high-power-UV LEDs, Indira Kaeplinger, Dominik Karolewski, Geert Brockmann, Thomas Ortlepp, Olaf Brodersen, CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH (Germany); Andreas Thies, Jens Rass, Sven Einfeldt, Neysha Lobo-Ploch, Christoph Stoelmacker, Frank Schnieder, Ferdinand-Braun-Institut (Germany) [10554-46]

3D device processing of GaN nanostructures for electronic and optoelectronic sensor platforms, Hutomo Suryo Wasisto, Jan Gülink, Shinta Mariana, Steffen Bornemann, Technische Univ. Braunschweig (Germany); Nursidik Yulianto, Technische Univ. Braunschweig (Germany) and Research Ctr. for Physics, Indonesian Institute of Sciences (Indonesia); Feng Yu, Klaas Stempel, Muhammad Fahlesa Fatahilah, Tony Granz, Technische Univ. Braunschweig (Germany); Nicolai Markiewicz, Technische Univ. Braunschweig (Germany) and Univ. de Barcelona (Spain); Daria Bezshlyakh, Gregor Scholz, Technische Univ. Braunschweig (Germany); Iqbal Syamsu, Technische Univ. Braunschweig (Germany) and Research Ctr. for Electronics and Telecommunication, Indonesian Institute of Sciences (Indonesia); Heidi Boht, Jana Hartmann, Sönke Fündling, Technische Univ. Braunschweig (Germany); Bernd Witzigmann, Univ. Kassel (Germany); Joan Daniel Prades, Univ. de Barcelona (Spain); Martin Strassburg, Hans-Jürgen Lugauer, OSRAM Opto Semiconductors GmbH (Germany); Andreas Waag, Technische Univ. Braunschweig (Germany) [10554-47]

Newly patented process provides low-cost expansion of LED white-light spectrum, Jan-Marie A. Spanard, Light Spectrum Glazes (USA) .. [10554-48]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Spectroscopic uplified dual-mode photoluminescence study in Nd³⁺-doped Y₂O₃ ceramic phosphor, Prasenjit Prasad Sukul, Kaushal Kumar, Indian Institute of Technology (Indian School of Mines), Dhanbad (India) [10554-49]

Patterned sapphire substrate and SiO₂ array in GaN LED, Xiaomin Jin, Gregory Chavoor, California Polytechnic State Univ., San Luis Obispo (USA); Guobin Liu, Intel Corp. (USA) [10554-50]

UV LED-based lightweight fixed-wavelength detector: for the development of a miniaturized high-performance liquid chromatography (HPLC) system, Wen Yin Guan, Univ. Sains Malaysia (Malaysia); Wei Yan Lee, Agilent Technologies (Malaysia) Sdn. Bhd. (Malaysia); Mervyn Wing On Liew, Soo Choon Tan, Jit Kang Lim, Univ. Sains Malaysia (Malaysia) [10554-51]

High-performance AlGaInP/GaInP multi-quantum wells (MQWs) light-emitting diodes (LEDs) on Ge-on-insulator (GOI) substrates, Yue Wang, Bing Wang, SMART-Singapore MIT Alliance for Research & Technology (Singapore); Shuyu Bao, Yiping Zhang, Nanyang Technological Univ. (Singapore); Kenneth Eng Kian Lee, SMART-Singapore MIT Alliance for Research & Technology (Singapore); Hilmi Volkan Demir, Nanyang Technological Univ. (Singapore); Soon Fatt Yoon, Nanyang Technological Univ. (Singapore) and SMART-Singapore MIT Alliance for Research & Technology (Singapore); Eugene A. Fitzgerald, Massachusetts Institute of Technology (USA) and SMART-Singapore MIT Alliance for Research & Technology (Singapore); Chuan Seng Tan, Nanyang Technological Univ. (Singapore) and SMART-Singapore MIT Alliance for Research & Technology (Singapore); Kwang Hong Lee, SMART-Singapore MIT Alliance for Research & Technology (Singapore) [10554-52]

Design and characterization of 3D-printed freeform lenses with subwavelength surface roughness for prescribed illuminations, Bisrat Girma Assefa, Toni Saastamoinen, Markku Pekkarinen, Markku Kuittinen, Jari Turunen, Jyrki Saarinen, Univ. of Eastern Finland (Finland) [10554-53]

Luminescence properties of carbon thermal reduced Ca₃(ScZn)₂Si₃O₁₂:Ce green phosphor for white LEDs, Yung-Tang Nien, National Formosa Univ. (Taiwan); In-Gann Chen, Arman Kusuma Wijaya, Bi-Jr Li, Ya-Han Chan, Yun-Fang Wu, National Cheng Kung Univ. (Taiwan) [10554-54]

Impacts of polarization effect and SRH recombination on the output performance of AlGaIn-based deep ultraviolet light-emitting diodes, Yen-Kuang Kuo, Jih-Yuan Chang, Fang-Ming Chen, National Changhua Univ. of Education (Taiwan) [10554-55]

Highly efficient flexible quantum-dot light-emitting diodes based on silver nanowire transparent electrodes, Ke Ding, Yunsheng Fang, Bin Hu, Lei Wang, Wuhan National Lab. for Optoelectronics (China) [10554-56]

Room-temperature photoluminescence spectrum from β-FeSi₂ films, Kensuke Akiyama, Kanagawa Institute of Industrial Science and Technology (Japan) and Tokyo Institute of Technology (Japan); Yoshihisa Matsumoto, Kanagawa Institute of Industrial Science and Technology (Japan); Hiroshi Funakubo, Tokyo Institute of Technology (Japan) [10554-57]

Calculation comparison of an idealized and non-idealized light source model for high-resolution Pixel Light headlamps, Marcel Philipp Held, Peer-Phillip Ley, Roland Lachmayer, Leibniz Univ. Hannover (Germany) [10554-58]

Analysis of asymmetric InGaIn-Delta-InN/AlGaIn quantum wells with GaN barriers for LEDs, Ioannis Fragkos, Wei Sun, Nelson Tansu, Lehigh Univ. (USA) [10554-59]

Road safety enhancement: human response to context-based on-road image projections using LED-based Pixel Light systems, Sadiq Rizvi, Marvin Knöchelmann, Peer-Phillip Ley, Leibniz Univ. Hannover (Germany) [10554-60]



CONFERENCE 10555

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Emerging Liquid Crystal Technologies XIII

Conference Chair: **Liang-Chy Chien**, Kent State Univ. (USA)

Conference Co-Chairs: **Dick J. Broer**, Technische Univ. Eindhoven (Netherlands); **Igor Muševič**, Jožef Stefan Institute (Slovenia); **Vladimir G. Chigrinov**, Hong Kong Univ. of Science and Technology (Hong Kong, China)

Program Committee: **Etienne Brasselet**, Univ. Bordeaux 1 (France); **Harry J. Coles**, Univ. of Cambridge (United Kingdom); **Antonio Martins Figueiredo Neto**, Univ. de São Paulo (Brazil); **Andy Y. G. Fuh**, National Cheng Kung Univ. (Taiwan); **Jun-ichi Fukuda**, Kyushu Univ. (Japan); **Tigran Galstian**, Ctr. d'Optique, Photonique et Laser (Canada); **Linda S. Hirst**, Univ. of California, Merced (USA); **Hirotsugu Kikuchi**, Kyushu Univ. (Japan); **Heinz S. Kitzerow**, Univ. Paderborn (Germany); **Jan P. Lagerwall**, Univ. du Luxembourg (Luxembourg); **Yi-Hsin Lin**, National Chiao Tung Univ. (Taiwan); **Akihiro Mochizuki**, i-CORE Technology, LLC (USA); **Kristiaan Neyts**, Univ. Gent (Belgium); **Toshiaki Nose**, Akita Prefectural Univ. (Japan); **Masanori Ozaki**, Osaka Univ. (Japan); **Miha Ravnik**, Univ. of Ljubljana (Slovenia); **Ivan I. Smalyukh**, Univ. of Colorado at Boulder (USA); **Nelson V. Tabiryan**, BEAM Engineering for Advanced Measurements Co. (USA); **Timothy J. White**, Air Force Research Lab. (USA); **Michael Wittke**, Merck KGaA (Germany); **Shin-Tson Wu**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Jun Yamamoto**, Kyoto Univ. (Japan); **Tae-Hoon Yoon**, Pusan National Univ. (Korea, Republic of)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 **MON 10:30 AM TO 12:10 PM**

Chiral, Nanostructured Materials, and Applications

Session Chair: **Stephen M. Morris**, Univ. of Cambridge (United Kingdom)

Experimental and theoretical approaches to understanding liquid-crystal phase transition templating (*Invited Paper*), Linda S. Hirst, Univ. of California, Merced (USA) [10555-1]

Preparation and SHG microscopic evaluation of piezoelectric micro-materials consisting of collagen (*Invited Paper*), Keisuke Yoshiki, Yuki Honda, Univ. of Hyogo (Japan) [10555-2]

Chiral nematic liquid-crystal microlenses (*Invited Paper*), Antal I. Jáklí, Kent State Univ (USA) [10555-3]

Polymer-stabilized liquid crystalline topological defect network for micro-pixelated optical devices (*Invited Paper*), Fumito Araoka, RIKEN (Japan); Yuji Sasaki, Hokkaido University (Japan); Khoa Le, Tokyo University of Science (Japan); Shuji Fujii, Hiroshi Orihara, Hokkaido University (Japan) [10555-4]

Lunch Break Mon 12:10 pm to 1:10 pm

SESSION 2 **MON 1:10 PM TO 3:05 PM**

Lasers and Diffractive Optical Elements I

Session Chair: **Nelson V. Tabiryan**, BEAM Engineering For Advanced Measurements Co. (USA)

Holographic zoom system based on spatial-light modulator and liquid device (*Invited Paper*), Qiong-Hua Wang, Sichuan Univ. (China) [10555-5]

Large-aperture liquid-crystal lens: floating electrode effects (*Invited Paper*), Chi-Yen Huang, Che-Ju Hsu, Jyun-Jia Jhang, Yi-Jun Liu, Chao-Ching Wu, National Changhua Univ. of Education (Taiwan) [10555-6]

Photonic crystalline colloids of 2D particles and its applications for displays (*Invited Paper*), Jang-Kun Song, Sungkyunkwan Univ. (Korea, Republic of) [10555-7]

Wide-field-of-view nanoscale Bragg liquid crystal polarization gratings (*Invited Paper*), Michael Escuti, North Carolina State Univ. (USA) [10555-53]

How to enlarge a lens power of a liquid-crystal lens with a spatially-distributed permittivity layer, Hung-Chun Lin, Hsin-Ju Su, Hao-Ren Lo, Yi-Hsin Lin, National Chiao Tung Univ. (Taiwan) [10555-8]

SESSION 3 **MON 3:25 PM TO 6:20 PM**

New Materials and Effects

Session Chair: **Timothy J. White**, Air Force Research Lab. (USA)

Numerical calculation of Kossel diagrams of cholesteric blue phases (*Invited Paper*), Jun-ichi Fukuda, Yasushi Okumura, Hirotsugu Kikuchi, Kyushu Univ. (Japan) [10555-9]

Low-voltage tunable color in full visible region using ferroelectric liquid-crystal-doped cholesteric liquid-crystal smart materials (*Invited Paper*), Jia-De Lin, Jyun-Wei Lin, Chia-Rong Lee, National Cheng Kung Univ. (Taiwan) [10555-10]

Softening of twist elasticity in hyper swollen SmC* phase (*Invited Paper*), Jun Yamamoto, Kanako Hata, Yoichi Takanishi, Kyoto Univ. (Japan) and Japan Science and Technology Agency (Japan); Isa Nishiyama, Dainippon Ink and Chemicals, Inc. (Japan) [10555-11]

Three-dimensional x-ray crystal structure analysis and electrical anisotropy of solution-processed oriented thin film utilizing liquid crystalline phthalocyanine (*Invited Paper*), Masashi Ohmori, Mitsuhiro Nakatani, Hirotake Kajii, Osaka Univ. (Japan); Makoto Yoneya, National Institute of Advanced Industrial Science and Technology (Japan); Akihiko Fujii, Masanori Ozaki, Osaka Univ. (Japan) [10555-12]

Higher reflectance in cholesteric liquid crystals (*Invited Paper*), Yo Inoue, Hiroshi Moritake, National Defense Academy (Japan) [10555-13]

The effects of chromophore spacer length on photomotility of liquid crystalline polymers (*Invited Paper*), Jeong Jae Wie, Jisoo Jeon, Jae Gwang Kim, Sivakumar Rajamanickam, Ji Ho Youk, INHA Univ. (Korea, Republic of) [10555-14]

Optical filter based on Fabry-Perot structure using a colloidal suspension of goethite (α -FeOOH) nanorods as electro-optic material (*Invited Paper*), Samir Abbas, Laurent M. Dupont, Télécom Bretagne (France); Ivan N. Dozov, Lab. de Physique des Solides, Univ. Paris-Sud (France); Patrick Davidson, Lab. de Physique des Solides (France); Corinne Chanéac, Lab. Chimie de la Matière Condensée de Paris, Collège de France (France) and Univ. Pierre et Marie Curie (France) [10555-15]

TUESDAY 30 JANUARY

SESSION 4.....TUE 8:00 AM TO 10:10 AM

Lasers and Diffractive Optical Elements II

Session Chair: **Etienne Brasselet**, Univ. Bordeaux 1 (France)

Liquid-crystal cells for high fluence near infrared lasers using a high-efficiency heat-conducting substrate, Keisuke Yoshiki, Wataru Kugimiya, Univ. of Hyogo (Japan); Anna Ito, Hiromasa Furuta, Panasonic Industrial Devices SUNX Co., Ltd. (Japan).....[10555-16]

A method to autocalibrate liquid-crystal-on-silicon (LCoS) displays by addressing holographic lens-based configurations, Haolin Zhang, Angel Lizana, Claudio Ramirez, Univ. Autònoma de Barcelona (Spain); Claudio Lemmi, Univ. de Buenos Aires (Argentina); Freddy Ramirez, Univ. Nacional de Colombia (Colombia); Juan Campos, Univ. Autònoma de Barcelona (Spain).....[10555-17]

Low-energy lasing with voltage and flow tuning based on liquid crystals (*Invited Paper*), Kristiaan Neyts, Inge Nys, Univ. Gent (Belgium); Tigran Dadalyan, Yerevan State Univ. (Armenia); Jeroen Beeckman, Univ. Gent (Belgium).....[10555-18]

Electrically switchable diffractive waveplates enabling large and thin electro-optical systems (*Invited Paper*), Nelson V. Tabirian, Jeoungyeon Hwang, BEAM Engineering For Advanced Measurements Co. (USA); Diane M. Steeves, Brian R. Kimball, U.S. Army Natick Soldier Research, Development and Engineering Ctr. (USA).....[10555-19]

Water condensation via nematic liquid crystals (*Invited Paper*), Yi-Hsin Lin, Chia-Ming Chang, Hung-Chun Lin, National Chiao Tung Univ. (Taiwan).....[10555-20]

Generation of diverse beam shapes in a liquid-crystal-filled laser cavity (*Invited Paper*), Matjaž Humar, Jožef Stefan Institute (Slovenia), Univ. of Ljubljana (Slovenia); Miha Papič, Jožef Stefan Institute (Slovenia); Igor Muševic, Jožef Stefan Institute (Slovenia), Univ. of Ljubljana (Slovenia).....[10555-21]

SESSION 5.....TUE 10:40 AM TO 12:10 PM

Polymers and LC Composites

Session Chair: **Dirk J. Broer**, Technische Univ. Eindhoven (Netherlands)

Polymerization speed and diffractive experiments in polymer network LC test cells (*Invited Paper*), Alexander Lorenz, Univ. Paderborn (Germany).....[10555-22]

Advancing flexible volatile compound sensors using liquid crystals encapsulated in polymer fibers (*Invited Paper*), Catherine Reyes, Univ. du Luxembourg (Luxembourg).....[10555-23]

Reconfigurable optical patterns in polymerizable liquid crystals using aberration-corrected direct laser writing (*Invited Paper*), John Sandford O'Neill, Chloe C. Tartan, Patrick S. Salter, Martin J. Booth, Steve J. Elston, Stephen M. Morris, Univ. of Oxford (United Kingdom).....[10555-24]

Drop-on-demand printing of liquid-crystal composites for photonics applications, Ellis Parry, Univ. of Oxford (United Kingdom); Serena Bolis, Univ. Libre de Bruxelles (Belgium) and Univ. Gent (Belgium); Alfonso A. Castrejon-Pita, Steve J. Elston, Univ. of Oxford (United Kingdom).....[10555-25]

Lunch/Exhibition Break Tue 12:10 pm to 1:40 pm

SESSION 6.....TUE 1:40 PM TO 3:00 PM

Spatial Light Modulators and Optical Filters

Session Chair: **Yi-Hsin Lin**, National Chiao Tung Univ. (Taiwan)

Recent advances in liquid-crystal THz filters (*Invited Paper*), Chia-Yi Huang, Tunghai Univ. (Taiwan).....[10555-26]

Quasi-optic millimeter-wave device application of LC material by using porous PMMA matrix (*Invited Paper*), Toshiaki Nose, Yoshiaki Watanabe, Akira Kon, Ryouta Ito, Michinori Honma, Akita Prefectural Univ. (Japan).....[10555-27]

Soft metamaterials: THz-frequency scale dynamics of liquid crystals, Dima Bolmatov, The Univ. of Tennessee (USA) and Oak Ridge National Lab. (USA).....[10555-28]

High-speed multi-bandpass liquid-crystal filter using dual-frequency liquid crystal for real-time spectral imaging system, Takahiro Ishinabe, Kohei Terashima, Tohoku Univ. (Japan); Kazuhiro Wako, Sendai National College of Technology (Japan); Yasuyuki Fujihara, Yusuke Aoyagi, Maasa Murata, Satoshi Nasuno, Shunichi Wakashima, Rihito Kuroda, Yosei Shibata, Shigetoshi Sugawa, Hideo Fujikake, Tohoku Univ. (Japan).....[10555-29]

SESSION 7.....TUE 3:30 PM TO 6:00 PM

Photoresponsive, Photo-Patterning, and Photoalignment

Session Chair: **Antal I. Jákli**, Kent State Univ. (USA)

Photo-mechanizing liquid-crystal materials (*Invited Paper*), Nathalie Katsonis, Univ. Twente (Netherlands).....[10555-30]

Electrically controlled liquid release from a liquid-crystal coating (*Invited Paper*), Danqing Liu, Anne Helene Gelebart, Dirk Broer, Technische Univ. Eindhoven (Netherlands).....[10555-31]

The contribution of liquid crystals to optomechanics (*Invited Paper*), Etienne Brasselet, Univ. Bordeaux 1 (France).....[10555-32]

Autonomous self-regulated liquid-crystal elastomer actuators (*Invited Paper*), Arri Priimagi, Hao Zeng, Owies Wani, Tampere Univ. of Technology (Finland).....[10555-33]

Performance enabled by photoalignment of liquid-crystalline elastomers (*Invited Paper*), Timothy J. White, Air Force Research Lab. (USA).....[10555-34]

Electric-field effects in the twist-bend nematic phase (*Invited Paper*), Claire Meyer, Univ. de Picardie Jules Verne (France); Ivan N. Dozov, Patrick Davidson, Lab. de Physique des Solides, Univ. Paris-Sud (France); Irena Dokli, Anamarija Knezevic, Andreja Lesac, Rudjer Boskovic Institute (Croatia).....[10555-35]

WEDNESDAY 31 JANUARY

SESSION 8.....WED 8:20 AM TO 9:50 AM

3D and AR/VR Displays

Session Chair: **Qiong-Hua Wang**, Sichuan Univ. (China)

Advanced multiplanar volumetric 3D display (*Invited Paper*), Kriss Osmanis, Gatis Valters, Roberts Zabels, Ugis Gertners, Ilmars Osmanis, Lightspace Technologies, SIA (Latvia).....[10555-36]

Display technologies for augmented reality (*Invited Paper*), Byoungho Lee, Seungjae Lee, Changwon Jang, Jong-Young Hong, Gang Li, Seoul National Univ. (Korea, Republic of).....[10555-37]

Liquid crystal true 3D displays for augmented reality applications (*Invited Paper*), Yan Li, Shuxin Liu, Pengcheng Zhou, Quanming Chen, Yikai Su, Shanghai Jiao Tong Univ. (China).....[10555-38]

Knotted polarization hopfions in light beams, Mark R. Dennis, Danica Sugic, Univ. of Bristol (United Kingdom).....[10555-39]

OPTO

CONFERENCE 10555

SESSION 9 WED 10:20 AM TO 12:30 PM

Emerging Technologies and Displays

Session Chair: **Kristiaan Neyts**, Univ. Gent (Belgium)

Directed self-assembly of blue-phase liquid crystals by chemically patterned surfaces (*Invited Paper*), Xiao Li, Jose A. Martinez-Gonzalez, Juan J. de Pablo, Paul F. Nealey, The Univ. of Chicago (USA) [10555-40]

High-reflective colorful films fabricated by all-solid multilayer cholesteric structures (*Invited Paper*), Dan Luo, Southern Univ. of Science and Technology of China (China) [10555-41]

Smart window using a thermally and optically switchable liquid crystal cell (*Invited Paper*), Tae-Hoon Yoon, Seung-Won Oh, Sang-Hyeok Kim, Jong-Min Baek, Pusan National Univ. (Korea, Republic of) [10555-42]

In-plane only retardation switching by certain type of smectic liquid crystal panels (*Invited Paper*), Akihiro Mochizuki, i-CORE Technology, LLC (USA) [10555-43]

Cholesteric metronomes with flexoelectrically-programmable amplitude, Andrii Varanytsia, Liquid Crystal Institute (USA); Vinay Joshi, Kai-Han Chang, Kent State Univ. (USA); Daniel A. Paterson, John M. D. Storey, Corrie Imrie, Univ. of Aberdeen (United Kingdom); Liang-Chy Chien, Kent State Univ. (USA) [10555-44]

Control of chromatic aberration with a liquid-crystal spatial light modulator, Nikolai Suchkov, Voptica S.L. (Spain) and Lab. de Óptica Univ. de Murcia (Spain); Enrique J. Fernández, Lab. de Óptica Univ. de Murcia (Spain); José L. Martínez, Univ. Miguel Hernández de Elche (Spain); Pablo Artal, Lab. de Óptica Univ. de Murcia (Spain) [10555-45]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Method of preparing a tunable-focus liquid-crystal (LC) lens, Xiaolong Li, Zuowei Zhou, Hongwen Ren, Chonbuk National Univ. (Korea, Republic of) [10555-46]

Electric field switched surface topography of liquid-crystal network polymer coating, Wei Feng, Danqing Liu, Dirk Broer, Technische Univ. Eindhoven (Netherlands) [10555-47]

A spatial light modulator consisting of three liquid crystals for controlling of the phase, ellipticity, and orientation of polarization, Keisuke Yoshiki, Univ. of Hyogo (Japan) [10555-48]

Electro-optical response of ferroelectric liquid crystals on the slippery gel interfaces, Waki Sakatsuji, Yoichi Takanishi, Kyoto Univ. (Japan); Isa Nishiyama, Dainippon Ink and Chemicals, Inc. (Japan); Jun Yamamoto, Kyoto Univ. (Japan) [10555-49]

Control of haze value using electrically-switchable liquid-crystal phase grating devices, Tae-Hoon Yoon, Tae-Hoon Choi, Jae-Hyeon Woo, Jae-Won Huh, Byoung-Gyu Jeon, Pusan National Univ. (Korea, Republic of) [10555-50]

Electromagnetic response of dielectric nanostructures in liquid crystals, Sushanth Amanganti, Mahindra École Centrale (India); Miha Ravnik, Univ. of Ljubljana (Slovenia); Dibakar Roy Chowdhury, Jayasri Dontabhaktuni, Mahindra École Centrale (India) [10555-51]

Nanosheet synthesis of MOF using a hyperswollen lyotropic lamellar phase, Takeru Omiya, Yoshiaki Uchida, Norikazu Nishiyama, Osaka Univ. (Japan) [10555-52]

CONFERENCE 10556

Wednesday–Thursday 31 January–1 February 2018 • Proceedings of SPIE Vol. 10556

Advances in Display Technologies VIII

Conference Chairs: **Liang-Chy Chien**, Kent State Univ. (USA); **Tae-Hoon Yoon**, Pusan National Univ. (Korea, Republic of); **Qiong-Hua Wang**, Sichuan Univ. (China)

Program Committee: **Karlheinz Blankenbach**, Pforzheim Univ. (Germany); **Pierre M. Boher**, ELDIM (France); **Liangcai Cao**, Tsinghua Univ. (China); **Cheng-Huan Chen**, National Tsing Hua Univ. (Taiwan); **Janglin Chen**, Industrial Technology Research Institute (Taiwan); **Jurgen H. Daniel**, PARC, A Xerox Co. (USA); **Paul S. Drzaic**, Apple Inc. (USA); **Mark Fihn**, Apple Inc. (USA); **Norbert Fruehauf**, Univ. Stuttgart (Germany); **Nobuyuki Hashimoto**, Citizen Holdings Co., Ltd. (Japan); **Klaus Hecker**, VDMA (Germany); **Alex Henzen**, IRX-Innovations B.V. (Netherlands); **Yi-Pai Huang**, National Chiao Tung Univ. (Taiwan); **Lachezar Komitov**, Univ. of Gothenburg (Sweden); **ByoungHo Lee**, Seoul National Univ. (Korea, Republic of); **Sin-Doo Lee**, Seoul National Univ. (Korea, Republic of); **Kars-Michiël H. Lenssen**, Philips Research Nederland B.V. (Netherlands); **Akihiro Mochizuki**, i-CORE Technology, LLC (USA); **Keith Rollins**, DuPont Teijin Films U.K. Ltd. (United Kingdom); **Robert A. Sprague**, Amazon Lab126 (USA); **Andrew J. Steckl**, Univ. of Cincinnati (USA); **Michael Wittek**, Merck KGaA (Germany)

WEDNESDAY 31 JANUARY

SESSION 1 WED 1:30 PM TO 3:10 PM

3D, Light-Field, and AR/VR Displays

Session Chair: **Qiong-Hua Wang**, Sichuan Univ. (China)

Meta-resonant waveguide gratings: better optical combiners for augmented reality, Guillaume Basset, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) [10556-1]

Divers-augmented vision display (DAVD) emerging technology development, Dennis Gallagher, Naval Surface Warfare Ctr. Panama City Div. (USA) [10556-2]

Full-parallax three-dimensional display with spherical symmetry, Daerak Heo, Sungjin Lim, Geunseop Choi, Joonku Hahn, Kyungpook National Univ. (Korea, Republic of) [10556-3]

Horizontal-parallax-only light-field display with cylindrical symmetry, Geunseop Choi, Hosung Jeon, Daerak Heo, Kyungpook National Univ. (Korea, Republic of); Hwi Kim, Korea Univ. Sejong Campus (Korea, Republic of); Joonku Hahn, Kyungpook National Univ. (Korea, Republic of) [10556-4]

Hybrid light-field display, Dongyeon Kim, Seungjae Lee, Seokil Moon, ByoungHo Lee, Seoul National Univ. (Korea, Republic of) [10556-5]

SESSION 2 WED 3:40 PM TO 5:50 PM

Display Materials and Systems

Session Chair: **Akihiro Mochizuki**, i-CORE Technology, LLC (USA)

Fast Switching of vertically-aligned nematic liquid crystals by two-dimensional confinement with virtual walls (*Invited Paper*), Tae-Hoon Yoon, Tae-Hoon Choi, Yeongyu Choi, Jae-Hyeon Woo, Byoung-Gyu Jeon, Pusan National Univ. (Korea, Republic of) [10556-6]

Antireflection and self-cleaning film with moth-eye-like structure for mobile flexible displays (*Invited Paper*), Guanjun Tan, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Yi-Hsin Lan, National Taiwan Univ. (Taiwan); Mao-Kuo Wei, National Dong Hwa Univ. (Taiwan); Lung-Han Peng, I-Chun Cheng, National Taiwan Univ. (Taiwan); Shin-Tson Wu, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Jiun-Haw Lee, National Taiwan Univ. (Taiwan) [10556-7]

Negative dispersion retarder for the display compensation film (*Invited Paper*), Ji-Hoon Lee, Chonbuk National Univ. (Korea, Republic of) [10556-8]

Polymer-based fabrication of coupled microlens arrays for application to heads-up displays, Weicheng Yan, The Univ. of British Columbia (Canada); Xian Jin, The Univ. of British Columbia Okanagan (Canada); Hongbae S. Park, The Univ. of British Columbia (Canada); Hamid Abdollahi, Recon Instruments Inc. (Canada); Boris Stoeber, The Univ. of British Columbia (Canada); Jonathan F. Holzman, The Univ. of British Columbia Okanagan (Canada) [10556-9]

Customer acceptance on anti-glare solution, Sophie Porte, David Hue, Valeo (France) [10556-10]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Retinal projection type super multi-view 3D head-mounted display using the time-division projection optical system, Tadayuki Konda, Katsuhisa Tanaka, Kayo Yoshimoto, Hideya Takahashi, Osaka City Univ. (Japan) [10556-22]

A multi-object-oriented iterative closest-point algorithm in augmented reality, Zhenhao Wang, Jilin Univ (China); Yan Zhao, Shigang Wang, Jilin Univ. (China) [10556-23]

Fiber-optic in-line diffuser for suppression of speckle contrast, Ju-Il Hwang, Seungmin Lee, Jong-Cheol Shin, Young-Geun Han, Hanyang Univ. (Korea, Republic of) [10556-24]

Partially coherent holographic display system based on human factors engineering, Zehao He, Liangcai Cao, Hao Zhang, Guofan Jin, Tsinghua Univ. (China) [10556-25]

THURSDAY 1 FEBRUARY

SESSION 3 THU 8:00 AM TO 10:20 AM

Display Manufacturing and Metrology

Session Chair: **Tae-Hoon Yoon**, Pusan National Univ. (Korea, Republic of)

Color volumes in lab and ICtCp color spaces for viewing angle color characterization of QLED and OLED HDR displays (*Invited Paper*), Pierre M. Boher, Thierry Leroux, ELDIM (France); Pierre Blanc, Lab d'Essai de la FNAC (France) [10556-11]

Real-time integral imaging pickup system using camera array (*Invited Paper*), Yan Xing, Zhao-Long Xiong, Qiong-Hua Wang, Sichuan Univ. (China) [10556-12]

Stress metrology for flat-panel displays G6 and bigger, Wojtek J. Walecki, Frontier Semiconductor, Inc. (USA) [10556-13]

Optical mapping near-eye three-dimensional display with correct focus cues, Wei Cui, Liang Gao, Univ. of Illinois at Urbana-Champaign (USA) [10556-14]

Flexible InGaN micro-LED arrays integrated with amorphous-silicon thin-film transistors, Mohsen Asad Sr., Qing Li, Czung-Ho Lee, Philippe Pearson, Manoj Sachdev, William S. Wong, Univ. of Waterloo (Canada) [10556-15]

Development of a color mixer for mixed-color education and its outreach activities, Suezou Nakadate, Yuichiro Kume, Masato Shibuya, Jun Chen, Yoshihiko Azuma, Tsuyoshi Moriyama, Tokyo Polytechnic Univ. (Japan) [10556-16]

OPTO

CONFERENCE 10556

SESSION 4.....THU 10:50 AM TO 12:10 PM

Emissive Displays

Session Chair: **Jiun-Haw Lee**, National Taiwan Univ. (Taiwan)

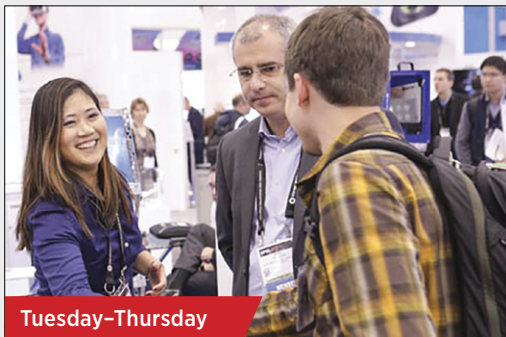
High-resolution active-matrix 10- μ m pixel-pitch GaN LED microdisplays for augmented reality applications, Francois Templier, Ludovic Dupré, Bertrand Dupont, Anis Daami, Bernard Aventurier, Franck Henry, Denis Sarrasin, Sébastien Renet, Frédéric Berger, François Olivier, Lydie Mathieu, CEA-LETI (France).....[10556-17]

Processing and characterization of high-resolution GaN-based micro-LED display, Huan-Yu Chien, National Chung Hsing Univ. (Taiwan); Ken-Yen Chen, Ray-Hua Horng, National Chiao Tung Univ. (Taiwan); Shih-Siang Yan, National Chung Hsing Univ. (Taiwan).....[10556-18]

Optical microcavity-based design for high-contrast displays, Osman Cifci, Mikayla Anderson, Ralph G Nuzzo, Paul V. Braun, Univ. of Illinois (USA).....[10556-19]

Light trapping for outside laser-display light harvesting, Yu Ping Zhang, Wen Song, The 55th technological Development Co., Ltd. (China); Guanjun Wang, Nanjing 55th Technological Development Co., Ltd (China); Kaian Wang, Liang Chen, Nanjing 55th Technological Development Co., Ltd. (China); Cheng Jiao, The 55th Research Institute of China Electronics Technology Group Corp. (China); Jianli Li, Nanjing Ecosmon Inc. (China); Jidong Yang, Yu Chen, Nanjing Ecosmon Inc. (China); Dao Zhang, The 55th Research Institute of China Electronics Technology Group Corp. (China).....[10556-20]

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Wednesday 31 January.....10:00 am to 5:00 pm

Thursday 1 February.....10:00 am to 4:00 pm

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- Optical components
- Communications technology
- Optical detectors
- High speed imaging and sensing
- Optical materials and substrates
- IR sources and detectors
- Electronic imaging components
- Optical coatings
- Lenses and filters
- Positions and mounts
- Metrology tools

CONFERENCE 10557

Wednesday–Thursday 31 January–1 February 2018 • Proceedings of SPIE Vol. 10557

Ultra-High-Definition Imaging Systems

Conference Chairs: **Seizo Miyata**, The Univ. of Electro-Communications (Japan); **Toyohiko Yatagai**, Utsunomiya Univ. (Japan); **Yasuhiro Koike**, Keio Univ. (Japan)

Program Committee: **Liangcai Cao**, Tsinghua Univ. (China); **Janglin Chen**, Industrial Technology Research Institute (Taiwan); **Ray T. Chen**, The Univ. of Texas at Austin (USA); **Toshio Chiba**, Nihon Univ. (Japan); **Namho Hur**, Electronics and Telecommunications Research Institute (Korea, Republic of); **Norihiko Ishii**, NHK Japan Broadcasting Corp. (Japan); **Toru Iwane**, Nikon Corp. (Japan); **Bahram Javidi**, Univ. of Connecticut (USA); **Kyuheon Kim**, Kyung Hee Univ. (Korea, Republic of); **Gauthier Lafruit**, Univ. Libre de Bruxelles (Belgium); **Byoungoo Lee**, Seoul National Univ. (Korea, Republic of); **Shiuan-Huei Lin**, National Chiao Tung Univ. (Taiwan); **Wolfgang Osten**, Institut für Technische Optik (Germany); **No-Cheol Park**, Yonsei Univ. (Korea, Republic of); **Ifor D. W. Samuel**, Univ. of St. Andrews (United Kingdom); **Mark Schubert**, Hollywood Post Alliance (USA); **Okihiro Sugihara**, Utsunomiya Univ. (Japan); **Xiaodi Tan**, Beijing Institute of Technology (China); **Kenkichi Tanioka**, Medical Imaging Consortium (Japan); **Din Ping Tsai**, Research Ctr. for Applied Sciences - Academia Sinica (Taiwan); **Kenji Yamamoto**, National Institute of Information and Communications Technology (Japan); **Hiromasa Yamashita**, Kairos Co. (Japan); **Whitney R. White**, Chromis Fiberoptics Inc. (USA)

WEDNESDAY 31 JANUARY

SESSION 1 WED 8:30 AM TO 10:10 AM

Storage I

Polarization holography for optical data storage, Toyohiko Yatagai, Utsunomiya Univ. CORE (Japan) [10557-1]

Optical memory for ultra-high-definition TV (*Invited Paper*), Xiaodi Tan, Xiao Lin, Jimpeng Liu, Li Yang, Beijing Institute of Technology (China); Hideyoshi Horimai, HolyMine Ltd. (Japan) [10557-2]

Holographic memory prototype drive with wavefront compensation for storing ultra-high-definition video signal (*Invited Paper*), Tetsuhiko Muroi, Yutaro Katano, Nobuhiro Kinoshita, Norihiko Ishii, NHK Japan Broadcasting Corp. (Japan) [10557-3]

Noise modeling and recording condition optimization for practical holographic drive (*Invited Paper*), Takeru Utsugi, Kazuhiko Ono, Yukinobu Tada, Hitachi-LG Data Storage, Inc. (Japan) [10557-4]

SESSION 2 WED 10:40 AM TO 12:20 PM

Imaging I

High-speed visible-light communication using organic semiconductors (*Invited Paper*), Ifor D. W. Samuel, Univ. of St Andrews (United Kingdom) [10557-5]

Ultra-high-definition display for light-field display (*Invited Paper*), Toru Iwane, Nikon Corp. (Japan) [10557-6]

8K super hi-vision technology and its medical application (*Invited Paper*), Kenkichi Tanioka, Medical Imaging Consortium (Japan) [10557-7]

Terrestrial ultra-high-definition broadcasting standard specification and its commercial service in Republic of Korea (*Invited Paper*), Kyuheon Kim, Kyung Hee Univ. (Korea, Republic of) [10557-8]

Lunch/Exhibition Break Wed 12:20 pm to 1:50 pm

SESSION 3 WED 1:50 PM TO 3:10 PM

Imaging II

A historical game-changer--The world's smallest 8K UHD endoscope: current state of the art (*Invited Paper*), Hiromasa Yamashita, Kairos Co., Ltd. (Japan); Kenkichi Tanioka, Medical Imaging Consortium (Japan); Toshio Chiba, Kairos Co., Ltd. (Japan) [10557-9]

Analysis of heat shrinkage of uniaxially heat-drawn films and synthesis of heat-resistant temperature-independent zero-birefringence polymer, Yuma Kobayashi, Keio Univ. (Japan); Akihiro Tagaya, Yasuhiro Koike, Keio Univ. (Japan) and Keio Photonics Research Institute (Japan) .. [10557-10]

Control of temperature-dependence of polymer birefringence for optical polymer films, Hiroaki Nagahama, Akihiro Tagaya, Keio Univ. (Japan); Yasuhiro Koike, Keio Univ. (Japan) and Keio Photonics Research Institute (Japan) [10557-11]

Organic-inorganic hybrid structure for high-resolution spatial light modulator (*Invited Paper*), Shiuan-Huei Lin, Vera Marinova, Ken Y. Hsu, National Chiao Tung Univ. (Taiwan) [10557-12]

SESSION 4 WED 3:40 PM TO 5:10 PM

Transmission I

Plastic fiber AOCs for UHD video (*Invited Paper*), Whitney R. White, Chromis Fiberoptics Inc. (USA) [10557-13]

Hybrid silicon photonic devices for high-bandwidth data and image processing and communications (*Invited Paper*), Ray T. Chen, The Univ. of Texas at Austin (USA) [10557-14]

Low-noise graded-index plastic optical fibers for consumer-friendly pluggable 8K optical interconnect (*Invited Paper*), Azusa Inoue, Yasuhiro Koike, Keio Univ. (Japan) [10557-15]

Significantly improved frequency response by low-noise graded-index plastic optical fiber, Kenta Muramoto, Azusa Inoue, Yasuhiro Koike, Keio Univ. (Japan) [10557-16]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>.

Proposal of material refractive index distribution measurement method based on lensless Fourier digital holography for holographic data storage, Natsuo Fushiki, Utsunomiya Univ. (Japan); Takashi Fukuda, National Institute of Advanced Industrial Science and Technology (Japan); Daisuke Barada, Utsunomiya Univ. (Japan); Toyohiko Yatagai, Utsunomiya Univ. Ctr. for Optical Research and Education (Japan) [10557-32]

Investigation of diffractive noises for holographic data storage by light propagation analysis with a refractive parameter, Satoshi Tagami, Daisuke Barada, Toyohiko Yatagai, Utsunomiya Univ. (Japan) [10557-33]

Position error measurement of recording medium by using known signal pattern in holographic data storage, Ittoku Hirashima, Daisuke Barada, Toyohiko Yatagai, Utsunomiya Univ. (Japan) [10557-34]

Improvement of data page restoring method using household transformation for holographic data storage, Shaqueeb Sarwar, Daisuke Barada, Toyohiko Yatagai, Utsunomiya Univ. (Japan) [10557-35]

High SBP compressive holography with an efficient block-wise model, Hua Zhang, Liangcai Cao, Wenhui Zhang, Hao Zhang, Guofan Jin, Tsinghua Univ. (China) [10557-36]

OPTO

CONFERENCE 10557

THURSDAY 1 FEBRUARY

SESSION 5.....THU 8:30 AM TO 11:20 AM

Storage II

Title to be determined (*Invited Paper*), No-Cheol Park, Yonsei Univ. (Korea, Republic of) [10557-17]

Spatial digital signal theory for holographic data storage (*Invited Paper*), Daisuke Barada, Utsunomiya Univ. (Japan) [10557-18]

Extension of temperature tolerance of recording medium in high-density holographic data storage (*Invited Paper*), Ching-Cherng Sun, Yeh-Wei Yu, Chih-Yuan Cheng, National Central Univ. (Taiwan); Shiu-an-Huei Lin, National Chiao Tung Univ. (Taiwan); Xuan-Hao Lee, Tsung-Hsun Yang, National Central Univ. (Taiwan) [10557-19]

Multilayer volume holographic optical memory with reduced crosstalk (*Invited Paper*), Liangcai Cao, Zehao He, Song Zong, Chunrong Chen, Guofan Jin, Tsinghua Univ. (China) [10557-20]

Material-response-function enhanced optical model of holographic data storage system (*Invited Paper*), Yeh-Wei Yu, Chi-Hsien Yang, Tsung-Hsun Yang, National Central Univ. (Taiwan); Shiu-an-Huei Lin, National Chiao Tung Univ. (Taiwan); Xuan-Hao Lee, Ching-Cherng Sun, National Central Univ. (Taiwan) [10557-21]

Polarization-controlled dual images recording with linear polarization holography, Jinliang Zang, Fenglan Fan, Ying Liu, Yifan Hong, Long Shao, Xiaodi Tan, Beijing Institute of Technology (China) [10557-22]

SESSION 6.....THU 11:20 AM TO 12:10 PM

Holography

Hologram printing for next-generation holographic display (*Invited Paper*), Kenji Yamamoto, National Institute of Information and Communications Technology (Japan) [10557-23]

Grating-based wide field-of-view digital holography for ultra-high-definition imaging (*Invited Paper*), Wenhui Zhang, Liangcai Cao, Hua Zhang, Guofan Jin, Tsinghua Univ. (China) [10557-24]

Lunch/Exhibition Break Thu 12:10 pm to 1:40 pm

SESSION 7.....THU 1:40 PM TO 3:10 PM

Imaging III

How to drive optical measurement systems to outstanding performance (*Invited Paper*), Wolfgang Osten, Institut für Technische Optik (Germany); Eberhard Manske, Institute for Process Measurement and Sensor Technology, Univ. of Technology Ilmenau (Germany) [10557-25]

High-image-quality high-resolution camera with high sensitivity up to 1100 nm (*Invited Paper*), Takeshi Koyama, Hiroyuki Ishihara, Teruo Hieda, Kazuhiko Kawase, Michio Ishikawa, Shuya Satoh, Hiroyuki Hashimoto, Canon Inc. (Japan) [10557-26]

55-inch 8K4K IPS-LCDs with high frame frequency, wide color gamut, and stereovision (*Invited Paper*), Junichi Maruyama, Panasonic Liquid Crystal Display Co., Ltd. (Japan) [10557-27]

Control of birefringence dispersion with no photoelasticity for photonics polymers, Kenta Hirose, Akihiro Tagaya, Keio Univ. (Japan); Yasuhiro Koike, Keio Univ. (Japan) and Keio Photonics Research Institute (Japan) .. [10557-28]

SESSION 8.....THU 3:40 PM TO 4:45 PM

Transmission II

Polymer-based high-speed data transmission devices and system applications (*Invited Paper*), Okihito Sugihara, Freddy S. Tan, Utsunomiya Univ. (Japan) [10557-29]

Ballpoint-pen interconnect of graded-index plastic optical fiber for pluggable optical interface cable, Yugo Kaseda, Azusa Inoue, Keio Univ. (Japan); Akihito Mitsui, Hitoshi Suzuki, Mitsubishi Pencil Co., Ltd. (Japan); Yasuhiro Koike, Keio Univ. (Japan) [10557-30]

Advanced photonics polymer for real color imaging systems towards 8K era, Yasuhiro Koike, Keio Univ. (Japan) [10557-31]

CONFERENCE 10558

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10558

Practical Holography XXXII: Displays, Materials, and Applications

Conference Chairs: **Hans I. Bjelkhagen**, Glyndwr Univ. (United Kingdom), Hansholo Consulting Ltd. (United Kingdom);
V. Michael Bove Jr., MIT Media Lab. (USA)

Program Committee: **Maria Isabel Azevedo**, ID+ Research Institute for Design, Media, and Culture, Univ de Aveiro (Portugal);
David Brotherton-Ratcliffe, Geola Technologies Ltd. (United Kingdom); **Frank C. Fan**, Shenzhen AFC Technology Co., Ltd. (China);
Gerald L. Heidt, Wasatch Photonics, Inc. (USA); **Toshio Honda**, Toppan Printing Co., Ltd. (Japan); **Fujio Iwata**, Toppan Printing Co., Ltd. (Japan); **Michael A. Klug**, Magic Leap, Inc. (USA); **Alkiviadis Lembessis**, The Hellenic Institute of Holography (Greece); **Deanna McMillen**, L-3 Communications EOTech (USA); **Martina L. Mrongovius**, RMIT Univ. (Australia), Ctr. for the Holographic Arts (USA), Academy of Media Arts, Cologne KHM (Germany); **Hiroshi Yoshikawa**, Nihon Univ. (Japan)

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:00 PM

Applications I

- Can we overcome display holography's brick wall?** (*Invited Paper*), Ian M. Lancaster, Reconnaissance International Ltd. (United Kingdom) [10558-1]
- Monochrome and color holography of pre-Hispanic Colombian goldwork: a way of Colombian heritage appropriation**, Alejandro Madrid Sánchez, Daniel Velásquez-Prieto, Univ. EAFIT (Colombia) [10558-2]
- Holographic diffraction gratings based on photopolymers: achieved results and new opportunities in astronomical spectroscopy**, Andrea Bianco, Alessio Zanutta, Marco Landoni, Paola Galli, Chiara Righi, INAF - Osservatorio Astronomico di Brera (Italy) [10558-3]
- Compact spectral multiplexing VPHGs using stacked photopolymeric layers**, Alessio Zanutta, Marco Landoni, Marco Riva, Andrea Bianco, INAF - Osservatorio Astronomico di Brera (Italy) [10558-4]
- Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 2 MON 1:30 PM TO 3:10 PM

Applications II

- Fresnel lenses fabricated in a two-component holographic photopolymer via dithered binary mask exposure**, David J. Glugla, Marvin D. Alim, Robert R. McLeod, Univ. of Colorado Boulder (USA) [10558-5]
- On-axis 3D microscope for x-ray beamlines at NSLS-II**, Kazimierz J. Gofron, Brookhaven National Lab. (USA); Jakub Wlodek, Stony Brook Univ. (USA); Yong Q. Cai, Brookhaven National Lab. (USA) ... [10558-7]
- Digital holography for the investigation of buried structures with a common-path reflection microscope**, Lena Göring, Markus Finkeldey, Martin R. Hofmann, Nils C. Gerhardt, Ruhr-Univ. Bochum (Germany) [10558-8]
- An updated diorama with a full-color H2 analog hologram**, Philippe Gentet, Kwangwoon Univ. (Korea, Republic of); Yves Gentet, Ultimate Holography (France); Seung-Hyun Lee, Kwangwoon Univ. (Korea, Republic of) [10558-9]
- Dynamic measurement of propagating waves in a piezoelectric linear motor by using shadow moiré method**, Shih-Lun Tai, Chun-Hsiung Wang, Sheng-Hsun Wu, Yu-Hsiang Hsu, Chih-Kung Lee, National Taiwan Univ. (Taiwan) [10558-10]

SESSION 3 MON 3:40 PM TO 5:10 PM

Materials and Processes

- On the impact of incoherent pre-exposure on vHOE recording in Bayfol® HX for see-through applications** (*Invited Paper*), Friedrich-Karl Bruder, Thomas P. Fäcke, Sven Hansen, Dennis Hönel, Christel Manecke, Christian Rewitz, Thomas Rölle, Enrico Orsell, Covestro AG (Germany) [10558-11]
- Formate as a sensitivity enhancer of holographic emulsions**, William R. Alschuler, California Institute of the Arts (USA) [10558-12]
- High dynamic range two-stage photopolymer materials through enhanced solubility high-refractive index writing monomers**, Marvin D. Alim, Sudheendran Mavila, David J. Glugla, Amy C. Sullivan, Christopher N. Bowman, Robert R. McLeod, Univ. of Colorado Boulder (USA) [10558-13]
- Spectral analysis of volume holograms in materials with diffusion-based formation mechanisms by means of coupled wave theory and Kramers-Kronig relations**, Vladimir N. Borisov, Aleksandr E. Angervaks, Aleksander I. Ryskin, Andrey V. Veniaminov, ITMO Univ. (Russian Federation) [10558-14]

OPTO

CONFERENCE 10558

TUESDAY 30 JANUARY

SESSION 4 TUE 8:00 AM TO 10:10 AM

Digital Holography I

Validation of objective image quality evaluation for computer-generated hologram (*Invited Paper*), Hiroshi Yoshikawa, Takeshi Yamaguchi, Hiroki Uetake, Nihon Univ. (Japan) [10558-15]

Development of full-color volume hologram printer, Miki Hirohashi, Shoma Aoyagi, Takeshi Yamaguchi, Hiroshi Yoshikawa, Nihon Univ. (Japan) [10558-16]

Design, development, and implementation of a low-cost full-parallax hologram printer, Alejandro Madrid Sánchez, Daniel Velásquez-Prieto, Univ. EAFIT (Colombia) [10558-17]

Frequency domain processing of digital holograms applied to high-accurate vision-based position control in micro-robotics, Maxime Jacquot, FEMTO-ST (France); Miguel Asmad Vergara, Pontificia Univ. Católica del Perú (Peru); Guillaume Laurent, Patrick Sandoz, FEMTO-ST (France) [10558-18]

Resolution-enhanced digital in-line holographic microscope with segmentation and pixel super-resolution techniques, Mingjun Wang, Jigang Wu, Shanghai Jiao Tong Univ. (China) [10558-19]

View synthesis from sparse camera array for pop-out rendering on hologram displays, Lode Jorissen, Univ. Hasselt (Belgium); Boaz Jessie Jackin, Koki Wakunami, Kenji Yamamoto, National Institute of Information and Communications Technology (Japan); Gauthier Lafruit, Univ. Libre de Bruxelles (Belgium); Philippe Bekaert, Univ. Hasselt (Belgium) [10558-20]

SESSION 5 TUE 10:40 AM TO 12:20 PM

Digital Holography II

Progress in transparent flat-panel holographic displays enabled by guided-wave acousto-optics, Sundeep Jolly, Nickolaos Savidis, Bianca C. Datta, MIT Media Lab. (USA); Daniel Smalley, Brigham Young Univ. (USA); V. Michael Bove Jr., MIT Media Lab. (USA) [10558-21]

Full-color holographic 3D display on a single SLM based on spatial sampling and selective frequency-filtering of color holograms, Shufeng Lin, Yong Seok Hwang, Eun-Soo Kim, Kwangwoon Univ. (Korea, Republic of) [10558-22]

Regional gamma curve calibration of liquid crystal SLM for holographic display, Tao Zhao, Juan Liu, Xinhui Duan, Qiankun Gao, Beijing Institute of Technology (China) [10558-23]

Volume holographic display based on phase-only computer generated holograms, Liangcai Cao, Zehao He, Dezhao Kong, Chunrong Chen, Hao Zhang, Guofan Jin, Tsinghua Univ. (China) [10558-24]

Sub-millimeter depth resolved digital holography, Jeroen Kalkman, Technische Univ. Delft (Netherlands) [10558-25]

TECHNICAL GROUP 7:30 PM TO 9:00 PM

Holography

Session Chairs : **Hans I. Bjelkhagen**, Glyndwr Univ. (United Kingdom), Hansholo Consulting Ltd. (United Kingdom);
V. Michael Bove, MIT Media Lab. (USA)

The Holography Technical Group is involved with the whole record of research, engineering, recording materials, and applications of holography. The main fields of interest are display holograms, commercial and artistic, holographic optical elements (HOEs), holographic interferometry and holographic non-destructive testing (HNNT), computer-generated holography (CGH), electro and digital holography, holographic microscopy, and holographic data storage (HDS). This meeting will focus on recent developments and directions, in particular, in regard to new materials, color display holography, digital holography, CGHs and HOEs.

WEDNESDAY 31 JANUARY

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Holographic recording in synthetic dye of system PVA and cupric chloride, María G. Conde-Cuatzo, Univ. Autonoma de Puebla (Mexico); Arturo Olivares-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Santa Toxqui-López, Benemérita Univ. Autónoma de Puebla (Mexico); Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Danae Hernández-Fonseca, Benemérita Univ. Autónoma de Puebla (Mexico) [10558-26]

Viewing window position control on holographic projection system by electrically focused tunable lens, Keehoon Hong, Kwan-Jung Oh, Hyon-Gon Choo, Yongjun Lim, Min Sik Park, Electronics and Telecommunications Research Institute (Korea, Republic of) [10558-27]

Diffraction pattern of gratings with radial symmetry and local modified periods, Arturo Olivares-Pérez, Joan Manuel Villa Hernández, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Santa Toxqui-López, Benemérita Univ. Autónoma de Puebla (Mexico); Mauricio Ortiz-Gutiérrez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); Manuel Jorge Ordóñez-Padilla, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Nildia Yamilet Mejías-Brisuela, Univ. Politécnica de Sinaloa (Mexico) [10558-28]

Photo-physicochemical mechanism of fluorescent system in holographic recording on albumin films with eosin-acrylamide, Manuel Jorge Ordóñez-Padilla, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) [10558-29]

Binary patterns tool for computer-generated holograms, Joan Manuel Villa Hernández, Arturo Olivares-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) [10558-30]

Effect of camera's fixed pattern noise on digital hologram reconstruction, Pavel A. Cheremkhin, Nikolay N. Evtikhiev, Vitaly V. Krasnov, Vladislav G. Rodin, Rostislav S. Starikov, National Research Nuclear Univ. MEPhI (Russian Federation) [10558-31]

Application to optical secret key sharing cryptography using phase-shifting digital holography, Sang-Keun Gil, The Univ. of Suwon (Korea, Republic of); Seok-Hee Jeon, Incheon National Univ. (Korea, Republic of); Jong-Rae Jung, Suwon Science College (Korea, Republic of) [10558-32]

Kinoform synthesis using phase Fourier hologram as basis for iterative algorithm, Vitaly V. Krasnov, Nikolay N. Evtikhiev, Pavel A. Cheremkhin, Vladislav G. Rodin, National Research Nuclear Univ. MEPhI (Russian Federation) [10558-33]

Measurement of phase modulation of an amplitude liquid crystal spatial light modulator HoloEye LC 2002 by dual-beam interferometric method, Vitaly V. Krasnov, Dmitriy S. Goncharov, Nikolay N. Ponomarev, Rostislav S. Starikov, National Research Nuclear Univ. MEPhI (Russian Federation) [10558-34]

The Rainbow CvBE: coherent v beam educator, Vivian Amos Sureshkumar, Krishna Nama Manjunatha, Martin J. Richardson, De Montfort Univ. (United Kingdom) [10558-35]

Color dispersion free holographic screen based on volume holographic optical element for augmented reality space projection display, Hyoung Sik Kim, Eun-Soo Kim, Yong Seok Hwang, Kwangwoon Univ. (Korea, Republic of) [10558-36]

Effect of degree of hydrolysis of polyvinyl alcohol on the diffraction efficiency from the gratings recorded in polyvinyl alcohol with ferric chloride films, Santa Toxqui-López, Benemérita Univ. Autónoma de Puebla (Mexico); Arturo Olivares-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Jairo Marroquín-Ramírez, Benemérita Univ. Autónoma de Puebla (Mexico); Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) [10558-37]

Evaluation of polymerization and diffusion times in holographic recording for acrylamide-based photopolymer film, Masashi Ohkawa, Niigata Univ. (Japan); Keiichi Osabe, Nagaoka Univ. of Technology (Japan); Takashi Sato, Niigata Univ. (Japan) [10558-38]

CONFERENCE 10559

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10559

Broadband Access Communication Technologies XII

Conference Chairs: **Benjamin B. Dingel**, Nasfinc Photonics, Inc. (USA); **Katsutoshi Tsukamoto**, Osaka Institute of Technology (Japan); **Spiros Mikroulis**, Huawei Technologies Duesseldorf GmbH (Germany)

Program Committee: **Harald Haas**, The Univ. of Edinburgh (United Kingdom); **Atsushi Kanno**, National Institute of Information and Communications Technology (Japan); **Mohsen Kavehrad**, The Pennsylvania State Univ. (USA); **Nathaniel Libatique**, Ateneo de Manila Univ. (Philippines); **Nicholas Madamopoulos**, The City College of New York (USA); **Ken-ichi Sato**, Nagoya Univ. (Japan); **Atul K. Srivastava**, NEL America, Inc. (USA); **Manoj Thakur**, Univ. College London (United Kingdom); **Junwen Zhang**, ZTE USA (USA)

Conference Cosponsors:  

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:00 PM

Optical Communication Keynote Session

Joint Session with Conferences 10559 and 10561

Session Chairs: **Guifang Li**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Benjamin B. Dingel**, Nasfinc Photonics, Inc. (USA)

Long-distance quantum key distribution (Keynote Presentation), Qiang Zhang, Univ. of Science and Technology of China (China). [10561-1]

Low-power and low-cost silicon-photonics coherent transceivers (Keynote Presentation), Christopher R. Doerr, Acacia Communications (USA) [10561-2]

Secure long-range and high bit-rate distribution of shared key using dark states ultra-long fiber laser (UFL) (Keynote Presentation), Jacob Scheuer, Tel Aviv Univ. (Israel) [10559-1]

BEST PAPER AWARDS CEREMONY

MONDAY 29 JANUARY 2018 12:00 PM TO 12:10 PM

Join us as we announce the winners of the Optical Communications Best Paper Awards. These awards will recognize the outstanding work of students and professionals who present the most notable recent results with broad impact in the area of optical communications. We will award one Best Student Paper Award and one Best Technical Paper Award (post-docs or early career professionals). All papers within Optical Communications conferences 10559, 10560, and 10561 qualify. See the OPTO awards page for eligibility and application requirements.

AWARD SPONSORS:

Lunch Break Mon 12:10 pm to 1:10 pm

SESSION 2 MON 1:10 PM TO 3:30 PM

Special Session on Advances in Secured Optical Communication

Session Chairs: **Guifang Li**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Jacob Scheuer**, Tel Aviv Univ. (Israel)

Quantum key distribution in multicore fibre for secure radio access networks (Invited Paper), Roberto Llorente, Ctr. de Tecnología de Nanofotonics, Univ. Politècnica de València (Spain); Antoine Provot, Ecole Nationale Supérieure d'Ingenieurs de Caen et Ctr. de Recherche (France); Maria Morant, Univ. Politècnica de València (Spain). [10559-2]

Optical-code-based technology for high-speed secure optical communication (Invited Paper), Xu Wang, Heriot-Watt Univ. (United Kingdom) [10559-3]

Coincidence studies of entangled photon pairs using nanowire detection and high-resolution time tagging for QKD application, Evan Katz, Roger P. Tokars, Ian R. Nemitz, John J. Pouch, NASA Glenn Research Ctr. (USA); Tony Roberts, Philip Battle, AdvR, Inc. (USA); Bertram M. Floyd, Sierra Lobo, Inc. (USA); Skyler Baugher, The Univ. of Toledo (USA); Nathaniel C. Wilson, Duke Univ. (USA); John D. Lekki, NASA Glenn Research Ctr. (USA) [10559-4]

Cloaking data in optical networks, Moti Fridman, Bar-Ilan Univ. (Israel) [10559-5]

Field trial of a QKD and high-speed classical data hybrid metropolitan network, Adrian Wonfor, Han Qin, Univ. of Cambridge (United Kingdom); Rupesh Kumar, Univ. of York (United Kingdom); Xinke Tang, Univ. of Cambridge (United Kingdom); James F. Dynes, Andrew J. Shields, Toshiba Research Europe Ltd. (United Kingdom); Richard V. Penty, Ian H. White, Univ. of Cambridge (United Kingdom) [10559-6]

Liquid surface oscillations for a time-dependent random-phase security system, Wei-Chih Wang, National Tsing Hua Univ. (Taiwan); David Schipf, Univ. of Washington (USA) [10559-7]

CONFERENCE 10559

SESSION 3 MON 4:00 PM TO 6:00 PM

5G Mobile Broadband and Advanced Front-haul Networks

Session Chairs: **Katsutoshi Tsukamoto**, Osaka Institute of Technology (Japan); **Spiros Mikroulis**, Huawei Technologies (Germany)

Distributed MIMO network for 5G-enhanced mobile broadband (*Invited Paper*), Fumiyuki Adachi, Tohoku Univ. (Japan) [10559-8]

Photonic-based heterogeneous wireless links for 5G network in dense user environment (*Invited Paper*), Hiroshi Murata, Osaka Univ. (Japan); Hiroyuki Toda, Doshisha Univ. (Japan); Naruto Yonemoto, Yasuyuki Kakubari, Electronic Navigation Research Institute (Japan); Nobuhiko Shibagaki, Hitachi, Ltd. (Japan); Kensuke Ikeda, Central Research Institute of Electric Power Industry (Japan); Hiroshi Mano, Kodens Techno Info K.K. (Japan) [10559-9]

5G small-cell networks leveraging optical technologies with mm-wave massive MIMO and MT-MAC protocols (*Invited Paper*), Sotiris Papaioannou, George Kalfas, Christos Vagionas, Charoula Mitsolidou, Pavlos Maniotis, Amalia Miliou, Nikos Pleros, Aristotle Univ. of Thessaloniki (Greece) [10559-10]

Coexistence of enhanced mobile broadband communications and ultra reliable low latency communications in mobile front-haul, Kai Ying, John M. Kowalski, Toshizo Nogami, Zhanping Yin, Jia Sheng, Sharp Labs. of America, Inc. (USA) [10559-11]

Vector signal generation and transmission by radio-over-fiber system with frequency doubling at 96 GHz, Naoki Kanada, Naruto Yonemoto, National Institute of Maritime, Port and Aviation Technology (Japan); Tetsuya Kawanishi, Waseda Univ. (Japan) [10559-12]

TUESDAY 30 JANUARY

SESSION 4 TUE 8:40 AM TO 10:20 AM

Free-Space and Optical Wireless Communication Technologies

Session Chairs: **Shlomi Arnon**, Ben-Gurion Univ. of the Negev (Israel); **Mohsen Kavehrad**, The Pennsylvania State Univ. (USA)

Approaching fundamental limits to free-space communication through atmospheric turbulence (*Invited Paper*), Joseph M. Kahn, Stanford Univ (USA); Aniceto Belmonte, Technical University of Catalonia (Spain) [10559-13]

Beamsteering for ultra-high data-rate optical wireless communications (*Invited Paper*), Dominic C. O'Brien, Univ of Oxford (United Kingdom) [10559-14]

Optimized optical wireless channel for indoor and intra-vehicle communications: power distribution and SNR analysis, Rana Shaaban, Saleh Faruque, Univ. of North Dakota (USA) [10559-15]

Indoor communications networks realized through hybrid free-space optical and wifi links, Spencer Liverman, Qiwei Wang, Anindita Borah, Yu-Jung Chu, Arun Natarajan, Thinh Nguyen, Alan X. Wang, Oregon State Univ. (USA) [10559-16]

SESSION 5 TUE 10:50 AM TO 12:20 PM

VLC and Optical Wireless Communication Technologies

Session Chair: **Dominic C. O'Brien**, Univ. of Oxford (United Kingdom)

LED-based high-speed visible light communications (*Invited Paper*), Nan Chi, Jianyang Shi, Yingjun Zhou, Xingyu Lu, Liang Qiao, Fudan Univ. (China) [10559-17]

Optical wireless communication in data-center applications, Shlomi Arnon, Ben-Gurion Univ. of the Negev (Israel) [10559-18]

Novel modulation scheme for VLC, Rizwana Ahmad, Anand Srivastava, Indraprastha Institute of Information Technology (India) [10559-19]

Optical antenna for a visible light communications receiver, Camilo Valencia-Estrada, Jorge García-Márquez, Suat Topsu, Oledcomm (France); Luc Chassagne, Univ. de Versailles Saint-Quentin-en Yvelines (France) [10559-20]

Lunch/Exhibition Break Tue 12:20 pm to 1:50 pm

SESSION 6 TUE 1:50 PM TO 3:30 PM

Advanced Optical Fiber, 5G Networks, and Passive Optical Networks (PON)

Session Chairs: **Katsutoshi Tsukamoto**, Osaka Institute of Technology (Japan); **Benjamin B. Dingel**, Nasfine Photonics, Inc. (USA)

Bend-insensitive optical fiber with high mechanical reliability for silicon-phonic packaging (*Invited Paper*), Ming-Jun Li, Corning Incorporated (USA) [10559-21]

Passive optical networks for 5G evolution (*Invited Paper*), Jun Shan Wey, Junwen Zhang, ZTE USA (USA) [10559-22]

Optimised QoS-aware integrated fiber-wireless architecture based on XGPON and EDCA, Ravneet Kaur, Anand Srivastava, Indraprastha Institute of Information Technology (India) [10559-23]

Experimental characterization of first-order polarization-mode dispersion in multi-core fiber, Andrés Macho Ortiz, Roberto Llorente, Univ. Politècnica de València (Spain) [10559-24]

SESSION 7 TUE 4:00 PM TO 5:20 PM

5G, Millimeter-Wave Technologies, and Advanced MIMO RoF Systems

Session Chair: **Katsutoshi Tsukamoto**, Osaka Institute of Technology (Japan)

Radio-over-fiber network technology for millimeter-wave distributed radar systems (*Invited Paper*), Atsushi Kanno, National Institute of Information and Communications Technology (Japan) [10559-25]

Fiber to 5G wireless networks: Optical-wireless convergence from a business perspective: challenges and opportunities (*Invited Paper*), Le Nguyen Binh, Spiros Mikroulis, Huawei Technologies Co., Ltd. (Germany) [10559-26]

Large-capacity long-distance bidirectional wireless signal transmission at hybrid K- and W-band, Xinying Li, Georgia Institute of Technology (USA) [10559-27]

WEDNESDAY 31 JANUARY

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Robust visible light communication technique based on the threshold map for smart indoor service, Yong Up Lee, Hallym Univ. (Korea, Republic of); Kyeong-Yoon Kang, Hallym Univ (Korea, Republic of); Ho-Koon Park, Hallym Univ. (Korea, Republic of) [10559-28]

Experimental evaluation of radio-over-fiber relay system using STBC and MRC, Yuki Mizusawa, Ikuya Kitamura, Kazuo Kumamoto, Hong Zhou, Osaka Institute of Technology (Japan) [10559-29]

Adiabatic fiber-coupler for mode-multiplexing, Simon Bolduc Beaudoin, Nicolas Godbout, Ecole Polytechnique de Montréal (Canada) [10559-30]

Lightweight multi-carrier modulation for IOT, Ahmed Hussein, Univ. at Albany (USA) and Arab Academy for Science, Technology & Maritime Transport (Egypt); Hany Elgala, Univ. at Albany (USA) [10559-31]

Enhancing security of optical cryptosystem against ciphertext-only attack with position-multiplexing and ultra-broadband illumination, Dongliang Tang, Nanyang Technological Univ. (Singapore); Sujit Kumar Sahoo, National Univ. of Singapore (Singapore) and Nanyang Technological Univ. (Singapore); Cuong Dang, Nanyang Technological Univ. (Singapore) [10559-32]

CONFERENCE 10560

Tuesday–Wednesday 30–31 January 2018 • Proceedings of SPIE Vol. 10560

Metro and Data Center Optical Networks and Short-Reach Links

Conference Chairs: **Atul K. Srivastava**, NEL America, Inc. (USA); **Madeleine Glick**, Massachusetts Institute of Technology (USA); **Youichi Akasaka**, Fujitsu Labs. of America, Inc. (USA)

Program Committee: **Philippe P. Absil**, IMEC (Belgium); **Shlomi Arnon**, Ben-Gurion Univ. of the Negev (Israel); **Kasyapa Balemarthy**, OFS Optics (India); **Carsten Behrens**, Univ. College London (United Kingdom); **Hacene Chaouch**, Arista Networks Inc (USA); **Benjamin B. Dingel**, Nasfine Photonics, Inc. (USA); **Ivan B. Djordjevic**, The Univ. of Arizona (USA); **Achyut K. Dutta**, Banpil Photonics, Inc. (USA); **Mitchell H. Fields**, Broadcom Ltd. (USA); **Ronald Freund**, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); **Kiyo Ishii**, National Institute of Advanced Industrial Science and Technology (Japan); **Hideki Isono**, Fujitsu Optical Components Ltd. (Japan); **Hai-Feng Liu**, Intel Corp. (USA); **B. Jonathan Luff**, Mellanox Technologies, Inc. (USA); **Yojiro Mori**, Nagoya Univ. (Japan); **Takahiro Nakamura**, Photonics Electronics Technology Research Association (Japan); **Wilfried Noell**, Süss MicroOptics SA (Switzerland); **Bishnu P. Pal**, Bennett Univ. (India); **Sebastian Randel**, Karlsruher Institut für Technologie (Germany); **Houman Rastegarfar**, College of Optical Sciences, The Univ. of Arizona (USA); **Jacklyn D. Reis**, CPqD (Brazil); **Takashi Saida**, NTT Photonics Labs. (Japan); **Payman Samadi**, Columbia Univ. (USA); **Michela Svaluto Moreolo**, Ctr. Tecnològic de Telecomunicacions de Catalunya (Spain); **Krishna Swaminathan**, Intel Corp. (USA); **Idelfonso Tafur Monroy**, DTU Fotonik (Denmark); **Takashi Takemoto**, Hitachi, Ltd. (Japan); **Werner Weiershausen**, Deutsche Telekom AG (Germany); **Jianjun Yu**, ZTE USA (USA)

Conference Cosponsors:  

TUESDAY 30 JANUARY

SESSION 1.....TUE 1:30 PM TO 3:35 PM

Short Reach Transmission Techniques

Session Chairs: **Youichi Akasaka**, Fujitsu Labs. of America, Inc. (USA); **Ivan B. Djordjevic**, The Univ. of Arizona (USA)

The best modulation format for 100G short-reach system: DMT, PAM-4, CAP or duobinary? (*Invited Paper*), Junwen Zhang, ZTE USA (USA). [10560-1]

Real-time system based on FPGA for optical communication system (*Invited Paper*), Ming Chen, Hunan Normal Univ. (China); Rui Deng, Qinghui Chen, Jing He, Lin Chen, Hunan Univ. (China) [10560-2]

DSP technologies in the Stokes vector receivers for short-reach optical transmission systems (*Invited Paper*), Shota Ishimura, Kosuke Nishimura, KDDI R&D Labs., Inc. (Japan) [10560-3]

Injection-locked single-mode VCSEL and DFB laser diode for orthogonal multiplexing and amplitude noise suppression: experimental and numerical studies up to 10 Gbit/s (*Invited Paper*), Franko Kueppers, Technische Univ. Darmstadt (Germany) [10560-4]

Experimental investigation of auxiliary management and control channel superimposition for mobile fronthaul network in DWDM-PON system (*Invited Paper*), Goji Nakagawa, Kyosuke Sone, Fujitsu Ltd. (Japan); Shoichiro Oda, Setsuo Yoshida, Fujitsu Labs., Ltd. (Japan); Motoyuki Takizawa, Yoshio Hirose, Takeshi Hoshida, Fujitsu Ltd. (Japan) [10560-5]

SESSION 2.....TUE 4:05 PM TO 5:25 PM

Short Reach Networks I

Session Chairs: **Takashi Saida**, NTT Photonics Labs. (Japan); **Benjamin B. Dingel**, Nasfine Photonics, Inc. (USA)

Design and optimization of photonic devices and optical fibers for space-division multiplexing (*Invited Paper*), B.M. Azizur Rahman, City, Univ. of London (United Kingdom) [10560-6]

An SOA-integrated EADFB laser for enhancement of modulated light output power and extension of transmission distances (*Invited Paper*), Takahiko Shindo, NTT Device Innovation Ctr. (Japan); Wataru Kobayashi, NTT Device Technology Labs. (Japan); Naoki Fujiwara, NTT Device Innovation Ctr. (Japan); Yoshitaka Ohiso, NTT Device Technology Labs. (Japan); Toshihide Yoshimatsu, NTT Device Innovation Ctr. (Japan); Hiroyuki Ishii, NTT Device Technology Labs. (Japan); Kimikazu Sano, NTT Device Innovation Ctr. (Japan); Hideaki Matsuzaki, NTT Device Technology Labs. (Japan) [10560-7]

Network topology and node connectivity in OPS/OBS photonic switched optical networks, Phillip Rudge Barbosa, Univ. Estadual de Campinas (Brazil); Indayara Martins, Pontifícia Univ. Católica de Campinas (Brazil) [10560-8]

Impact of number of channels on signal transmission in elastic optical network, Indayara Bertoldi Martins, Indayara Bertoldi Martins, Pontifícia Univ. Católica de Campinas (Brazil); Grethell Pérez-Sánchez, Univ. Autónoma Metropolitana (Mexico); Ivan Aldaya, Univ. Estadual Paulista “Júlio de Mesquita Filho” (Brazil); André Aguiar, Univ. Federal de Uberlândia (Brazil); Phillip Rudge Barbosa, Univ. Estadual de Campinas (Brazil) [10560-9]

WEDNESDAY 31 JANUARY

SESSION 3.....WED 8:30 AM TO 10:25 AM

Scaling Datacenter Optical Interconnects

Session Chairs: **Madeleine Glick**, Massachusetts Institute of Technology (USA); **Hideki Isono**, Fujitsu Optical Components Ltd. (Japan)

Scaling optical interconnects to meet the bandwidth density crunch (*Invited Paper*), Oded Raz, Chenhui Li, Gonzalo Guelbenzu de Villota, Teng Li, Ripalta Stabile, Technische Univ. Eindhoven (Netherlands) [10560-10]

Photonic switching platform for datacenters enabling rapid network reconfiguration (*Invited Paper*), Benjamin G. Lee, IBM Thomas J. Watson Research Ctr. (USA) [10560-11]

Scalable highly flexible WDM switch for ONoC architectures, Nicolas Michit, STMicroelectronics (France) and Institut des Nanotechnologies de Lyon (France) and CEA-LETI (France); Audrey Michard, STMicroelectronics (France) and Lab. de Génie Électrique de Paris (France); Patrick Le Maitre, STMicroelectronics (France); Benoit Charbonnier, CEA-LETI (France); Jean-Francois Carpentier, STMicroelectronics (France); Régis Orobitchouk, Institut des Nanotechnologies de Lyon (France). [10560-12]

High-bandwidth density optically interconnected terabit/s boards (*Invited Paper*), Marco Romagnoli, Gabriele De Angelis, Luigi Tallone, Vito Sorianello, Stefano Tirelli, Consorzio Nazionale Interuniversitario per le Telecomunicazioni (Italy); Philippe Absil, Bradley Snyder, Johan Bauwelinck, Xin Yin, Dries Van Thourhout, Joan Juvert Sandez, IMEC (Belgium); Roberto Osellame, Rebeca Martínez Vázquez, Diogo P. Lopes, Consiglio Nazionale delle Ricerche (Italy); Giovanni Battista Preve, Aina A. Serrano Rodrigo, Univ. Politècnica de València (Spain); Paola Galli, Nokia Corp. (Italy); Guido Chiaretti, STMicroelectronics (Italy); Francesco Testa, Ericsson R&D (Italy); Ana Belen González, EPIC-European Photonics Industry Consortium (Belgium); Alberto Bianchi, Ericsson R&D (Italy) [10560-13]

Consolidated optical flow switching in cloud data centers (*Invited Paper*), Houman Rastegarfar, The Univ. of Arizona (USA); Alberto Leon-Garcia, Univ. of Toronto (Canada); Madeleine Glick, AIM Photonics Academy (USA); Nasser Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA) [10560-14]

OPTO

CONFERENCE 10560

SESSION 4. WED 11:00 AM TO 12:10 PM

Short Reach Networks II

Session Chairs: **Philippe P. Absil**, IMEC (Belgium); **Yojiro Mori**, Nagoya Univ. (Japan)

Large-scale optical node architecture enabling spectral-efficiency maximization in ultra-dense WDM networks, Shuhei Yamaoka, Ryota Hashimoto, Yojiro Mori, Hiroshi Hasegawa, Ken-ichi Sato, Nagoya Univ. (Japan). [10560-15]

System and device technologies for coherent optical communications (*Invited Paper*), Keisuke Kojima, Toshiaki Koike-Akino, David S. Millar, Bingnan Wang, Milutin Pajovic, Kieran Parsons, Mitsubishi Electric Research Labs. (USA); Bowen Song, Jonathan Klamkin, Univ. of California, Santa Barbara (USA). [10560-16]

Using system simulation to evaluate design choices for automotive ethernet-over-plastic optical fiber, Pablo V. Mena, Enrico Ghillino, Synopsys, Inc. (USA); Dwight Richards, College of Staten Island (USA); Satoshi Hyuga, Makoto Nakai, Manabu Kagami, Toyota Central R&D Labs., Inc. (Japan); Robert Scarmozzino, Synopsys, Inc. (USA). [10560-17]

DMT visible light communication system using commercial RGBA LEDs, Rakesh Mohan Krishna VS, Ivan Djordjevic, The Univ. of Arizona (USA). [10560-18]

Lunch/Exhibition Break Wed 12:10 pm to 1:30 pm

SESSION 5. WED 1:30 PM TO 3:10 PM

Optical Transceivers and Novel Techniques I

Session Chairs: **Atul K. Srivastava**, NEL America, Inc. (USA); **Jianjun Yu**, ZTE USA (USA)

Optical signal processing using coherent optical frequency combs (*Invited Paper*), Yinwen Cao, Ahmad Fallahpour, Morteza Ziyadi, Ahmed Almairan, Changjing Bao, Peicheng Liao, Amirhossein Mohajerin-Ariaei, Fatemeh Alishahi, Alan E. Willner, The Univ. of Southern California (USA). [10560-19]

Ultra-low-noise amplification on a 100-micron-scale chip (*Invited Paper*), Amr S. Helmy, Univ. of Toronto (Canada) [10560-20]

Ripple shaping in fiber-optic channels (*Invited Paper*), Mariia Sorokina, Aston Univ. (United Kingdom) [10560-21]

Dynamic optical networks based on digital subcarrier multiplexing (*Invited Paper*), Rongqing Hui, Tong Xu, The Univ. of Kansas (USA); Andrea Fumagalli, The Univ. of Texas at Dallas (USA). [10560-22]

SESSION 6. WED 3:40 PM TO 5:00 PM

Optical Transceivers and Novel Techniques II

Session Chairs: **Atul K. Srivastava**, NEL America, Inc. (USA); **Jianjun Yu**, ZTE USA (USA)

Latest standardization trends for client and networking optical transceivers and its future directions (*Invited Paper*), Hideki Isono, Fujitsu Optical Components Ltd. (Japan) [10560-23]

Demonstration of 153.6-Tbps throughput from 1,536x1,536 optical switch with uniform-loss and cyclic-frequency AWGs, Hiroki Nagai, Yojiro Mori, Hiroshi Hasegawa, Ken-ichi Sato, Nagoya Univ. (Japan) [10560-24]

100 Gb/s and 200 Gb/s silicon photonics WDM transceivers for data center applications (*Invited Paper*), Amir A. Tavallaee, Gerald Miller, Pegah Seddighian, Bhavin Bijlani, Jacob Levy, Roshanak Shafiqi, Chatchai Bushyakanist, Wei Qian, Dazeng Feng, Jonathan Luff, Mehdi Asghari, Mellanox Technologies, Inc. (USA) [10560-25]

Planning of optical passive networks (PON) with reduced cost: a Brazilian case study, Karcus Day Rosario Assis, Federal Univ. do Recôncavo of Bahia (Brazil); Alex Santos, Univ. Federal do Recôncavo da Bahia (Brazil); Leonardo Dias, Univ. Federal da Bahia (Brazil); Raul Almeida Jr., Univ. Federal de Pernambuco (Brazil) [10560-26]

WEDNESDAY POSTER SESSION WED 6:00 PM TO 8:00 PM

Posters-Wednesday

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Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Vector mm-wave signal generation at W-band based on EAM+PM (*Invited Paper*), Hada Wang, Xinying Li, Jianjun Yu, Fudan Univ. (China). [10560-27]

SDN based in-band adaptive coding by distributed pseudonoise preamble detection in optical networks, Mingwei Yang, Ivan B. Djordjevic, The Univ. of Arizona (USA) [10560-28]

Automated design of add/drop equipment and effective wavelength assignment in complex DWDM networks, Dmitry Khomchenko, Dmitry Yevseyenko, VPI Development Ctr. (Belarus); Jim Farina, VPIphotonics (USA); André Richter, VPIphotonics GmbH (Germany). [10560-29]

Design and fabrication of restricted mode launching device for high-speed multimode fiber link, Ryosuke Hatai, Takaaki Ishigure, Keio Univ. (Japan) [10560-30]

Higher-order mode filter based on multimode fiber for reducing BER in telecommunication link, Michal Murawski, Polish Ctr. of Photonics and Fiber Optics (Poland); Lukasz Szostkiewicz, InPhoTech (Poland); Lukasz Chorchos, Jaroslaw P. Turkiewicz, Warsaw Univ. of Technology (Poland); Lukasz Ostrowski, InPhoTech (Poland); Beata Bienkowska, Polish Ctr. of Photonics and Fiber Optics (Poland); Tomasz Nasilowski, InPhoTech (Poland) . [10560-31]

CONFERENCE 10561

Monday–Wednesday 29–31 January 2018 • Proceedings of SPIE Vol. 10561

Next-Generation Optical Communication: Components, Sub-Systems, and Systems VII

Conference Chairs: **Guifang Li**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Xiang Zhou**, Google (USA)

Program Committee: **Kazi S. Abedin**, OFS Fitel LLC (USA); **Jin-Xing Cai**, TE SubCom (USA); **Hwan Seok Chung**, Electronics and Telecommunications Research Institute (Korea, Republic of); **Benjamin B. Dingel**, Nasfine Photonics, Inc. (USA); **Ezra Ip**, NEC Labs. America, Inc. (USA); **Yongmin Jung**, Univ. of Southampton (United Kingdom); **Inuk Kang**, NOKIA Bell Labs (USA); **Tsuyoshi Konishi**, Osaka Univ. (Japan); **Ming-Jun Li**, Corning Incorporated (USA); **Chao Lu**, The Hong Kong Polytechnic Univ. (Hong Kong, China); **Akihiro Maruta**, Osaka Univ. (Japan); **Takashi Sasaki**, Innovation Core SEI, Inc. (USA); **Siyuan Yu**, Univ. of Bristol (United Kingdom); **Yanjun Zhu**, Huawei Technologies Co., Ltd. (USA)

Conference Cosponsors: **CORNING** 

MONDAY 29 JANUARY

PLENARY SESSION 8:00 AM TO 10:05 AM

OPTO PLENARY SESSION

- 8:00 am: **Welcome and Opening Remarks**
Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); **Graham T. Reed**, Optoelectronics Research Ctr. (United Kingdom)
- 8:05 am: **Silicon Photonics: Bigger is Better**
Andrew G. Rickman, Rockley Photonics Ltd. (United Kingdom)
- 8:45 am: **III-nitride nanowire LEDs and diode lasers: monolithic light sources on (001) Si emitting in the 600-1300nm range**
Pallab K. Bhattacharya, Ctr. for Photonics and Multiscale Nanomaterials, Univ. of Michigan (USA)
- 9:25 am: **Photonics beyond the diffraction limit**
Min Gu, Lab. of Artificial-Intelligence Nanophotonics, RMIT Univ. (Australia)

SESSION 1 MON 10:30 AM TO 12:00 PM

Optical Communication Keynote Session

Joint Session with Conferences 10559 and 10561

Session Chairs: **Guifang Li**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Benjamin B. Dingel**, Nasfine Photonics, Inc. (USA)

- Long-distance quantum key distribution (Keynote Presentation)**, Qiang Zhang, Univ. of Science and Technology of China (China). [10561-1]
- Low-power and low-cost silicon-photonics coherent transceivers (Keynote Presentation)**, Christopher R. Doerr, Acacia Communications (USA) [10561-2]
- Secure long-range and high bit-rate distribution of shared key using dark states ultra-long fiber laser (UFL) (Keynote Presentation)**, Jacob Scheuer, Tel Aviv Univ. (Israel) [10559-1]

BEST PAPER AWARDS CEREMONY

MONDAY 29 JANUARY 2018 12:00 PM TO 12:10 PM

Join us as we announce the winners of the Optical Communications Best Paper Awards. These awards will recognize the outstanding work of students and professionals who present the most notable recent results with broad impact in the area of optical communications. We will award one Best Student Paper Award and one Best Technical Paper Award (post-docs or early career professionals). All papers within Optical Communications conferences 10559, 10560, and 10561 qualify. See the OPTO awards page for eligibility and application requirements.

AWARD SPONSORS:

CORNING 

TUESDAY 30 JANUARY

SESSION 2 TUE 8:30 AM TO 10:00 AM

Tx/Rx I

- Flexible optical transceivers (Invited Paper)**, Kim Roberts, Ciena Canada (Canada) [10561-3]
- High-responsivity L-band micro intradyne coherent receiver using InP-based photodetector integrated with 90° hybrid**, Munetaka Kurokawa, Masaru Takechi, Hideki Yagi, Kenji Sakurai, Yoshihiro Yoneda, Yasushi Fujimura, Sumitomo Electric Industries, Ltd. (Japan) [10561-4]
- Silicon photonic devices for telecommunication and data center applications (Invited Paper)**, Kwangwoong Kim, Po Dong, Argishti Melikyan, Nokia Bell Labs. (USA) [10561-5]
- Optical terabit transmitter and receiver based on passive polymer and InP technology for high-speed optical connectivity between datacenters**, Vasilis Katopodis, Christos Tsokos, National Technical Univ. of Athens (Greece); David de Felipe, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Maria Spyropoulou, National Technical Univ. of Athens (Greece); Agnieszka Konczykowska, III-V Lab. (France); Alessandro Aimone, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Panos Groumas, National Technical Univ. of Athens (Greece); Jean-Yves Dupuy, Filipe Jorge, Muriel Riet, III-V Lab. (France); Haik Mardoyan, Nokia Bell Labs. (France); Annachiara Pagano, Marco Quagliotti, Diego Roccatto, TelecomitaliaLAB (Italy); Tom Keinicke Johansen, Technical Univ. of Denmark (Denmark); Marcello Tienforti, Antonello Vannucci, Cordon Group (Italy); Norbert Keil, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Hercules Avramopoulos, Christos Kouloumentas, National Technical Univ. of Athens (Greece) [10561-6]

OPTO

CONFERENCE 10561

SESSION 3.....TUE 10:30 AM TO 12:00 PM

Tx/Rx II

Enabling optical component technologies for next-generation broadband optical access (*Invited Paper*), Colin J. McKinstry, Ning Cheng, Xiang Liu, Huawei Technologies Co., Ltd. (USA)..... [10561-7]

Frequency offset-locked dual-carrier excitation of phase-modulated electro-optic frequency combs for bandwidth scaling and nonlinear spectral broadening, K.P. Nagarjun, B.S. Vikram, Indian Institute of Science (India); Suparna S., Indian Institute of Technology Madras (India); Ajay Singh, Shankar Kumar Selvaraja, V.R. Supradeepa, Indian Institute of Science (India)..... [10561-8]

Integrated-optic tunable OFDM signal demultiplexer with small loss variation characteristics, Koichi Takiguchi, Ritsumeikan Univ. (Japan)..... [10561-9]

Kramers-Kronig coherent receiver (*Invited Paper*), Cristian Antonelli, Antonio Mecozzi, Univ. degli Studi dell'Aquila (Italy); Mark Shtauf, Tel Aviv Univ. (Israel)..... [10561-10]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 4.....TUE 1:30 PM TO 3:15 PM

SDM and FSO I

High-capacity transmission with homogeneous multicore fibers and wideband optical combs (*Invited Paper*), Benjamin J. Puttnam, Ruben S. Luis, Georg Rademacher, Jun Sakaguchi, Werner Klaus, Yoshinari Awaji, Naoya Wada, National Institute of Information and Communications Technology (Japan); Bill P. P. Kuo, RAM Photonics, LLC (USA); John Marciante, RAM Photonics, LLC (USA)..... [10561-11]

Measurement of differential mode delay using reference-free low-coherence digital holography, Shogo Hoshino, Atsushi Okamoto, Yuta Goto, Kazuhisa Ogawa, Akihisa Tomita, Hokkaido Univ. (Japan); Yuta Wakayama, Takehiro Tsuritani, KDDI R&D Labs., Inc. (Japan)..... [10561-12]

Measurement of differential modal group delay of few-mode fibers using four-wave mixing, Varun Kelkar, Smaranika Swain, Deepa Venkitesh, Indian Institute of Technology Madras (India)..... [10561-13]

Advanced chip package of a fiber-coupled superconducting single-photon detector for a closed-cycle cryostat, Christian Möller, Kristin Neckermann, Manuel Kermann, Thomas Ortlepp, CIS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH (Germany)..... [10561-17]

Low-differential modal gain multimode fiber amplifiers (*Invited Paper*), Rodrigo Amezcua-Correa, Jose Enrique Antonio-Lopez, Zeinab Sanjabi Eznaveh, Juan Carlos Alvarado Zacarias, Axel Schülzgen, Guifang Li, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Nicolas Fontaine, Roland Ryf, Haoshuo Chen, Nokia Bell Labs. (USA); Cédric Gonnet, Pierre Sillard, Prysmian Group (France)..... [10561-14]

SESSION 5.....TUE 3:45 PM TO 5:00 PM

SDM and FSO II

Selective spatial mode attenuator using phase-intensity-phase modulation toward mode-division multiplexing transmission, Zihan Zhou, Atsushi Okamoto, Shimpei Shimizu, Kazuhisa Ogawa, Akihisa Tomita, Hokkaido Univ. (Japan); Yuta Wakayama, Takehiro Tsuritani, KDDI R&D Labs., Inc. (Japan)..... [10561-15]

MIMO-free space-division-multiplexing for data center applications, Wei Wang, Jian Zhao, Lin Zhang, Tianjin Univ. (China); Qi Mo, FiberHome Telecommunication Technologies Co., Ltd. (China); Zhiqun Yang, Yaping Liu, Tianjin Univ. (China); Rachel Sampson, Guifang Li, Univ. of Central Florida (USA)..... [10561-16]

Precision optical components for LiDAR systems developed for autonomous vehicles, Andrew A. Chesworth, Jeremy Huddleston, LightPath Technologies, Inc. (USA)..... [10561-18]

Laser pointing sensor system for beaconless lasercom, Marc T. Jacoby, Optical Physics Co. (USA); Aaron J. Swank, NASA Glenn Research Ctr. (USA)..... [10561-19]

Stable nonlinear pulses in dispersion-managed optical fiber communication systems with compensated losses, Vladislav Neskorniuk, Anton Lukashchuk, Skolkovo Institute of Science and Technology (Russian Federation) and Moscow Institute of Physics and Technology (Russian Federation); Ildar Gabitov, Skolkovo Institute of Science and Technology (Russian Federation) and The Univ. of Arizona (USA); Arkadi Chipouline, Mohammadreza Malekizandi, Technische Univ. Darmstadt (Germany); Franko Kueppers, Technische Univ. Darmstadt (Germany) and The Univ. of Arizona (USA)..... [10561-20]

WEDNESDAY 31 JANUARY

SESSION 6.....WED 8:30 AM TO 10:00 AM

Fiber and Transmission Systems I

Approaching Shannon capacity limit using coded modulation (*Invited Paper*), Hussam G. Batshon, TE Connectivity Subsea Communications (USA)..... [10561-21]

Accurate model to predict performance of coherent optical transponder, Qiang Wang, Juniper Networks, Inc. (USA)..... [10561-22]

G.654.E optical fibers for high-data-rate terrestrial transmission systems with long reach (*Invited Paper*), John D. Downie, Corning Incorporated (USA)..... [10561-23]

Fabrication and characterization of all-fiber 120° optical hybrids, Marie-Helene Bussieres-Hersir, Nicolas Godbout, Ecole Polytechnique de Montréal (Canada)..... [10561-24]

SESSION 7.....WED 10:30 AM TO 12:15 PM

Fiber and Transmission Systems II

Ultralow-loss Ge-free silica core fiber for submarine transmission system (*Invited Paper*), Yoshiaki Tamura, Sumitomo Electric Industries, Ltd. (Japan)..... [10561-25]

Wave-band multiplexed 20-Gb/s QPSK simultaneous transmission over 4-km holey fiber in O- and T-bands with homodyne detection, Shoko Yamada, Aoyama Gakuin Univ. (Japan), National Institute of Information and Communications Technology (Japan); Atsushi Kanno, Naokatsu Yamamoto, National Institute of Information and Communications Technology (Japan); Hideyuki Sotobayashi, Aoyama Gakuin Univ. (Japan)..... [10561-26]

Entropy loading for multi-carrier optical systems (*Invited Paper*), Di Che, William Shieh, The Univ. of Melbourne (Australia)..... [10561-27]

Flexible optical transmission: MQAM, hybrid formats, and probabilistic shaping (*Invited Paper*), Fred Buchali, Nokia Bell Labs. (Germany)..... [10561-28]

WEDNESDAY POSTER SESSION.....WED 6:00 PM TO 8:00 PM

Posters-Wednesday

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster authors, view poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>.

Visible light communication in cooperative vehicular communication systems, Manuel Augusto Vieira, Paula Louro, CTS-UNINOVA-Instituto Superior de Engenharia de Lisboa (Portugal); Manuela Vieira, Instituto Superior de Engenharia de Lisboa (Portugal); Pedro Vieira, Instituto Superior de Engenharia de Lisboa (Portugal)..... [10561-29]



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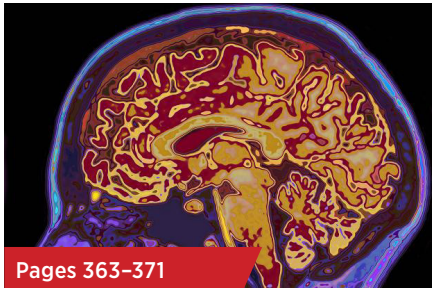


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Photonics West Applications Tracks

These three tracks highlight papers being presented during Photonics West that address technology solutions for some of the most promising new applications.



Pages 363–371

BRAIN

SPIE Brain 2018 will highlight papers that describe the development of innovative technologies that will increase our understanding of brain function.

- Clinical and Translational Neurophotonics
- Neural Imaging, Sensing, Optogenetics, and Optical Manipulation
- Clinical Technologies, Laser Tissues Interaction, and Tissue Engineering
- Nanobiophotonics

Sunday Special Event:

Neurotechnologies Plenary Session, See page 7 for details.



Pages 372–381

TRANSLATIONAL RESEARCH

SPIE Translational Research 2018 will highlight papers that showcase the latest photonics technologies, tools, and techniques with high potential to impact healthcare.

- Photonic Therapeutics and Diagnostics
- Neurophotonics, Neurosurgery, and Optogenetics
- Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering
- Clinical Technologies and Systems
- Biomedical Spectroscopy, Microscopy, and Imaging
- Nano/Biophotonics

Sunday Special Event:

Translational Research Lunchtime Forum, See page 12 for details.

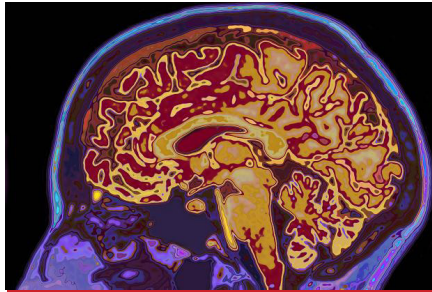


Pages 382–387

3D PRINTING

SPIE Applications of 3D Printing 2018 highlights papers that showcase innovative ways to apply this multidimensional/multidisciplinary technology.

- Additive Manufacturing
- Selective Laser Melting, Maser Sintering, Laser Photopolymerization
- Novel Materials, Protean Materials, and Laser Interactions
- Software That Increases Efficiencies and Speed
- In-situ Sensors or Probes to Verify and Quantify Additive Manufacturing Processes in Real Time
- Conformal Photonics/Electronics



BRAIN 2018

SPIE Brain 2018 will highlight papers that describe the development of innovative technologies that will increase our understanding of brain function.

- Clinical and Translational Neurophotonics
- Neural Imaging, Sensing, Optogenetics, and Optical Manipulation
- Clinical Technologies, Laser Tissues Interaction, and Tissue Engineering
- Nanobiophotonics

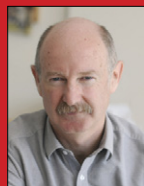
SUNDAY SPECIAL EVENT:

Neurotechnologies Plenary Session, see page 7 for details.

SYMPOSIUM CHAIRS



David Boas
Boston Univ.
(USA)



Rafael Yuste
Columbia Univ.
(USA)

Photonic Therapeutics and Diagnostics

(ORDERED BY CONFERENCE
AND PAPER NUMBER)

Implantable lithographically defined photonic microprobe

Paper 10470-45

Mohammad Amin Tadayon,
Columbia Univ. (USA), et al.
Conference 10470: Endoscopic
Microscopy XIII
Session 9: New Endoscopic
Technologies and Advances II

Using a wearable near-infrared spectroscopy device in children with Tourette syndrome

Paper 10472-18

Pou-Leng Cheong, National Chiao
Tung Univ. (Taiwan), et al.
Conference 10472: Diseases in the
Breast and Reproductive System IV
Session 5: Developmental
Biology and Pediatrics

Photobiomodulation for the brain: has the light dawned?

Paper 10477-1

Michael R. Hamblin, Wellman Ctr.
for Photomedicine, Massachusetts
General Hospital (USA), et al.
Conference 10477: Mechanisms of
Photobiomodulation Therapy XIII
Session 1: PBM therapy in
Neuroregeneration and Neurorehabilitation

Synapto-protective effect of low-level light emitting diode (LED) therapy in an in vitro model of status epilepticus

Paper 10477-4

Namgue Hong, Dankook Univ.
(Korea, Republic of), et al.
Conference 10477: Mechanisms of
Photobiomodulation Therapy XIII
Session 1: PBM therapy in
Neuroregeneration and Neurorehabilitation

Non-invasive therapy for traumatic brain injury with NPLT

Paper 10477-7

Adelaide Micci, The Univ. of Texas
Medical Branch (USA), et al.
Conference 10477: Mechanisms of
Photobiomodulation Therapy XIII
Session 1: PBM therapy in
Neuroregeneration and Neurorehabilitation

Transcranial red and near-infrared lasers at fluency of 8 J/cm² enhances brain mitochondrial function in aging model

Paper 10477-28

Farzad Salehpour, Tabriz Univ. of Medical
Sciences (Iran, Islamic Republic of), et al.
Conference 10477: Mechanisms of
Photobiomodulation Therapy XIII
Session 4: Mechanisms of PBM Therapy

Improved identification of cranial nerves using paired-agent imaging: topical staining protocol optimization through experimentation and simulation

Paper 10478-19

Veronica C. Torres, Illinois Institute
of Technology (USA), et al.
Conference 10478: Molecular-
Guided Surgery: Molecules,
Devices, and Applications IV
Session 4: Contrast Agents

Neurophotonics, Neurosurgery, and Optogenetics

Low level light therapy on stroke with a portable and illumination- parameter adjustable LED helmet

Paper 10480-2

Ting Li, Univ. of Electronic Science and
Technology of China (China), et al.
Conference 10480: Clinical and
Translational Neurophotonics 2018
Session 1: Operative and Post Op. Therapy

Optical mapping of prefrontal activity in pathological gamblers

Paper 10480-7

Zhen Yuan, Univ. of Macau
(Macao, China), et al.
Conference 10480: Clinical and
Translational Neurophotonics 2018
Session 2: Optical Spectroscopy: Clinical I

Optical mapping of the brain activity in children with Down's syndrome

Paper 10480-8

Zhen Yuan, Univ. of Macau
(Macao, China), et al.
Conference 10480: Clinical and
Translational Neurophotonics 2018
Session 2: Optical Spectroscopy: Clinical I

Model choice influence on calibration of brain health monitoring using combined frequency domain near infrared spectroscopy and diffuse correlation spectroscopy

Paper 10480-12

Stefan A. Carp, Athinoula A. Martinos Ctr.
for Biomedical Imaging, Massachusetts
General Hospital (USA), et al.
Conference 10480: Clinical and
Translational Neurophotonics 2018
Session 3: Optical Spectroscopy: Clinical II

Intraoperative hyperspectral imaging of brain hemodynamics during epileptiform activity

Paper 10480-13

Audrey Laurence, Ecole Polytechnique
de Montréal (Canada), et al.
Conference 10480: Clinical and
Translational Neurophotonics 2018
Session 3: Optical Spectroscopy: Clinical II

Optical intrinsic signal imaging for brain tumor surgery

Paper 10480-14

Tien-Yu Hsiao, National Chiao Tung Univ. (Taiwan), et al.

Conference 10480: Clinical and Translational Neurophotonics 2018

Session 3: Optical Spectroscopy: Clinical II

Intraoperative reflectance and fluorescence spatial frequency domain imaging to enhance guidance of glioma resection

Paper 10480-18

Dennis J. Wirth, Dartmouth Hitchcock Medical Ctr. (USA), et al.

Conference 10480: Clinical and Translational Neurophotonics 2018

Session 4: Fluorescence Resection and Spectroscopy

In vivo imaging of cerebral hemodynamics and tissue scattering in rat brain using a surgical microscope camera system

Paper 10480-21

Izumi Nishidate, Tokyo Univ. of Agriculture and Technology (Japan), et al.

Conference 10480: Clinical and Translational Neurophotonics 2018

Session 5: Optical Spectroscopy: Pre-Clinical I

Monte Carlo look up table-based inverse algorithm to estimate cerebral optical properties in small animals using frequency-domain near infrared spectroscopy

Paper 10480-25

Seung Yup Lee, Emory Univ. (USA), et al.

Conference 10480: Clinical and Translational Neurophotonics 2018

Session 5: Optical Spectroscopy: Pre-Clinical I

Inverse Monte Carlo lookup table method to determine cerebral tissue properties in small animals using diffuse reflectance spectroscopy

Paper 10480-26

Corey Zheng, Emory Univ. (USA), et al.

Conference 10480: Clinical and Translational Neurophotonics 2018

Session 5: Optical Spectroscopy: Pre-Clinical I

Optical topography guided diffuse optical tomography for imaging brain function: a methodological study on semi-3 dimensional reconstruction

Paper 10480-28

Bingyuan Wang, Tianjin Univ. (China), et al.

Conference 10480: Clinical and Translational Neurophotonics 2018

Session 6: Optical Spectroscopy: Pre-Clinical II

GRIN lens based confocal system for deep brain calcium imaging

Paper 10481-1

Ling Fu, Britton Chance Ctr. for Biomedical Photonics (China), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 1: In Vivo Mouse Brain Imaging I

Stimulus-evoked functional and blood perfusion changes in the healthy and tumorous rat somatosensory cortex imaged with UHR-OCT

Paper 10481-2

Kostadinka Bizheva, Univ. of Waterloo (Canada), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 1: In Vivo Mouse Brain Imaging I

Deep brain two-photon NIR fluorescence imaging for study of Alzheimer's disease

Paper 10481-4

Congping Chen, Hong Kong Univ. of Science and Technology (China), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 1: In Vivo Mouse Brain Imaging I

In vivo volumetric imaging of fast biological dynamics in deep tissue via wavefront engineering

Paper 10481-5

Lingjie Kong, Tsinghua Univ. (China), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 1: In Vivo Mouse Brain Imaging I

Imaging of stimulus-induced hemodynamic response in the rat cortex using phase-stabilized swept-source OCT

Paper 10481-7

Paul Shin, KAIST (Korea, Republic of), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 2: In Vivo Mouse Brain Imaging II

Exploring with a reflectance fiber probe the biological mechanisms inducing light scattering and absorption changes during rat somatosensory cortex activation: relevance for the study of neurovascular and neurometabolic coupling mechanisms

Paper 10481-8

Pierre P. Marquet, Institut Univ. en Santé Mentale de Québec, Univ. Laval (Canada), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 2: In Vivo Mouse Brain Imaging II

Optically-transparent micro-ring resonator enables longitudinal cortical imaging by photoacoustic microscopy

Paper 10481-9

Hao Li, Northwestern Univ. (USA), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 2: In Vivo Mouse Brain Imaging II

Brainsmatics: bridging the brain science and brain-inspired artificial intelligence

Paper 10481-10

Qingming Luo, Suzhou Institute of Brainmatics, Huazhong Univ. of Science and Technology (China), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Mapping the quantitative cytoarchitecture of the whole mouse brain by light-sheet microscopy and digital brain atlasing

Paper 10481-11

Ludovico Silvestri, LENS - Lab. Europeo di Spettroscopia Non-Lineari (Italy), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Imaging whole mouse brains with a dual resolution serial swept-source OCT scanner

Paper 10481-12

Joël Lefebvre, Ecole Polytechnique de Montréal (Canada), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Line-illumination modulation for high-throughput optical-sectioning imaging

Paper 10481-14

Rui Jin, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Photoacoustic tomography: Deep functional imaging at high spatiotemporal resolution

Paper 10481-15

Lihong V. Wang, California Institute of Technology (USA), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 4: Brain-Wide Imaging II

Volumetric optoacoustic mapping of fast neuronal activity in an isolated mouse brain model expressing genetically encoded calcium indicator

Paper 10481-16

Sven Gottschalk, Institute of Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 4: Brain-Wide Imaging II

Hybrid averaging optical coherence tomography angiography and applications in brain

Paper 10481-20

Peng Li, Zhejiang Univ. (China), et al.

Conference 10481: Neural Imaging and Sensing 2018

Session 5: Novel Technologies I

Structure illuminated two-photon microscopy for high resolution imaging deep into the brain

Paper 10481-23

Yao Zheng, Zhejiang Univ. (China), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 5: Novel Technologies I

High-speed, high-resolution in vivo brain imaging with wavefront shaping

Paper 10481-25

Na Ji, Univ. of California, Berkeley (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Generation of extremely thin light sheets allows fast isotropic imaging of whole mouse brains by ultramicroscopy

Paper 10481-26

Hans-Ulrich Dodt, Technische Univ. Wien (Austria), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Super-resolution localization microscopy with large field-of-view for mapping synaptic connectivity at multiple scales

Paper 10481-27

Zhenli Huang, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Simultaneous two-photon microscopy and magnetic resonance imaging at ultrahigh field of 16.4 Tesla

Paper 10481-28

Meng Cui, Purdue Univ. (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

UbasM: a simple, rapid, efficient balanced optical clearing method for brain imaging

Paper 10481-29

Lingling Chen, Shenzhen Univ. (China), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Interferometric near-infrared spectroscopy (iNIRS) at short source-detector separations

Paper 10481-30

Oybek Kholiqov, Univ. of California, Davis (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 7: Human Brain Imaging

Detection of cortical oxygen for clinical analysis and trends research of olfactory memory by using functional optical topography

Paper 10481-32

Yen Ting Chen, National Chiao Tung Univ. (Taiwan), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 7: Human Brain Imaging

Advances of deep imaging in brain within optical tissue windows

Paper 10481-35

Lingyan Shi, Columbia Univ. (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Long term imaging of living brain glial cancer cells

Paper 10481-36

Patricia M. A. Farias, Phornano Holding GmbH (Austria), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Cerebral penetrating arteriole dynamics has important implication to the exacerbated ischemic injury in type 2 diabetes

Paper 10481-37

Yuangong Li, Univ. of Washington (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

White matter atrophy in spinocerebellar ataxia type 1 mouse models revealed by serial optical coherence scanner

Paper 10481-39

Chao J. Liu, Univ. of Minnesota, Twin Cities (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Photodynamic opening of blood-brain barrier

Paper 10481-40

Oxana V. Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Investigating amyloid-beta plaques in whole brain sections of a mouse model of Alzheimer's disease with a visible light optical coherence microscope

Paper 10481-41

Antonia Lichtenegger, Medizinische Univ. Wien (Austria), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Simultaneous OCT imaging and temperature sensing with a miniaturized fiber-optic probe

Paper 10481-42

Jiawen Li, The Univ. of Adelaide (Australia), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

A novel neurophotonics approach to study neural networks in vitro

Paper 10481-43

Wardiya Afshar Saber, School of Medicine, Univ. of St. Andrews (United Kingdom), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Three-dimensional reconstruction of the human brain cortex by means of a SWITCH/TDE-combined clearing method

Paper 10481-44

Irene Costantini, LENS - Lab. Europeo di Spettroscopia Non-Lineari (Italy), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Change in cognitive process during dance video game play with different appendages for motor output

Paper 10481-45

Kota Suzuki, Meiji Univ. (Japan), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Analysis of prefrontal cortex function in TD patient during working memory task and olfactory task by using fNIRS measurements

Paper 10481-46

WeiShan Hsiao, Institute of Biomedical Engineering, National Chiao Tung Univ. (Taiwan), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Diffusion quantification of IR-780 dye delivered using Lexiscan through the blood brain barrier

Paper 10481-47

Rebecca W. Pak, Johns Hopkins Univ. (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

A software pipeline for high-throughput stitching and processing of teravoxel-sized 3D images of brain samples

Paper 10481-49

Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Voluntary exercise confers protection against age-related deficits in brain oxygenation in awake mice model of Alzheimer's disease

Paper 10481-50

Xuecong Lu, Ecole Polytechnique de Montréal (Canada), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Hemodynamic monitoring in different cortical layers with a single fiber optical system

Paper 10481-51

Linhui Yu, Univ. of Calgary (Canada), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Single camera hemodynamic imaging of mouse brain with intact skull

Paper 10481-53

Zephaniah Phillips, Korea Univ. (Korea, Republic of), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Long fiber based multi-channel NIRS system for freely moving mice

Paper 10481-54

Zephaniah Phillips, Korea Univ. (Korea, Republic of), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Understanding neurovascular mechanisms during cortical spreading depression in ischemic stroke rats using novel ECoG-LSCI technology

Paper 10481-55

Han-Chi Pan, National Health Research Institutes (Taiwan), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Optical clearing method for skull tissue for in-vivo morphological imaging of the rat brain with UHR-OCT

Paper 10481-56

Nadine Haymour, Univ. of Waterloo (Canada), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Deep brain imaging using an ultra-thin OCT endoscopy probe

Paper 10481-59

Woo June Choi, Univ. of Washington (USA), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Improved near infrared spectroscopy patch with conformal contact elastomeric substrate

Paper 10481-60

Chang Hyun Park, Pusan National Univ. (Korea, Republic of), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Bio-signal impact of cybersickness caused by virtual reality

Paper 10481-61

Yi Tien Lin, National Chiao Tung Univ. (Taiwan), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

DeepBouton: automated identification of single-neuron axonal boutons at the brain-wide scale

Paper 10481-64

Shaoqun Zeng, Britton Chance Ctr. for Biomedical Photonics (China), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Simultaneous two-layer two photon imaging with frequency multiplexing

Paper 10481-65

Xiaohua Lv, Britton Chance Ctr. for Biomedical Photonics (China), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Whole-brain imaging using multi-view sub-voxel-resolving light-sheet microscopy

Paper 10481-67

Jun Nie, Huazhong Univ. of Science and Technology (China), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Three-channel whole-brain optical imaging for visualizing dual-labeled input and output of neural circuit with co-located anatomical reference

Paper 10481-68

Zhangheng Ding, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China), et al.
Conference 10481: Neural Imaging and Sensing 2018
Session Mon: Poster Session

Validating the temperature rise during infrared neural inhibition with increased block width

Paper 10482-3

Jeremy B. Ford, Vanderbilt Univ. (USA), et al.
Conference 10482: Optogenetics and Optical Manipulation 2018
Session 1: Control I

Optogenetic probing of muscle function, active sensation, and recovery from nerve damage in the mouse whisker system

Paper 10482-5

David J. Margolis, Rutgers, School of Arts and Sciences (USA), et al.
Conference 10482: Optogenetics and Optical Manipulation 2018
Session 1: Control I

Excitability of astrocyte in vitro with infrared neural stimulation

Paper 10482-6

Wilson R. Adams, Vanderbilt Univ. (USA), et al.
Conference 10482: Optogenetics and Optical Manipulation 2018
Session 1: Control I

Infrared light alters cardiorespiratory activity in a dose and site dependent manner in the in situ arterially perfused brainstem preparation

Paper 10482-10

Gjinovefa Kola, Case Western Reserve Univ. (USA), et al.
Conference 10482: Optogenetics and Optical Manipulation 2018
Session 2: Control II

In-vivo label-free optical detection of neural activities in retina

Paper 10482-12

Subrata Batabyal, Nanoscope Technologies, LLC (USA), et al.
Conference 10482: Optogenetics and Optical Manipulation 2018
Session 3: Detection

Measuring IR-induced 3D temperature profiles using phase decorrelation OCT

Paper 10482-13

Junqi Zhuo, Case Western Reserve Univ. (USA), et al.
Conference 10482: Optogenetics and Optical Manipulation 2018
Session 3: Detection

Optical stimulation and monitoring of the visual system using bioluminescent opsin

Paper 10482-14

Samarendra K. Mohanty, Nanoscope Technologies, LLC (USA), et al.
Conference 10482: Optogenetics and Optical Manipulation 2018
Session 3: Detection

A compact integrated device for spatially-selective optogenetic neural stimulation based on the Utah Optrode Array

Paper 10482-15

Robert Scharf, The Univ. of Utah (USA), et al.

Conference 10482: Optogenetics and Optical Manipulation 2018
Session 3: Detection

Single source for simultaneous two-photon stimulation and imaging based on spectral-temporal modulation of supercontinuum generation

Paper 10482-16

Yuan-Zhi Liu, Univ. of Illinois (USA), et al.

Conference 10482: Optogenetics and Optical Manipulation 2018
Session 4: Delivery

Modeling of cerebral blood flow in reaction to neural stimulation

Paper 10482-18

Rex Chin-Hao Chen, Univ. of Wisconsin-Milwaukee (USA), et al.

Conference 10482: Optogenetics and Optical Manipulation 2018
Session 4: Delivery

Light propagation analysis in neural tissue for wireless optogenetic nanonetworks

Paper 10482-21

Pedram Johari, Univ. at Buffalo (USA), et al.

Conference 10482: Optogenetics and Optical Manipulation 2018
Session 4: Delivery

Targeted nano-enhanced Optical delivery of opsin for dry-AMD therapy

Paper 10482-23

Sivakumar Gajjaraman, Nanoscope Technologies, LLC (USA), et al.

Conference 10482: Optogenetics and Optical Manipulation 2018
Session 5: Manipulation

An all-optical system for rapid and deep interrogation of behaviorally relevant activity patterns

Paper 10482-24

Gilad Lerman, NYU School of Medicine (USA), et al.

Conference 10482: Optogenetics and Optical Manipulation 2018
Session 5: Manipulation

Computational algorithm for assessing inter-neuronal connectivity to optimize optogenetic stimulation and neural circuit activity

Paper 10482-30

Carlos Renteria, Univ. of Illinois (USA), et al.

Conference 10482: Optogenetics and Optical Manipulation 2018
Session 6: Mechanism

Clinical Technologies and Systems

Measuring 3D temperature profiles using phase-decorrelation OCT

Paper 10483-50

Junqi Zhuo, Case Western Reserve Univ. (USA), et al.

Conference 10483: Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII
Session 8: OCT New Technology II

Few-mode fiber OCT for angular scattering contrast in tissue

Paper 10483-77

Pablo Eugui, Medizinische Univ. Wien (Austria), et al.

Conference 10483: Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII
Session 12: Novel Contrast

Integrated Raman biopsy probe for high yield targeted brain cancer biopsies

Paper 10484-12

Joannie Desroches, Ecole Polytechnique de Montréal (Canada), et al.

Conference 10484: Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session 3: Robotics and Light Biopsies for Surgical Applications

The study on fast localization method of anomaly block in brain based on differential optical density

Paper 10484-39

Huiquan Wang, Tianjin Polytechnic Univ. (China), et al.

Conference 10484: Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session 10: Imaging: Theory and Simulations

Which experimental model can sensitively indicate brain death by Functional near-infrared spectroscopy?

Paper 10484-42

Ting Li, Univ. of Electronic Science and Technology of China (China), et al.

Conference 10484: Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session Sun: Poster Session

Near infrared assessment of the brain in cardiac arrest patients

Paper 10484-43

Thu Nga Nguyen, Ryerson Univ. (Canada), et al.

Conference 10484: Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session Sun: Poster Session

Automatic and accurate segmentation of cerebral tissues in fMRI dataset with combination of image processing and deep learning

Paper 10485-9

Ting Li, Univ. of Electronic Science and Technology of China (China), et al.

Conference 10485: Optics and Biophotonics in Low-Resource Settings IV
Session 2: Machine Learning in Imaging, Sensing and Diagnostics

3D on-chip microscopy of optically cleared tissue

Paper 10485-35

Yibo Zhang, Univ. of California, Los Angeles (USA), et al.

Conference 10485: Optics and Biophotonics in Low-Resource Settings IV
Session 8: Computational Imaging and Sensing

Cost effective wireless embedded multichannel NIRS system

Paper 10485-45

Chuan-Hsiang Yu, National Chiao Tung Univ. (Taiwan), et al.

Conference 10485: Optics and Biophotonics in Low-Resource Settings IV
Session Sun: Poster Session

Influence of low temperature ageing on optical and mechanical properties of transparent yttria stabilized-zirconia cranial prosthesis

Paper 10486-9

Nami Davoodzadeh, Univ. of California, Riverside (USA), et al.

Conference 10486: Design and Quality for Biomedical Technologies XI
Session 2: Phantoms and Test Methods

High definition diffusion tensor imaging for optic nerve fiber tracking: translational implications for whole eye transplantation

Paper 10486-14

Vijay Gorantla, Wake Forest School of Medicine (USA), et al.

Conference 10486: Design and Quality for Biomedical Technologies XI
Session 3: Innovative Optical Modalities

Measurements of coherent hemodynamics to enrich the physiological information provided by near-infrared spectroscopy (NIRS) and functional MRI

Paper 10487-13

Sergio Fantini, Tufts Univ. (USA), et al.

Conference 10487: Multimodal Biomedical Imaging XIII
Session 3: Clinical Applications

Investigation of hydrogen sulfide gas using Pd/Pt material based fiber Bragg grating sensor

Paper 10488-8

Amna Bedi, DIT Univ. (India), et al.

Conference 10488: Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII
Session 3: Sensors Detectors and Treatment Tools II

Design and analysis of FBG based sensor for detection of damage in oil and gas pipelines for safety of life at sea
Paper 10488-31

Amna Bedi, DIT Univ. (India), et al.
Conference 10488: Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII
Session 8: Sensors Detectors and Treatment Tools VII

Design of tapered optical fibers to achieve high spatial selectivity during infrared neural stimulation
Paper 10488-39

Nelson Salas, Univ. of Miami (USA), et al.
Conference 10488: Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII
Session 9: Sensors Detectors and Treatment Tools VIII

In vivo, noncontact, real-time, optical and spectroscopic assessment of the immediate local physiological response to spinal cord injury in a rat model
Paper 10489-10

Joseph Chaiken, Syracuse Univ. (USA), et al.

Conference 10489: Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis
Session 3: Spectroscopic Instrumentation and Designs

Alzheimer's disease: evaluation using label-free fluorescence of tryptophan metabolites and the kynurenine pathway
Paper 10489-49

Laura A. Sordillo, The City College of New York (USA), et al.

Conference 10489: Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis
Session Tues: Poster Session

Micro-engineering a novel platform to reconstruct physiology and functionality of the human brain microvasculature in vitro
Paper 10491-23

Yasaman Daghighi, Univ. of California, Berkeley (USA), et al.

Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 5: Applications II

Fabrication of an optically-penetrating, multi-layered organ-on-chip device to study longitudinal changes in blood-brain barrier optical redox ratios
Paper 10491-42

Nasya Sturdivant, Univ. of Arkansas (USA), et al.

Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 10: Medical Microsystems II

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Effects of short infrared laser pulses on neuron metabolism
Paper 10492-17

Roxanne Glazier, Georgia Institute of Technology (USA), et al.
Conference 10492: Optical Interactions with Tissue and Cells XXIX
Session 4: Laser Modulation of Cells

Approaching through-skull optical brain imaging and phototherapy: optical properties of head tissues in near and short-wave infrared regions
Paper 10492-37

Sergii Golovynskyi, Shenzhen Univ. (China), et al.
Conference 10492: Optical Interactions with Tissue and Cells XXIX
Session PMon: Posters-Monday

Laser speckle imaging of brain blood flow through a transparent nanocrystalline yttria-stabilized-zirconia cranial implant
Paper 10493-2

Nami Davoodzadeh, Univ. of California, Riverside (USA), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 1: Speckle Technologies

OCT Eigen decompensation based penetrating vessel mapping
Paper 10493-15

Wei Wei, Univ. of Washington (USA), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 4: Functional Imaging and Spectroscopy I

Combined NIRS and DCS measurements of cerebral hemodynamics during intracranial and blood pressure changes
Paper 10493-16

Jana M. Kainerstorfer, Carnegie Mellon Univ. (USA), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

Monitoring of acute injury in experimental cerebral ischemic stroke using optical coherence tomography
Paper 10493-18

Woo June Choi, Univ. of Washington (USA), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

OCT angiography reveals age-related differences in cerebral blood flow of anesthetized mice
Paper 10493-19

Woo June Choi, Univ. of Washington (USA), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

Evaluating vasculature changes in the murine embryonic brain due to prenatal alcohol exposure using optical coherence tomography, in utero
Paper 10493-20

Raksha Raghunathan, Univ. of Houston (USA), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

OCT velocimetry reveals electrical-evoked temporal capillary hemodynamics in mouse cerebral cortex during functional activation
Paper 10493-21

Wei Wei, Univ. of Washington (USA), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

DAS: A simple, efficient, scalable and Dil-compatible optical clearing method for intact systems
Paper 10493-33

Lingling Chen, Shenzhen Univ. (China), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session 8: Optical Clearing and Biomechanics

Control of epileptic seizures in WAG/Rij Rats by means of brain-computer interface
Paper 10493-34

Vladimir V. Makarov, Saratov State Univ. (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Nonlinear dynamics and coherent resonance in a network of coupled neural-like oscillators
Paper 10493-40

Andrei V. Andreev, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Brain-computer interface for alertness estimation and improving
Paper 10493-48

Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Nonlinear correlation method for the separation of couplings in EEG experiments with neural ensembles
Paper 10493-49

Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Effect of filtration of signals of brain activity on quality of recognition of brain activity patterns using artificial intelligence methods
Paper 10493-50

Alexander E. Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Use of parallel computing for analyzing big data in EEG studies of ambiguous perception
Paper 10493-54

Vladimir A. Maksimenko, Saratov State Technical Univ. (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Study of the interactions in neural ensemble of the brain using wavelet analysis
Paper 10493-55

Vladimir A. Maksimenko, Saratov State Technical Univ. (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Identification of the patterns of brain activity during the imagination of movements using an artificial neural network
Paper 10493-63

Semen Kurkin, Saratov State Technical Univ. (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Noninvasive measurement of cerebral venous oxygenation in neonates with a multi-wavelength, fiber-coupled laser diode optoacoustic system
Paper 10494-9

Stephen Herrmann, The Univ. of Texas Medical Branch (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 1: Clinical Applications

In-vivo assessment of radiation-induced cerebrovascular damage in mice by hybrid optoacoustic-ultrasound bio-microscopy
Paper 10494-17

Johannes Rebling, Helmholtz Zentrum München GmbH (Germany), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 3: Therapy Monitoring and Guidance II

Non-invasive detection of matrix-metalloproteinase activity in a mouse model of cerebral ischemia using multispectral optoacoustic tomography
Paper 10494-23

Ruiqing Ni, ETH Zürich (Switzerland), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 4: Preclinical Imaging

Optoacoustic theranostics
Paper 10494-49

Irene Y. Petrov, The Univ. of Texas Medical Branch (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 7: Quantitative Imaging

Quantification of amyloid deposits and oxygen extraction fraction in the brain with multispectral optoacoustic imaging in arcAbeta mouse model of Alzheimer's disease
Paper 10494-50

Ruiqing Ni, ETH Zurich (Switzerland), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Real-time volumetric mapping of calcium activity in living mice by functional optoacoustic neuro-tomography
Paper 10494-52

Sven Gottschalk, Institut für Biologische und Medizinische Bildgebung, Helmholtz Zentrum München GmbH (Germany), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Transcranial recording of stimulated neuronal activity in vivo using photoacoustic voltage-sensitive dye imaging
Paper 10494-53

Jeeun Kang, Johns Hopkins Univ. (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Noninvasive optoacoustic monitoring of cerebral venous blood oxygenation in humans: Validation with invasive measurements
Paper 10494-54

Yuriy Petrov, The Univ. of Texas Medical Branch (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Photoacoustic imaging of bio-electrical activity using quantum dots
Paper 10494-80

Parag V. Chitnis, George Mason Univ. (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 12: Molecular Imaging

A fast MEMS scanning photoacoustic microscopy system and its application in glioma study
Paper 10494-88

Renzhe Bi, Singapore Bioimaging Consortium (Singapore), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 13: Microscopy

Whole-organ atlas imaged by label-free high-resolution photoacoustic microscopy assisted by a microtome
Paper 10494-93

Terence T. W. Wong, Washington Univ. in St. Louis (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 13: Microscopy

Comprehensive photoacoustic characterization of the cerebral vasculature in awake mice
Paper 10494-161

Rui Cao, Univ. of Virginia (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session PMon: Posters-Monday

Feasibility of transfontanelle photoacoustic imaging: Towards neonatal functional brain imaging
Paper 10494-232

Karl Kratkiewicz, Wayne State Univ. (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session PTue: Posters-Tuesday

Development of a low-cost neonatal brain imaging system using photoacoustic technology: phantom study
Paper 10494-235

Karl Kratkiewicz, Wayne State Univ. (USA), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session PTue: Posters-Tuesday

Optical technologies for in vivo monitoring of lymphatic system in the brain

Paper 10495-18

Oxana V. Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation), et al. Conference 10495: Biophotonics and Immune Responses XIII Session 4: Novel Detection Technology

Structure-stiffness relation of the brain tissue determined by oscillatory indentation mapping

Paper 10496-39

Nelda Antonovaité, Vrije Univ. Amsterdam (Netherlands), et al. Conference 10496: Optical Elastography and Tissue Biomechanics V Session 9: Tissue Mechanical Properties

Imaging deep in the brain using dendritic upconverting nanoparticles

Paper 10497-37

Mirna El Khatib, Perelman School of Medicine, Univ. of Pennsylvania (USA), et al. Conference 10497: Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XVI Session 6: Spectral Imaging I

Biomedical Spectroscopy, Microscopy, and Imaging

Module for multiphoton high-resolution hyperspectral imaging and spectroscopy

Paper 10498-19

Aram Zeytunyan, Newport Corp. (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 4: Technology and In Vivo Imaging I

Scanless three-dimensional excitation and detection by selective access multifoci multiphoton microscopy

Paper 10498-40

Yi Xue, Massachusetts Institute of Technology (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 8: Technology and In Vivo Imaging II

In vivo three-photon imaging of deep mouse cerebellum

Paper 10498-41

Mengran Wang, Cornell Univ. (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 8: Technology and In Vivo Imaging II

Frequency-multiplexed multi-beam two photon imaging for recording of Ca²⁺ signals in neural ensembles

Paper 10498-43

Dmitri A. Tsyboulski, Allen Institute (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 8: Technology and In Vivo Imaging II

Improving sensitivity of stimulated Raman scattering microscopy with cavity dumped optical parametric oscillator and its application in brain imaging

Paper 10498-47

Wenlong Yang, Harvard Univ. (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 9: Coherent Raman I

Multi-photon photoacoustic imaging

Paper 10498-64

Jun Xia, Univ. at Buffalo (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 12: Technology and In Vivo Imaging III

In vivo, two-color multiphoton microscopy using a femtosecond diamond Raman laser

Paper 10498-65

Jeremy W. Jarrett, The Univ. of Texas at Austin (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 12: Technology and In Vivo Imaging III

Adaptive optics plug-and-play setup for high-resolution microscopes with multi-actuator adaptive lens

Paper 10498-67

Martino Quintavalla, Univ. degli Studi di Padova (Italy), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session 12: Technology and In Vivo Imaging III

Non-planar microscopy via multi-pupil wavefront shaping

Paper 10498-79

Lingjie Kong, Tsinghua Univ. (China), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session PSun: Posters-Sunday

Improvement of two-photon microscopic imaging in deep regions of living mouse brains by utilizing a light source based on an electrically controllable gain-switched laser diode

Paper 10498-89

Kazuaki Sawada, Hokkaido Univ. (Japan), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session PSun: Posters-Sunday

Large scale serial two-photon microscopy to investigate local vascular changes in whole rodent brain models of Alzheimer's disease

Paper 10498-92

Patrick Delafontaine-Martel, Ecole Polytechnique de Montréal (Canada), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session PSun: Posters-Sunday

Polymer dots enable deep in vivo multiphoton fluorescence imaging of cerebrovascular architecture

Paper 10498-103

Ahmed Hassan, The Univ. of Texas at Austin (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session PSun: Posters-Sunday

Comparison of excitation wavelengths for in vivo deep imaging of mouse brain

Paper 10498-110

Mengran Wang, Cornell Univ. (USA), et al. Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII Session PSun: Posters-Sunday

High contrast light field microscopy with single-objective selective volume illumination

Paper 10499-18

Sara Madaan, Univ. of California, Los Angeles (USA), et al. Conference 10499: Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV Session 6: Polarization and Light Field Microscopy

Imaging a seizure model in zebrafish with structured illumination light sheet microscopy

Paper 10499-38

Yang Liu, The Univ. of Georgia (USA), et al. Conference 10499: Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV Session 11: Multidimensional Imaging of Biological Systems

Low cost light-sheet microscopy for whole brain imaging

Paper 10499-44

Manish Kumar, Northwestern Univ. (USA), et al. Conference 10499: Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV Session 12: New Methods in Microscopy

Development of chair-side evaluation system of swallowing discomfort of denture wearers

Paper 10501-19

Keisuke Matsumoto, Meiji Univ. (Japan), et al. Conference 10501: Optical Diagnostics and Sensing XVIII: Toward Point-of-Care Diagnostics Session 5: Near Infrared Sensing and Monitoring In Vivo

Adaptive micro endoscopy using liquid crystal lenses with segmented electrodes

Paper 10502-1

Tigran Galstian, Ctr. d'Optique, Photonique et Laser (Canada), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 1: Wavefront Shaping Devices: Deformable Mirrors, Spatial Light Modulators

Robust adaptive optics systems for retinal imaging

Paper 10502-8

Stephen A. Burns, Indiana Univ. (USA), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 2: AO for Microscopy and Optical Coherence Tomography I

Large-field-of-view imaging by multi-pupil adaptive optics

Paper 10502-9

Lingjie Kong, Tsinghua Univ. (China), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 3: AO for Microscopy and Optical Coherence Tomography II

An add-on adaptive optical module for laser scanning microscopy

Paper 10502-14

Na Ji, Howard Hughes Medical Institute (USA), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 4: AO for Microscopy and Optical Coherence Tomography III

Wavefront engineering in living tissue using time-reversed ultrasonically encoded (TRUE) focusing for deep-tissue optogenetic modulation

Paper 10502-35

Joshua Brake, California Institute of Technology (USA), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 8: Applications of Time-Reversal in Biological Imaging, Optical Phase Conjugation

SCAPE microscopy for high-speed 3D imaging of living tissues

Paper 10502-38

Elizabeth M. Hillman, Columbia Univ. (USA), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 9: Shaped Beams for Light Sheet and Structured Illumination Microscopy

Two-photon holographic imaging and optogenetics of neural circuits

Paper 10502-40

Weijian Yang, Columbia Univ. (USA), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 9: Shaped Beams for Light Sheet and Structured Illumination Microscopy

Spatio-temporal volumetric light shaping for two-photon optogenetics

Paper 10502-43

Dimitri Tanese, Univ. Paris Descartes (France), et al.
Conference 10502: Adaptive Optics and Wavefront Control for Biological Systems IV
Session 10: Channel Demixing for Endoscopy/Fibers I

Reflection gradient light interference microscopy (epi-GLIM) for label-free imaging of bulk specimens

Paper 10503-14

Mikhail E. Kandel, Univ. of Illinois (USA), et al.
Conference 10503: Quantitative Phase Imaging IV
Session 4: QPI Methodologies III

Multimodal quantitative phase digital holographic microscopy to identify disease-specific cell phenotypes

Paper 10503-45

Pierre P. Marquet, Institut Univ. en Santé Mentale de Québec (Canada), et al.
Conference 10503: Quantitative Phase Imaging IV
Session 11: QPI Clinical Applications I

HoloConvNet: A deep learning framework for holographic screening of anthrax spores

Paper 10503-70

YoungJu Jo, KAIST (Korea, Republic of), et al.
Conference 10503: Quantitative Phase Imaging IV
Session PMon: Posters-Monday

Real-time halo correction in common-path QPI

Paper 10503-97

Mikhail E. Kandel, Univ. of Illinois (USA), et al.
Conference 10503: Quantitative Phase Imaging IV
Session PMon: Posters-Monday

Multiphoton microscopy for deep brain imaging

Paper 10504-11

Chris Xu, Cornell Univ. (USA), et al.
Conference 10504: Biophysics, Biology and Biophotonics III: the Crossroads
Session 3: New Technologies in Medical Diagnostics

High throughput 3D microscopy for in vivo fluorescence imaging

Paper 10505-30

Meng Cui, Purdue Univ. (USA), et al.
Conference 10505: High-Speed Biomedical Imaging and Spectroscopy III: Toward Big Data Instrumentation and Management
Session 8: High-throughput In Vivo Imaging

Multifunctional gold nanoparticles for diagnosis of Alzheimer's disease

Paper 10506-41

Renana Opochninsky, Bar-Ilan Univ. (Israel), et al.
Conference 10506: Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XV
Session PTue: Posters-Tuesday

Labeling and tracking exosomes within the brain using gold nanoparticles

Paper 10506-44

Oshra Betzer, Institute of Nanotechnology and Advanced Materials, Bar-Ilan Univ. (Israel), et al.
Conference 10506: Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XV
Session PTue: Posters-Tuesday

Time-gated background-free imaging of temperature

Paper 10508-8

Sergei A. Vinogradov, Univ. of Pennsylvania (USA), et al.
Conference 10508: Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications X
Session 2: Molecular and Physiological Imaging Strategies and Probes

Surface plasmon resonance based ring resonator for biosensing applications

Paper 10509-15

Santosh Kumar, DIT Univ. (India), et al.
Conference 10509: Plasmonics in Biology and Medicine XV
Session 4: Plasmonics, Sensing and Bioanalytical Applications

200-W single frequency laser based on short active double clad tapered fiber

Paper 10512-81

Christophe Pierre, ALPhANOV (France), et al.
Conference 10512: Fiber Lasers XV: Technology and Systems
Session Tue: Posters-Tuesday

Laser microstructured diamond electrode arrays for bionic eye applications

Paper 10520-10

Steven Praver, The Univ. of Melbourne (Australia), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session 3: Laser Micro/Nano Structuring on Flexible Substrates

Drilling progress of deep holes in tool steel using high energy picosecond laser pulses

Paper 10520-31

Ehsan Zahedi, Univ. Stuttgart (Germany), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session 7: Laser Micro/Nano Structuring on Metals



TRANSLATIONAL RESEARCH

SPIE Translational Research 2018 will highlight papers that showcase the latest photonics technologies, tools, and techniques with high potential to impact healthcare.

- Photonic Therapeutics and Diagnostics
- Neurophotonics, Neurosurgery, and Optogenetics
- Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering
- Clinical Technologies and Systems
- Biomedical Spectroscopy, Microscopy, and Imaging
- Nano/Biophotonics

SYMPOSIUM CHAIRS



Bruce Tromberg
Beckman Laser Institute, Univ. of California, Irvine (USA)



Gabriela Apiou
Harvard Medical School, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA)

Sunday Special Event:

Translational Research Lunchtime Forum, See page 12 for details.

Photonic Therapeutics and Diagnostics

Implantable lithographically defined photonic microprobe

Paper 10470-45

Mohammad Amin Tadayon, Columbia Univ. (United States), et al.

Conference: 10470 Endoscopic Microscopy XIII

Session 9: New Endoscopic Technologies and Advances II

Using a wearable near-infrared spectroscopy device in children with Tourette syndrome

Paper 10472-18

Pou-Leng Cheong, National Chiao Tung Univ. (Taiwan), et al.

Conference: 10472 Diseases in the Breast and Reproductive System IV
Session 5: Developmental Biology and Pediatrics

Photobiomodulation for the brain: has the light dawned?

Paper 10477-1

Michael Hamblin, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (United States), et al.

Conference: 10477 Mechanisms of Photobiomodulation Therapy XIII
Session 1: PBM therapy in Neuroregeneration and Neurorehabilitation

Synapto-protective effect of low-level light emitting diode (LED) therapy in an in vitro model of status epilepticus

Paper 10477-4

Namgue Hong, Dankook Univ. (Korea, Republic of), et al.

Conference: 10477 Mechanisms of Photobiomodulation Therapy XIII
Session 1: PBM therapy in Neuroregeneration and Neurorehabilitation

Non-invasive therapy for traumatic brain injury with NPLT

Paper 10477-7

Adelaide Micci, The Univ. of Texas Medical Branch (United States), et al.

Conference: 10477 Mechanisms of Photobiomodulation Therapy XIII
Session 1: PBM therapy in Neuroregeneration and Neurorehabilitation

Transcranial red and near-infrared lasers at fluency of 8 J/cm² enhances brain mitochondrial function in aging model

Paper 10477-28

Farzad Salehpour, Tabriz Univ. of Medical Sciences (Iran, Islamic Republic of), et al.

Conference: 10477 Mechanisms of Photobiomodulation Therapy XIII
Session 4: Mechanisms of PBM Therapy

Improved identification of cranial nerves using paired-agent imaging: topical staining protocol optimization through experimentation and simulation

Paper 10478-19

Veronica Torres, Illinois Institute of Technology (United States), et al.

Conference: 10478 Molecular-Guided Surgery: Molecules, Devices, and Applications IV
Session 4: Contrast Agents
Program Track: Neurophotonics, Neurosurgery, and Optogenetics

Low level light therapy on stroke with a portable and illumination-parameter adjustable LED helmet

Paper 10480-2

Pengbo Wang, Univ. of Electronic Science and Technology of China (China), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018
Session 1: Operative and Post Op. Therapy

Optical mapping of prefrontal activity in pathological gamblers

Paper 10480-7

Zhen Yuan, Univ. of Macau (Macao, China), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018
Session 2: Optical Spectroscopy: Clinical I

Optical mapping of the brain activity in children with Down's syndrome

Paper 10480-8

Zhen Yuan, Univ. of Macau (Macao, China), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018
Session 2: Optical Spectroscopy: Clinical I

Model choice influence on calibration of brain health monitoring using combined frequency domain near infrared spectroscopy and diffuse correlation spectroscopy

Paper 10480-12

Stefan Carp, Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital (United States), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018
Session 3: Optical Spectroscopy: Clinical II

Intraoperative hyperspectral imaging of brain hemodynamics during epileptiform activity

Paper 10480-13

Audrey Laurence, Ecole Polytechnique de Montréal (Canada), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018
Session 3: Optical Spectroscopy: Clinical II

Optical intrinsic signal imaging for brain tumor surgery

Paper 10480-14

Tien-Yu Hsiao, National Chiao Tung Univ. (Taiwan), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018

Session 3: Optical Spectroscopy: Clinical II

Intraoperative reflectance and fluorescence spatial frequency domain imaging to enhance guidance of glioma resection

Paper 10480-18

Dennis Wirth, Dartmouth Hitchcock Medical Ctr. (United States), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018

Session 4: Fluorescence Resection and Spectroscopy

In vivo imaging of cerebral hemodynamics and tissue scattering in rat brain using a surgical microscope camera system

Paper 10480-21

Izumi Nishidate, Tokyo Univ. of Agriculture and Technology (Japan), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018

Session 5: Optical Spectroscopy: Pre-Clinical I

Monte Carlo look up table-based inverse algorithm to estimate cerebral optical properties in small animals using frequency-domain near infrared spectroscopy

Paper 10480-25

Seung Yup Lee, Emory Univ. (United States), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018

Session 5: Optical Spectroscopy: Pre-Clinical I

Inverse Monte Carlo lookup table method to determine cerebral tissue properties in small animals using diffuse reflectance spectroscopy

Paper 10480-26

Corey Zheng, Emory Univ. (United States), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018

Session 5: Optical Spectroscopy: Pre-Clinical I

Optical topography guided diffuse optical tomography for imaging brain function: a methodological study on semi-3 dimensional reconstruction

Paper 10480-28

Bingyuan Wang, Tianjin Univ. (China), et al.

Conference: 10480 Clinical and Translational Neurophotonics 2018

Session 6: Optical Spectroscopy: Pre-Clinical II

GRIN lens based confocal system for deep brain calcium imaging

Paper 10481-1

Ling Fu, Britton Chance Ctr. for Biomedical Photonics (China), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 1: In Vivo Mouse Brain Imaging I

Stimulus-evoked functional and blood perfusion changes in the healthy and tumorous rat somatosensory cortex imaged with UHR-OCT

Paper 10481-2

Kostadinka Bizheva, Univ. of Waterloo (Canada), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 1: In Vivo Mouse Brain Imaging I

Deep brain two-photon NIR fluorescence imaging for study of Alzheimer's disease

Paper 10481-4

Congping Chen, Hong Kong Univ. of Science and Technology (China), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 1: In Vivo Mouse Brain Imaging I

Voluntary exercise confers protection against age-related deficits in brain oxygenation in awake mice model of Alzheimer's disease

Paper 10481-50

Lingjie Kong, Tsinghua Univ. (China), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session Mon: Poster Session

Exploring with a reflectance fiber probe the biological mechanisms inducing light scattering and absorption changes during rat somatosensory cortex activation: relevance for the study of neurovascular and neurometabolic coupling mechanisms

Paper 10481-8

Paul Shin, KAIST (Korea, Republic of), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 2: In Vivo Mouse Brain Imaging II

Optically-transparent micro-ring resonator enables longitudinal cortical imaging by photoacoustic microscopy

Paper 10481-9

Pierre Marquet, Institut Univ. en Santé Mentale de Québec, Univ. Laval (Canada), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 2: In Vivo Mouse Brain Imaging II

Infrared light alters cardiorespiratory activity in a dose and site dependent manner in the in situ arterially perfused brainstem preparation

Paper 10482-10

Hao Li, Northwestern Univ. (United States), et al.

Conference: 10481 Optogenetics and Optical Manipulation 2018

Session 2: Control II

Brainsmatics: bridging the brain science and brain-inspired artificial intelligence

Paper 10481-10

Qingming Luo, Suzhou Institute of Brainmatics, Huazhong Univ. of Science and Technology (China), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Mapping the quantitative cytoarchitecture of the whole mouse brain by light-sheet microscopy and digital brain atlasing

Paper 10481-11

Ludovico Silvestri, LENS - Lab. Europeo di Spettroscopia Non-Lineari (Italy), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Imaging whole mouse brains with a dual resolution serial swept-source OCT scanner

Paper 10481-12

Joél Lefebvre, Ecole Polytechnique de Montréal (Canada), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Line-illumination modulation for high-throughput optical-sectioning imaging

Paper 10481-14

Rui Jin, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 3: Brain-Wide Imaging I

Photoacoustic tomography: Deep functional imaging at high spatiotemporal resolution

Paper 10481-15

Lihong Wang, California Institute of Technology (United States), et al.

Conference: 10481 Neural Imaging and Sensing 2018

Session 4: Brain-Wide Imaging II

Translational Research Applications

Volumetric optoacoustic mapping of fast neuronal activity in an isolated mouse brain model expressing genetically encoded calcium indicator

Paper 10481-16

Sven Gottschalk, Institute of Biological and Medical Imaging, Helmholtz Zentrum München GmbH (Germany), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 4: Brain-Wide Imaging II

Hybrid averaging optical coherence tomography angiography and applications in brain

Paper 10481-20

Peng Li, Zhejiang Univ. (China), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 5: Novel Technologies I

Structure illuminated two-photon microscopy for high resolution imaging deep into the brain

Paper 10481-23

Yao Zheng, Zhejiang Univ. (China), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 5: Novel Technologies I

High-speed, high-resolution in vivo brain imaging with wavefront shaping

Paper 10481-25

Na Ji, Univ. of California, Berkeley (United States), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Generation of extremely thin light sheets allows fast isotropic imaging of whole mouse brains by ultramicroscopy

Paper 10481-26

Hans-Ulrich Dodt, Technische Univ. Wien (Austria), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Super-resolution localization microscopy with large field-of-view for mapping synaptic connectivity at multiple scales

Paper 10481-27

Zhenli Huang, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Simultaneous two-photon microscopy and magnetic resonance imaging

at ultrahigh field of 16.4 Tesla

Paper 10481-28

Meng Cui, Purdue Univ. (United States), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

UbasM: a simple, rapid, efficient balanced optical clearing method for brain imaging

Paper 10481-29

Lingling Chen, Shenzhen Univ. (China), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 6: Novel Technologies II

Interferometric near-infrared spectroscopy (iNIRS) at short source-detector separations

Paper 10481-30

Oybek Kholiqov, Univ. of California, Davis (United States), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 7: Human Brain Imaging

Detection of cortical oxygen for clinical analysis and trends research of olfactory memory by using functional optical topography

Paper 10481-32

Yen Ting Chen, National Chiao Tung Univ. (Taiwan), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 7: Human Brain Imaging

Advances of deep imaging in brain within optical tissue windows

Paper 10481-35

Lingyan Shi, Columbia Univ. (United States), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Long term imaging of living brain glial cancer cells

Paper 10481-36

Patricia M. Farias, Phornano Holding GmbH (Austria), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Cerebral penetrating arteriole dynamics has important implication to the exacerbated ischemic injury in type 2 diabetes

Paper 10481-37

Yuandong Li, Univ. of Washington (United States), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

White matter atrophy in spinocerebellar ataxia type 1 mouse models revealed by serial optical coherence scanner

Paper 10481-39

Chao Liu, Univ. of Minnesota, Twin Cities (United States), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Photodynamic opening of blood-brain barrier

Paper 10481-40

Oxana Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session 8: Optical Sensing and Imaging for Brain Diseases

Investigating amyloid-beta plaques in whole brain sections of a mouse model of Alzheimer's disease with a visible light optical coherence microscope

Paper 10481-41

Antonia Lichtenegger, Medizinische Univ. Wien (Austria), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session Mon: Poster Session

Simultaneous OCT imaging and temperature sensing with a miniaturized fiber-optic probe

Paper 10481-42

Jiawen Li, The Univ. of Adelaide (Australia), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session Mon: Poster Session

A novel neurophotonics approach to study neural networks in vitro

Paper 10481-43

Erik Schartner, The Univ. of Adelaide (Australia), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session Mon: Poster Session

Three-dimensional reconstruction of the human brain cortex by means of a SWITCH/TDE-combined clearing method

Paper 10481-44

Wardiya Afshar Saber, School of Medicine, Univ. of St. Andrews (United Kingdom), et al.
Conference: 10481 Neural Imaging and Sensing 2018
Session Mon: Poster Session

Change in cognitive process during dance video game play with different appendages for motor output

Paper 10481-45
Irene Costantini, LENS - Lab. Europeo di Spettroscopia Non-Lineari (Italy), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Analysis of prefrontal cortex function in TD patient during working memory task and olfactory task by using fNIRS measurements

Paper 10481-46
Kota Suzuki, Meiji Univ. (Japan), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Diffusion quantification of IR-780 dye delivered using Lexiscan through the blood brain barrier

Paper 10481-47
WeiShan Hsiao, Institute of Biomedical Engineering, National Chiao Tung Univ. (Taiwan), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

A software pipeline for high-throughput stitching and processing of teravoxel-sized 3D images of brain samples

Paper 10481-49
Rebecca Pak, Johns Hopkins Univ. (United States), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

In vivo volumetric imaging of fast biological dynamics in deep tissue via wavefront engineering

Paper 10481-5
Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopia Non-Lineari (Italy), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session 1: In Vivo Mouse Brain Imaging I

Hemodynamic monitoring in different cortical layers with a single fiber optical system

Paper 10481-51
Xuecong Lu, Ecole Polytechnique de Montréal (Canada), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Single camera hemodynamic imaging of mouse brain with intact skull

Paper 10481-53
Linhui Yu, Univ. of Calgary (Canada), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Long fiber based multi-channel NIRS system for freely moving mice

Paper 10481-54
Seung-Ho Paik, Korea Univ. (Korea, Republic of), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Understanding neurovascular mechanisms during cortical spreading depression in ischemic stroke rats using novel ECoG-LSCI technology

Paper 10481-55
Young Kyu Kim, Korea Univ. (Korea, Republic of), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Optical clearing method for skull tissue for in-vivo morphological imaging of the rat brain with UHR-OCT

Paper 10481-56
Han-Chi Pan, National Health Research Institutes (Taiwan), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Deep brain imaging using an ultra-thin OCT endoscopy probe

Paper 10481-59
Nadine Haymour, Univ. of Waterloo (Canada), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Improved near infrared spectroscopy patch with conformal contact elastomeric substrate

Paper 10481-60
Woo June Choi, Univ. of Washington (United States), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Bio-signal impact of cybersickness caused by virtual reality

Paper 10481-61
Chang Hyun Park, Pusan National Univ. (Korea, Republic of), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

DeepBouton: automated identification of single-neuron axonal boutons at the brain-wide scale

Paper 10481-64
Yi Tien Lin, National Chiao Tung Univ. (Taiwan), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Simultaneous two-layer two photon imaging with frequency multiplexing

Paper 10481-65
Shaoqun Zeng, Britton Chance Ctr. for Biomedical Photonics (China), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Whole-brain imaging using multi-view sub-voxel-resolving light-sheet microscopy

Paper 10481-67
Yiming Guo, Britton Chance Ctr. for Biomedical Photonics (China), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Three-channel whole-brain optical imaging for visualizing dual-labeled input and output of neural circuit with co-located anatomical reference

Paper 10481-68
Jun Nie, Huazhong Univ. of Science and Technology (China), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session Mon: Poster Session

Imaging of stimulus-induced hemodynamic response in the rat cortex using phase-stabilized swept-source OCT

Paper 10481-7
Zhangheng Ding, Wuhan National Lab. for Optoelectronics, Huazhong Univ. of Science and Technology (China), et al.
 Conference: 10481 Neural Imaging and Sensing 2018
 Session 2: In Vivo Mouse Brain Imaging II

Computational algorithm for assessing inter-neuronal connectivity to optimize optogenetic stimulation and neural circuit activity

Paper 10482-30
Jeremy Ford, Vanderbilt Univ. (United States), et al.
 Conference: 10482 Optogenetics and Optical Manipulation 2018
 Session 6: Mechanism

Excitability of astrocyte in vitro with infrared neural stimulation

Paper 10482-6
Akhil Bandi, Rutgers, The State Univ. of New Jersey (United States), et al.
 Conference: 10482 Optogenetics and Optical Manipulation 2018
 Session 1: Control I

Measuring 3D temperature profiles using phase-decorrelation OCT

Paper 10483-50
Wilson Adams, Vanderbilt Univ. (United States), et al.
 Conference: 10482 Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII
 Session 8: OCT New Technology II

Translational Research Applications

In-vivo label-free optical detection of neural activities in retina

Paper 10482-12
Gjinovefa Kola, Case Western Reserve Univ. (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 3: Detection

Measuring IR-induced 3D temperature profiles using phase decorrelation OCT

Paper 10482-13
Subrata Batabyal, Nanoscope Technologies, LLC (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 3: Detection

Optical stimulation and monitoring of the visual system using bioluminescent opsin

Paper 10482-14
Junqi Zhuo, Case Western Reserve Univ. (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 3: Detection

A compact integrated device for spatially-selective optogenetic neural stimulation based on the Utah Optrode Array

Paper 10482-15
Samarendra Mohanty, Nanoscope Technologies, LLC (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 3: Detection

Single source for simultaneous two-photon stimulation and imaging based on spectral-temporal modulation of supercontinuum generation

Paper 10482-16
Robert Scharf, The Univ. of Utah (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 4: Delivery

Modeling of cerebral blood flow in reaction to neural stimulation

Paper 10482-18
Yuan-Zhi Liu, Univ. of Illinois (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 4: Delivery

Light propagation analysis in neural tissue for wireless optogenetic nanonetworks

Paper 10482-21
Rex Chin-Hao Chen, Univ. of Wisconsin-Milwaukee (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 4: Delivery

Targeted nano-enhanced Optical delivery of opsin for dry-AMD therapy

Paper 10482-23
Pedram Johari, Univ. at Buffalo (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 5: Manipulation

An all-optical system for rapid and deep interrogation of behaviorally relevant activity patterns

Paper 10482-24
Sivakumar Gajjerman, Nanoscope Technologies, LLC (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 5: Manipulation

Validating the temperature rise during infrared neural inhibition with increased block width

Paper 10482-3
Gilad Lerman, NYU School of Medicine (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 1: Control I

Optogenetic probing of muscle function, active sensation, and recovery from nerve damage in the mouse whisker system

Paper 10482-5
Carlos Renteria, Univ. of Illinois (United States), et al.
Conference: 10482 Optogenetics and Optical Manipulation 2018
Session 1: Control I

Clinical Technologies and Systems

Few-mode fiber OCT for angular scattering contrast in tissue

Paper 10483-77
Junqi Zhuo, Case Western Reserve Univ. (United States), et al.
Conference: 10483 Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII
Session 12: Novel Contrast

Integrated Raman biopsy probe for high yield targeted brain cancer biopsies

Paper 10484-12
Pablo Eugui, Medizinische Univ. Wien (Austria), et al.
Conference: 10483 Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session 3: Robotics and Light Biopsies for Surgical Applications

The study on fast localization method of anomaly block in brain based on differential optical density

Paper 10484-39
Joannie Desroches, Ecole Polytechnique de Montréal (Canada), et al.
Conference: 10484 Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session 10: Imaging: Theory and Simulations

Which experimental model can sensitively indicate brain death by Functional near-infrared spectroscopy?

Paper 10484-42
Huiquan Wang, Tianjin Polytechnic Univ. (China), et al.
Conference: 10484 Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session Sun: Poster Session

Near infrared assessment of the brain in cardiac arrest patients

Paper 10484-43
Boan Pan, Univ. of Electronic Science and Technology of China (China), et al.
Conference: 10484 Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVI
Session Sun: Poster Session

Low cost thermal camera for use in preclinical detection of diabetic peripheral neuropathy in primary care setting

Paper 10485-30
Thu Nga Nguyen, Ryerson Univ. (Canada), et al.
Conference: 10484 Optics and Biophotonics in Low-Resource Settings IV
Session 7: Emerging Technologies

High definition diffusion tensor imaging for optic nerve fiber tracking: translational implications for whole eye transplantation

Paper 10486-14
Zhenglun Kong, Northeastern Univ. (United States), et al.
Conference: 10485 Design and Quality for Biomedical Technologies XI
Session 3: Innovative Optical Modalities

3D on-chip microscopy of optically cleared tissue

Paper 10485-35
Niranchana Manivannan, VisionQuest Biomedical LLC (United States), et al.
Conference: 10485 Optics and Biophotonics in Low-Resource Settings IV
Session 8: Computational Imaging and Sensing

Cost effective wireless embedded multichannel NIRS system

Paper 10485-45
Yibo Zhang, Univ. of California, Los Angeles (United States), et al.
Conference: 10485 Optics and Biophotonics in Low-Resource Settings IV
Session Sun: Poster Session

Automatic and accurate segmentation of cerebral tissues in fMRI dataset with combination of image processing and deep learning

Paper 10485-9
Chuan-Hsiang Yu, National Chiao Tung Univ. (Taiwan), et al.
 Conference: 10485 Optics and Biophotonics in Low-Resource Settings IV
 Session 2: Machine Learning in Imaging, Sensing and Diagnostics

Measurements of coherent hemodynamics to enrich the physiological information provided by near-infrared spectroscopy (NIRS) and functional MRI

Paper 10487-13
Nami Davoodzadeh, Univ. of California, Riverside (United States), et al.
 Conference: 10486 Multimodal Biomedical Imaging XIII
 Session 3: Clinical Applications

Influence of low temperature ageing on optical and mechanical properties of transparent yttria stabilized-zirconia cranial prosthesis

Paper 10486-9
Vijay Gorantla, Wake Forest School of Medicine (United States), et al.
 Conference: 10486 Design and Quality for Biomedical Technologies XI
 Session 2: Phantoms and Test Methods

Design and analysis of FBG based sensor for detection of damage in oil and gas pipelines for safety of life at sea

Paper 10488-31
Angelo Sassaroli, Tufts Univ. (United States), et al.
 Conference: 10487 Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII
 Session 8: Sensors Detectors and Treatment Tools VII

In vivo, noncontact, real-time, optical and spectroscopic assessment of the immediate local physiological response to spinal cord injury in a rat model

Paper 10489-10
Amna Bedi, DIT Univ. (India), et al.
 Conference: 10488 Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis
 Session 3: Spectroscopic Instrumentation and Designs

Design of tapered optical fibers to achieve high spatial selectivity during infrared neural stimulation

Paper 10488-39
Amna Bedi, DIT Univ. (India), et al.
 Conference: 10488 Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII
 Session 9: Sensors Detectors and Treatment Tools VIII

Investigation of hydrogen sulfide gas using Pd/Pt material based fiber Bragg grating sensor

Paper 10488-8
Nelson Salas, Univ. of Miami (United States), et al.
 Conference: 10488 Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XVIII
 Session 3: Sensors Detectors and Treatment Tools II

Alzheimer's disease: evaluation using label-free fluorescence of tryptophan metabolites and the kynurenine pathway

Paper 10489-49
Joseph Chaiken, Syracuse Univ. (United States), et al.
 Conference: 10489 Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis
 Session Tues: Poster Session

Micro-engineering a novel platform to reconstruct physiology and functionality of the human brain microvasculature in vitro

Paper 10491-23
Laura Sordillo, The City College of New York (United States), et al.
 Conference: 10489 Microfluidics, BioMEMS, and Medical Microsystems XVI
 Session 5: Applications II

Fabrication of an optically-penetrating, multi-layered organ-on-chip device to study longitudinal changes in blood-brain barrier optical redox ratios

Paper 10491-42
Yasaman Daghighi, Univ. of California, Berkeley (United States), et al.
 Conference: 10491 Microfluidics, BioMEMS, and Medical Microsystems XVI
 Session 10: Medical Microsystems II

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Effects of short infrared laser pulses on neuron metabolism

Paper 10492-17
Nasya Sturdivant, Univ. of Arkansas (United States), et al.
 Conference: 10491 Optical Interactions with Tissue and Cells XXIX
 Session 4: Laser Modulation of Cells

Approaching through-skull optical brain imaging and phototherapy: optical properties of head tissues in near and short-wave infrared regions

Paper 10492-37
Roxanne Glazier, Georgia Institute of Technology (United States), et al.
 Conference: 10492 Optical Interactions with Tissue and Cells XXIX
 Session PMon: Posters-Monday

OCT Eigen decompensation based penetrating vessel mapping

Paper 10493-15
Sergii Golovynskyi, Shenzhen Univ. (China), et al.
 Conference: 10492 Dynamics and Fluctuations in Biomedical Photonics XV
 Session 4: Functional Imaging and Spectroscopy I

Evaluating vasculature changes in the murine embryonic brain due to prenatal alcohol exposure using optical coherence tomography, in utero

Paper 10493-20
Nami Davoodzadeh, Univ. of California, Riverside (United States), et al.
 Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
 Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

Combined NIRS and DCS measurements of cerebral hemodynamics during intracranial and blood pressure changes

Paper 10493-16
Wei Wei, Univ. of Washington (United States), et al.
 Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
 Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

Monitoring of acute injury in experimental cerebral ischemic stroke using optical coherence tomography

Paper 10493-18
Alexander Ruesch, Carnegie Mellon Univ. (United States), et al.
 Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
 Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

OCT angiography reveals age-related differences in cerebral blood flow of anesthetized mice

Paper 10493-19
Woo June Choi, Univ. of Washington (United States), et al.
 Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
 Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

Translational Research Applications

Laser speckle imaging of brain blood flow through a transparent nanocrystalline yttria-stabilized-zirconia cranial implant

Paper 10493-2

Woo June Choi, Univ. of Washington (United States), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session 1: Speckle Technologies

OCT velocimetry reveals electrical-evoked temporal capillary hemodynamics in mouse cerebral cortex during functional activation

Paper 10493-21

Raksha Raghunathan, Univ. of Houston (United States), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session 5: Cerebral Hemo- Lympho- and Glymphatic Dynamics

DAS: A simple, efficient, scalable and DiI-compatible optical clearing method for intact systems

Paper 10493-33

Wei Wei, Univ. of Washington (United States), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session 8: Optical Clearing and Biomechanics

Control of epileptic seizures in WAG/Rij Rats by means of brain-computer interface

Paper 10493-34

Lingling Chen, Shenzhen Univ. (China), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Nonlinear dynamics and coherent resonance in a network of coupled neural-like oscillators

Paper 10493-40

Vladimir Makarov, Saratov State Univ. (Russian Federation), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Brain-computer interface for alertness estimation and improving

Paper 10493-48

Andrei Andreev, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Nonlinear correlation method for the separation of couplings in EEG experiments with neural ensembles

Paper 10493-49

Alexander Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Effect of filtration of signals of brain activity on quality of recognition of brain activity patterns using artificial intelligence methods

Paper 10493-50

Alexander Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Use of parallel computing for analyzing big data in EEG studies of ambiguous perception

Paper 10493-54

Alexander Hramov, Yuri Gagarin State Technical Univ. of Saratov (Russian Federation), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Study of the interactions in neural ensemble of the brain using wavelet analysis

Paper 10493-55

Vladimir Maksimenko, Saratov State Technical Univ. (Russian Federation), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Identification of the patterns of brain activity during the imagination of movements using an artificial neural network

Paper 10493-63

Vladimir Maksimenko, Saratov State Technical Univ. (Russian Federation), et al.
Conference: 10493 Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Comprehensive photoacoustic characterization of the cerebral vasculature in awake mice

Paper 10494-161

Semen Kurkin, Saratov State Technical Univ. (Russian Federation), et al.
Conference: 10493 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session PMon: Posters-Monday

Whole-organ atlas imaged by label-free high-resolution photoacoustic microscopy assisted by a microtome

Paper 10494-93

Stephen Herrmann, The Univ. of Texas Medical Branch (United States), et al.
Conference: 10494 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session 13: Microscopy

Non-invasive detection of matrix-metalloproteinase activity in a mouse model of cerebral ischemia using multispectral photoacoustic tomography

Paper 10494-23

Johannes Rebling, Helmholtz Zentrum München GmbH (Germany), et al.
Conference: 10494 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session 4: Preclinical Imaging

Feasibility of transfontanelle photoacoustic imaging: Towards neonatal functional brain imaging

Paper 10494-232

Ruiqing Ni, ETH Zürich (Switzerland), et al.
Conference: 10494 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session PTue: Posters-Tuesday

Quantification of amyloid deposits and oxygen extraction fraction in the brain with multispectral photoacoustic imaging in arcAbeta mouse model of Alzheimer's disease

Paper 10494-50

Irene Petrov, The Univ. of Texas Medical Branch (United States), et al.
Conference: 10494 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Real-time volumetric mapping of calcium activity in living mice by functional photoacoustic neuro-tomography

Paper 10494-52

Ruiqing Ni, ETH Zurich (Switzerland), et al.
Conference: 10494 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Transcranial recording of stimulated neuronal activity in vivo using photoacoustic voltage-sensitive dye imaging

Paper 10494-53

Sven Gottschalk, Institut für Biologische und Medizinische Bildgebung, Helmholtz Zentrum München GmbH (Germany), et al.
Conference: 10494 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Noninvasive photoacoustic monitoring of cerebral venous blood oxygenation in humans: Validation with invasive measurements

Paper 10494-54

Jeeun Kang, Johns Hopkins Univ. (United States), et al.
Conference: 10494 Photons Plus
Ultrasound: Imaging and Sensing 2018
Session 8: Functional Imaging and Brain Imaging

Photoacoustic imaging of bio-electrical activity using quantum dots

Paper 10494-80

Yuriy Petrov, The Univ. of Texas Medical Branch (United States), et al.
Conference: 10494 Photons Plus Ultrasound: Imaging and Sensing 2018
Session 12: Molecular Imaging

A fast MEMS scanning photoacoustic microscopy system and its application in glioma study

Paper 10494-88

Nashaat Rasheed, George Mason Univ. (United States), et al.
Conference: 10494 Photons Plus Ultrasound: Imaging and Sensing 2018
Session 13: Microscopy

Noninvasive measurement of cerebral venous oxygenation in neonates with a multi-wavelength, fiber-coupled laser diode optoacoustic system

Paper 10494-9

Renzhe Bi, Singapore Bioimaging Consortium (Singapore), et al.
Conference: 10494 Photons Plus Ultrasound: Imaging and Sensing 2018
Session 1: Clinical Applications

Optical technologies for in vivo monitoring of lymphatic system in the brain

Paper 10495-18

Terence T. Wong, Washington Univ. in St. Louis (United States), et al.
Conference: 10494 Biophotonics and Immune Responses XIII
Session 4: Novel Detection Technology

In-vivo assessment of radiation-induced cerebrovascular damage in mice by hybrid optoacoustic-ultrasound bio-microscopy

Paper 10494-17

Rui Cao, Univ. of Virginia (United States), et al.
Conference: 10494 Photons Plus Ultrasound: Imaging and Sensing 2018
Session 3: Therapy Monitoring and Guidance II

Development of a low-cost neonatal brain imaging system using photoacoustic technology: phantom study

Paper 10494-235

Mohammad R. Avanaki, Wayne State Univ. (United States), et al.
Conference: 10494 Photons Plus Ultrasound: Imaging and Sensing 2018
Session PTue: Posters-Tuesday

Optoacoustic theranostics

Paper 10494-49

Mohammad R. Avanaki, Wayne State Univ. (United States), et al.
Conference: 10494 Photons Plus Ultrasound: Imaging and Sensing 2018
Session 7: Quantitative Imaging

Structure-stiffness relation of the brain tissue determined by oscillatory indentation mapping

Paper 10496-39

Oxana Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation), et al.
Conference: 10495 Optical Elastography and Tissue Biomechanics V
Session 9: Tissue Mechanical Properties
Program Track: Biomedical Spectroscopy, Microscopy, and Imaging

Imaging deep in the brain using dendritic upconverting nanoparticles

Paper 10497-37

Nelda Antonovaité, Vrije Univ. Amsterdam (Netherlands), et al.
Conference: 10496 Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XVI
Session 6: Spectral Imaging I

Polymer dots enable deep in vivo multiphoton fluorescence imaging of cerebrovascular architecture

Paper 10498-103

Mirna El Khatib, Perelman School of Medicine, Univ. of Pennsylvania (United States), et al.
Conference: 10497 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session PSun: Posters-Sunday

Scanless three-dimensional excitation and detection by selective access multifoci multiphoton microscopy

Paper 10498-40

Aram Zeytunyan, Newport Corp. (United States), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 8: Technology and In Vivo Imaging II

In vivo three-photon imaging of deep mouse cerebellum

Paper 10498-41

Yi Xue, Massachusetts Institute of Technology (United States), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 8: Technology and In Vivo Imaging II

Frequency-multiplexed multi-beam two photon imaging for recording of Ca²⁺ signals in neural ensembles

Paper 10498-43

Mengran Wang, Cornell Univ. (United States), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 8: Technology and In Vivo Imaging II

Improving sensitivity of stimulated Raman scattering microscopy with cavity dumped optical parametric oscillator and its application in brain imaging

Paper 10498-47

Dmitri Tsyboulski, Allen Institute (United States), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 9: Coherent Raman I

Multi-photon photoacoustic imaging

Paper 10498-64

Wenlong Yang, Harvard Univ. (United States), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 12: Technology and In Vivo Imaging III

In vivo, two-color multiphoton microscopy using a femtosecond diamond Raman laser

Paper 10498-65

Depeng Wang, Univ. at Buffalo (United States), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 12: Technology and In Vivo Imaging III

Adaptive optics plug-and-play setup for high-resolution microscopes with multi-actuator adaptive lens

Paper 10498-67

Jeremy Jarrett, The Univ. of Texas at Austin (United States), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 12: Technology and In Vivo Imaging III

Femtosecond semiconductor disk lasers: a promising tool for the future of multiphoton imaging

Paper 10498-76

Martino Quintavalla, Univ. degli Studi di Padova (Italy), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session PSun: Posters-Sunday

Non-planar microscopy via multi-pupil wavefront shaping

Paper 10498-79

Florian Emaury, ETH Zurich (Switzerland), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session PSun: Posters-Sunday

Improvement of two-photon microscopic imaging in deep regions of living mouse brains by utilizing a light source based on an electrically controllable gain-switched laser diode

Paper 10498-89

Lingjie Kong, Tsinghua Univ. (China), et al.
Conference: 10498 Multiphoton Microscopy in the Biomedical Sciences XVIII
Session PSun: Posters-Sunday

Translational Research Applications

Large scale serial two-photon microscopy to investigate local vascular changes in whole rodent brain models of Alzheimer's disease

Paper 10498-92

Kazuaki Sawada, Hokkaido

Univ. (Japan), et al.

Conference: 10498 Multiphoton Microscopy

in the Biomedical Sciences XVIII

Session PSun: Posters-Sunday

High contrast light field microscopy with single-objective selective volume illumination

Paper 10499-18

Patrick Delafontaine-Martel, Ecole

Polytechnique de Montréal (Canada), et al.

Conference: 10498 Three-Dimensional

and Multidimensional Microscopy: Image

Acquisition and Processing XXV

Session 6: Polarization and

Light Field Microscopy

Comparison of excitation wavelengths for in vivo deep imaging of mouse brain

Paper 10498-110

Ahmed Hassan, The Univ. of Texas

at Austin (United States), et al.

Conference: 10498 Multiphoton Microscopy

in the Biomedical Sciences XVIII

Session PSun: Posters-Sunday

Module for multiphoton high-resolution hyperspectral imaging and spectroscopy

Paper 10498-19

Mengran Wang, Cornell Univ.

(United States), et al.

Conference: 10498 Multiphoton Microscopy

in the Biomedical Sciences XVIII

Session 4: Technology and In Vivo Imaging I

Imaging a seizure model in zebrafish with structured illumination light sheet microscopy

Paper 10499-38

Sara Madaan, Univ. of California,

Los Angeles (United States), et al.

Conference: 10499 Three-Dimensional

and Multidimensional Microscopy: Image

Acquisition and Processing XXV

Session 11: Multidimensional

Imaging of Biological Systems

Low cost light-sheet microscopy for whole brain imaging

Paper 10499-44

Yang Liu, The Univ. of Georgia

(United States), et al.

Conference: 10499 Three-Dimensional

and Multidimensional Microscopy: Image

Acquisition and Processing XXV

Session 12: New Methods in Microscopy

Development of chair-side evaluation system of swallowing discomfort of denture wearers

Paper 10501-19

Manish Kumar, Northwestern

Univ. (United States), et al.

Conference: 10499 Optical

Diagnostics and Sensing XVIII:

Toward Point-of-Care Diagnostics

Session 5: Near Infrared Sensing

and Monitoring In Vivo

Adaptive micro endoscopy using liquid crystal lenses with segmented electrodes

Paper 10502-1

Keisuke Matsumoto, Meiji

Univ. (Japan), et al.

Conference: 10501 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 1: Wavefront Shaping Devices:

Deformable Mirrors, Spatial Light Modulators

An add-on adaptive optical module for laser scanning microscopy

Paper 10502-14

Tigran Galstian, Ctr. d'Optique,

Photonique et Laser (Canada), et al.

Conference: 10502 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 4: AO for Microscopy and

Optical Coherence Tomography III

Large-field-of-view imaging by multi-pupil adaptive optics

Paper 10502-9

Stephen Burns, Indiana Univ.

(United States), et al.

Conference: 10502 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 3: AO for Microscopy and

Optical Coherence Tomography II

Reflection gradient light interference microscopy (epi-GLIM) for label-free imaging of bulk specimens

Paper 10503-14

Lingjie Kong, Tsinghua Univ. (China), et al.

Conference: 10502 Quantitative

Phase Imaging IV

Session 4: QPI Methodologies III

Wavefront engineering in living tissue using time-reversed ultrasonically encoded (TRUE) focusing for deep-tissue optogenetic modulation

Paper 10502-35

Ichun Anderson Chen, Howard Hughes

Medical Institute (United States), et al.

Conference: 10502 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 8: Applications of Time-

Reversal in Biological Imaging,

Optical Phase Conjugation

SCAPE microscopy for high-speed 3D imaging of living tissues

Paper 10502-38

Joshua Brake, California Institute of

Technology (United States), et al.

Conference: 10502 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 9: Shaped Beams for Light Sheet

and Structured Illumination Microscopy

Two-photon holographic imaging and optogenetics of neural circuits

Paper 10502-40

Elizabeth Hillman, Columbia

Univ. (United States), et al.

Conference: 10502 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 9: Shaped Beams for Light Sheet

and Structured Illumination Microscopy

Spatio-temporal volumetric light shaping for two-photon optogenetics

Paper 10502-43

Weijian Yang, Columbia Univ.

(United States), et al.

Conference: 10502 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 10: Channel Demixing

for Endoscopy/Fibers I

Robust adaptive optics systems for retinal imaging

Paper 10502-8

Dimitrii Tanese, Univ. Paris

Descartes (France), et al.

Conference: 10502 Adaptive Optics and

Wavefront Control for Biological Systems IV

Session 2: AO for Microscopy and

Optical Coherence Tomography I

Multimodal quantitative phase digital holographic microscopy to identify disease-specific cell phenotypes

Paper 10503-45

Mikhail Kandel, Univ. of Illinois

(United States), et al.

Conference: 10503 Quantitative

Phase Imaging IV

Session 11: QPI Clinical Applications I

HoloConvNet: A deep learning framework for holographic screening of anthrax spores

Paper 10503-70

Pierre Marquet, Institut Univ. en Santé

Mentale de Québec (Canada), et al.

Conference: 10503 Quantitative

Phase Imaging IV

Session PMon: Posters-Monday

Real-time halo correction in common-path QPI

Paper 10503-97

YoungJu Jo, KAIST (Korea,

Republic of), et al.

Conference: 10503 Quantitative

Phase Imaging IV

Session PMon: Posters-Monday

Multiphoton microscopy for deep brain imaging

Paper 10504-11

Mikhail Kandel, Univ. of Illinois (United States), et al.

Conference: 10503 Biophysics, Biology and Biophotonics III: the Crossroads
Session 3: New Technologies in Medical Diagnostics

High throughput 3D microscopy for in vivo fluorescence imaging

Paper 10505-30

Chris Xu, Cornell Univ. (United States), et al.

Conference: 10504 High-Speed Biomedical Imaging and Spectroscopy III: Toward Big Data Instrumentation and Management
Session 8: High-throughput In Vivo Imaging
Program Track: Nano/Biophotonics

Multifunctional gold nanoparticles for diagnosis of Alzheimer's disease

Paper 10506-41

Meng Cui, Purdue Univ. (United States), et al.

Conference: 10505 Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XV
Session PTue: Posters-Tuesday

Labeling and tracking exosomes within the brain using gold nanoparticles

Paper 10506-44

Renana OPOCHINSKY, Bar-Ilan Univ. (Israel), et al.

Conference: 10506 Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XV
Session PTue: Posters-Tuesday

Time-gated background-free imaging of temperature

Paper 10508-8

Oshra Betzer, Institute of Nanotechnology and Advanced Materials, Bar-Ilan Univ. (Israel), et al.

Conference: 10506 Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications X
Session 2: Molecular and Physiological Imaging Strategies and Probes

Surface plasmon resonance based ring resonator for biosensing applications

Paper 10509-15

Sergei Vinogradov, Univ. of Pennsylvania (United States), et al.

Conference: 10508 Plasmonics in Biology and Medicine XV
Session 4: Plasmonics, Sensing and Bioanalytical Applications

200-W single frequency laser based on short active double clad tapered fiber

Paper 10512-81

Lokendra Singh, DIT Univ. (India), et al.

Conference: 10509 Fiber Lasers XV: Technology and Systems
Session Tue: Posters-Tuesday

Laser microstructured diamond electrode arrays for bionic eye applications

Paper 10520-10

Christophe Pierre, ALPhANOV (France), et al.

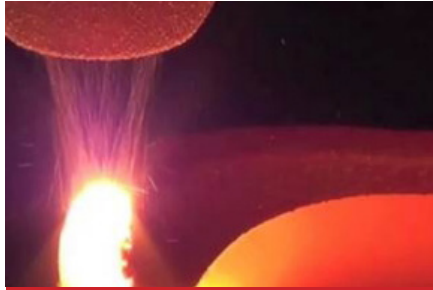
Conference: 10512 Laser-based Micro- and Nanoprocessing XII
Session 3: Laser Micro/Nano Structuring on Flexible Substrates

Drilling progress of deep holes in tool steel using high energy picosecond laser pulses

Paper 10520-31

Steven Praver, The Univ. of Melbourne (Australia), et al.

Conference: 10520 Laser-based Micro- and Nanoprocessing XII
Session 7: Laser Micro/Nano Structuring on Metals



3D PRINTING

SPIE Applications of 3D Printing 2018 highlights papers that showcase innovative ways to apply this multidimensional/multidisciplinary technology.

- Additive Manufacturing
- Selective Laser Melting, Maser Sintering, Laser Photopolymerization
- Novel Materials, Protean Materials, and Laser Interactions
- Software That Increases Efficiencies and Speed
- In-situ Sensors or Probes to Verify and Quantify Additive Manufacturing Processes in Real Time
- Conformal Photonics/ Electronics

SYMPOSIUM CHAIR



Henry Helvajian
The Aerospace Corp. (USA)

The use of 3D scanners for skin prick allergy testing: a feasibility study

Paper 10467-23

Rudolf M. Verdaasdonk, Vrije Univ. Medical Ctr. (Netherlands), et al.
Conference 10467: Photonics in Dermatology and Plastic Surgery 2018
Session 3: Structured Light Imaging

In vivo imaging of the oral cavity by endoscopic optical coherence tomography

Paper 10469-18

Julia Walther, Universitätsklinikum Carl Gustav Carus Dresden (Germany), et al.
Conference 10469: Optical Imaging, Therapeutics, and Advanced Technology in Head and Neck Surgery and Otolaryngology 2018
Session 4: Optically Guided Cancer Surgery II

Endoscopic optical coherence tomography for depth-resolved imaging of the human oral cavity in vivo

Paper 10470-18

Julia Walther, Universitätsklinikum Carl Gustav Carus Dresden (Germany), et al.
Conference 10470: Endoscopic Microscopy XIII
Session 4: Endoscopic OCT

3D printed optics for use in miniaturised optical coherence tomography needle probes

Paper 10470-22

Jiawen Li, The Univ. of Adelaide (Australia), et al.
Conference 10470: Endoscopic Microscopy XIII
Session 5: Optical Imaging Probe Designs

3D printed phantom of retinal photoreceptor cells for evaluating adaptive optics imaging modalities

Paper 10474-12

Nikita Kedia, U.S. Food and Drug Administration (United States), et al.
Conference 10474: Ophthalmic Technologies XXVIII
Session 4: Ophthalmic Imaging: Adaptive Optics Instrumentation

Development of low-cost enabling technology for image-guided photodynamic therapy treatment of oral cancer in resource-limited settings

Paper 10476-25

Jonathan P. Celli, Univ. of Massachusetts Boston (United States), et al.
Conference 10476: Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXVII
Session 7: Photodynamic Therapy VII

Wavelet tree structure based speckle noise removal for optical coherence tomography

Paper 10483-98

Xin Yuan, Nokia Bell Labs (United States), et al.
Conference 10483: Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII
Session Sun: Poster Session I: Technology

A dual-mode mobile phone microscope using the onboard camera flash

Paper 10485-2

Antony Orth, Ctr. of Excellence for Nanoscale BioPhotonics, RMIT Univ. (Australia), et al.
Conference 10485: Optics and Biophotonics in Low-Resource Settings IV
Session 1: Smartphone Based Optical Instruments

Biomimetic 3D-printed neurovascular phantoms for macro-and micro-scale Near-infrared Fluorescence Imaging

Paper 10486-6

Yi Liu, Univ. of Maryland, College Park (United States), et al.
Conference 10486: Design and Quality for Biomedical Technologies XI
Session 2: Phantoms and Test Methods

Additive manufacturing of microfluidic glass chips

Paper 10491-9

Frederik Kotz, Karlsruher Institut für Technologie (Germany), et al.
Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 2: Manufacturing I

Characterization and optimization of a stereolithography-based hydrogel for improved properties

Paper 10491-10

A. Camila Uzcategui, Univ. of Colorado Boulder (United States), et al.
Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 2: Manufacturing I

3D printing of conductive polymers using scanned nanopipettes

Paper 10491-17

Alex Wibawa, Queen Mary Univ. of London (United Kingdom), et al.
Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 4: Manufacturing II

Micro-engineering a novel platform to reconstruct physiology and functionality of the human brain microvasculature in vitro

Paper 10491-23

Yasaman Daghighi, Univ. of California, Berkeley (United States), et al.
Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 5: Applications II

Fluid transient characteristics of a 3D printed microfluidic tesla pump

Paper 10491-25

Jessica Hallgath, Univ. of Michigan-Dearborn (United States), et al.
Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 6: Microfluidic Devices II

Fabrication of an optically-penetrating, multi-layered organ-on-chip device to study longitudinal changes in blood-brain barrier optical redox ratios

Paper 10491-42

Nasya Sturdivant, Univ. of Arkansas (United States), et al.
Conference 10491: Microfluidics, BioMEMS, and Medical Microsystems XVI
Session 10: Medical Microsystems II

Fully automated z-scan setup based on a tunable fs-oscillator

Paper 10492-2

Wolfgang Steiger, Technische Univ. Wien (Austria), et al.
Conference 10492: Optical Interactions with Tissue and Cells XXIX
Session 1: Ultrafast Pulsed Laser Interactions

Laser assisted nanoceramics reinforced polymer scaffolds for tissue engineering: additional heating and stem cells behavior

Paper 10493-68

Igor V. Shishkovsky, P.N. Lebedev Physical Institute (Russian Federation), et al.
Conference 10493: Dynamics and Fluctuations in Biomedical Photonics XV
Session PSun: Posters-Sunday

Transurethral illumination probe design for prostate photoacoustic imaging

Paper 10494-11

Min Ai, The Univ. of British Columbia (Canada), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 2: Therapy Monitoring and Guidance I

In-vivo three-dimensional optoacoustic molecular imaging of the synovial vasculature in a mouse model of knee joint osteoarthritis

Paper 10494-20

Zhongyu LIU, The Third Affiliated Hospital, Sun Yat-Sen Univ. (China), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 4: Preclinical Imaging

Novel 3D printing technology for direct fabrication of tissue-mimicking phantoms

Paper 10494-74

Daniil I. Nikitichev, Univ. College London (United Kingdom), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 11: Phantoms and Standards for Photoacoustic Imaging

Patient-specific tissue-mimicking phantoms for photoacoustic and ultrasound imaging

Paper 10494-75

Efthymios Maneas, Univ. College London (United Kingdom), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session 11: Phantoms and Standards for Photoacoustic Imaging

Uniform light delivery for quantitative volumetric optoacoustic tomography

Paper 10494-115

Ben Mc Larney, Helmholtz Zentrum München GmbH (Germany), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session PSun: Posters-Sunday

Tunable phononic lens for deep tissue imaging

Paper 10494-138

Delfino Reyes Contreras, Univ. Autónoma del Estado de México (Mexico), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session PSun: Posters-Sunday

Novel realistic tissue-mimicking prostate cancer phantom for the diagnostic and training

Paper 10494-219

Daniil I. Nikitichev, Univ. College London (United Kingdom), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session PTue: Posters-Tuesday

Developing multimodal photoacoustic tomography system for three-dimensional imaging

Paper 10494-223

Kaiye Xia, Peking Univ. (China), et al.
Conference 10494: Photons Plus Ultrasound: Imaging and Sensing 2018
Session PTue: Posters-Tuesday

Dual camera, low cost, multi-spectral colposcope for visualization and analysis of the cervix

Paper 10497-34

David Levitz, MobileODT Ltd. (Israel), et al.
Conference 10497: Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XVI
Session 5: Cytomics

3D brain oxygenation measurements in awake hypertensive mice using two photon phosphorescence lifetime imaging

Paper 10498-68

Xuecong Lu, Ecole Polytechnique de Montréal (Canada), et al.
Conference 10498: Multiphoton Microscopy in the Biomedical Sciences XVIII
Session 12: Technology and In Vivo Imaging III

Three-wavelength digital holographic microscopy for imaging protozoa in intensity and phase

Paper 10499-8

James K. Wallace, Jet Propulsion Lab. (United States), et al.
Conference 10499: Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV
Session 2: Holography and Scatterometry

Laser written fluorescence in plastic slides for microscope calibration

Paper 10499-43

Patrick S. Salter, Univ. of Oxford (United Kingdom), et al.
Conference 10499: Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV
Session 12: New Methods in Microscopy

A novel wearable technology for estimation of muscle oxygen saturation and lactate threshold power in exercising muscle

Paper 10501-23

Parisa Farzam, Harvard Medical School (United States), et al.
Conference 10501: Optical Diagnostics and Sensing XVIII: Toward Point-of-Care Diagnostics
Session 5: Near Infrared Sensing and Monitoring In Vivo

Solving the refractive index: thickness ambiguity in quantitative phase imaging of primary neurons in culture with low-cost custom-made 3D-printed perfusion chamber

Paper 10503-67

Erik Bélanger, Institut Univ. en Santé Mentale de Québec (Canada), et al.
Conference 10503: Quantitative Phase Imaging IV
Session PMon: Posters-Monday

Biomechanical properties of cells revealed by shear flow assays in an in-house microfluidic chamber and quantitative phase digital holographic microscopy

Paper 10504-19

Erik Bélanger, Institut Univ. en Santé Mentale de Québec (Canada), et al.
Conference 10504: Biophysics, Biology and Biophotonics III: The Crossroads
Session 4: Imaging Cellular and Molecular Dynamics and Biomechanics

Compressive spectral optical coherence tomography

Paper 10505-3

Xin Yuan, Nokia Bell Labs (United States), et al.
Conference 10505: High-Speed Biomedical Imaging and Spectroscopy III: Toward Big Data Instrumentation and Management
Session 1: Computational Imaging

3D Printing Applications

Fabrication of continuous and isolated 3D plasmonic micro-structured super-crystals arrays for SERS sensing

Paper 10507-20

Nicolas Pazos Perez, Univ. Rovira i Virgili (Spain), et al.
Conference 10507: Colloidal Nanoparticles for Biomedical Applications XIII
Session 6: SERS Sensing with Nanoparticles

Multiple-pulse effects during printing of silver paste using laser induced forward transfer

Paper 10519-22

Miguel Morales, Univ. Politécnica de Madrid (Spain), et al.
Conference 10519: Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XXIII
Session 6: Laser Direct Writing II

3D printed complex micro- and nano-optical devices: Aberration correction, hybrid systems, and integration of plasmonics

Paper 10519-34

Harald Giessen, Univ. Stuttgart (Germany), et al.
Conference 10519: Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XXIII
Session 9: 3D Manufacturing in Micro- and Nanoscale
3D laser nano-printing for bio-scaffolds and metamaterials
Paper 10519-35

Martin Wegener, Karlsruher Institut für Technologie (Germany), et al.
Conference 10519: Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XXIII
Session 9: 3D Manufacturing in Micro- and Nanoscale

Numerical modeling of multi-photon polymerization by ultrafast laser

Paper 10519-36

Paul Somers, Purdue Univ. (United States), et al.
Conference 10519: Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XXIII
Session 9: 3D Manufacturing in Micro- and Nanoscale

Solvent induced reversible deformations of polymeric 3D microstructures for actuation and sensing applications

Paper 10520-13

Sima Reksyte, Vilnius Univ. (Lithuania), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session 3: Laser Micro/Nano Structuring on Flexible Substrates

Formation of two way shape memory effect in NiTi and NiTiHF alloy using pulsed laser irradiation

Paper 10520-32

Saidjafarzoda Ilhom, Western Kentucky Univ. (United States), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session 7: Laser Micro/Nano Structuring on Metals

Laser direct writing for energy storage and integrated wireless devices

Paper 10520-46

Jinguang Cai, Tohoku Univ. (China), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session 10: Advanced Laser Structuring for Energy Storage and Conversion I

Laser in battery manufacturing: impact of intrinsic and artificial electrode porosity on chemical degradation and battery lifetime

Paper 10520-47

Peter Smyrek, Karlsruhe Institut für Technologie (Germany), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session 10: Advanced Laser Structuring for Energy Storage and Conversion I

Femtosecond laser hybrid subtractive-additive 3D micro- and nano-fabrication: A magic bullet in today's material processing

Paper 10520-54

Linas Jonušauskas, Vilnius Univ. (Lithuania), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session Tue: Posters-Tuesday

Local temperature measurement during ultrafast laser 3D nanolithography writing

Paper 10520-58

Mangirdas Malinauskas, Vilnius Univ. (Lithuania), et al.
Conference 10520: Laser-based Micro- and Nanoprocessing XII
Session Tue: Posters-Tuesday

Fabrication of 3D microelectronic devices based on femtosecond laser and metal microsolidification inside hard brittle material

Paper 10521-19

Chao Shan, Xi'an Jiaotong Univ. (China), et al.
Conference 10521: Synthesis and Photonics of Nanoscale Materials XV
Session Tue: Posters-Tuesday

Longitudinal writing of vertical waveguides in fused silica: Toward new integrated photonic technologies

Paper 10522-20

Diogo Pereira Lopes, Politecnico di Milano (Italy), et al.
Conference 10522: Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII
Session 5: Ultrafast Laser Writing of Waveguide and Fiber Devices

Selective laser-induced etching (SLE): A scalable subtractive 3D printing process for transparent glasses and crystals

Paper 10522-30

Jens Gottmann, LightFab GmbH (Germany), et al.
Conference 10522: Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII
Session 7: Laser-assisted Chemical Structuring of Glasses

Femtosecond laser based three dimensionals micromachining of optical fibers

Paper 10522-31

David Lambelet, Ecole Polytechnique Fédérale de Lausanne (Switzerland), et al.
Conference 10522: Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII
Session 7: Laser-assisted Chemical Structuring of Glasses

Chemical-assisted etching of single-pulse laser filaments for rapid 3D micro-structuring in fused silica

Paper 10522-32

Erden Ertorer, Univ. of Toronto (Canada), et al.
Conference 10522: Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII
Session 7: Laser-assisted Chemical Structuring of Glasses

Tuning of the thermal expansion coefficient of fused silica by femtosecond laser

Paper 10522-38

Pieter Vlugter, Ecole Polytechnique Fédérale de Lausanne (Switzerland), et al.
Conference 10522: Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII
Session 9: 3D Glass Modification

Three-dimensional laser nanostructuring of crystals

Paper 10522-44

Airán Ródenas, CNR-Istituto di Fotonica e Nanotecnologie (Italy), et al.
Conference 10522: Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XVIII
Session 10: 3D Crystal Structuring

Additive manufacturing of reflective and transmissive optics: Potential and new solutions for optical systems

Paper 10523-1
Andreas Heinrich, Hochschule Aalen (Germany), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 1: Different Views of Laser 3D Processing

Stereolithographic fabrication of engineered lattice structures having non-traditional strut geometries

Paper 10523-2
Denis Cormier, Rochester Institute of Technology (United States), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 1: Different Views of Laser 3D Processing

Additive manufacturing: Capabilities, challenges, and future

Paper 10523-3
Yung C. Shin, Purdue Univ. (United States), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 1: Different Views of Laser 3D Processing

Development of a hybrid exposure system for lithography-based additive manufacturing technologies

Paper 10523-4
Bernhard Busetti, Technische Univ. Wien (Austria), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 1: Different Views of Laser 3D Processing

3D printing of transparent materials by selective laser etching and multiphoton polymerization in one machine

Paper 10523-5
Jens Gottmann, LightFab GmbH (Germany), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 1: Different Views of Laser 3D Processing

Laser heated, fiber fed additive manufacturing of transparent soda-lime glass

Paper 10523-6
Edward C. Kinzel, Missouri Univ. of Science and Technology (United States), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 1: Different Views of Laser 3D Processing

Advances in laser peening technology and possible extension to 3D manufacturing tools

Paper 10523-7
Yuji Sano, ImPACT (Japan), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 2: Other Processes with Lasers

Light controlling sound: Selective laser sintering as a tool for building aqueous acoustic metamaterials

Paper 10523-8
Charles Rohde, U.S. Naval Research Lab. (United States), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 2: Other Processes with Lasers

3D microfluidic fabrication using a low refractive index polymer for clear microscopic observation at the fluid boundary

Paper 10523-10
Yasutaka Hanada, Hirotsaki Univ. (Japan), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 3: Microfluidic

Dynamic programming approach to adaptive slicing for optimization under a global volumetric error constraint

Paper 10523-11
Andrew Deng, Univ. of California, Los Angeles (United States), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 3: Microfluidic

Selective laser melting of glass using ultrashort laserpulses

Paper 10523-12
Brian Seyfarth, Friedrich-Schiller-Univ. Jena (Germany), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 3: Microfluidic

SLA 3D printer with novel biocompatible materials based on carbon nanotubes

Paper 10523-14
Aleksandr Alexandrovich Polokhin, National Research Univ. of Electronic Technology (Russian Federation), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 4: Polymers Optical Material 3D

High-throughput 3D printing of customized imaging lens

Paper 10523-17
Xiangfan Chen, Northwestern Univ. (United States), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 4: Polymers Optical Material 3D

3D microfabrication of mouse and human variants of serum albumin by femtosecond laser multiphoton cross-linking

Paper 10523-18
Daniela Serien, RIKEN (Japan), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 5: 3D Laser Lithography I: Joint Session with Conferences 10523 and 10544

Optical lithography using stimulated emission depletion

Paper 10523-19
Paul Somers, Purdue Univ. (United States), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 6: 3D Laser Lithography II: Joint Session with Conferences 10523 and 10544

Synchrotron x-ray induced real time observations of cobalt-chromium alloy layer formation by micro laser cladding

Paper 10523-23
Yuji Sato, Osaka Univ. (Japan), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 7: Special Session: Laser Peening/Cladding

Additive Manufacturing of reflective optics: Evaluating finishing methods

Paper 10523-24
Georg Leuteritz, Leibniz Univ. Hannover (Germany), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 7: Special Session: Laser Peening/Cladding

Extending the printing capabilities of laser-induced forward transfer from two-dimensional patterning to direct three-dimensional printing

Paper 10523-25
Paul Delrot, Ecole Polytechnique Fédérale de Lausanne (Switzerland), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 8: Forward Transfer

Micropatterning of glassy, polymeric, and metallic materials by fs-LIFT

Paper 10523-26
Juliana M. P. Almeida, Univ. de São Paulo (Brazil), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 8: Forward Transfer

Laser induced forward transfer bioprinting of immune cells and chemoattractant proteins for immunological responses studies

Paper 10523-28
Sara Lauzurica, Univ. Politécnica de Madrid (Spain), et al.
 Conference 10523: Laser 3D Manufacturing V
 Session 8: Forward Transfer

3D Printing Applications

Laser-induced forward transfer (LIFT) of 3D microstructures

Paper 10523-29

Alberto Piqué, U.S. Naval Research Lab. (United States), et al.
Conference 10523: Laser 3D Manufacturing V
Session 8: Forward Transfer

Wide format, high speed and low cost fabrication of 3D cardboard molds by laser based rapid layered manufacturing (RLM) technology

Paper 10523-31

Claudio Rottman, Highcon Systems Ltd. (Israel), et al.
Conference 10523: Laser 3D Manufacturing V
Session 9: Status Additive Technology

All inkjet printed frequency steered phased array antennas with multi angle receiving demonstrated via simulation

Paper 10523-32

Ray Chen, The Univ. of Texas at Austin (United States), et al.
Conference 10523: Laser 3D Manufacturing V
Session 9: Status Additive Technology

Nanoscale 3D printing enables fundamental biology studies

Paper 10523-33

Alice White, Boston Univ. (United States), et al.
Conference 10523: Laser 3D Manufacturing V
Session 10: Microprinting

Single-photon micro-additive manufacturing through a multimode optical fiber

Paper 10523-35

Paul Delrot, Ecole Polytechnique Fédérale de Lausanne (Switzerland), et al.
Conference 10523: Laser 3D Manufacturing V
Session 10: Microprinting

Optical 3D printing in mesoscale

Paper 10523-36

Mangirdas Malinauskas, Vilnius Univ. (Lithuania), et al.
Conference 10523: Laser 3D Manufacturing V
Session 10: Microprinting

Designing for the DMLS process

Paper 10523-39

Greg Thompson, Proto Labs, Inc. (United States), et al.
Conference 10523: Laser 3D Manufacturing V
Session 11: Metal Processing

4D manufacturing of intermetallic SMA fabricated by SLM process

Paper 10523-40

Igor V. Shishkovsky, P.N. Lebedev Physical Institute (Russian Federation), et al.
Conference 10523: Laser 3D Manufacturing V
Session 11: Metal Processing

Selective laser melting of copper using ultrashort laser pulses at different wavelengths

Paper 10523-41

Lisa Kaden, Friedrich-Schiller- Univ. Jena (Germany), et al.
Conference 10523: Laser 3D Manufacturing V
Session 11: Metal Processing

Rapid TMC laser prototyping: Compositional and phase-structural sustainability via combinatorial design of titanium based gradient alloy reinforced by nano sized TiC or TiB₂ ceramics

Paper 10523-44

Igor V. Shishkovsky, P.N. Lebedev Physical Institute (Russian Federation), et al.
Conference 10523: Laser 3D Manufacturing V
Session 12: New Processes and Process Control I

A compact beam diagnostic device for 3D additive manufacturing systems

Paper 10523-45

Andreas Koglbauer, PRIMES GmbH (Germany), et al.
Conference 10523: Laser 3D Manufacturing V
Session 12: New Processes and Process Control I

Optics to Control Thermal Effects in Selective Laser Melting

Paper 10523-48

Alexander V. Laskin, AdlOptica Optical Systems GmbH (Germany), et al.
Conference 10523: Laser 3D Manufacturing V
Session 13: New Processes and Process Control II

Influence of thermally induced aberrations on resulting intensity distribution

Paper 10525-4

Alexander V. Laskin, AdlOptica Optical Systems GmbH (Germany), et al.
Conference 10525: High-Power Laser Materials Processing: Applications, Diagnostics, and Systems VII
Session 1: Systems I

3D-printed optical active components

Paper 10529-30

Andreas Heinrich, Hochschule Aalen (Germany), et al.
Conference 10529: Organic Photonic Materials and Devices XX
Session 7: Materials

3D-additive manufacturing non-destructive characterization with terahertz waves

Paper 10531-26

Jean-Paul Guillet, Univ. Bordeaux 1 (France), et al.
Conference 10531: Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XI
Session 6: Terahertz Imaging and Volume Inspection

Fabrication of hyperuniform disordered photonic network materials

Paper 10544-26

Frank Scheffold, Univ. de Fribourg (Switzerland), et al.
Conference 10544: Advanced Fabrication Technologies for Micro/ Nano Optics and Photonics XI
Session 8: 3D Laser Lithography I: Joint Session with Conferences 10523 and 10544

Multiphoton processing technologies for applications in biology and tissue engineering

Paper 10544-27

Aleksandr Ovsianikov, Technische Univ. Wien (Austria), et al.
Conference 10544: Advanced Fabrication Technologies for Micro/ Nano Optics and Photonics XI
Session 8: 3D Laser Lithography I: Joint Session with Conferences 10523 and 10544

2PP-DLW in hydrogels for excitation and immobilization of living cells

Paper 10544-28

Cornelia Denz, Westfälische Wilhelms- Univ. Münster (Germany), et al.
Conference 10544: Advanced Fabrication Technologies for Micro/ Nano Optics and Photonics XI
Session 8: 3D Laser Lithography I: Joint Session with Conferences 10523 and 10544

Towards a cellulose-based photoresist

Paper 10544-29

Marie-Christin Angermann, Technische Univ. Kaiserslautern (Germany), et al.
Conference 10544: Advanced Fabrication Technologies for Micro/ Nano Optics and Photonics XI
Session 8: 3D Laser Lithography I: Joint Session with Conferences 10523 and 10544

Printing structural colors via direct laser writing

Paper 10544-30

Gordon Zyla, Ruhr-Univ. Bochum (Germany), et al.
Conference 10544: Advanced Fabrication Technologies for Micro/ Nano Optics and Photonics XI
Session 8: 3D Laser Lithography I: Joint Session with Conferences 10523 and 10544

Direct laser writing of electromagnetic metasurfaces for infra-red frequency range

Paper 10544-31

Vyngantas Mizeikis, Shizuoka Univ. (Japan), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 9: 3D Laser Lithography II: Joint Session with Conferences 10523 and 10544

Femtosecond laser-induced optical properties in silver-containing gallogermanate heavy metal oxide glasses

Paper 10544-32

Yannick G. Petit, Institut de Chimie de la Matière Condensée de Bordeaux (France), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 9: 3D Laser Lithography II: Joint Session with Conferences 10523 and 10544

Metal and metal-composite micro-structures via direct laser writing

Paper 10544-33

Erik H. Waller, Technische Univ. Kaiserslautern (Germany), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 9: 3D Laser Lithography II: Joint Session with Conferences 10523 and 10544

Femtosecond laser 3D nanoprining for functional devices

Paper 10544-34

Hong-Bo Sun, Jilin Univ. (China), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 10: 3D Laser Lithography III

Additive manufacturing for the production of micro-optics

Paper 10544-35

Michael Thiel, Nanoscribe GmbH (Germany), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 10: 3D Laser Lithography III

Two-photon laser lithography in metrology

Paper 10544-36

Julian Hering, Technische Univ. Kaiserslautern (Germany), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 10: 3D Laser Lithography III

Comparison of fabrication strategies for diffractive optical elements using two-photon polymerization

Paper 10544-37

Fabian Hilbert, Multiphoton Optics GmbH (Germany), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 10: 3D Laser Lithography III

Next generation 3D printing of glass: The emergence of enabling materials

Paper 10544-38

Bastian E. Rapp, Karlsruher Institut für Technologie (Germany), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 11: 3D Laser Lithography IV

Polymer optics for tunable and printable optical systems

Paper 10544-39

Hans Zappe, Univ. of Freiburg (Germany), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 11: 3D Laser Lithography IV

Fabrication of 3D glass-ceramic micro- /nano-structures by direct laser writing lithography and pyrolysis

Paper 10544-40

Mangirdas Malinauskas, Vilnius Univ. (Lithuania), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 11: 3D Laser Lithography IV

Two-photon absorption lithography for nanofabrication of 3D x-ray compound refractive lenses

Paper 10544-41

Natalia Kokareva, M.V. Lomonosov Moscow State Univ. (Russian Federation), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 11: 3D Laser Lithography IV

The optical damage treshold of 3D nanolithography produced microstructures under intense femtosecond irradiation

Paper 10544-42

Linas Jonušauskas, Vilnius Univ. (Lithuania), et al.

Conference 10544: Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI
Session 11: 3D Laser Lithography IV

Micro-CLIP fabrication speed dependence on feature size and material composition

Paper 10546-7

Henry Oliver T. Ware, Northwestern Univ. (United States), et al.

Conference 10546: Emerging Digital Micromirror Device Based Systems and Applications X
Session 2: Advanced Manufacturing using DMD or other SLM: Joint Session with Conferences 10544 and 10546

Design and characterization of 3D-printed freeform lenses with subwavelength surface roughness for prescribed illuminations

Paper 10554-53

Bisrat Girma Assefa, Univ. of Eastern Finland (Finland), et al.

Conference 10554: Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XXII
Session: Posters-Wednesday



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Program Tracks

- Photonic Therapeutics and Diagnostics
- Neurophotonics, Neurosurgery, and Optogenetics
- Clinical Technologies and Systems
- Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering
- Biomedical Spectroscopy, Microscopy, and Imaging
- Nano/Biophotonics
- Laser Sources
- Nonlinear Optics and Beam Guiding
- Micro/Nano Applications
- Macro Applications
- Optoelectronic Materials and Devices
- Photonic Integration
- Nanotechnologies in Photonics
- MOEMS-MEMS in Photonics
- Semiconductor Lasers and LEDs
- Displays and Holography
- Advanced Quantum and Optoelectronic Applications
- Optical Communications: Devices to Systems
- Optical Materials & Fabrication
- Optical Systems & Lens Design
- Optomechanics
- Metrology and Standards
- Imaging
- Snapshots: 2-Hour Courses for Non-Technical Staff
- Industry Workshops
- Professional Development Workshops

Workshops and Courses for Industry and Non-Technical Staff

INDUSTRY WORKSHOPS

Free to attend. No CEU* credits. 1-hour to all-day sessions.

- Basics of Laser Material Processing
- How to Speak "High Power Diode Laser"
- Concurrent Opto-Mechanical Engineering: Where do You Start? A Session for Engineering Managers
- Concurrent Design for Optical and Mechanical Engineers with Zemax Virtual Prototyping
- Laser Optics & Polarizers, PLDs & APDs, and IR Detectors: One-day Workshop
- Photodetectors, Raman Spectroscopy, and SiPMs versus PMTs: One-day Workshop
- Marketing Tips for Small Companies: How to Bring Customers to You
- Export Control Working Groups: Cameras, Lasers, Lenses and Optics

SNAPSHOT COURSES

Fees vary. Earn CEU credits. 2-hour sessions.

- Basic Optics for Non-Optics Personnel
- The Very Least You Need to Know about Optics
- Fundamentals of Optical Engineering
- Introduction to VR, AR, MR and Smart Eyewear: Market Expectations, Hardware Requirements and Investment Patterns
- Additive Manufacturing of Metals - Powder Bed Fusion and Directed Energy Deposition
- Biomedical Optics: Imaging Biomaker Basics



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COURSE INDEX

Photonic Therapeutics and Diagnostics

SC1221	Mon	Physiological Optics of the Eye for Engineers <i>(Lakshminarayanan)</i> 8:30 am to 5:30 pm	398
SC1175	Tue	Optics in the Hospital—Endoscope Specification and Design <i>(Leiner)</i> 8:30 am to 12:30 pm	398
SC702	Tue	Optics and Optical Quality of the Human Eye <i>(Roorda)</i> 1:30 pm to 5:30 pm	399

Neurophotronics, Neurosurgery, and Optogenetics

SC1126	Mon	Neurophotronics <i>(Levi, Dufour)</i> 1:30 pm to 5:30 pm	399
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Clinical Technologies and Systems

SC312	Sun	Principles and Applications of Optical Coherence Tomography <i>(Fujimoto)</i> 1:30 pm to 5:30 pm,	400
SC981	Mon	Biomedical Applications of Specialty Optical Fibers and Fiber Sensors <i>(Mendez, Arkwright)</i> 1:30 pm to 5:30 pm	401
SC868	Tue	Optical Design for Biomedical Imaging <i>(Liang)</i> 1:30 pm to 5:30 pm	400
SC1228	Tue	Diffuse Optics in Biology and Medicine: Noninvasive Probes of Tissue Health <i>(Busch)</i> 1:30 pm to 5:30 pm	401
SC1205	Wed	Fundamentals of Applied Pathophysiology in Optical Diagnostics <i>(Shadgan)</i> 8:30 am to 5:30 pm	399

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

SC029	Sun	Tissue Optics <i>(Jacques)</i> 1:30 pm to 5:30 pm	402
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Biomedical Spectroscopy, Microscopy, and Imaging

SC1203	Sun	Analysis of Texture and Oriented Patterns in Biomedical Images <i>(Rangayyan)</i> 8:30 am to 12:30 pm	402
SC806	Sun	Advanced Multivariate Statistics for Imaging <i>(Bajorski)</i> 8:30 am to 5:30 pm	403

Nano/Biophotonics

SC1206	Sun	Nanophotonics: Fluorescence and Plasmon Controlled Fluorescence <i>(Fixler)</i> 8:30 am to 12:30 pm	404
SC1186	Wed	Fluorescence Sensing and Imaging: Towards Portable Healthcare <i>(Levi)</i> 8:30 am to 12:30 pm	403

Laser Sources

SC752	Sun	Solid State Laser Technology <i>(Hodgson)</i> 8:30 am to 5:30 pm	406
SC1020	Sun	Splicing of Specialty Fibers and Glass Processing of Fused Components for Fiber Laser and Medical Probe Applications <i>(Wang)</i> 8:30 am to 12:30 pm	404
SC1181	Sun	Ultrafast Lasers and Amplifiers <i>(Paschotta)</i> 8:30 am to 5:30 pm	405
SC1174	Mon	Improving Laser Reliability, an Introduction <i>(Grossman, Asbury)</i> 8:30 am to 5:30 pm	405
SC972	Tue	Basic Laser Technology: Fundamentals and Performance Specifications <i>(Sukuta)</i> 8:30 am to 12:30 pm	406
SC1207	Tue	High-Power Laser Technologies <i>(Paschotta)</i> 8:30 am to 12:30 pm	405

Nonlinear Optics and Beam Guiding

SC047	Mon	Introduction to Nonlinear Optics <i>(Fisher)</i> 8:30 am to 12:30 pm	407
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Micro/Nano Applications

SC743	Sun	Micromachining with Femtosecond Lasers <i>(Nolte)</i> 8:30 am to 12:30 pm	408
SC689	Wed	Precision Laser Micromanufacturing <i>(Schaeffer)</i> 1:30 pm to 5:30 pm	407

Macro Applications

SC1144	Tue	Laser Systems Engineering <i>(Kasunic)</i> 8:30 am to 5:30 pm	408
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Optoelectronic Materials and Devices

SC747	Sun	Semiconductor Photonic Device Fundamentals <i>(Linden)</i> 8:30 am to 5:30 pm	409
SC1091	Mon	Fundamentals of Reliability Engineering for Optoelectronic Devices <i>(Leisher)</i> 1:30 pm to 5:30 pm	409

Photonic Integration

SC1071	Sun	Understanding Diffractive Optics <i>(Soskind)</i> 8:30 am to 5:30 pm	410
SC1204	Sun	Volume Bragg Gratings—New Optical Components Providing Unique Means <i>(Glebov)</i> 1:30 pm to 5:30 pm	410
SC817	Wed	Silicon Photonics <i>(Michel, Saini)</i> 1:30 pm to 5:30 pm	410

Nanotechnologies in Photonics

SC608	Sun	Photonic Crystals: A Crash Course, from Bandgaps to Fibers <i>(Johnson)</i> 8:30 am to 12:30 pm	411
SC1191	Sun	Quantum Sensors <i>(Lanzagorta, Venegas-Andraca)</i> 8:30 am to 12:30 pm	411

MONEY-BACK GUARANTEE

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CONTINUING EDUCATION UNITS

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MOEMS-MEMS in Photonics

SC1230	Sun	Optical MEMS Engineering (<i>Khalil</i>) 8:30 am to 5:30 pm	413
SC454	Tue	Fabrication Technologies for Micro- and Nano-Optics (<i>Suleski</i>) 8:30 am to 12:30 pm	413
SC1125	Wed	Design, Modeling and Fabrication Techniques for Micro-optics: Applications to Display, Imaging, Sensing and Metrology (<i>Kress</i>) 8:30 am to 5:30 pm	412

Advanced Quantum and Optoelectronic Applications

SC1210	Sun	Quantum Computing (<i>Venegas-Andraca, Lanzagorta</i>) 1:30 pm to 5:30 pm	414
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Semiconductor Lasers and LEDs

SC1146	Mon	Laser Diode Beam Basics, Characteristics and Manipulation (<i>Sun</i>) 1:30 pm to 5:30 pm	414
SC386	Thu	Advanced Thermal Management Materials for Optoelectronic, Microelectronic and MEMS Packaging (<i>Zweben</i>) 8:30 am to 5:30 pm	415

Displays and Holography

SC1218	Sun	Optical Technologies and Architectures for Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) Head-Mounted Displays (HMDs) (<i>Kress</i>) 8:30 am to 5:30 pm	416
SC1234	Tue	Introduction to VR, AR, MR and Smart Eyewear: Markets Expectations, Hardware Requirements and Investment Patterns (<i>Kress</i>) 1:30 pm to 3:30 pm	416
SC1096	Wed	Head Mounted Displays for Augmented Reality Applications (<i>Browne, Melzer</i>) 8:30 am to 5:30 pm	415

Optical Materials & Fabrication

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SC1178	Tue	Fundamentals of Molded Optics (<i>Symmons, Schaub</i>) 8:30 am to 12:30 pm	417

Optical Systems & Lens Design

SC156	Sun	Basic Optics for Engineers (<i>Boreman</i>) 8:30 am to 5:30 pm, \$595 / \$705	420
SC690	Sun	Optical System Design: Layout Principles and Practice (<i>Greivenkamp</i>) 8:30 am to 5:30 pm	421
SC011	Sun	Design of Efficient Illumination Systems (<i>Cassarly</i>) 1:30 pm to 5:30 pm	419
SC1224	Mon	Fundamentals of Optical Engineering (<i>Vogt</i>) 8:30 am to 10:30 am	422
SC935	Mon	Introduction to Lens Design (<i>Bentley</i>) 8:30 am to 5:30 pm	422
SC1170	Mon	The Very Least You Need To Know About Optics (<i>Diehl</i>) 10:30 am to 12:30 pm	422
SC609	Mon	Basic Optics for Non-Optics Personnel (<i>Harding</i>) 1:30 pm to 3:30 pm	423
SC1232	Mon	Introduction to LIDAR for Autonomous Vehicles (<i>Shaw</i>) 1:30 pm to 5:30 pm	420
SC1199	Tue	Stray Light Analysis and Control (<i>Fest</i>) 8:30 am to 5:30 pm	419
SC1229	Tue	Introduction to Performance Budgeting (<i>Arenberg</i>) 1:30 pm to 5:30 pm	419
SC720	Wed	Cost-Conscious Tolerancing of Optical Systems (<i>Youngworth</i>) 1:30 pm to 5:30 pm	421
SC003	Thu	Practical Optical System Design (<i>Youngworth</i>) 8:30 am to 5:30 pm	418

Optomechanics

SC014	Sun	Introduction to Optomechanical Design (<i>Vukobratovich</i>) 8:30 am to 5:30 pm	423
SC015	Mon	Fastening Optical Elements with Adhesives (<i>Daly</i>) 8:30 am to 12:30 pm	424
SC010	Tue	Introduction to Optical Alignment Techniques (<i>Castle</i>) 8:30 am to 5:30 pm	423
SC1085	Thu	Optomechanical Systems Engineering (<i>Kasunic</i>) 8:30 am to 5:30 pm	424

Metrology & Standards

SC212	Mon	Modern Optical Testing (<i>Wyant</i>) 8:30 am to 12:30 pm	425
SC700	Tue	Understanding Scratch and Dig Specifications (<i>Aikens</i>) 8:30 am to 12:30 pm	425
SC1017	Tue	Optics Surface Inspection Workshop (<i>Aikens</i>) 1:30 pm to 5:30 pm	425

Imaging

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SC967	Mon	High Dynamic Range Imaging: Sensors and Architectures (<i>Darmont</i>) 8:30 am to 5:30 pm	428
SC068	Tue	Use of CCD and CMOS Sensors in Visible Imaging Applications (<i>Lomheim</i>) 8:30 am to 12:30 pm	426
SC1231	Wed	Designing and Specifying Digital Cameras (<i>Baldwin</i>) 8:30 am to 12:30 pm	427
SC157	Wed	MTF in Optical and Electro-Optical Systems (<i>Boreman</i>) 8:30 am to 5:30 pm	428
SC1233	Wed	Camera Image Quality Benchmarking (<i>Phillips, Eliasson</i>) 1:30 pm to 5:30 pm	427

Snapshots: 2-Hour Courses for Non-Technical Staff

SC1224	Mon	Fundamentals of Optical Engineering (<i>Vogt</i>) 8:30 am to 10:30 am	429
SC1237	Mon	Additive Manufacturing of Metals - Powder Bed Fusion and Directed Energy Deposition (<i>Nassar</i>) 10:30 am to 12:30 pm	429
SC1238	Mon	Biomedical Optics: Imaging Biomarker Basics (<i>Bohndiek</i>) 1:30 pm to 3:30 pm	430
SC1170	Mon	The Very Least You Need To Know About Optics (<i>Diehl</i>) 10:30 am to 12:30 pm	428
SC609	Mon	Basic Optics for Non-Optics Personnel (<i>Harding</i>) 1:30 pm to 3:30 pm	430
SC1234	Tue	Introduction to VR, AR, MR and Smart Eyewear: Marke Expectations, Hardware Requirements and Investment Patterns (<i>Kress</i>) 1:30 pm to 3:30 pm	429

Industry Workshops

WS9006	Mon	Photodetectors, Raman Spectroscopy, and SiPMs versus PMTs: One-day Workshop (<i>Piatek</i>) 8:30 am to 5:30 pm	431
WS9007	Wed	Laser Optics & Polarizers, PLDs & APDs, and IR Detectors: One-day Workshop (<i>Volke, Grubisic, Snyder, Merken</i>) 8:30 am to 5:30 pm	432
WS9005	Wed	Concurrent Design for Optical and Mechanical Engineers with Zemax Virtual Prototyping (<i>Pickering, Peguero</i>) 1:00 pm to 5:00 pm	431

Professional Development Workshops

WS1208	Mon	The Seven Habits of Highly Effective Project Managers (<i>Warner</i>) 8:30 am to 12:30 pm	433
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COURSES

DAILY COURSE SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Photonic Therapeutics and Diagnostics					
		SC1221 Physio-logical Optics of the Eye for Engineers (<i>Lakshminarayanan</i>) 8:30 am to 5:30 pm, \$600 / \$710, p.398 NEW	SC1175 Optics in the Hospital - Endoscope Specification and Design (<i>Leiner</i>) 8:30 am to 12:30 pm, \$340 / \$395, p.398		
			SC702 Optics and Optical Quality of the Human Eye (<i>Roorda</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.399		
Neurophotonics, Neurosurgery, and Optogenetics					
		SC1126 Neurophotonics (<i>Levi, Dufour</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.399			
Clinical Technologies and Systems					
	SC312 Principles and Applications of Optical Coherence Tomography (<i>Fujimoto</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.400	SC981 Biomedical Applications of Specialty Optical Fibers and Fiber Sensors (<i>Mendez, Arkwright</i>) 1:30 pm to 5:30 pm, \$375 / \$430, p.401	SC868 Optical Design for Biomedical Imaging (<i>Liang</i>) 1:30 pm to 5:30 pm, \$395 / \$450, p.400	SC1205 Fundamentals of Applied Pathophysiology in Optical Diagnostics (<i>Shadgan</i>) 8:30 am to 5:30 pm, \$550 / \$660, p.399	
			SC1228 Diffuse Optics in Biology and Medicine: Noninvasive Probes of Tissue Health (<i>Busch</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.401		
Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering					
	SC029 Tissue Optics (<i>Jacques</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.402				
Biomedical Spectroscopy, Microscopy, and Imaging					
	SC1203 Analysis of Texture and Oriented Patterns in Biomedical Images (<i>Rangayyan</i>) 8:30 am to 12:30 pm, \$410 / \$465, p.402 NEW				
	SC806 Advance Multivariate Statistics for Imaging (<i>Bajorski</i>) 8:30 am to 5:30 pm, \$550 / \$660, p.403 NEW				
Nano/Biophotonics					
	SC1206 Nanophotonics: Fluorescence and Plasmon Controlled Fluorescence (<i>Fixler</i>) 8:30 am to 12:30 pm, \$315 / \$370, p.404			SC1186 Fluorescence Sensing and Imaging: Towards Portable Healthcare (<i>Levi</i>) 8:30 am to 12:30 pm, \$315 / \$370, p.403	

DAILY COURSE SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Laser Sources					
	SC752 Solid State Laser Technology (Hodgson) 8:30 am to 5:30 pm, \$550 / \$660, p.406	SC1174 Improving Laser Reliability: an Introduction (Grossman, Asbury) 8:30 am to 5:30 pm, \$550 / \$660, p.405	SC972 Basic Laser Technology: Fundamentals and Performance Specifications (Sukuta) 8:30 am to 12:30 pm, \$315 / \$370, p.406		SC1207 High Power Laser Technologies (Paschotta) 8:30 am to 12:30 pm, \$315 / \$370, p.405
	SC1020 Splicing of Specialty Fibers and Glass Processing of Fused Components for Fiber Laser and Medical Probe Applications (Wang) 8:30 am to 12:30 pm, \$315 / \$370, p.404				
	SC1181 Ultrafast Lasers and Amplifiers (Paschotta) 8:30 am to 5:30 pm, \$550 / \$660, p.405				
Nonlinear Optics and Beam Guiding					
		SC047 Introduction to Nonlinear Optics (Fisher) 8:30 am to 12:30 pm, \$315 / \$370, p.407			
Micro/Nano Applications					
	SC743 Micromachining with Femtosecond Lasers (Nolte) 8:30 am to 12:30 pm, \$315 / \$370, p.408			SC689 Precision Laser Micromanufacturing (Schaeffer) 1:30 pm to 5:30 pm, \$315 / \$370, p.407	
Macro Applications					
			SC1144 Laser Systems Engineering (Kasunic) 8:30 am to 5:30 pm, \$620 / \$730, p.408		
Optoelectronic Materials and Devices					
	SC747 Semiconductor Photonic Device Fundamentals (Linden) 8:30 am to 5:30 pm, \$550 / \$660, p.409	SC1091 Fundamentals of Reliability Engineering for Optoelectronic Devices (Leisher) 1:30 pm to 5:30 pm, \$315 / \$370, p.409			
Photonic Integration					
	SC1071 Understanding Diffractive Optics (Soskind) 8:30 am to 5:30 pm, \$585 / \$695, p.410			SC817 Silicon Photonics (Michel, Saini) 1:30 pm to 5:30 pm, \$315 / \$370, p.410	
	SC1204 Volume Bragg Gratings—New Optical Components Providing Unique Means (Glebov) 1:30 pm to 5:30 pm, \$315 / \$370, p.410				

COURSES

DAILY COURSE SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Nanotechnologies in Photonics					
	SC608 Photonic Crystals: A Crash Course, from Bandgaps to Fibers (Johnson) 8:30 am to 12:30 pm, \$360 / \$415, p.411				
	SC1191 Quantum Sensors (Lanzagorta, Venegas-Andraca) 8:30 am to 12:30 pm, \$315 / \$370, p.411				
MOEMS-MEMS in Photonics					
	SC1230 Optical MEMS Engineering (Khalil) 8:30 am to 5:30 pm, \$550 / \$660, p.413		SC454 Fabrication Technologies for Micro- and Nano-Optics (Suleski) 8:30 am to 12:30 pm, \$315 / \$370, p.413	SC1125 Design, Modeling and Fabrication Techniques for Micro-optics: Applications to Display, Imaging, Sensing and Metrology (Kress) 8:30 am to 5:30 pm, \$550 / \$660, p.412	
Advanced Quantum and Optoelectronic Applications					
	SC1210 Quantum Computing (Venegas-Andraca, Lanzagorta) 1:30 pm to 5:30 pm, \$315 / \$370, p.414				
Semiconductor Lasers and LEDs					
		SC1146 Laser Diode Beam Basics, Characteristics and Manipulation (Sun) 1:30 pm to 5:30 pm, \$315 / \$370, p.414			SC386 Advanced Thermal Management Materials for Optoelectronic, Microelectronic and MEMS Packaging (Zweber) 8:30 am to 5:30 pm, \$550 / \$660, p.415
Displays and Holography					
	SC1218 Optical Technologies and Architectures for Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) Head Mounted Displays (HMDs) (Kress) 8:30 am to 5:30 pm, \$550 / \$660, p.416		SC1234 Introduction to VR, AR, MR and Smart Eyewear: Markets Expectations, Hardware Requirements and Investment Patterns (Kress) 1:30 pm to 3:30 pm, \$175 / \$200, p.416	SC1096 Head-Mounted Displays for Augmented Reality Applications (Browne, Melzer) 8:30 am to 5:30 pm, \$595 / \$705, p.415	
Optical Materials and Fabrication					
		SC321 Thin Film Optical Coatings (MacLeod) 8:30 am to 5:30 pm, \$550 / \$660, p.418	SC1178 Fundamentals of Molded Optics (Symmons, Schaub) 8:30 am to 12:30 pm, \$350 / \$405, p.417		

DAILY COURSE SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Optical Systems & Lens Design					
	SC156 Basic Optics for Engineers (<i>Boreman</i>) 8:30 am to 5:30 pm, \$595 / \$705, p.420	Mon SC1224 Fundamentals of Optical Engineering (<i>Vogt</i>) 8:30 am to 10:30 am, \$175 / \$200, p.422 NEW	SC1199 Stray Light Analysis and Control (<i>Fest</i>) 8:30 am to 5:30 pm, \$595 / \$705, p.419	SC720 Cost-Conscious Tolerancing of Optical Systems (<i>Youngworth</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.421	SC003 Practical Optical System Design (<i>Youngworth</i>) 8:30 am to 5:30 pm, \$655 / \$765, p.418
	SC690 Optical System Design: Layout Principles and Practice (<i>Greivenkamp</i>) 8:30 am to 5:30 pm, \$585 / \$695, p.421	Mon SC935 Introduction to Lens Design (<i>Bentley</i>) 8:30 am to 5:30 pm, \$585 / \$695, p.422	SC1229 Introduction to Performance Budgeting (<i>Arenberg</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.419		
	SC011 Design of Efficient Illumination Systems (<i>Cassarly</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.419	SC1170 The Very Least You Need To Know About Optics (<i>Diehl</i>) 10:30 am to 12:30 pm, \$175 / \$200, p.422			
		SC609 Basic Optics for Non-Optics Personnel (<i>Harding</i>) 1:30 pm to 3:30 pm, \$175 / \$200, p.423			
		SC1232 Introduction to LIDAR for Autonomous Vehicles (<i>Shaw</i>) 1:30 pm to 5:30 pm, \$315 / \$370, p.420 NEW			
Optomechanics					
	SC014 Introduction to Optomechanical Design (<i>Vukobratovich</i>) 8:30 am to 5:30 pm, \$1,050 / \$1,305, p.423		SC010 Introduction to Optical Alignment Techniques (<i>Castle</i>) 8:30 am to 5:30 pm, \$550 / \$660, p.423		SC1085 Optomechanical Systems Engineering (<i>Kasunic</i>) 8:30 am to 5:30 pm, \$620 / \$730, p.424
		SC015 Fastening Optical Elements with Adhesives (<i>Daly</i>) 8:30 am to 12:30 pm, \$315 / \$370, p.424			
Metrology and Standards					
		SC212 Modern Optical Testing (<i>Wyant</i>) 8:30 am to 12:30 pm, \$350 / \$405, p.425	SC700 Understanding Scratch and Dig Specifications (<i>Aikens</i>) 8:30 am to 12:30 pm, \$315 / \$370, p.425		
			SC1017 Optics Surface Inspection Workshop (<i>Aikens</i>) 1:30 pm to 5:30 pm, \$415 / \$470, p.425		

COURSES

DAILY COURSE SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Imaging					
	SC1222 Deep Learning and Its Applications in Image Processing <i>(Nasrabadi)</i> 8:30 am to 5:30 pm, \$550 / \$660, p.426 NEW	SC967 High Dynamic Range Imaging: Sensors and Architectures <i>(Darmont)</i> 8:30 am to 5:30 pm, \$595 / \$705, p.428	SC068 Use of CCD and CMOS Sensors in Visible Imaging Applications <i>(Lomheim)</i> 8:30 am to 12:30 pm, \$390 / \$445, p.426 NEW	SC1231 Designing Digital Cameras <i>(Baldwin)</i> 8:30 am to 12:30 pm, \$315 / \$370, p.427 NEW	
				SC157 MTF in Optical and Electro-Optical Systems <i>(Boreman)</i> 8:30 am to 5:30 pm, \$595 / \$705, p.428	
				SC1233 Camera Image Quality Benchmarking <i>(Phillips, Eliasson)</i> 1:30 pm to 5:30 pm, \$315 / \$370, p.427 NEW	
Snapshots: 2-Hour Courses for Non-Technical Staff					
		SC1224 Fundamentals of Optical Engineering <i>(Vogt)</i> 8:30 am to 10:30 am, \$175 / \$200, p.429 NEW			
			SC1234 Introduction to VR, AR, MR and Smart Eyewear: Markets Expectations, Hardware Requirements and Investment Patterns <i>(Kress)</i> 1:30 pm to 3:30 pm, \$175 / \$200, p.416 NEW		
		SC1237 Additive Manufacturing of Metals – Powder Bed Fusion and Directed Energy Deposition <i>(Nassar)</i> 10:30 am to 12:30 pm, \$175 / \$200, p.429 NEW			
		SC1238: Bio-medical Optics: Imaging Biomarker Basics <i>(Bohndiek)</i> 1:30 pm to 3:30 pm, \$175 / \$200, p.430 NEW			
		SC1170 The Very Least You Need To Know About Optics <i>(Diehl)</i> 10:30 am to 12:30 pm, \$175 / \$200, p.428			
		SC609 Basic Optics for Non-Optics Personnel <i>(Harding)</i> 1:30 pm to 3:30 pm, \$175 / \$200, p.430			

DAILY COURSE SCHEDULE

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Industry Workshops					
				WS9007 Laser Optics & Polarizers, PLDs & APDs, and IR Detectors: One-day Workshop (<i>Volke, Grubisic, Snyder, Merken</i>) 8:30 am to 5:30 pm, p.432	
				WS9005 Concurrent Design for Optical and Mechanical Engineers with Zemax Virtual Prototyping (<i>Pickering, Peguero</i>) 1:00 pm to 5:00 pm, p.431	
				WS9006 Photodetectors, Raman Spectroscopy, and SiPMs versus PMTs: One-day Workshop (<i>Piatek</i>) 8:30 am to 5:30 pm, p.431	
Professional Development Workshops					
		WS1208 The Seven Habits of Highly Effective Project Managers (<i>Warner</i>) 8:30 am to 12:30 pm, \$125 / \$175, p.433			

COURSES

Photonic Therapeutics and Diagnostics

Optics in the Hospital - Endoscope Specification and Design

SC1175 • Course Level: Intermediate
CEU: 0.4 • \$340 Members • \$395 Non-Members USD
SPIE Student Members: \$188
Tuesday 8:30 am to 12:30 pm

Minimally invasive and robotic surgery rely on endoscopes to provide the “eyes” of the surgeon. Endoscopes are perhaps the most complex of commercial optical systems and may contain 30 or more optical components. The design of these medical devices must be robust enough to withstand the rigors of thousands of cycles of pressurized steam sterilization, yet address the requirements needed for incredibly delicate clinical procedures.

This course teaches how to approach the use of miniature optics in your medical device design. We examine the optics from the physicians’ perspective; e.g. how the endoscope optics for abdominal surgery are different than those for knee surgery. Optical specifications are covered in detail, including ISO testing requirements and FDA requirements. The course finishes with the critical area of design for manufacturing.

LEARNING OUTCOMES

This course will enable you to:

- identify the types of medical procedures for which endoscopes can be deployed.
- classify the types of endoscope optics that are used in the body.
- explain the key specifications that define an endoscope design.
- describe the ISO specifications and FDA regulations pertinent to each endoscope design.
- identify at least three types of rigid endoscopes and two types of flexible endoscopes.
- identify elements of a substandard endoscope design and explain what needs to be improved.
- engineer the optics of a simple endoscope given the required clinical parameters.

INTENDED AUDIENCE

The course is intended for optical engineers and engineering managers who are beginning or continuing work with medical endoscopes or industrial borescopes. Familiarity with geometrical optics, and a minimum of a BS in Optics or equivalent work experience is assumed.

INSTRUCTOR

Dennis Leiner is the president of Leiner Optics, an engineering company that assists startups and Fortune 500 companies who are incorporating visualization into their medical devices. Dr. Leiner received his B.S. and M.S. degrees in Optics from the University of Rochester and his Ph.D. from the University of Connecticut. He taught optics at the University of Massachusetts in Lowell until 1985 when he started Lighthouse Imaging Corporation, a leader in endoscope optics design and manufacture. He holds multiple patents in endoscope design using gradient-index optics, infrared optics, fiberoptics, and injection-molded optics. He is a Chairperson Elect of the Optics and Electro Optics Standards Council (OEOSC) and is Group Leader for Existing Endoscope Standards at ANSI.

COURSE PRICE INCLUDES the e-book *Digital Endoscope Design* (SPIE Press, 2016) by Dennis C. Leiner.

Physiological Optics of the Eye ^{NEW} for Engineers

SC1221 • Course Level: Introductory
CEU: 0.7 • \$600 Members • \$710 Non-Members USD
SPIE Student Members: \$314

Monday 8:30 am to 5:30 pm

Given the prevalence and potential impact of visual displays, head mounted, virtual reality and assisted reality devices, it is important for the optical engineer working in these areas to know about how the human eye works and how auxiliary devices can be interfaced to the eye. Devices vary by their relationship to the user’s eyes. Various visual factors, both perceptual and optical, will have to be taken into account. These factors include accommodation, aging, color, contrast, eye relief distance, field of view, flicker, glare, resolution, stereopsis, motion and aberrations of the eye. Design of such optical systems requires knowledge of the metrics of visual performance in spatial, temporal and color domains. These factors are important when selecting head-mounted displays for specific applications. These optical and human factors performance metrics constrain the design and use of such devices. I will describe and discuss these various factors.

LEARNING OUTCOMES

This course will enable you to:

- explain the visual system and identify various factors that influence vision
- describe the dioptrics of the eye and schematic eye models
- list various parameters of the visual system of interest to the optician
- describe various metrics such as contrast sensitivity function, flicker sensitivity function, the V-Lambda curve and spectral sensitivity, color vision, accommodation, etc.
- explain the human factors involved in the design and use of these technologies
- explain various aspects of visual performance and combine these various performance metrics to formulate a global model of vision
- compare various display, HMD, VR and AR devices in terms of their capability for working with the human visual system

INTENDED AUDIENCE

Optical engineers, designers, managers, graduate students, and people interested in the visual system in general. Some knowledge of geometric optics is required. However, no knowledge of anatomy or physiology is necessary. The necessary biological aspects will be included in the course.

INSTRUCTOR

Vasudevan Lakshminarayanan is currently a professor of vision science, Physics, Electrical and Computer Engineering and Systems Design Engineering at the University of Waterloo. Primarily a theorist, he is a Fellow of OSA, SPIE, AAAS, APS, IoP, etc. and the recipient of a number of awards including the Optics Educator award of SPIE (2011). He has authored and edited 13 books and over 300 publications in topics ranging from optical physics and engineering, neuroscience, bioengineering, applied math and ophthalmology/ optometry.

COURSE PRICE INCLUDES the text, *Field Guide to Visual and Ophthalmic Optics* (SPIE Press) by Jim Schwiegerling

Optics and Optical Quality of the Human Eye

SC702 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Tuesday 1:30 pm to 5:30 pm

The eye has a complex and exquisitely designed optical system yet, when compared with modern optical systems, its image quality is surprisingly poor. This course will discuss the optical properties of the different components of the eye from the cornea to the retina, and how they impact visual quality. We will evaluate benefits and limitations of various techniques, such as adaptive optics and laser refractive surgery, which have been developed to overcome the eye's optical limitations. Aberration limits will be presented so that designers of optical systems, where the eye often plays an intrinsic role, can estimate the degree of correction required for their products to produce high quality perceived imagery.

LEARNING OUTCOMES

This course will enable you to:

- name and describe the major optical components of the eye and how they work together to form an image on the retina
- identify the limitations of the optical system of the eye and how they impact perceived image quality
- compare and contrast the optical system of the eye with other man-made optical instruments
- design an optical system that appreciates and considers the intrinsic role of the eye in that system as an optical component

INTENDED AUDIENCE

The course is intended to impart practical knowledge to optical design engineers or clinicians (ophthalmologists, refractive surgeons, optometrists), but it will also be of general interest to anyone who is interested in learning about the unique optical system of the eye.

INSTRUCTOR

Austin Roorda has a PhD in Vision Science and Physics and is a Professor of Vision Science and Optometry at the University of California, Berkeley. His research areas include adaptive optics, high resolution ophthalmoscopy, and optics of the human eye.

Neurophotonics, Neurosurgery, and Optogenetics

Neurophotonics

SC1126 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Monday 1:30 pm to 5:30 pm

The brain is the most widely studied body organ, and yet our understanding of its operation and the connection between changes to the physiology and the progression of disease is quite limited. Modern imaging tools, including optical imaging techniques, have enabled the study of many neural diseases and conditions and have assisted in evaluating the effect of drugs in model animal pre-clinical studies and in medical diagnosis. This course will review the principles and major optical techniques used for optical brain imaging. We will review the main cellular types in the brain and the organization of the anatomical regions into functional units. We will compare the major optical techniques used in brain imaging and discuss the contrast mechanisms that are used in each technique. We will review the use of external markers (mainly fluorescent markers), compare them to optical imaging techniques that use intrinsic contrast mechanisms (scattering, absorption, coherence, auto-fluorescence), and give examples in functional imaging of blood flow, oxygen levels, and neuronal activity. New methods using genetic introduction of proteins to control brain activity (Optogenetics) and selectively label cells will be described. Finally, we will discuss, with the help of examples, the relevance of these optical techniques in pre-clinical studies and clinical diagnosis.

LEARNING OUTCOMES

This course will enable you to:

- be familiar with the major cellular components and functional areas of the brain
- compare optical imaging to other common techniques for brain imaging applications
- learn about the most common optical techniques used for anatomical and functional evaluation of the brain, and to identify major attributes of each technique including the contrast mechanism, use of external markers (dyes), temporal and lateral resolution, and penetration depth into the tissue
- explain how intrinsic optical techniques (OCT, Raman, Speckle contrast, IOSI) work and evaluate their use in optical brain imaging
- describe the use of these optical imaging techniques in evaluating functional brain information including blood flow, oxygen consumption, and neural activity
- summarize the use of proteins as fluorescent markers and for Optogenetic optical brain stimulation
- list common applications of optical techniques in pre-clinical animal studies and clinical applications

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about optical imaging techniques and how to apply them to image biological cells and tissues in the brain. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Ofer Levi is a Professor of Electrical Engineering and Biomedical Engineering at the University of Toronto. He also holds a Visiting Professor position at Stanford University, CA. He has spent over two decades in academia and industry, designing and developing optical imaging systems, laser sources, and optical sensors. He specializes in design and optimization of optical bio-sensors, Bio-MEMS, and optical imaging systems for biomedical applications, including in cancer and brain imaging. Dr. Levi is a member of OSA, IEEE-P, and SPIE.

Suzie Dufour is a biophotonic researcher at INO. She received her BSc degree in physics from Laval University in 2004 and her PhD in neurobiology in 2012. Her PhD involved the design and fabrication of micro-optrodes for in vivo experimentation. She completed postdoctoral researches on in vivo brain imaging at University of Toronto and Toronto Western Research Institute. Her past and current research interests include biophotonics, optical in vivo brain imaging, optogenetics and electrophysiology.

COURSES

Clinical Technologies and Systems

Fundamentals of Applied Pathophysiology in Optical Diagnostics

SC1205 • Course Level: Introductory
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Wednesday 8:30 am to 5:30 pm

This course is a critical and fundamental introduction to main pathophysiological processes across the human body, emphasizing on optics and photonics engineering approaches for innovative design and development of novel methods and devices to screen, detect, diagnose and monitor clinical conditions.

The majority of human diseases are rooted in one of the few main pathological processes such as inflammation, infection, atrophy, hypertrophy, hyperplasia, ischemia and hypoxia. Understanding the basics, natures, mechanisms, specifications and effects of these main pathologic processes on human body structure and function helps biophotonics engineers and researchers to better comprehend contemporary methods of detection and management of these conditions. This knowledge enables them to theorize, innovate and design new optical techniques and devices for diagnosis and monitoring of pathologic conditions in different organ systems. Such an approach will also enable engineers to extrapolate standard diagnostic techniques from one to other organs for various disorders that are similar in pathology. This should be considered as a critical and necessary skill in modern biomedical engineering. This course aims to provide this essential intuition.

LEARNING OUTCOMES

This course will enable you to:

- learn the fundamental pathophysiological process within the human body
- recognize pathological changes in tissue structure, and biophysical, biochemical, biomechanical and metabolic properties, applied in design and development of optical diagnostic methods and systems
- identify potential optical methods and techniques to detect and monitor general and specific pathological processes
- implement well-known optical diagnostic methods from one to other organs for detecting similar pathological process
- develop novel optical methods for early detection and diagnosis of tissue pathological changes and organ dysfunctions through a unique bedside to bench approach
- apply clinical considerations in design and development of diagnostic and monitoring systems
- recognize clinical challenges and limitations of different optical diagnostic methods

INTENDED AUDIENCE

Biomedical students, scientists, engineers and technicians who wish to learn more about human pathophysiology, applied in design and development of novel optical diagnostic methods and devices.

INSTRUCTOR

Babak Shadgan is a Senior Member of SPIE, is a medical doctor (M.D.) with a Ph.D. in Clinical Biophotonics. With more than two decades of medical practice, research and development Babak has developed a specific knowledge in clinical biophotonics with a unique bedside to bench approach. He has been invented a number of novel diagnostic methods using noninvasive optical technologies. Recognition for his work in this field includes an extensive list of national and international research grants and awards including a SPIE D.J. Lovell Award. Dr. Shadgan is a Research Scientist in International Collaborations on Repair Discoveries (ICORD) of the University of British Columbia.

Principles and Applications of Optical Coherence Tomography

SC312 • Course Level: Advanced
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 1:30 pm to 5:30 pm

Optical coherence tomography (OCT) is a new imaging modality, which is the optical analog of ultrasound. OCT can perform high resolution cross sectional imaging of the internal structure of biological tissues and materials. OCT is promising for biomedical imaging because it functions as a type of optical biopsy, enabling tissue pathology to be imaged in suit and in real time. This technology also has numerous applications in other fields ranging from nondestructive evaluation of materials to optical data storage. This course describes OCT and the integrated disciplines including fiber optics, interferometry, high-speed optical detection, biomedical imaging, in vitro and in vivo studies, and clinical medicine

LEARNING OUTCOMES

This course will enable you to:

- describe the principles of optical coherence tomography (OCT)
- explain a systems viewpoint of OCT technology
- describe OCT detection approaches and factors governing performance
- describe ultrafast laser technology and other low coherence light sources
- describe OCT imaging devices such as microscopes, hand held probes and catheters
- describe functional imaging such as Doppler and spectroscopic OCT
- provide an overview of clinical imaging including clinical ophthalmology, surgical guidance, and detection of neoplasia and guiding biopsy
- gain an overview of materials applications
- discuss transitioning technology from the laboratory to the clinic

INTENDED AUDIENCE

This material is appropriate for scientists, engineers, and clinicians who are performing research in medical imaging.

INSTRUCTOR

James Fujimoto is Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. His research interests include femtosecond optics and biomedical imaging and his group is responsible for the invention and development of optical coherence tomography. Dr. Fujimoto is a member of the National Academy of Sciences and National Academy of Engineering. He is co-chair of the SPIE BIOS symposium and co-chair of the conference on Optical Coherence Tomography and Coherence Domain Techniques at BIOS. Dr. Fujimoto is a co-founder of LightLabs Imaging, a company developing OCT for intravascular imaging that was recently acquired by St. Jude Medical.

Attendee testimonial:

Great course from the inventor! What more can you ask for.

Optical Design for Biomedical Imaging

SC868 • Course Level: Intermediate

CEU: 0.4 • \$395 Members • \$450 Non-Members USD

SPIE Student Members: \$210

Tuesday 1:30 pm to 5:30 pm

This course provides attendees with a basic working knowledge of optical design for biomedical imaging. The course will begin with the fundamentals of biomedical optics, followed by light sources, detectors, and other optical components for biomedical imaging. The course will focus on optical systems and techniques for different imaging modalities.

LEARNING OUTCOMES

This course will enable you to:

- learn the fundamentals of biomedical optics
- specify and select lenses, light sources, detectors, and other optical components
- describe the optical system requirements for biomedical imaging
- become familiar with various optical systems for biomedical imaging
- design and model illumination and imaging systems for biomedical applications

INTENDED AUDIENCE

This material is intended for anyone who is interested in understanding and developing optical systems for biomedical applications. Basic knowledge of optical systems and lens design is expected.

INSTRUCTOR

Rongguang (Ron) Liang is an associate professor at College of Optical Sciences, University of Arizona. Prior to that, he was a Senior Principal Research Scientist at Carestream Health Inc and a Principal Research Scientist at Eastman Kodak Company. He has been working on optical design for 15 years, in the fields of biomedical imaging, digital imaging, display, and 3D imaging. He is a Topical Editor of Applied Optics.

COURSE PRICE INCLUDES the e-book *Optical Design for Biomedical Imaging* (SPIE Press, 2010) by Rongguang Liang.

Biomedical Applications of Specialty Optical Fibers and Fiber Sensors

SC981 • Course Level: Introductory

CEU: 0.4 • \$375 Members • \$430 Non-Members USD

SPIE Student Members: \$202

Monday 1:30 pm to 5:30 pm

This course provides a broad overview of optical fiber sensing principles and techniques for biological and medical applications, as well as on the generic uses of specialty optical fibers for biomedical devices and medical instruments. Healthcare industry trends, its sensing needs and the benefits brought on by fiber optics are also reviewed.

The course is divided into three sections. Section I provides an introduction to the ongoing status and trends in the healthcare industry and the medical needs that demand the use of optical fibers and fiber-based sensors. In Section II, a review of fiber optic sensor (FOS) technology is made, describing its operating principles, associated components (such as light sources, detectors, couplers, polarizers, etc.), and the specialty fiber types required for biomedical sensing system integration. A review of the non-sensing applications of fibers for illumination, imaging and laser delivery is also made. Finally, in Section III, a review of the major classes of biomedical fiber sensors and sensing techniques is made based on fiber Bragg gratings (FBG), Fabry-Perot cavities, interferometers and others, for single-point and distributed in-vivo sensing. A brief overview will also be given on fiber-optic endoscopic, intra-vascular and needle type probes for Optical Coherence Tomography (OCT).

LEARNING OUTCOMES

This course will enable you to:

- describe the operating principles, features and advantages of fiber optic sensors
- review a wide range of sensor types for physiological, biochemical and imaging applications
- learn how specialty optical fibers are used in diverse biomedical devices and sensors
- know some of the special biomedical considerations such as materials biocompatibility and related industry standards
- illustrate specific sensing solutions and their clinical impact through case-study analysis
- obtain an overall view of the healthcare and biomedical fiber sensing industries and their trends

INTENDED AUDIENCE

Technical managers, scientists, engineers, technicians and research students who wish to learn about biomedical sensors and fiber sensing technology and review their implementation and applications. The course is also suitable to gain an overview of the field and to learn about the state-of-the-art of fiber optic-based biomedical and life sciences applications and devices.

INSTRUCTOR

Alexis Mendez is President of MCH Engineering LLC, a consulting firm specializing in optical fiber sensing technology, and has over 25 years of experience in optical fiber technology, sensors and instrumentation. He was the former Group Leader of the Fiber Optic Sensors Lab within ABB Corporate Research (USA), working on the development of new fiber optic sensing systems for electric utility and oil & gas applications. He has written over 65 technical publications, holds 4 US patents and is recipient of an R&D 100 award. He is an SPIE Fellow, editor of the *Specialty Optical Fibers Handbook* and co-author of the textbook, *Fiber Optic Sensors: Fundamentals and Applications*. Dr. Mendez was also past chair of the International Optical Fiber Sensors Conference (OFS-18). Dr. Mendez holds a PhD. degree in Electrical Engineering from Brown University.

John Arkwright is the South Australian Premier's Professorial Research Fellow in biomedical engineering at Flinders University in Adelaide, Australia. Prof. Arkwright has an extensive background in optical fiber technology and devices, initially for the telecommunications industry and, more recently, for biomedical sensing. He has worked in both industrial R&D and academic roles always with an emphasis on developing and commercializing new technologies. At Flinders University, he is conducting research on the design, fabrication, and commercialization of fiber optic catheters for in-vivo diagnostics. John is also Managing Director of Arkwright Technologies Pty Ltd.

COURSE PRICE INCLUDES the e-book *Fiber Optic Sensors: Fundamentals and Applications*, Fourth Edition (SPIE Press, 2015) by David A. Krohn, Trevor W. MacDougall, and Alexis Mendez.

Diffuse Optics in Biology and Medicine: Noninvasive Probes of Tissue Health

SC1228 • Course Level: Introductory

CEU: 0.4 • \$315 Members • \$370 Non-Members USD

SPIE Student Members: \$178

Tuesday 1:30 pm to 5:30 pm

This course explains principles and applications of diffuse optics in biology and medicine. Diffuse optical tools have a large and rapidly expanding set of pre-clinical and clinical applications. We will focus on measurements of 'thick' tissues (<1cm) with diffuse optical spectroscopy, diffuse correlation spectroscopy, diffuse optical tomography, and diffuse fluorescence. The primary goal of this course is to provide attendees with sufficient knowledge to grasp the underlying concepts, strengths, and weaknesses of the technologies involved. Examples will be taken from preclinical and clinical applications, especially critical care. Researchers considering use of diffuse optical tools, clinicians in search of technologies to address pressing monitoring needs, and translational researchers interested in applying diffuse optics will benefit from the course.

COURSES

LEARNING OUTCOMES

This course will enable you to:

- define the regime in which diffuse optical techniques are applicable
- describe diffuse optical data types, their relationships, and their limitations
- explain the principle of diffuse correlation spectroscopy
- summarize the current range of preclinical and clinical diffuse optical applications
- determine the appropriate diffuse optical instrument for a particular application
- discriminate between studies undertaken with various diffuse optical data types
- access key resources for diffuse optical information

INTENDED AUDIENCE

Scientists, engineers, clinicians, technicians, or managers interested in expanding their knowledge of diffuse optics and its applications. Undergraduate training in engineering or science, a basic knowledge of optics, and an interest in clinical or preclinical applications is assumed.

INSTRUCTOR

David Busch has been designing and clinically deploying diffuse optical systems for 15 years at the University of Pennsylvania and Children's Hospital of Philadelphia. He has been both a Whitaker and Fulbright fellow and currently chairs the Therapeutic Laser Applications group of the Optical Society of America. He received a Ph.D. in physics from the University of Pennsylvania in 2011.

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Tissue Optics

SC029 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 1:30 pm to 5:30 pm

This course outlines the principles of light transport in tissues that underlie design of optical measurement devices and laser dosimetry for medicine. Topics include radiative transport in turbid tissues, the optical properties of tissues, modeling techniques for light transport simulation in tissues, analysis of reflectance and fluorescence spectra measured in turbid tissues by topical and imbedded optical fiber devices, video techniques, and criteria involved in establishing laser dosimetry protocols. Lessons are illustrated using case studies of optical fiber devices, video imaging techniques, and design of therapeutic laser protocols.

LEARNING OUTCOMES

This course will enable you to:

- conduct optical measurements of tissue optical properties
- calculate light distributions in tissues
- design an optical measurement of tissue using optical fibers or video
- justify the dosimetry of therapeutic laser protocols

INTENDED AUDIENCE

This material is intended for biomedical engineers and medical physicists interested in medical applications of ultraviolet, visible, and near infrared wavelengths from both conventional and laser light sources.

INSTRUCTOR

Steven Jacques is Professor in Biomedical Engineering, Tufts University.

Biomedical Spectroscopy, Microscopy, and Imaging

Analysis of Texture and Oriented ^{NEW} Patterns in Biomedical Images

SC1203 • Course Level: Advanced
CEU: 0.4 • \$410 Members • \$465 Non-Members USD
SPIE Student Members: \$216
Sunday 8:30 am to 12:30 pm

Various types of texture and oriented patterns are encountered in medical images. The liver and brain demonstrate distinct texture in images obtained by X-ray computed tomography and ultrasonography. Examples of oriented tissue patterns include fibroglandular breast tissue patterns converging towards the nipple, spicules emanating from cancerous lesions, organization of collagen fibers and blood vessels in ligaments, and retinal blood vessels diverging from the optic nerve head. Several models and examples of random, ordered, and oriented texture patterns in images will be presented in this tutorial. Methods for statistical and structural analysis of various types of texture, fractal analysis, and spectral analysis in the Fourier domain will be presented. Procedures for directional filtering in the Fourier domain and Gabor filters for analysis of oriented patterns as well as measures of directional distribution for analysis of oriented texture will be described.

The design of specific techniques for quantitative analysis of particular types of tissue patterns will be discussed, including multiple examples from different modalities of biomedical imaging and clinical applications. Several applications will be illustrated, including landmarking of mammograms and retinal fundus images, analysis of bilateral asymmetry in mammograms, detection of architectural distortion as a sign of early stages of breast cancer, detection and analysis of retinal vascular architecture for diagnosis of retinopathy, and quantitative analysis of healing of ligaments via remodeling of collagen and microvascular structure. The focus will be on clinical applications of quantitative analysis of biomedical images and computer-aided diagnosis.

LEARNING OUTCOMES

This course will enable you to:

- identify appropriate methods
- design suitable algorithms
- formulate pattern analysis procedures
- construct systems for characterization of texture and oriented patterns in biomedical images

INTENDED AUDIENCE

Graduate students, researchers, practicing engineers, computer scientists, information technologists, medical physicists, and data-processing specialists working in diverse areas such as telecommunications, seismic and geophysical applications, biomedical applications, and hospital information systems should find this course useful in their quest to learn advanced techniques for image analysis. They will draw inspiration from the applications demonstrated in the course, and learn about computer applications in medicine and computer-aided medical diagnosis.

INSTRUCTOR

Rangaraj Rangayyan is a Professor Emeritus of Electrical and Computer Engineering at the University of Calgary, Calgary, Alberta, Canada. He received the Bachelor of Engineering in Electronics and Communication in 1976 from the University of Mysore at the People's Education Society College of Engineering, Mandya, Karnataka, India, and the Ph.D. in Electrical Engineering from the Indian Institute of Science, Bangalore, Karnataka, India, in 1980. His research interests are in the areas of digital signal and image processing, biomedical signal and image analysis, and computer-aided diagnosis. He has published more than 160 papers in journals and 270 papers in proceedings of conferences. He was recognized with the 1997 and 2001 Research Excellence Awards of the Department of Electrical and Computer Engineering, the 1997 Research Award of the Faculty of Engineering, and by appointment as "University Professor" (2003-2013) at the Uni-

versity of Calgary. He is the author of two textbooks: “Biomedical Signal Analysis” (IEEE/ Wiley, 2002, 2015) and “Biomedical Image Analysis” (CRC, 2005). He has coauthored and coedited several other books, including “Color Image Processing with Biomedical Applications” (SPIE, 2011). He has been recognized with the 2013 IEEE Canada Outstanding Engineer Medal, the IEEE Third Millennium Medal (2000), and elected as Fellow, IEEE (2001); Fellow, Engineering Institute of Canada (2002); Fellow, American Institute for Medical and Biological Engineering (2003); Fellow, SPIE (2003); Fellow, Society for Imaging Informatics in Medicine (2007); Fellow, Canadian Medical and Biological Engineering Society (2007); Fellow, Canadian Academy of Engineering (2009); and Fellow, Royal Society of Canada (2016).

COURSE PRICE INCLUDES the text *Biomedical Image Analysis* (CRC Press) by Rangaraj M. Rangayyan.

Advanced Multivariate Statistics ^{NEW} for Imaging

SC806 • Course Level: Advanced
CEU: 0.7 • \$550 Members • \$6600 Non-Members USD
SPIE Student Members: \$294
Sunday 8:30 am to 5:30 pm

In this course, you will learn some of the more advanced tools for the analysis of multivariate data. The topics covered include canonical correlation analysis, discrimination and classification (supervised learning), Fisher discrimination, independent component analysis (ICA), and a new method of nonnegative PCA. These tools are being used more frequently in a wide range of imaging applications, so it is important for a user to know how and in what context they should be used. The instructor will emphasize intuitive and geometric understanding of the introduced concepts and will also explain the relationships among these methods, clarifying misconceptions about them. All methods will be discussed in the context of practical and useful examples of imaging data.

LEARNING OUTCOMES

This course will enable you to:

- investigate correlations between two sets of variables using canonical correlations
- construct discrimination procedures for characterizing several populations based on multivariate data
- create plots based on Fisher discriminants
- acquire the concept of independent component analysis (ICA) and its relationship to PCA
- decide whether ICA is appropriate for your type of data
- apply a new method of nonnegative PCA in order to obtain components with improved interpretability

INTENDED AUDIENCE

This course is intended for participants who already have some experience with analysis of multivariate data but need to learn about the more advanced statistical tools. Participants are expected to have some knowledge of linear algebra and PCA. A related course (Principles of Multivariate Statistics for Imaging, which is offered at this conference) is not a prerequisite but is suggested for those who would like to gain a broader perspective on a wider range of multivariate methods.

INSTRUCTOR

Peter Bajorski is Professor of Statistics at the Rochester Institute of Technology. He teaches graduate courses in statistics including a course on Multivariate Statistics for Imaging Science. He also designs and teaches short courses in industry, with longer-term follow-up and consulting. He performs research in statistics and in hyperspectral imaging. Dr. Bajorski wrote a book on Statistics for Imaging, Optics, and Photonics published in the prestigious Wiley Series in Probability and Statistics. He is a senior member of SPIE and IEEE.

Nano/Biophotonics

Fluorescence Sensing and Imaging: Towards Portable Healthcare

SC1186 • Course Level: Intermediate
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Wednesday 8:30 am to 12:30 pm

Advances in medicine and technology are opening a new era of portable healthcare. Together with health apps, wearable/portable health monitoring systems are targeting medical diagnosis or health and wellness. The development of Wearable Health Monitoring Systems (WHMS) has been motivated mainly by increasing healthcare costs and by an aging world population. Fluorescent dyes are frequently used to mark biological samples, and track tissues, cells and individual molecules. In the lab, fluorescence is used to understand physiology and develop new cures to common diseases. In the clinic, fluorescence is used to diagnose health conditions and to evaluate treatments. Translating fluorescence imaging to portable healthcare systems will help us take better care of ourselves.

This course will review fundamental properties of fluorescent dyes, tissue absorption and scattering and show how these can be used to track vital signs and provide wellness indicators during a physical activity. Focusing on fluorescence imaging and sensing as a major technique for biomedical and healthcare applications, we will describe the optimization of an optical imaging system to specific dye spectra, and tailoring the optical system modules for specific applications such as bench-top microscopes, portable healthcare imaging, and in vivo fluorescence imaging in pre-clinical and clinical studies. We will review examples of portable fluorescence imaging systems in rapid disease diagnosis, and in health monitoring.

LEARNING OUTCOMES

This course will enable you to:

- describe dye properties such as excitation and emission spectra, quantum efficiency, and the schematic of a fluorescence process
- summarize the different main classes of fluorescent markers including small molecule dyes, nano-crystal quantum dots, and fluorescent proteins and their attributes
- explain the principles of fluorescence microscopy and the main modules (lenses, filters, sensors, light sources) involved in fluorescence imaging systems
- describe the design of miniature mobile fluorescence imaging systems and their unique challenges
- summarize common applications of fluorescence imaging in portable health monitoring systems

INTENDED AUDIENCE

Engineers, scientists, students and managers who wish to learn more about fluorescent markers, tissue properties, design of fluorescence imaging systems, and their application in biomedical lab systems and in portable imaging. Some prior knowledge in microscopy and imaging is desirable.

INSTRUCTOR

Ofer Levi is a Professor of Electrical Engineering and Biomedical Engineering at the University of Toronto. He is serving as an Associate Editor of Biomedical Optics Express journal and currently hold a Visiting Professor position at Stanford University, CA. He has spent over 25 years in academia and industry, designing and developing optical imaging systems, laser sources, and optical sensors. He specializes in design and optimization of optical bio-sensors, Bio-MEMS, and optical imaging systems for biomedical applications, including in cancer and brain imaging. Dr. Levi is a member of OSA, IEEE-Photonics, and SPIE.

COURSES

Nanophotonics: Fluorescence and Plasmon Controlled Fluorescence ^{NEW}

SC1206 • Course Level: Intermediate
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 8:30 am to 12:30 pm

During the past 20 years there has been a remarkable growth in the use of fluorescence in the biological sciences. Fluorescence spectroscopy and time-resolved fluorescence are considered to be primarily research tools in biochemistry and biophysics. This emphasis has changed, and the use of fluorescence has expanded. Fluorescence is now a dominant methodology used extensively in biotechnology, flow cytometry, medical diagnostics, DNA sequencing, forensics, and genetic analysis, to name a few.

The lectures will deal with basics of steady-state and time-resolved fluorescence spectroscopy, instrumentation and data analysis. They will cover time-domain and frequency-domain measurements, anisotropy, quenching and Förster Resonance Energy Transfer (FRET). Next, the lectures cover advanced time-resolved fluorescence topics and data analysis. Applications of fluorescence in biophysics, sensing, plasmon controlled fluorescence or material science are presented along with an introduction to fluorescence microscopy.

LEARNING OUTCOMES

This course will enable you to:

- describe the operating principles, features and advantages of time resolve measurements especially Time-Domain and Frequency-Domain Lifetime Measurements; Fluorescence Anisotropy; and Time-Resolved Energy Transfer
- review a wide range of nano photonics tools for physiological, biochemical and imaging applications
- summarize the different main classes of plasmon controlled fluorescence markers including small molecule dyes, carbon dots, and fluorescent proteins and their attributes
- describe the design of dual model imaging systems and their unique challenges

INTENDED AUDIENCE

The course wishing an in-depth introduction to the principles of fluorescence spectroscopy and its applications. Engineers, scientists, students and managers who are typically professionals who are using or intend to use fluorescence in their research. Attendees should have some knowledge of fluorescence, typically in a specialized area.

INSTRUCTOR

Dror Fixler is a Professor of Electrical Engineering at Bar-Ilan University. He is serving as an Associate Editor of Journal of Biophotonics, Journal of Biomedical Photonics & Engineering and Cytometry Part A and currently holds a Visiting Professor position at Technical Institute of Physics and Chemistry (TIPC), Chinese Academy of Sciences (CAS), China. He has spent over 25 years in academia and industry, designing and developing optical imaging systems and optical sensors. He specializes in fluorescence measurements (FLIM and anisotropy decay), optical super resolution, high-end electro-optical system engineering and light-tissue interaction. Dr. Fixler is a senior member of SPIE.

Laser Sources

Splicing of Specialty Fibers and Glass Processing of Fused Components for Fiber Laser and Medical Probe Applications

SC1020 • Course Level: Intermediate
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 8:30 am to 12:30 pm

This course provides attendees with the fundamentals of specialty fiber fusion splicing and fiber glass processing technologies with a focus on high power fiber laser and medical fiber probe applications. It provides an introduction on specialty fibers, reviews the fiber processing approach, and compares different techniques, especially on different fiber fusion processes along with different fusion hardware. It describes fiber waveguide and coupling optics associated with these processes and discusses practical fusion splicing methods for specialty fibers in order to achieve optimal optical coupling between dissimilar fibers. In addition, it illustrates fiber glass processing and fabrication techniques for producing fused fiber components, such as adiabatic taper, mode-field adaptor (MFA), fiber combiners and couplers, and other related fused fiber devices. The course also describes several practical application examples on fiber lasers and monolithic fiber-based probes for OCT medical imaging.

LEARNING OUTCOMES

This course will enable you to:

- become familiar with fiber processing fundamentals and state-of-the-art fiber splicing and fusion processing tools and hardware
- learn specialty fiber basics and waveguide coupling optics between dissimilar fibers
- gain in-depth knowledge of the fiber fusion splicing process and fiber glass processing techniques
- learn practical fiber fusion and glass processing methods for the splicing of various specialty fibers (including LMA fibers, PCF fibers, and soft-glass fibers), and fabrication of adiabatic taper, MFA, combiner, and other fiber coupling devices
- apply these fiber fusion and glass processing technologies to fiber laser and fiber based medical probe applications

INTENDED AUDIENCE

This material is intended for anyone who needs to handle and splice specialty fibers and wants to learn advanced fiber fusion splicing, tapering, and glassing processing technologies for fabricating high performance fiber-based devices. This course is valuable for those who want to develop or fabricate fiber-based devices or further improve their fiber system performance.

INSTRUCTOR

Baishi Wang is currently with Vytran Division of Thorlabs in Morganville, New Jersey. He received his Ph.D from SUNY at Stony Brook. His technical focus is on specialty fibers and fused fiber component, fiber lasers and amplifiers, fiber fusion process technologies and their applications to fiber lasers and fiber probes. Prior to joining Vytran in 2006, he was a technical staff member in Specialty Fiber Division at Lucent Technologies and OFS in Somerset, New Jersey. He has published numerous papers in referred conferences and journals, provided invited talks regularly, served as a conference committee member, and been awarded several patents. He is a reviewer for leading photonics and fiber optics journals. He is a senior member of SPIE and member of OSA.

Improving Laser Reliability: an Introduction

SC1174 • Course Level: Introductory
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Monday 8:30 am to 5:30 pm

From science to so-called secret sauces, we will share some of the tricks, techniques, and good practices that go into designing and manufacturing reliable lasers and systems. Lasers are often expensive. Eliminating laser failures, even one laser failure, is a big win. This course examines both optical and non-optical issues that affect reliability. We will emphasize solid-state lasers, frequency-converted lasers, aspects of fiber lasers, and systems that use lasers. We will cover semiconductor lasers, mainly from the perspective of using them as components. Our goal is to help you make more reliable lasers and more reliable laser systems. Together, we will discuss many examples illustrating key failure modes and how to avoid failures. This course has new examples and information for 2018

LEARNING OUTCOMES

This course will enable you to:

- identify and mitigate risks to reliability for each phase of the laser product life cycle
- utilize best-practices in your design and manufacturing to increase laser reliability
- design tests for qualification and screening of lasers
- estimate laser lifetime
- troubleshoot problems for each phase of the laser product life cycle

INTENDED AUDIENCE

Includes designers and builders of lasers or of systems that use lasers. We welcome laser engineers, laser scientists, manufacturing engineers, reliability engineers, quality engineers, optical engineers, laser technicians, optical technicians, project leaders, program leaders, and managers. A general understanding of lasers and optics is a prerequisite for this class, but you need not be an expert.

INSTRUCTOR

William Grossman pioneered making reliable diode-pumped solid-state infrared and ultraviolet lasers. Will and his team designed and refined the Q-series line of ultraviolet lasers, made by Lightwave Electronics Corporation and then by JDS Uniphase (now Lumentum LLC). These have been among the best selling diode-pumped lasers ever built. Will has authored a broad range of publications and patents on lasers including work on: solid-state laser design, laser reliability, fiber lasers, laser applications, laser materials, nonlinear optics, and free-electron lasers. Will was Vice President of Engineering at Lightwave, Director of Lasers at JDSU, and Director of Lasers and Optics at Electro Scientific Industries.

Cheryl Asbury has over 15 years of experience developing laser systems for space applications that require high optical power output and high reliability over mission lifetimes of 10+ years. She currently serves as the Photonics Specialist in the Component Engineering and Assurance Office at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, CA. Cheryl came to JPL after 5 years at Lightwave Electronics Corporation, where she managed the development and delivery of 6 space-qualified diode-pumped solid-state lasers to the Tropospheric Emission Spectrometer (TES) Instrument on NASA's Aura spacecraft, which continues to collect data on the Earth's atmosphere 13 years after its launch in 2004. Cheryl earned a BS in Applied and Engineering Physics from Cornell University and an MS in Applied Physics from the University of Michigan.

Attendee testimonial:

Excellent - I'm glad I invested the time to take this course. The real-world-examples were extremely instructive and valuable.

Ultrafast Lasers and Amplifiers

SC1181 • Course Level: Advanced
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Sunday 8:30 am to 5:30 pm

This course gives detailed insight into the operation principles and essential limitations of lasers and amplifiers for ultrashort pulse generation. Mode-locked lasers of different kinds, including both bulk lasers and fiber lasers, and the different mode-locking mechanisms used in those are discussed in detail and often demonstrated with numerical simulations. Also, principles and limitations of pulse amplification in bulk and fiber devices are treated.

LEARNING OUTCOMES

This course will enable you to:

- describe the principle of pulse generation with mode locking
- name several factors which can cause instabilities in mode-locked lasers
- describe the essential differences between bulk laser and fiber laser technology
- identify various limiting effects for the performance of ultrafast lasers and amplifiers
- know essential methods required for the efficient development of ultrashort pulse sources

INTENDED AUDIENCE

This course is intended for laser engineers and researchers being interested in the development of ultrafast lasers and amplifiers based on different technologies. They should already have some knowledge of optics and lasers.

INSTRUCTOR

Rüdiger Paschotta is an expert in laser physics, nonlinear optics and fiber technology, who previously was a researcher and is now working in his company RP Photonics Consulting GmbH, providing technical consultancy primarily for companies building or using lasers and related devices. Details are available on the web page <https://www.rp-photonics.com/paschotta.html>.

High-Power Laser Technologies

SC1207 • Course Level: Intermediate
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Thursday 8:30 am to 12:30 pm

This course starts with an overview on competing technologies for high-power solid-state laser sources, including bulk lasers, amplified and fiber-based sources. The primary topic is the analysis of performance potentials of different technologies in situations with different boundary conditions, such as continuous-wave operation with no restrictions or with high beam quality and/or a limited emission bandwidth, and the generation of intense laser pulses with nanosecond, picosecond or femtosecond durations. In this context, the concept of power scaling is given a meaningful basis, and scaling considerations are demonstrated in example cases.

LEARNING OUTCOMES

This course will enable you to:

- name different laser technologies for the generation of high optical powers or pulse energies
- identify the basic physical performance limitations for different laser types
- describe a methodology for comparing performance potentials
- explain the principle of power scaling, and apply scaling considerations to concrete cases

INTENDED AUDIENCE

Scientists, engineers, technicians, or R&D managers who wish to learn more about high-power laser technologies and how to compare them. A basic familiarity with the technical foundations of laser technology is assumed.

COURSES

INSTRUCTOR

Rüdiger Paschotta is an expert in laser physics, nonlinear optics and fiber technology. He started a career as a researcher and later on founded his company RP Photonics Consulting GmbH, providing technical consultancy and software primarily for companies building or using lasers and related devices. Details are available on the web page <https://www.rp-photonics.com/paschotta.html>.

Solid State Laser Technology

SC752 • Course Level: Intermediate
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Sunday 8:30 am to 5:30 pm

This course provides an overview of the design, performance characteristics and the current state of the art of solid state lasers and devices. The course reviews the laser-relevant properties of key solid state materials, and discusses the design principles for flashlamp pumped and diode-pumped solid state lasers in cw, pulsed, Q-switched and modelocked operation. Solid state media emphasized include Nd and Yb-doped crystals but mid-IR materials such as Tm, Ho and Er-doped fluorides and oxides will be addressed as well. The course will cover the fundamental scaling laws for power, energy and beam quality for various geometries of the gain medium (rod, slab, disk, waveguide) and pumping arrangements (side and end-pumped) and provides an overview of the state-of-the art of solid state lasers. This includes a review of the design and performance of fiber lasers/amplifiers and their comparison to bulk solid state lasers. An overview of the state-of-the art of optically pumped semiconductor lasers (OPSL) will also be given.

Important technical advances (such as diode pump developments) that allowed the technology to mature into diverse industrial and biomedical OEM devices as well as high power and scientific applications will be highlighted along with some remaining design and performance challenges. Topics also include nonlinear frequency conversion techniques, such as harmonic generation, Raman scattering and parametric processes, commonly used in solid state lasers to extend operation to alternative spectral regimes. The course includes an overview of currently available solid state laser products and their industrial and scientific applications.

LEARNING OUTCOMES

This course will enable you to:

- describe the significant laser-relevant properties of solid state laser materials
- acquire an up-to-date overview of solid state laser materials, components, resonators and applications
- assess how thermal properties limit power scaling and beam quality in practical laser systems
- acquire the design criteria for solid state lasers in cw and pulsed operation
- learn about the design methodology of Q-switched and modelocked lasers
- compare the properties, advantages and limitations of different high power solid state laser configurations including fiber lasers/amplifiers
- become familiar with design principles for solid state lasers with second and third harmonic generation
- develop an appreciation of the scope, depth and pace of technical progress of the state-of-the art of solid state lasers in the UV, visible, IR and mid-IR wavelengths range

INTENDED AUDIENCE

This course is intended for graduate students, engineers, scientists, technicians and managers working in solid state laser research or product development.

INSTRUCTOR

Norman Hodgson is Vice President for Technology and Advanced R&D at Coherent, Inc.. He has more than 30 years experience in solid state laser design, optimization and product development. Previously held positions include Vice President of Engineering at Coherent (2003-2009), Director of Engineering at Spectra-Physics (1998-2003), Inc., Senior Laser Engineer and Program Manager at Carl Zeiss, Inc. (1992-1996) and various university positions. He received his PhD in Physics from Technical University Berlin in 1990. He is co-author of the book "Optical Resonators" (Springer-Verlag 1996) which went into a second edition as "Laser Resonators and Beam Propagation" (Springer-Verlag 2005). Dr. Hodgson has authored over 90 publications and conference presentations and is co-inventor on more than 25 issued and pending patents.

Basic Laser Technology: Fundamentals and Performance Specifications

SC972 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Tuesday 8:30 am to 12:30 pm

If you are uncomfortable working with lasers as "black boxes" and would like to have a basic understanding of their inner workings, this introductory course will be of benefit to you. The workshop will cover the basic principles common to the operation of any laser/laser system. Next, we will discuss laser components and their functionality. Components covered will include laser pumps/energy sources, mirrors, active media, nonlinear crystals, and Q-switches. The properties of laser beams will be described in terms of some of their common performance specifications such as longitudinal modes and monochromaticity, transverse electromagnetic (TEM) modes and focusability, continuous wave (CW) power, peak power and power stability. Laser slope and wall-plug efficiencies will also be discussed.

LEARNING OUTCOMES

This course will enable you to:

- describe the overall inner workings of any laser
- describe the functionality of the key laser components
- know the difference between how acousto- and electro-optic Q-switches work
- explain how each key component in a laser may contribute to laser performance
- intelligently engage your clients or customers using proper laser terminology
- build stronger relationships with clients and customers by demonstrating product knowledge
- obtain the technical knowledge and confidence to enhance your job performance and rise above the competition, inside and outside your company

INTENDED AUDIENCE

Managers, engineers, technicians, assemblers, sales/marketing, customer service, and other support staff. This short course will help cultivate a common/standardized understanding of lasers across the company.

INSTRUCTOR

Sydney Sukuta is currently a Laser Technology professor at San Jose City College. He also has industry experience working for some of the world's leading laser manufacturers in Silicon Valley where he saw first-hand the issues they encounter on a daily basis. In response, Dr. Sukuta developed prescriptive short courses to help absolve most of these issues.

Nonlinear Optics and Beam Guiding

Introduction to Nonlinear Optics

SC047 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Monday 8:30 am to 12:30 pm

This introductory-level course provides the basic concepts of bulk media nonlinear optics. Although some mathematical formulas are provided, the emphasis is on simple explanations. It is recognized that the beginning practitioner in nonlinear optics is overwhelmed by a constellation of complicated nonlinear optical effects, including second-harmonic generation, optical Kerr effect, self-focusing, self-phase modulation, self-steepening, fiber-optic solitons, chirping, stimulated Raman and Brillouin scattering, and photorefractive phenomena. It is our job in this course to demystify this daunting collection of seemingly unrelated effects by developing simple and clear explanations for how each works, and learning how each effect can be used for the modification, manipulation, or conversion of light pulses. Where possible, examples will address the nonlinear optical effects that occur inside optical fibers. Also covered are examples in liquids, bulk solids, and gases.

LEARNING OUTCOMES

This course will enable you to:

- be able to explain to another person the origins and concepts behind the Slowly-Varying Envelope Approximation (SVEA)
- recognize what nonlinear events come into play in different effects
- appreciate the intimate relationship between nonlinear events which at first appear quite different
- appreciate how a variety of different nonlinear events arise, and how they affect the propagation of light
- comprehend how wavematching, phase-matching, and index matching are related
- be able, without using equations, to explain to others how self-phase modulation impresses “chirping” on pulses
- describe basic two-beam interactions in photorefractive materials
- develop an appreciation for the extremely broad variety of ways in which materials exhibit nonlinear behavior

INTENDED AUDIENCE

The material presented will be useful to engineers, scientists, students and managers who need a fundamental understanding of nonlinear optics.

INSTRUCTOR

Robert Fisher is the owner of RA Fisher Associates, LLC, his firm providing technical training in lasers and in optics, private consulting, and expert witness legal services. He has been active in laser physics and in nonlinear optics for the last 40 years. He has taught graduate courses at the Univ. of California, Davis, and worked at both Lawrence Livermore National Lab. and Los Alamos National Lab. He is an SPIE Fellow and an OSA Fellow, and was a 3-year member of SPIE's Board of Directors. He has served on the CLEO Conference Nonlinear Optics Subcommittee for 5 years, with two of those years as its chair. He has chaired numerous SPIE conferences. He was the Program Chair of the CLEO 2010 Conference and was General Chair of the CLEO 2012 Conference (now renamed CLEO: Science and Innovations). He is currently co-chair of the CLEO Course Committee. He has been nominated for and has made two cuts to be one of the five top finalists for the International Bluegrass Association's award “Mentor of the Year.”

Attendee testimonial:

I got a lot more inspiration than I expected and for this I am grateful.

Micro/Nano Applications

Precision Laser Micromanufacturing

SC689 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Wednesday 1:30 pm to 5:30 pm

This course is a comprehensive look at laser technology as applied to precision micromanufacturing. A brief background discussion on laser history, technology and definition of important terms will be presented. Then, available laser sources will be compared and contrasted including CO₂, excimer, Nd:YAG, fiber and short pulse lasers. IR and UV material/photon interaction, basic optical components and system integration are also crucial to getting good processing results and these will all be examined in detail. Finally, real applications from the medical, micro-electronics, aerospace and other fields will be presented.

This course has been greatly expanded to include detailed discussions on short pulse lasers (ps and fs) and their applications, both present and future. Also, MicroManufacturing includes technologies such as welding, joining and additive technologies. While the main emphasis of the course is still MicroMachining (material removal), additive technologies will be discussed also – especially 3D LAM (Laser Additive Manufacturing).

LEARNING OUTCOMES

This course will enable you to:

- compare UV, IR and other laser sources to each other and learn where each is best applied
- describe and be familiar with several kinds of microprocessing lasers on the market
- describe material/photon interaction and why and how UV lasers for instance are different than IR lasers
- analyze a potential manufacturing application to identify it as a possible candidate for laser processing
- familiarize yourself with ‘real world’ opportunities for laser micromanufacturing
- identify marketplace growth opportunities

INTENDED AUDIENCE

The course will benefit anyone with an interest in small-scale industrial laser processing and achieving the best part quality, highest resolution and cost effectiveness. Engineers will benefit from the technical discussions. Project Managers will benefit from cost considerations and risk reduction scenarios.

INSTRUCTOR

Ronald Schaeffer is Chief Executive Officer of PhotoMachining, Inc. He has been involved in laser manufacture and materials processing for over 30 years, working in and starting small companies. He has over 150 publications, has written monthly web and print columns and is on the Editorial Advisory Board of Industrial Laser Solutions magazine where he also writes an ongoing BLOG. He is the author of the textbook “Fundamentals of Laser Micromachining”. He is also a past member of the Board of Directors of the Laser Institute of America and is affiliated with the New England Board of Higher Education. He has a Ph.D. in Physical Chemistry from Lehigh University and did graduate work at the University of Paris, after which he worked for several major laser companies. He is a US Army veteran of the 172nd Mountain Brigade and the 101st Airborne division. In his spare time he farms, collects antique pocket watches, plays guitar and rides a motorcycle.

COURSES

Micromachining with Femtosecond Lasers

SC743 • Course Level: Intermediate
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 8:30 am to 12:30 pm

This course provides attendees with the knowledge necessary to understand and apply femtosecond laser pulses for micromachining tasks in a variety of materials. Emphasis will be placed on developing a fundamental understanding of how femtosecond pulses interact with the sample. From this knowledge, the advantages and limitations of femtosecond lasers for various micromachining tasks can be readily understood. Examples will be given in the micromachining of the surface of metals, semiconductors, and transparent materials, as well as the formation of photonic and microfluidic devices in the bulk of transparent materials.

LEARNING OUTCOMES

This course will enable you to:

- summarize the linear and non-linear interaction mechanisms of femtosecond laser pulses with metals, semiconductors, and transparent materials
- explain mechanisms for material removal and modification, as well as factors affecting precision and degree of collateral damage
- describe unique capabilities afforded by femtosecond pulses for micromachining bulk transparent materials
- determine appropriate femtosecond laser parameters for a micromachining task
- compare various micromachining methods and evaluate the most appropriate for a given job

INTENDED AUDIENCE

This course is aimed at people already doing or interested in starting research on short-pulse laser micromachining, as well as at people who have specific micromachining problems and wish to evaluate the potential of femtosecond lasers for accomplishing their task. Those who do not have a background in some of the unique properties of femtosecond laser pulses would benefit from attending SC541, "An Introduction to Femtosecond Laser Techniques," by Eric Mazur and/or SC746 "Introduction to Ultrafast Technology" by Rick Trebino before attending this course.

INSTRUCTOR

Stefan Nolte is a Professor at the Friedrich Schiller University and at the Fraunhofer IOF in Jena, Germany. His research topics include ultrashort pulse micromachining for industrial and medical applications. He has been actively engaged in research on femtosecond laser micromachining since the field's inception in the mid-1990s.

COURSE PRICE INCLUDES a detailed reading list of key papers.

Macro Applications

Laser Systems Engineering

SC1144 • Course Level: Introductory
CEU: 0.7 • \$620 Members • \$730 Non-Members USD
SPIE Student Members: \$322
Tuesday 8:30 am to 5:30 pm

While there are a number of courses on laser design, this course emphasizes a systems-level overview of the design and engineering of systems which incorporate lasers. Starting with a summary of the various types of lasers and their selection, it reviews common laser specifications (peak power, spatial coherence, etc.), Gaussian beam characteristics and propagation, laser system optics, beam control and scanning, radiometry and power budgets, detectors specific to laser systems, and the integration of these topics for developing a complete laser system. The emphasis is on real-world design problems, as well as the commercial off-the-shelf (COTS) components used to solve them.

LEARNING OUTCOMES

This course will enable you to:

- describe laser types, properties, and selection, including semiconductor, solid-state, fiber, and gas lasers
- identify laser specifications such as average power, peak power, linewidth, pulse repetition frequency, etc. that are unique to specific applications such as manufacturing, biomedical systems, laser radar, laser communications, laser displays, and directed energy
- quantify Gaussian beam characteristics, propagation, and imaging; compare beam quality metrics [M2, beam-parameter product (BPP), and Strehl ratio]
- select laser system optics (windows, focusing lenses, beam expanders, collimators, beam shapers and homogenizers) and identify critical specifications for their use, including beam truncation, aberrations, surface figure, surface roughness, surface quality, material absorption, backreflections, coatings, and laser damage threshold (LDT)
- distinguish between hardware elements available for beam control, including galvanometers, polygon scanners, MEMS scanners, and f-theta lenses
- develop power budgets and radiometric estimates of performance for point and extended objects; estimate signal-to-noise ratio (SNR) for active imaging, laser ranging, and biomedical systems
- select detectors appropriate for laser systems, including PIN photodiodes, avalanche photodiodes (APDs), and photomultiplier tubes (PMTs); estimate the performance limitations of noise sources (detector, speckle, etc.) and their effects on sensitivity and SNR

INTENDED AUDIENCE

Intended for engineers (laser, systems, optical, mechanical, and electrical), scientists, technicians, and managers who are developing, specifying, or purchasing laser systems.

INSTRUCTOR

Keith Kasunic has more than 30 years of experience developing optical, electro-optical, infrared, and laser systems. He holds a Ph.D. in Optical Sciences from the University of Arizona, an MS in Mechanical Engineering from Stanford University, and a BS in Mechanical Engineering from MIT. He has worked for or been a consultant to a number of organizations, including Lockheed Martin, Ball Aerospace, Sandia National Labs, and Nortel Networks. He is currently the Technical Director of Optical Systems Group, LLC. He is also the author of three textbooks [Optical Systems Engineering (McGraw-Hill, 2011), Optomechanical Systems Engineering (John Wiley, 2015), and Laser Systems Engineering (SPIE Press, 2016)], an Adjunct Professor at Univ. of Central Florida's CREOL, an Affiliate Instructor with Georgia Tech's SENSIAC, and an Instructor for the Optical Engineering Certificate Program at Univ. of California – Irvine.

COURSE PRICE INCLUDES the textbook *Laser Systems Engineering* (SPIE Press, 2016) by Keith J. Kasunic.

Optoelectronic Materials and Devices

Fundamentals of Reliability Engineering for Optoelectronic Devices

SC1091 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Monday 1:30 pm to 5:30 pm

Component reliability impacts the bottom line of every supplier and customer in the optics industry. Nevertheless, a solid understanding of the fundamental principles of reliability is often limited to a small team of engineers who are responsible for product reliability for an entire organization. There is tremendous value in expanding this knowledge base to others to ensure that all stakeholders (product engineers, managers, technicians, and even customers) speak a “common language” with respect to the topic of reliability.

This course provides a broad foundation in reliability engineering methods applied to lifetest design and data analysis. While the course focuses on the application of reliability engineering to optoelectronic devices, the underlying principles can be applied to any component.

LEARNING OUTCOMES

This course will enable you to:

- identify the primary goals of reliability testing
- define a complete reliability specification
- differentiate between parametric and non-parametric reliability lifetests
- list the models used to describe reliability and select the best for a given population
- define a FIT score and explain why it is not a good measure of reliability
- estimate reliability model parameters from real data
- analyze cases which include insufficient, problematic, and/or uncertain data
- compute confidence bounds and explain their importance
- differentiate between failure modes and root causes
- identify infant mortalities, random failures, and wear-out in the data
- compare competing failure modes
- analyze cases in which slow degradation is present
- state the goal of accelerated lifetesting and identify when it is (and is not) appropriate
- list common stresses used in accelerated lifetesting and explain how to treat these quantitatively
- differentiate between step-stress and multicell accelerated lifetesting
- use accelerated lifetest data to simultaneously extract acceleration parameters and population reliability
- relate component reliability to module/system reliability

INTENDED AUDIENCE

The course targets a wide range of participants, including students, engineers, and managers and seeks to dispel common misconceptions which pervade the industry. A basic understanding of probability and statistics (high school level) may be helpful, but is not required.

INSTRUCTOR

Paul Leisher is a Senior Engineer with the Laser Systems Engineering and Operation Division at Lawrence Livermore National Laboratory (LLNL) in Livermore, California. Prior to joining LLNL, Dr. Leisher served as Associate Professor of Physics and Optical Engineering at Rose-Hulman Institute of Technology (Terre Haute, Indiana) and as the Manager of Advanced Technology at nLight Corporation (Vancouver, Washington). He received a B.S. degree in electrical engineering from Bradley University (Peoria, Illinois) in 2002, and a M.S. and Ph.D. in electrical and computer engineering from the University of Illinois at Ur-

ana-Champaign in 2004 and 2007, respectively. Dr. Leisher’s research interests include the design, fabrication, characterization, and analysis of high power semiconductor lasers and other photonic devices. His past responsibilities included the design and analysis of accelerated lifetests for assessing the reliability of high power diode lasers. He has authored over 200 technical journal articles and conference presentations and served as the principal investigator on 48 funded research projects. Dr. Leisher is a senior member of both SPIE and IEEE.

Semiconductor Photonic Device Fundamentals

SC747 • Course Level: Introductory
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Sunday 8:30 am to 5:30 pm

Updated for 2018, this course presents a basic, in-depth description and explanation of the operation of the broad range of semiconductor photonic devices used for light generation, modulation, manipulation, detection and application, covering the optical spectral region extending from UV, visible, IR, through terahertz (sub-mm). The course begins with a review of the basics of semiconductor materials, with primary emphasis on their electrical and photonic properties. The motion of electrons and holes is discussed, and photon absorption and generation mechanisms are reviewed. The course describes and examines device structures such as p-n junctions, Schottky barriers, quantum wells, quantum wires and quantum dots, Bragg reflectors, quantum cascade lasers as tunable coherent infrared sources, VCSELs, distributed feedback lasers, avalanching, tunneling and various photonic device effects. Current research as well as commercially-available photonic devices and representative systems are discussed. Course participants will gain an in-depth understanding of semiconductor photonic devices, their figures of merit, limitations, applications, and current areas of research.

LEARNING OUTCOMES

This course will enable you to:

- explain the basic operating principles of semiconductor photonic devices
- explain the operation of laser diodes, VCSELs, LEDs, OLEDs, quantum cascade lasers, light modulators, photodetectors, PIN and APDs, multi-quantum well and quantum dot structures, CCDs, etc.
- explain the various device figures of merit and their limitations
- specify device characteristics required for your system applications
- explain the device manufacturer’s data sheet content relevant to your application
- identify what questions to ask device manufacturers

INTENDED AUDIENCE

Aimed at managers, engineers, system designers, R&D personnel, and technicians working on components and sub-assemblies as well as systems. No formal mathematics or physics background is necessary.

INSTRUCTOR

Kurt Linden received a PhD in Electrical Engineering, with primary emphasis on semiconductor photonics. With over 45 years of practical experience in the design, development, manufacture, testing, and application of a broad range of semiconductor photonic devices and systems, he is a pioneer in the development of visible, infrared, and far-infrared devices and is currently involved with their incorporation into operational systems. Dr. Linden has taught basic semiconductor physics and photonics courses at MIT, USPTO, and Northeastern University, and presents in-house as well as annual conference tutorials on photonics, received “best instructor” citations, and has served as an expert witness on this subject. He is currently a senior scientist at N2 Biomedical LLC, where he applies the basic concepts of semiconductor photonics to new biomedical systems.

COURSES

Photonic Integration

Understanding Diffractive Optics

SC1071 • Course Level: Introductory
CEU: 0.7 • \$585 Members • \$695 Non-Members USD
SPIE Student Members: \$308
Sunday 8:30 am to 5:30 pm

The course covers the fundamental principles of diffraction phenomena. Qualitative explanation of diffraction by the use of field distributions and graphs provides the basis for understanding fundamental relations and important trends. Attendees will also learn the important terminology employed in the field of diffractive optics. The instructor provides a comprehensive overview of the main types of diffractive optical components, including phase plates, diffraction gratings, binary optics, diffractive kinoforms, stepped-diffractive surfaces, holographic optical elements, and photonic crystals. Based on practical examples provided by the instructor, attendees will learn the benefit of incorporating diffractive optical components in optical and photonics instruments, such as augmented and virtual reality displays, optical data storage devices, optical tweezers, and laser systems.

LEARNING OUTCOMES

This course will enable you to:

- explain the fundamentals of diffraction, including Fresnel and Fraunhofer diffraction, the Talbot effect, apodization, diffraction by multiple apertures, and superresolution phenomena
- explain terminology in the field of diffractive optics
- describe the operational principles of the major types of diffractive optical components in the scalar and resonant domains, the diffraction efficiency, and the blazing condition
- describe diffraction phenomena associated with the propagation of laser beams
- compare the main diffractive optics fabrication techniques
- distinguish the various functions performed by diffractive optics components in optical systems
- compare the benefits and limitations of diffractive components

INTENDED AUDIENCE

This material is intended for engineers, scientists, college students, and photonics enthusiasts who would like to broaden their knowledge and understanding of diffractive optics, as well as to learn the numerous practical applications of diffractive optical components in modern optical instruments.

INSTRUCTOR

Yakov Soskind is a renowned expert in physical optics and innovative photonics instrumentation development. For over 35 years, Dr. Soskind has made extensive contributions in the areas of diffractive optics and nano-photonics, optical engineering, laser resonators and beam shaping, fiber-optics, imaging, and illumination. He is a founding chair of the Photonic Instrumentation Engineering conference, an annual conference at OPTO/Photonics West providing an interdisciplinary forum for engineers and scientists to present their ideas, designs, case studies, and success stories in the field of photonic instrumentation. Dr. Soskind is the author of the *Field Guide to Diffractive Optics* (SPIE Press, 2011) and has been awarded more than 25 domestic and international patents in the field of photonics.

COURSE PRICE INCLUDES the *Field Guide to Diffractive Optics*, FG21 (SPIE Press, 2011) by Yakov Soskind.

Volume Bragg Gratings—New Optical Components Providing Unique Means

SC1204 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 1:30 pm to 5:30 pm

This course explains basic principles and applications of volume Bragg gratings (VBGs) that are holographic optical elements recorded in volume of photo-thermo-refractive optical glass. These elements enable dramatic increase of brightness of lasers and resolution of spectral analyzers. The goal of the course is to describe features of photosensitive optical glass, properties of VBGs, principles of gratings modeling and design, main types of optical components based on VBGs, and amazing results of their use in lasers and photonic devices. People who want to bring lasers and photonic devices to new level will benefit from taking this course.

LEARNING OUTCOMES

This course will enable you to:

- learn properties of holographic photo-thermo-refractive glass
- identify optical beams and pulses transformations produced by different types of VBGs
- describe VBGs' applications
- determine the problems that could be solved by VBGs
- calculate parameters of VBGs that provide necessary functionality of laser and photonics systems
- use VBGs for spectral and angular selection, pulses stretching and compression, and spectral and coherent beam combining

INTENDED AUDIENCE

Scientists, engineers, and students who wish to learn about new optical elements that provide new functionality for laser and photonic devices. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Leonid Glebov is a co-inventor of volume Bragg gratings in photo-thermo-refractive glass. He earned Ph.D. and Doctor of Science degrees in Optics at State Optical Institute in Russia. Dr. Glebov is a Research Professor at CREOL/College of Optics and Photonics, University of Central Florida and a founder of OptiGrate Corp. He is a Fellow of SPIE, OSA, American Ceramic Society, and National Academy of Inventors. He is a recipient of SPIE Denice Gabor award in holography. Dr. Glebov conducts researches in photoinduced processes in glasses, holographic optical elements and lasers controlled by those elements.

Silicon Photonics

SC817 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Wednesday 1:30 pm to 5:30 pm

Silicon Microphotonics is a platform for the large scale integration of CMOS electronics with photonic components. This course will evaluate the most promising silicon optical components and the path to electronic-photonic integration. The subjects will be presented in two parts: 1) Context: a review of optical interconnection and the enabling solutions that arise from integrating optical and electronic devices at a micron-scale, using thin film processing; and 2) Technology: case studies in High Index Contrast design for silicon-based waveguides, filters, photodetectors, modulators, laser devices, and an application-specific opto-electronic circuit. The course objective is an overview of the silicon microphotonic platform drivers and barriers in design or fabrication.

LEARNING OUTCOMES

This course will enable you to:

- identify trends in optical interconnection and the power of electronic-photonic convergence
- explain how the electronic, thermal and mechanical constraints of planar integration promote silicon as the optimal platform for microphotonics

- design application-specific photonic devices that take advantage of unique materials processing and device design solutions
- compute the performance of micron-scale optically passive/active devices
- judge the feasibility and impact of the latest silicon photonic devices

INTENDED AUDIENCE

This material is intended for anyone who needs to learn how to design integrated optical systems on a silicon platform. Those who either design their own photonic devices or who work with engineers and scientists will find this course valuable.

INSTRUCTOR

Jurgen Michel is a Senior Research Scientist at the MIT Microphotonics Center and a Senior Lecturer at the Department of Materials Science and Engineering at MIT. He has conducted research on silicon based photonic devices for more than 20 years.

Sajan Saini received his doctoral degree in materials science at MIT in 2004, during which he investigated materials and device designs for optically pumped waveguide amplifiers in silicon microphotonics. Sajan has worked with the MIT Microphotonics Center as a postdoctoral associate; he has also been a professor with the physics department at Queens College of CUNY (City University of New York), and lectured with the writing program at Princeton University. In addition to running a graduate research program on nanostructured materials, he has taught courses on photonics, introductory quantum physics, general astronomy, scientific writing, graphic novels and science-fiction, and climate science communications. At AIM Photonics Academy, Sajan oversees the production of all teaching and learning materials, including online modules, certification courses, and Summer Academy offerings. He has taught at SPIE Photonics West, co-authored several patents, and his scientific and science writings have appeared in IEEE and APL publications, book chapters, and *Harper's Magazine*.

Nanotechnologies in Photonics

Quantum Sensors **NEW**

SC1191 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 8:30 am to 12:30 pm

Quantum sensors are sensing devices that exploit quantum phenomena in such a way that makes them perform substantially better than their classical counterparts. This course uses an information-theoretic approach to identify and explain the basic design principles and potential applications of quantum sensors. A primary goal of the course is to describe those aspects of quantum phenomena that can be harnessed in order to design and develop novel sensing devices. To this end, the course summarizes recent theoretical and experimental results that showcase the feasibility of quantum sensors. In addition, the course compares the theoretical performance of quantum sensors with their classical counterparts in the areas of radar, lidar, photo-detection, magnetometry, and gravimetry.

LEARNING OUTCOMES

This course will enable you to:

- explain the difference between classical and quantum information
- explain the difference between classical and quantum sensing
- describe the role played by quantum entanglement and superposition in the design of quantum sensors
- describe how the detrimental effects of environmental quantum noise can be mitigated
- explain the basic design principles to design and develop novel quantum sensors
- summarize recent research results that showcase the feasibility of quantum sensing
- describe the potential applications and advantages of quantum radar, lidar, photo-detection, magnetometry, and gravimetry
- compare the theoretical performance of quantum and classical sensing devices

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about quantum sensors and their potential applications to radar, lidar, photo-detection, magnetometry and gravimetry. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Marco Lanzagorta is a Research Physicist at the US Naval Research Laboratory in Washington DC. Dr. Lanzagorta is a recognized authority on the research and development of advanced information technologies and their application to combat and scientific systems. Dr. Lanzagorta has over 100 publications in the areas of physics and computer science, and he authored the books *Quantum Radar* (2011), *Underwater Communications* (2012), and *Quantum Information in Gravitational Fields* (2014). Dr. Lanzagorta received a doctorate degree in theoretical physics from Oxford University in the United Kingdom. Before joining NRL, Dr. Lanzagorta was Technical Fellow and Director of the Quantum Technologies Group of ITT Exelis, and worked at the European Organization for Nuclear Research (CERN) in Switzerland, and at the International Centre for Theoretical Physics (ICTP) in Italy.

Salvador Venegas-Andraca is a scientist and entrepreneur devoted to scientific research, technology development, technology transfer and teaching. Dr. Venegas-Andraca is a Professor of Mathematics and Computer Science at Tecnológico de Monterrey and he is a leading scientist in the field of quantum walks as well as a cofounder of the field of Quantum Image Processing. Dr. Venegas-Andraca has published 25 scientific papers and has authored the book *Quantum Walks for Computer Scientists* (2008). Dr. Venegas-Andraca holds a PhD in physics awarded by the University of Oxford, has been a visiting professor at Harvard University (USA), Bahia Blanca University (Argentina), Sergio Arboleda University (Colombia) and del Valle University (Colombia). Dr. Venegas-Andraca is a Senior Member of ACM and Fellow of the Mexican Academy of Sciences.

Photonic Crystals: A Crash Course, from Bandgaps to Fibers

SC608 • Course Level: Intermediate
CEU: 0.4 • \$360 Members • \$415 Non-Members USD
SPIE Student Members: \$196
Sunday 8:30 am to 12:30 pm

This half-day course will survey basic principles and developments in the field of photonic crystals, nano-structured optical materials that achieve new levels of control over optical phenomena. This leverage over photons is primarily achieved by the photonic band gap: a range of wavelengths in which light cannot propagate within a suitably designed crystal, forming a sort of optical insulator.

The course will begin with an introduction to the fundamentals of wave propagation in periodic systems, Bloch's theorem and band diagrams, and from there moves on to the origin of the photonic band gap and its realization in practical structures. After that we will cover a number of topics and applications important for understanding the field and its future.

Topics will include: the introduction of intentional defects to create waveguides, cavities, and ideal integrated optical devices in a crystal; exploitation of exotic dispersions for negative-refraction, super-prisms, and super-lensing; the combination of photonic band gaps and conventional index guiding to form easily fabricated hybrid systems (photonic-crystal slabs); the origin and control of losses in hybrid systems; photonic band gap and microstructured optical fibers; and computational approaches to understanding these systems (from brute-force simulation to semi-analytical techniques).

LEARNING OUTCOMES

This course will enable you to:

- learn the fundamental concepts necessary for understanding photonic crystals
- gain familiarity with the unusual phenomena and devices that have been enabled by photonic bandgaps, and the directions taken to achieve them in practice

COURSES

- understand the principles and perspectives by which future applications in nano-structured photonics may be developed and described

INTENDED AUDIENCE

This course is designed for engineers and scientists who wish to understand how photonic crystals work and its potential applications to quantum optical devices and optoelectronics. It is aimed at those who have an understanding of elementary electromagnetism and some familiarity with the applications and governing principles of optical devices.

INSTRUCTOR

Steven Johnson is a Professor of Applied Mathematics and Physics at MIT. He works in the field of nanophotonics—electromagnetism in media structured on the wavelength scale, especially in the infrared and optical regimes—where he works on many aspects of the theory, design, and computational modeling of nanophotonic devices, both classical and quantum. He is coauthor of over 200 papers and over 25 patents, including the second edition of the textbook *Photonic Crystals: Molding the Flow of Light*, and was ranked among the top ten most-cited authors in the field of photonic crystals by ScienceWatch.com in 2008. In addition to traditional publications, he distributes several widely used free-software packages for scientific computation, including the MPB and Meep electromagnetic simulation tools (cited in over 1000 papers to date) and the FFTW fast Fourier transform library (for which he received the 1999 J. H. Wilkinson Prize for Numerical Software).

COURSE PRICE INCLUDES the text *Photonic Crystals: Molding the Flow of Light (Second Edition)* (Princeton University Press, 2008) by John D. Joannopoulos, Steven G. Johnson, Joshua N. Winn & Robert D. Meade.

MOEMS-MEMS in Photonics

Design, Modeling and Fabrication Techniques for Micro-optics: Applications to Display, Imaging, Sensing and Metrology

SC1125 • Course Level: Intermediate
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Wednesday 8:30 am to 5:30 pm

This course provides an overview of the various design and fabrication techniques available to the optical engineer for micro / nano optics, diffractive optics and holographic optics. Emphasis is put on DFM (Design For Manufacturing) for wafer scale fabrication, Diamond Turning Machining (DTM) and holographic origination. The course shows how design techniques can be tailored to address specific fabrication techniques' requirements and production equipment constraints. The course also addresses various current application fields as in display, imaging, sensing and metrology.

It is built around 4 sections: (1) design, (2) modeling, (3) fabrication/mass production and (4) application fields.

- 1) The course reviews various design techniques used in standard optical CAD tools such as Zemax and CodeV to design Diffractive Optical Elements (DOEs), Micro-Lens Arrays (MLAs), hybrid optics and refractive micro-optics, Holographic Optical Element (HOE), as well as numerical design techniques for Computer Generated Holograms (CGHs).
- 2) Modeling single micro optics or complex micro-optical systems including MLAs, DOEs, HOEs, CGHs, and other hybrid elements can be a difficult task when using classical ray tracing algorithms. We review techniques using physical optics propagation to model all diffraction effects, along with systematic or random fabrication errors, multi-order propagation and other effects which cannot be modeled accurately through ray tracing.

- 3) Following the design (1) and modeling tasks (2), the optical engineer needs to perform a DFM process so that the resulting design can be fabricated by the desired manufacturing partner/vendor over a specific equipment. We will review such DFM for wafer fab via optical lithography (tape-out process), single point diamond turning (SPDT), or holographic recording specification. The course also reviews fracturing techniques to produce GDSII layout files for specific lithographic fabrication techniques and manufacturing equipment.
- 4) This section reviews current application fields for which micro-optics are providing an especially good match, quasi impossible to implement through traditional optics, such as depth mapping sensing (structured illumination based sensor) and augmented reality display (waveguide grating combiner optics). Applications examples in high resolution incremental/absolute optical encoders are also reviewed. Design and modeling techniques will be described for such applications fields, and optical hardware sub-system implementations and micro-optic elements will be shown and demonstrated at the end of the course.

LEARNING OUTCOMES

This course will enable you to:

- review the various micro-optics / diffractive optics design techniques used today in popular optical design software
- decide which design software is best suited for a particular design task
- evaluate the constraints linked to either ray tracing or physical optics propagation techniques, and develop custom numerical propagation algorithms in Matlab or C
- model systematic and random fabrication errors, especially for lithographic fabrication
- compare the various constraints linked to mask layout generation for lithographic fabrication (GDSII)
- adapt GDSII tape out files to various lithographic fabrication techniques (multilevel, direct write, grey scale, etc...)
- learn about current application fields and products using such optics, as in Augmented and Mixed Reality headsets, and high resolution hybrid incremental/absolute diffractive optical encoders.

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about how to design, model, prototype, test and mass produce micro-optics, diffractive optics and hybrid optics, and how such optics can be integrated effectively in industrial or consumer products. Basic knowledge in optics is assumed.

INSTRUCTOR

Bernard Kress Over the past two decades, Bernard Kress has made significant scientific contributions as an engineer, researcher, associate professor, consultant, instructor, and author. He has been instrumental in developing numerous optical sub-systems for consumer and industrial products, generating IP, teaching and transferring technological solutions to industry. Application sectors include laser materials processing, optical anti-counterfeiting, biotech sensors, optical telecom devices, optical data storage, optical computing, optical motion sensors, digital displays systems, and eventually HUD and HMD displays (smart glasses, AR/MR/VR). Bernard has been specifically involved in the field of micro-optics, wafer scale optics, holography and nano-photonics. He has published half a dozen books and has more than 35 patents granted. He is a short course instructor for the SPIE and has been chair of various SPIE conferences. He is an SPIE fellow since 2013 and has been elected to the board of Directors of SPIE (2017-19). Bernard has joined Google [X] Labs. in 2011 as the Principal Optical Architect on the Google Glass project, and is since 2015 the Partner Optical Architect at Microsoft Corp. on the HoloLens project.

Optical MEMS Engineering ^{NEW}

SC1230 • Course Level: Intermediate
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Sunday 8:30 am to 5:30 pm

This course provides an overview of the Optical MEMS technology from an engineering point of view. First, the course will explain the main features of the Optical MEMS market showing the different segments and the characteristics of each segment. Then, the course will give an overview of the main technologies in this domain showing the pros and cons of each technology from an industrial point of view and indicating some of their success stories. The attendees will then go through the details of the analysis and design of optical MEMS components. This includes the optical propagation through micro structures as well as the mechanical design of some common actuators (Comb drive actuator, thermal actuator, etc.) to be able to understand and appreciate the compatibility and contradictions faced when performing such designs. The course will be suitable for a beginner engineer who wants to penetrate the field of Optical MEMS as it allows him to ramp-up rapidly and jump into the initial design of a working optical MEMS component in a very short time.

LEARNING OUTCOMES

This course will enable you to:

- identify the important specs of the different market segments in the Optical MEMS market.
- differentiate between the MEMS technologies required for a specific product development.
- predict the technology development required for a specific optical MEMS product building.
- estimate the optical performance of a MEMS structure under specific input excitation.
- construct an initial optical and mechanical design of a MEMS structure and identify the tools required to finalize this design.

INTENDED AUDIENCE

Scientists, engineers and decision makers in the companies working or targeting to work in field of optical MEMS.

INSTRUCTOR

Diaa Khalil obtained his PhD from INPG France in 1993. Prof. Diaa Khalil has over 33 years of experience in micro photonics systems, including integrated optoelectronics and optical MEMS technology. He is currently the CTO of the Optical MEMS Division in Si-Ware Systems company, leading a group of talented engineers developing an innovative FTIR MEMS spectrometer, a unique product that gained the Prism award in the Photonics West conference 2014 in SF USA. Prior to joining SWS, he worked with MEMScAP company as the head of the optical MEMS design group where he led the design and characterization of a 2x2 switch, and introduced a novel VOA (variable Optical Attenuator) achieving the world record of minimum PDL reported for wide dynamic range. Diaa Khalil is also a Professor in the Faculty of Eng., Ain Shams University since 2004, and currently the Head of the ECE department. He introduced the courses of Integrated Optics, Optical MEMS, and Applied Optical Engineering for the post-graduate engineering students. He is also leading a group of scientists working in the fields of Photonic microsystems. He supervised more than 45 MSc and PhD thesis in the fields of: Optics, Optoelectronics, Applied Spectroscopy, Optical MEMS and integrated Optics. He is a holder of Egyptian state prize in engineering sciences in 1998. He is a senior member in the OSA and the IEEE Photonic Society and a member in the SPIE. He is currently the head of commission D in the National URSI committee, in Egypt. He is also a member in the editorial board of the journal, "Light : Science and Applications" produced by the Nature Publishing Group NPG. Prof. Diaa Khalil is inventor of about 15 patents and author and co-author of more than 200 scientific publications in international journals and conferences.

Fabrication Technologies for Micro- and Nano-Optics

SC454 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Tuesday 8:30 am to 12:30 pm

Applications of micro and nano-scale optics are widespread in essentially every industry that uses light in some way. A short list of sample application areas includes communications, solar power, biomedical sensors, laser-assisted manufacturing, and a wide range of consumer electronics. Understanding both the possibilities and limitations for manufacturing micro- and nano-optics is useful to anyone interested in these areas. To this end, this course provides an introduction to fabrication technologies for micro- and nano-optics, ranging from refractive microlenses to diffractive optics to sub-wavelength optical nanostructures.

After a short overview of key applications and theoretical background for these devices, the principles of photolithography are introduced. With this backdrop, a wide variety of lithographic and non-lithographic fabrication methods for micro- and nano-optics are discussed in detail, followed by a survey of testing methods. Relative advantages and disadvantages of different techniques are discussed in terms of both technical capabilities and scalability for manufacturing. Issues and trends in micro- and nano-optics fabrication are also considered, focusing on both technical challenges and manufacturing infrastructure.

LEARNING OUTCOMES

This course will enable you to:

- describe example applications and key 'rules of thumb' for micro- and nano-optics
- explain basic principles of photolithography and how they apply to the fabrication of micro- and nano-optics
- identify and explain multiple techniques for micro- and nano-optics fabrication
- compare the advantages and disadvantages of different manufacturing methods
- describe and compare performance and metrological testing methods for micro- and nano-optics
- evaluate fabrication trends and supporting process technologies for volume manufacturing

INTENDED AUDIENCE

Engineers, scientists, and managers who are interested in the design, manufacture, or application of micro/nano-optics, or systems that integrate these devices. A background in basic optics is helpful but not assumed.

INSTRUCTOR

Thomas Suleski has been actively involved in research and development of micro- and nano-optics since 1991 at Georgia Tech, Digital Optics Corporation, and since 2003, as a member of the faculty at the University of North Carolina at Charlotte. He holds 13 patents and more than 120 technical publications on the design, fabrication, and testing of micro- and nano-optical components and systems. Dr. Suleski is a Fellow of SPIE, the International Society for *Optical Engineering*, and currently serves as Senior Editor for JM3, the *Journal of Micro/Nanolithography, MEMS and MOEMS*.

COURSES

Advanced Quantum and Optoelectronic Applications

Quantum Computing **NEW**

SC1210 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Sunday 1:30 pm to 5:30 pm

Quantum computing, one of the most recent joint ventures between physics and the theory of computation, can be defined as the scientific field whose purpose is to develop hardware and algorithms based on quantum mechanical phenomena. In addition to further advance the mathematical and physical foundations of quantum computing, scientists and engineers who work in this field focus on developing cutting-edge quantum algorithms in areas like artificial intelligence, cryptanalysis, machine learning, database search, chemical simulations, and image processing. The course summarizes recent theoretical and experimental results that showcase the feasibility of large-scale quantum computation. In addition, the course describes the potential applications of quantum computing to signal analysis, sensor fusion, and computer vision.

LEARNING OUTCOMES

This course will enable you to:

- explain the difference between classical and quantum information.
- explain the difference between classical and quantum computing.
- identify key quantum mechanical properties as computational resources.
- describe the fundamental quantum algorithmic techniques.
- describe the potential applications and advantages of quantum computation applied to problems from signal analysis, communications, sensor fusion, and computer vision.

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about quantum computing and its potential applications to signal analysis, communications, sensor fusion, and computer vision. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Salvador Venegas-Andraca is a scientist and entrepreneur devoted to scientific research, technology development, technology transfer and teaching. Dr. Venegas-Andraca is a Professor of Mathematics and Computer Science at Tecnológico de Monterrey and he is a leading scientist in the field of quantum walks as well as a cofounder of the field of Quantum Image Processing. Dr Venegas-Andraca has published 25 scientific papers and has authored the book *Quantum Walks for Computer Scientists* (2008). Dr. Venegas-Andraca holds a PhD in physics awarded by the University of Oxford, has been a visiting professor at Harvard University (USA), Bahia Blanca University (Argentina), Sergio Arboleda University (Colombia) and del Valle University (Colombia). Dr Venegas-Andraca is a Senior Member of ACM and Fellow of the Mexican Academy of Sciences.

Marco Lanzagorta is a Research Physicist at the US Naval Research Laboratory in Washington DC. Dr. Lanzagorta is a recognized authority on the research and development of advanced information technologies and their application to combat and scientific systems. Dr. Lanzagorta has over 100 publications in the areas of physics and computer science, and he authored the books *Quantum Radar* (2011), *Underwater Communications* (2012), and *Quantum Information in Gravitational Fields* (2014). Dr. Lanzagorta received a doctorate degree in theoretical physics from the University of Oxford. Before joining NRL, Dr. Lanzagorta was Technical Fellow and Director of the Quantum Technologies Group of ITT Exelis, and worked at the European Organization for Nuclear Research (CERN) in Switzerland, and at the International Centre for Theoretical Physics (ICTP) in Italy.

Semiconductor Lasers and LEDs

Laser Diode Beam Basics, Characteristics and Manipulation

SC1146 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Monday 1:30 pm to 5:30 pm

Laser diodes are the most widely used lasers and have several unique properties that are difficult to handle. This course first describes laser diode basic properties. Then, laser diode beam properties are extensively explained in detail. Attendees of the course will gain practical knowledge about laser diode beam characteristics, modeling and parameter measurement, learn about designing laser diode optics, and be able to effectively handle and utilize laser diodes.

LEARNING OUTCOMES

This course will enable you to:

- describe the unique properties of laser diodes
- describe the unique properties of laser diode beams
- model laser diode beams
- describe the operating principles of laser diode beam measurement instruments
- measure laser diode beam parameters
- design laser diode optics
- become familiar with laser diode, laser diode optics and laser diode module vendors
- tailor a diode laser beam to suit your own application

INTENDED AUDIENCE

Scientists, engineers, technicians, college students or managers who wish to learn how to effectively use laser diodes. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Haiyin Sun has thirty years' engineering, research and management experience in optics and lasers. He held senior optical engineer or manager positions with L-3 Communications, Coherent, Oplink Communications, and Power Technology, working mainly on laser diode optics design and optical engineering. He has designed and tested numerous types of laser diode modules and is the co-inventor of five laser diode optics patents. He is the primary author of two books, one book chapter and about twenty journal papers on laser diodes, laser diode beams and laser diode optics published by Springer, CRC Press, IEEE J. Q.E., JOSA., Opt. Lett., Appl. Opt., Opt. Eng., Opt. Comm., etc., and his work has been cited in *Photonics Spectra* and the *Melles Griot Catalog*. He was an adjunct assistant professor of applied science at the University of Arkansas and an editorial board member of the *Journal of Optical Communications* (Germany). He earned a Ph.D. in Applied Science, a M.S in Optics and a B.S in Physics.

This course will cover the content of the text *Laser Diode Beam Basics, Characteristics and Manipulations* (Springer, 2012), written by the instructor.

Advanced Thermal Management Materials for Optoelectronic, Microelectronic and MEMS Packaging

SC386 • Course Level: Intermediate
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Thursday 8:30 am to 5:30 pm

There are now a large and increasing number of production advanced materials designed to solve the critical problems in packaging of microelectronics, diode lasers, LEDs, displays, photovoltaics, sensors and MEMS. This course will examine materials to help alleviate issues including heat dissipation, thermal stresses, warpage, alignment, weight, size, cost, and manufacturing yield. Decades-old traditional low-coefficient-of-thermal-expansion (CTE) materials like tungsten/copper, molybdenum/copper, copper-Invar-copper, "Kovar", etc., have thermal conductivities that are no better than that of aluminum. There are now many low-density, low-CTE advanced composite and monolithic materials with much higher thermal conductivities - some as high as 1700 W/m-K - resulting in a large, increasing number of production applications. Some are cheaper than traditional materials. Weight savings as high as 85% have been demonstrated.

LEARNING OUTCOMES

This course will enable you to:

- compare the advantages, disadvantages and properties of the numerous and increasing number of advanced thermal management materials compared to traditional ones
- greatly increase heat dissipation
- improve reliability, alignment, strength and stiffness
- reduce size, weight, thermal stresses and warpage
- improve and simplify thermal design and reduce battery power
- use hard solders
- select manufacturing processes to reduce cost and increase yield
- use current applications to guide your own designs and improve competitive position
- plan for future developments through a knowledge of key future trends, including carbon nanotubes, graphite nanoplatelets, graphene, etc.

INTENDED AUDIENCE

This course is designed for engineers, scientists and managers involved in design and manufacture of optoelectronic, microelectronic and MEMS systems; material development; and thermal management.

INSTRUCTOR

Carl Zweben PhD, now an independent consultant on advanced thermal materials and structural composites, was for many years Advanced Technology Manager and Division Fellow at GE. Dr. Zweben has over 40 years' experience in development and application of many types of advanced materials. He is a Life Fellow of ASME, a Fellow of ASM and SAMPE, and an Associate Fellow of AIAA. He is the first winner of the GE Engineer-of-the-Year and One-in-a-Thousand awards. He has published widely and taught over 250 classroom, satellite broadcast, video and Internet-based short courses in the U.S., Europe and Asia.

This course replaces its previous versions, "Advanced Thermal Management and Packaging Materials", "Advanced Materials for Optoelectronic and MEMS Packaging", and "Advanced Thermal Management Materials for Optoelectronic, Microelectronic and MEMS Packaging", and has been updated to include numerous recent advances in technology and applications.

Displays and Holography

Head-Mounted Displays for Augmented Reality Applications

SC1096 • Course Level: Introductory
CEU: 0.7 • \$595 Members • \$705 Non-Members USD
SPIE Student Members: \$312
Wednesday 8:30 am to 5:30 pm

There has never been a more exciting time for augmented reality. The advent of high resolution microdisplays, the invention of new optical designs like waveguide eyepieces, and the significant advances in optical manufacturing techniques mean that augmented reality head mounted displays can be produced now that were not possible even a few years ago. This new hardware, coupled with innovative concepts in software applications as demonstrated in Google's Project Glass video, mean that for the first time it may be possible to develop a compelling augmented reality system for the consumer market.

The authors, with a combined experience of almost 50 years in the design of augmented reality systems, will identify the key performance parameters necessary to understand the specification, design and purchase of augmented reality HMD (head mounted display) systems and help students understand how to separate the hype from reality in evaluating new augmented reality HMDs. This course will evaluate the performance of various HMD systems and give students the basic tools necessary to understand the important parameters in augmented reality HMDs. This is an introductory class and assumes no background in head mounted displays or optical design.

LEARNING OUTCOMES

This course will enable you to:

- define basic components and attributes of augmented reality head-mounted displays and visually coupled systems
- describe important features and enabling technologies of an HMD and their impact on user performance and acceptance
- differentiate between video and optical see-through augmented reality HMDs
- identify key user-oriented performance requirements and link their impact on HMD design parameters
- list basic features of the human visual system and biomechanical attributes of the head and neck and the guidelines to follow to prevent fatigue or strain
- identify key tradeoffs for monocular, binocular and biocular systems
- classify current image source technologies and their methods for producing color imagery
- describe methods of producing augmented reality HMDs
- evaluate tradeoffs for critical display performance parameters

INTENDED AUDIENCE

Software developers, hardware engineers, scientists, engineers, researchers, technicians, or managers who wish to learn the fundamentals of the specification, design, and use of augmented reality head mounted displays.

INSTRUCTOR

Michael Browne is the General Manager of the Vision Products Division at SA Photonics in Los Gatos, California. He has a Ph.D. in Optical Engineering from the University of Arizona's Optical Sciences Center. Mike has been involved in the design, test and measurement of augmented reality systems since 1991. At Kaiser Electronics, Mike led the design of numerous augmented reality head mounted displays systems including those for the RAH-66 Comanche helicopter and the F-35 Joint Strike Fighter. Mike also invented one of the first head-mounted "virtual workstations" for interacting with data in a virtual space. Mike leads SA Photonics' programs for the design and development of person-mounted information systems, including body-worn electronics, head-mounted displays and night vision systems. Mike's current research includes investigations into the design of wide field of view augmented reality head mounted displays, binocular rivalry in head mounted displays, digital night vision and smear reduction in digital displays.

COURSES

James Melzer is a Technical Director for Displays and Human Factors at Thales Visionix, Inc., in Aurora, Illinois. He has been designing head-mounted displays for professional, military, medical and training applications for over 30 years. He holds a BS from Loyola University of Los Angeles and an SM from the Massachusetts Institute of Technology. He has extensive experience in optical and displays engineering, visual human factors, and is an expert in display design for head-mounted systems, aviation life-support, and user interface. His research interests are in visual and auditory perception, cognitive workload reduction, and bio-inspired applications of invertebrate vision. He has authored 50 technical papers and book chapters and holds four patents in head-mounted display design.

COURSE PRICE INCLUDES the text *Head Mounted Displays: Designing for the User* (2011) by James Melzer and Kirk Moffitt, and a Stereopticon viewer for in-course exercises.

Attendee testimonial:

I was able to apply a lot of the material to my PhD research, and was also able to meet many industry leaders that were extreme experts in the field. Definite bonus!

Optical Technologies and Architectures ^{NEW} for Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) Head Mounted Displays (HMDs)

SC1218 • Course Level: Intermediate

CEU: 0.7 • \$550 Members • \$660 Non-Members USD

SPIE Student Members: \$294

Sunday 8:30 am to 5:30 pm

The course provides an extensive overview of the current product offerings as well as the various optical architectures, as in:

- Smart Glasses and Digital Eyewear
- Augmented Reality (AR) and Mixed Reality (MR) headsets
- Virtual Reality (VR) and Merged Reality headsets

The course describes the optical backbone of existing systems, as well as the various optical building blocks, as in:

- Display engines including microdisplay panel architectures, scanner based light engines and phase panels
- Optical combiners integrated either in free space or waveguide platforms
- Depth mapping sensors either through structured illumination or time of flight.
- Head tracking, gaze tracking and gesture sensors

Emphasis is set on the design and fabrication techniques to provide the best display immersion and comfort:

- Wearable comfort (size/ weight, CG)
- Visual comfort (eye box size and IPD coverage, angular resolution, FOV, distortion, dynamic range, contrast,...)
- Passive and active foveated rendering and peripheral displays
- VAC (Vergence Accommodation Conflict) mitigation through varifocal, multifocal, spatial and temporal light fields and per pixel depth holographic displays.

The features and limitations of current optical technologies addressing such specifications are reviewed.

In order to design next generation head worn systems, one needs to fully understand the specifics and limitations of the human visual system, and design the optics and the optical architecture around such.

Challenges for next generation systems are reviewed, where immersion and comfort need to be addressed along with consumer level costs requirements.

Finally, the course reviews market analysts' expectations, projected over the next 5 to 10 years, and lists the main actors (major product design companies, start-ups and optical building block vendors, and current investment rounds in such).

Demonstration of some of the state of the art AR, MR and VR headsets will be offered to attendees at the end of the course.

LEARNING OUTCOMES

This course will enable you to:

- Identify the various consumer and enterprise head worn systems available in industry today, defined as smart glasses, digital eyewear, AR, MR and VR HMDs, and understand their fundamental differences and specifics
- Explain the current optical technologies and sub-systems, their advantages and limitations.
- Describe the relations and implications between FOV, resolution, MTF, eyebox size, effective IPD coverage, screen door effects, pupil swim, vergence/accommodation disparity, foveated rendering, peripheral displays,
- Examine the human visual system, its specifics and limitations.
- Identify the limitations of current optical architectures and how some can be overcome by designing the optics around the human visual system.
- Describe the feature and functionality requirement for next generation systems, and review the key enabling technologies.
- Examine the current AR/VR market status as well as the upcoming market expectations for each field (smart glasses, AR and VR)

INTENDED AUDIENCE

Optical, mechanical and electrical engineers involved in the design and development of Enterprise and Consumer HMDs in all their declinations. Product and project managers involved in defining current and next generation HMD products, technology product roadmaps and next generation optical sub-systems.

INSTRUCTOR

Bernard Kress Over the past two decades, Bernard Kress has made significant scientific contributions as an engineer, researcher, associate professor, consultant, instructor, and author. He has been instrumental in developing numerous optical sub-systems for consumer and industrial products, generating IP, teaching and transferring technological solutions to industry. Application sectors include laser materials processing, optical anti-counterfeiting, biotech sensors, optical telecom devices, optical data storage, optical computing, optical motion sensors, digital displays systems, and eventually HUD and HMD displays (smart glasses, AR/MR/VR). Bernard has been specifically involved in the field of micro-optics, wafer scale optics, holography and nano-photonics. He has published half a dozen books and has more than 35 patents granted. He is a short course instructor for the SPIE and has been chair of various SPIE conferences. He is an SPIE fellow since 2013 and has been elected to the board of Directors of SPIE (2017-19). Bernard has joined Google [X] Labs. in 2011 as the Principal Optical Architect on the Google Glass project, and is since 2015 the Partner Optical Architect at Microsoft Corp. on the HoloLens project.

Introduction to VR, AR, MR and Smart Eyewear: Market Expectations, Hardware Requirements and Investment Patterns ^{NEW}

SC1234 • Course Level: Introductory

CEU: 0.2 • \$175 Members • \$200 Non-Members USD

SPIE Student Members: \$110

Tuesday 1:30 pm to 3:30 pm

This course serves as a high level introduction to the various categories of Head Mounted Displays (HMDs) available today: Smart Glasses or Smart Eyewear, Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and provides a synthetic overview of both current hardware architectures and related markets (enterprise and consumer).

Products limitations and next generation hardware and functionality requirements to fulfill the expected market will be reviewed in a synthetic way.

LEARNING OUTCOMES

This course will enable you to:

- Explain the current product offerings and be able to compare performances of different products as in visual and wearable comfort, display immersion and costs.

Optical Materials & Fabrication

Fundamentals of Molded Optics

SC1178 • Course Level: Introductory

CEU: 0.4 • \$350 Members • \$405 Non-Members USD

SPIE Student Members: \$192

Tuesday 8:30 am to 12:30 pm

This course provides attendees with an overview of the numerous optical molding technologies with an emphasis on the fundamentals of the more dominant fields of injection molded plastic optics and precision glass molding. A review of glass molding, plastic molding and hybrid molding processes will be included. The attendee will gain an understanding of how and when molded optics can be effectively used in products and how to select the correct manufacturing method. Course topics include description of the manufacturing processes, tool design features, materials properties, design methods unique to molded optical elements, manufacturing tolerances, coatings, test methods, and examples of applications that use optical elements.

LEARNING OUTCOMES

This course will enable you to:

- explore the advantages and limitations of molded optics
- identify the appropriate material and manufacturing method for a product
- design manufacturable optical systems using molded components
- avoid design problems that are unique to molded optics
- minimize the production cost and maximize the performance of your products

INTENDED AUDIENCE

This is an introductory course intended for individuals that design or fabricate optical systems that may include molded optical components. It is also beneficial to technical management staff who need to understand the advantages and limitations of molded optical components.

INSTRUCTOR

Alan Symmons is the Executive Vice President of Operations at LightPath Technologies, a worldwide leader in precision glass molding. He previously held the titles of Vice President of Corporate Engineering and Director of Engineering. Prior to joining LightPath in 2006, he was Engineering Manager at Aurora Optical, a cell phone camera module manufacturer, and held various engineering positions in injection molded plastic optics at both Applied Image Group – Optics & Donnelly Optics. Alan has 20 years of experience in molded optics with over a dozen published papers in the field. He is a Senior Member of SPIE and OSA, a member of ASPE and active in the Florida Photonics Cluster. Alan has a Bachelors of Science in Mechanical Engineering from Rensselaer Polytechnic Institute and a Master's in Business Administration from the Eller School of Management at the University of Arizona.

Michael Schaub is a Senior Principal Optical Engineer at Raytheon Missile Systems. In addition, he is the founder of Schaub Optical LLC, an optical design and engineering consulting firm. Prior to joining Raytheon, he worked at Donnelly Optics, where he designed and developed multiple high volume plastic optical designs.

Mike has over 20 years experience in plastic optics, with two books and several papers published. He is a member of SPIE and OSA. He has a BS in Optics from the Institute of Optics at the University of Rochester, a M.Sc. in Engineering Science from the University of Oxford, and a M.S. and Ph.D. in Optical Sciences from the Optical Sciences Center at the University of Arizona.

COURSE PRICE INCLUDES the *Field Guide to Molded Optics* (SPIE Press, 2016) by Alan Symmons and Michael Schaub.

- describe current HMD optical sensors, including head tracking, gaze tracking, gesture sensing and depth mapping.
- explain current HMD hardware ecosystem, from end product design houses, to product integrators, contract manufacturers, optical building blocks vendors, down to mass fabrication equipment providers.
- Explain the shortcomings of current immersive 3D display architectures.
- anticipate next generation HMD hardware revisions and product re-definitions.
- Explain why it is going to be a long ride towards the ultimate consumer product.
- anticipate the rise of new optical building block technologies able to sustain successive hardware revs.
- anticipate the fall of existing optical building block technologies unable to sustain successive hardware revs.
- identify new niche market segment growths based on next generation features and functionality expectations

INTENDED AUDIENCE

This 2 hours course is structured to be synthetic with a broad overview of the topics. It is intended for a wide audience, ranging from marketing and business development managers, market analysts and venture capital bankers, to product/project managers and engineers in various fields (OE, EE, ME, CR, SWE).

The companion day-long course (SC1218) is more specifically intended for Optical Engineers.

INSTRUCTOR

Bernard Kress Over the past two decades, Bernard Kress has made significant scientific contributions as an engineer, researcher, associate professor, consultant, instructor, and author. He has been instrumental in developing numerous optical sub-systems for consumer and industrial products, generating IP, teaching and transferring technological solutions to industry. Application sectors include laser materials processing, optical anti-counterfeiting, biotech sensors, optical telecom devices, optical data storage, optical computing, optical motion sensors, digital displays systems, and eventually HUD and HMD displays (smart glasses, AR/MR/VR). Bernard has been specifically involved in the field of micro-optics, wafer scale optics, holography and nano-photonics. He has published half a dozen books and has more than 35 patents granted. He is a short course instructor for the SPIE and has been chair of various SPIE conferences. He is an SPIE fellow since 2013 and has been elected to the board of Directors of SPIE (2017-19). Bernard has joined Google [X] Labs. in 2011 as the Principal Optical Architect on the Google Glass project, and is since 2015 the Partner Optical Architect at Microsoft Corp. on the HoloLens project.

COURSES

Thin Film Optical Coatings

SC321 • Course Level: Intermediate
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Monday 8:30 am to 5:30 pm

Virtually no modern optical system could operate without optical coatings. Much of any optical system consists of a series of coated and shaped surfaces. The shape determines the power of the surface but it is the coating that determines the specular properties, the amount of light transmitted or reflected, the phase change, the emittance, the color, the polarization, the retardation, including even the mechanical properties. Optical coatings consist of assemblies of thin films of materials where interference properties combine with the intrinsic properties of the materials to yield the desired optical performance. They act to reduce the reflectance losses of lenses, increase the reflectance of mirrors, reduce glare and electromagnetic emission from display systems, improve the thermal insulation of buildings, protect eyes from laser radiation, analyze gases, act as anticounterfeiting devices on banknotes, multiplex or demultiplex communication signals, separate or combine color channels in display projectors, and these are just a few of their roles. This course emphasizes understanding and takes students from fundamentals to techniques for design and manufacture.

LEARNING OUTCOMES

This course will enable you to:

- understand the basic principles of optical interference coatings
- perform many rapid design calculations and assessments without needing a computer
- speak knowledgeably about the parameters that characterize optical coatings
- design simple coatings given a suitably equipped computer
- know the advantages and disadvantages of the basic processes for the production of these filters
- understand the influence of errors in monitoring and estimate tolerances in production

INTENDED AUDIENCE

Anyone who is or wishes to become involved in the manufacture or use of optical coatings or who wants to know more about this rapidly growing and important field. The level is appropriate for someone who has completed high school mathematics and/or science.

INSTRUCTOR

H. Angus Macleod is President of Thin Film Center, a software, training and consulting company in optical coatings, and is Professor Emeritus of Optical Sciences at the University of Arizona. He has been deeply involved in optical coatings for over forty years.

Optical Systems & Lens Design

Practical Optical System Design

SC003 • Course Level: Intermediate
CEU: 0.7 • \$655 Members • \$765 Non-Members USD
SPIE Student Members: \$336
Thursday 8:30 am to 5:30 pm

This course is also available in online format.

This course will provide attendees with a basic working knowledge of optical design and associated engineering. The information in this course will help novice and experienced designers, as well as people who interact with optical designers and engineers, sufficiently understand these problems and solutions to minimize cost and risk. The course includes background information for optical design and an array of pragmatic considerations such as optical system specification, analysis of optical systems, material selection, use of catalog systems and components, ultraviolet through infrared system considerations, environmental factors and solutions, Gaussian beam optics, and production considerations such as optical testing and alignment. The course includes many practical and useful examples emphasizing rigorous optical design and engineering with an emphasis on designing for manufacture. Even if you have never used an optical design program before, you will become fluent with how to estimate, assess, execute, and manage the design of optical systems for many varied applications.

This course is a continuation of the long-running Practical Optical Systems Design course established and taught by Robert E. Fischer.

LEARNING OUTCOMES

This course will enable you to:

- develop a complete optical system design specification
- review fundamental physics and engineering related to optical design
- assess and analyze optical systems using computer-aided methods
- properly take into account system considerations such as environmental factors
- design for manufacture, alignment, and testing
- describe all aspects of optical design and associated engineering

INTENDED AUDIENCE

This course is intended for anyone who needs to learn how to design optical systems. It will be of value to those who either design their own optics or those who work directly or indirectly with optical designers, as you will now understand what is really going on and how to ask the right questions of your designers.

INSTRUCTOR

Richard Youngworth Ph.D. is Founder and Chief Engineer of Riyo LLC, an optical design and engineering firm providing engineering and product development services. Dr. Youngworth is a research adjunct professor at The College of Optical Sciences at the University of Arizona and an adjunct teaching professor in the Physics Department at Boise State University. His industrial experience spans diverse topics including optical metrology, design, manufacturing, and analysis. Dr. Youngworth has spent significant time working on optical systems in the challenging transition from ideal design to successful volume manufacturing. He is widely considered an expert, due to his research, lectures, publications, and industrial work on the design, producibility, and tolerance analysis of optical components and systems. Dr. Youngworth regularly teaches "Practical Optical System Design" and "Cost-Conscious Tolerancing of Optical Systems" for SPIE. He has a B.S. in electrical engineering from the University of Colorado at Boulder and earned his Ph.D. in optics at the University of Rochester by researching tolerance analysis of optical systems.

COURSE PRICE INCLUDES the text *Optical System Design, 2nd Edition* (SPIE Press, 2008/McGraw-Hill) by Robert E. Fischer, Biljana Tadic-Galeb, and Paul R. Yoder, Jr.

Design of Efficient Illumination Systems

SC011 • Course Level: Intermediate

CEU: 0.4 • \$315 Members • \$370 Non-Members USD

SPIE Student Members: \$178

Sunday 1:30 pm to 5:30 pm

Illumination systems are included in fiber illuminators, projectors, and lithography systems. The design of an illumination system requires balancing uniformity, maximizing the collection efficiency from the source, and minimizing the size of the optical package. These choices are examined for systems using lightpipes, lens arrays, faceted optics, tailored edge rays designs, and integrating spheres through a combination of computer simulations, hardware demonstrations and discussions.

LEARNING OUTCOMES

This course will enable you to:

- describe the differences between illuminance, intensity and luminance
- compute the required source luminance given typical illumination system specifications
- compute the change in luminance introduced by an integrating sphere
- distinguish between a Kohler illuminator and an Abbe illuminator
- explain the difference in uniformity performance between a tailored edge ray reflector and a standard conic reflector
- design a lightpipe system to provide uniform illuminance
- design a lens array system to create a uniform illuminance distribution
- design a reflector with facets to create a uniform illuminance distribution

INTENDED AUDIENCE

Individuals who design illumination systems or need to interface with those designers will find this course appropriate. Previous exposure to Optical Fundamentals (Reflection, Refraction, Lenses, Reflectors) is expected.

INSTRUCTOR

William Cassarly is a Synopsys Scientist at Synopsys (formerly Optical Research Associates). Before joining ORA 19 years ago, Cassarly worked at GE for 13 years, holds 48 US patents, and has worked extensively in the areas of illumination system design, sources, photometry, light pipes, and non-imaging optics. Bill was awarded the GE Corporate 'D. R. Mack Advanced Course Supervisor Award' for his efforts in the training of GE Engineers and is an SPIE Fellow.

ATTENDEE TESTIMONIAL:

This was the most illumination info I've had in one place!

Stray Light Analysis and Control

SC1199 • Course Level: Introductory

CEU: 0.7 \$595 Members • \$705 Non-Members USD

SPIE Student Members: \$312

Tuesday 8:30 am to 5:30 pm

This course explains the basic principles of designing, building, and testing optical systems whose stray light performance is adequate for their intended purpose. It teaches methods to identify stray light problems in the design phase when they can be most easily and inexpensively fixed, and does not emphasize the use of any particular stray light analysis software, but rather the fundamental principles of radiometry and optical design necessary to use such software effectively. Application of the course material is demonstrated in class by measuring the stray light performance of a simple camera system and comparing the measurement to both first order estimates and detailed ray tracing results.

LEARNING OUTCOMES

This course will enable you to:

- explain the meaning of the phrase "Move it or block it"

- differentiate between in-field and out-of-field stray light
- differentiate between internal and external stray light
- explain the pros and cons of basic radiometric analysis vs. detailed ray tracing analysis
- quantify stray light in an optical system using standard metrics such as Point Source Transmittance and Veiling Glare
- quickly estimate the stray light performance of a simple optical system using basic radiometry
- identify problematic stray light paths in an optical system by performing a backwards ray trace in stray light analysis software
- use techniques such as ray aiming and statistical analysis to reduce the time required to complete a ray trace
- verify the result of a ray tracing analysis with basic radiometry
- list the primary mechanisms of stray light
- predict the BSDF of a contaminated optical surface from its IEST-1246C cleanliness level
- predict the BSDF of an optical surface from its surface roughness statistics
- measure the BSDF of a surface
- list popular black surface treatments (such as anodize) used to control stray light
- use anti-reflection coatings to reduce stray light due to ghost reflections
- explain the root cause of large unit-to-unit variability in stray light performance
- design an optimal set of baffle vanes
- design primary mirror baffles for Cassegrain telescopes
- design stray light control features such as field stops and relayed pupils
- measure the stray light performance of an optical system
- define meaningful stray light performance requirements
- explain the benefit of having a stray light model whose predictions have been correlated with measurements

INTENDED AUDIENCE

Designers, builders, testers, and users of optical systems who wish to learn more about the causes of stray light and the best methods to control it. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Eric Fest has been developing stray light control systems for the aerospace industry for over two decades, and is currently an Engineering Fellow at Raytheon Company. He is the author of numerous publications on the topic of stray light, including the SPIE Press best-selling book *Stray Light Analysis and Control*. He has a Ph.D. in Optical Sciences from the University of Arizona.

COURSE PRICE INCLUDES the e-book *Stray Light Analysis and Control* (SPIE Press) by Eric Fest.

Introduction to Performance Budgeting **NEW**

SC1229 • Course Level: Introductory

CEU: 0.4 • \$315 Members • \$370 Non-Members USD

SPIE Student Members: \$178

Tuesday 1:30 pm to 5:30 pm

A performance budget is fundamental to understanding the likely outcome of a design or measurement process. The budget also gives insight into the distribution of likely performance and how it is affected by design. Because of the clear link between performance and design, the performance or error budget is the central tool in systems engineering, design and measurement. The ability to construct such a budget should be in every scientist's and engineer's tool kit regardless if the system is a simple measurement, component or something vastly more complex. This course explains the basic principles of the construction of a rigorous performance budget and understanding the distribution of outcomes. The problem of allocation of performance among components or subsystems is also introduced and explained. Examples of performance budgets and allocations are taken from various problems in the systems engineering of astronomical and laser systems are used to illustrate application of these techniques. This course will be of benefit, scientists, engineers and managers who want to answer the questions, "what are the chances of success of my project?" and "how can I maximize the probability of success?"

COURSES

LEARNING OUTCOMES

This course will enable you to:

- compose a performance or error budget and explain its construction
- calculate the distribution of likely outcomes of a design or measurement process
- determine how to allocate performance among components or subsystems
- calculate the most likely value for the performance of a component or system
- identify the sensitivity of performance to all parameters in the system
- explain the probability of the success of design project

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about performance and error budgeting and allocation. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Jonathan Arenberg has been working as an optical and systems engineer for over 35 years. His work experience has included tactical and high-power laser components and systems and major space astronomical projects such as Chandra and the James Webb Space Telescope and numerous technology efforts. He holds degrees in physics and engineering from the University of California, Los Angeles and currently the Chief Engineer for Northrop Grumman Aerospace Systems on the James Webb Space Telescope and for Space Science Missions. Dr. Arenberg is an SPIE fellow.

Introduction to LIDAR for **NEW** Autonomous Vehicles

SC1232 • Course Level: Introductory

CEU: 0.4 • \$315 Members • \$370 Non-Members USD

SPIE Student Members: \$178

Monday 1:30 pm to 5:30 pm

This course explains the basic principles of Light Detection And Ranging (LIDAR) instruments and applications, emphasizing nontraditional applications such as autonomous vehicles. A primary goal of the course is to illustrate how application-specific requirements drive the design of small, portable LIDAR systems. Some traditional environmental sensing LIDAR systems are briefly explored to establish the underlying design principles, then attention turns to detailed examples of nontraditional applications that range from LIDAR for mapping fish and insects to LIDAR for guiding autonomous vehicles on the road, in the air, and in the water.

LEARNING OUTCOMES

This course will enable you to:

- explain the parameters that determine the size and weight of a LIDAR system.
- identify application-specific requirements that drove the design of state-of-the-art LIDAR systems for use in emerging applications.
- describe the advantages and disadvantages of staring and scanning LIDAR systems.
- estimate the maximum detectable range and the range resolution.
- distinguish between various LIDAR system designs for use on autonomous vehicles.
- compare advantages and disadvantages of different designs for small, portable LIDAR systems.
- recognize key technologies to watch or work on for achieving your dream miniature LIDAR.

INTENDED AUDIENCE

Engineers, scientists, technicians, or managers who want to understand what limits the size and capabilities of LIDAR instruments used for autonomous vehicles and other emerging applications. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Joseph Shaw has been developing and using optical remote sensing systems since 1989, first at NOAA and currently as professor of optics, electrical engineering, and physics at Montana State University. He has published about and patented LIDAR designs for applications ranging from traditional atmospheric measurements to nontraditional applications such as monitoring insects in flight. Recognition for his work includes NOAA research awards, a Presidential Early Career Award for Scientists and Engineers, and the World Meteorological Organization's Vaisala Prize. He earned a Ph.D. in Optical Sciences at the University of Arizona. Dr. Shaw is a Fellow of both the OSA and SPIE. He believes that learning should be fun and uses that belief in designing and presenting courses.

Basic Optics for Engineers

SC156 • Course Level: Introductory

CEU: 0.7 • \$595 Members • \$705 Non-Members USD

SPIE Student Members: \$312

Sunday 8:30 am to 5:30 pm

This course is also available in online format.

This course introduces each of the following basic areas of optics, from an engineering point of view: geometrical optics, image quality, flux transfer, sources, detectors, and lasers. Basic calculations and concepts are emphasized.

LEARNING OUTCOMES

This course will enable you to:

- compute the following image properties: size, location, fidelity, brightness
- estimate diffraction-limited imaging performance
- explain optical diagrams
- describe the factors that affect flux transfer efficiency, and their quantitative description
- compute the spectral distribution of a source
- describe the difference between photon and thermal detectors
- calculate the signal to noise performance of a sensor (D^* and noise equivalent power)
- differentiate between sensitivity and responsivity
- explain the main factors of laser beams: monochromaticity, collimation, and propagation

INTENDED AUDIENCE

This class is intended for engineers, technicians, and managers who need to understand and apply basic optics concepts in their work. The basics in each of the areas are covered, and are intended for those with little or no prior background in optics, or for those who need a fundamental refresher course.

INSTRUCTOR

Glenn Boreman served as the 2017 President of SPIE, and is the Chairman of the Department of Physics and Optical Science at the University of North Carolina at Charlotte since 2011. He received a BS in Optics from Rochester and PhD in Optics from Arizona. Prof. Boreman served on the faculty of University of Central Florida for 27 years, with 25 PhD students supervised to completion. His research interests are in infrared detectors, infrared metamaterials, and electro-optical sensing systems. Prof. Boreman is a Fellow of SPIE, OSA, and the Military Sensing Symposium.

COURSE PRICE INCLUDES the e-book *Basic Electro-Optics for Electrical Engineers* (SPIE Press, 1998) by Glenn D. Boreman.

Optical System Design: Layout Principles and Practice

SC690 • Course Level: Introductory
CEU: 0.7 • \$585 Members • \$695 Non-Members USD
SPIE Student Members: \$308
Sunday 8:30 am to 5:30 pm

This course provides the background and principles necessary to understand how optical imaging systems function, allowing you to produce a system layout which will satisfy the performance requirements of your application.

This course teaches the methods and techniques of arriving at the first-order layout of an optical system by a process which determines the required components and their locations. This process will produce an image of the right size and in the right location. A special emphasis is placed on understanding the practical aspects of the design of optical systems.

Optical system imagery can readily be calculated using the Gaussian cardinal points or by paraxial ray tracing. These principles are extended to the layout and analysis of multi-component systems. This course includes topics such as imaging with thin lenses and systems of thin lenses, stops and pupils, and afocal systems. The course starts by providing the necessary background and theory of first-order optical design followed by numerous examples of optical systems illustrating the design process.

LEARNING OUTCOMES

This course will enable you to:

- specify the requirements of an optical system for your application including magnification, object-to-image distance, and focal length
- diagram ray paths and do simple ray tracing
- describe the performance limits imposed on optical systems by diffraction and the human eye
- predict the imaging characteristics of multi-component systems
- determine the required element diameters
- apply the layout principles to a variety of optical instruments including telescopes, microscopes, magnifiers, field and relay lenses, zoom lenses, and afocal systems
- adapt a known configuration to suit your application
- grasp the process of the design and layout of an optical system

INTENDED AUDIENCE

This course is intended for engineers, scientists, managers, technicians and students who need to use or design optical systems and want to understand the principles of image formation by optical systems. No previous knowledge of optics is assumed in the material development, and only basic math is used (algebra, geometry and trigonometry). By the end of the course, these techniques will allow the design and analysis of relatively sophisticated optical systems.

INSTRUCTOR

John Greivenkamp is a professor at the College of Optical Sciences of The University of Arizona where he teaches geometrical optics and optical system design to undergraduate and graduate students. John is the editor of the SPIE Field Guides and is the author of the *Field Guide to Geometrical Optics* (SPIE Press, 2004).

COURSE PRICE INCLUDES the *Field Guide to Geometrical Optics* (SPIE Press, 2004) by John E. Greivenkamp.

SPECIAL NOTE: This course is a continuation of Warren Smith's long-standing SPIE course SC001, Optical System Design: Layout Principles and Practice and incorporates many of the same approaches and material used for that course.

Cost-Conscious Tolerancing of Optical Systems

SC720 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Wednesday 1:30 pm to 5:30 pm

The purpose of this course is to present concepts, tools, and methods that will help attendees determine optimal tolerances for optical systems. Detailed topics in the course apply to all volumes of systems being developed – from single systems to millions of units. The importance of tolerancing throughout the design process is discussed in detail, including determining robustness of the specification and design for manufacture and operation. The course also provides a background to effective tolerancing with discussions on variability and relevant applied statistics. Tolerance analysis and assignment with strong methodology and examples are discussed in detail. A short introduction is also provided for useful development and production tools like design of experiments and statistical process control. References and examples are included to help researchers, designers, engineers, and technicians practically apply the concepts to plan, design, engineer, and build high-quality cost-competitive optical systems.

LEARNING OUTCOMES

This course will enable you to:

- define variability and comprehend its impact on nominal systems
- utilize fundamental applied statistics in tolerancing
- construct tolerance analysis budgets
- perform detailed tolerance analysis
- summarize different design of experiment and statistical process control strategies

INTENDED AUDIENCE

This material is intended for managers, engineers, and technical staff involved in product design from concept through manufacturing.

INSTRUCTOR

Richard Youngworth Ph.D. is Founder and Chief Engineer of Riyo LLC, an optical design and engineering firm providing engineering and product development services. Dr. Youngworth is a research adjunct professor at The College of Optical Sciences at the University of Arizona and an adjunct teaching professor in the Physics Department at Boise State University. His industrial experience spans diverse topics including optical metrology, design, manufacturing, and analysis. Dr. Youngworth has spent significant time working on optical systems in the challenging transition from ideal design to successful volume manufacturing. He is widely considered an expert, due to his research, lectures, publications, and industrial work on the design, producibility, and tolerance analysis of optical components and systems. Dr. Youngworth regularly teaches “Practical Optical System Design” and “Cost-Conscious Tolerancing of Optical Systems” for SPIE. He has a B.S. in electrical engineering from the University of Colorado at Boulder and earned his Ph.D. in optics at the University of Rochester by researching tolerance analysis of optical systems.

COURSES

Introduction to Lens Design

SC935 • Course Level: Introductory
CEU: 0.7 • \$585 Members • \$695 Non-Members USD
SPIE Student Members: \$308
Monday 8:30 am to 5:30 pm

Have you ever needed to specify, design, or analyze a lens system and wondered how to do it or where to start? Would you like a better understanding of the terminology used by lens designers? Are you interested in learning techniques to better utilize your optical design software? Have you always wanted to know what the difference is between spherical aberration and coma or where those crazy optical tolerances come from? If your answer to any of these questions is yes, this course is for you!

This full day course begins with a review of basic optics, including paraxial optics, system layout, and lens performance criteria. A discussion of how different system specifications influence the choice of design form, achievable performance, and cost will be presented. Third-order aberration theory, stop shift theory, and induced aberrations are examined in detail. Factors that affect aberrations and the principles of aberration correction are discussed. Demonstrations of computer aided lens design are given accompanied by a discussion of optimization theory, variables and constraints, and local vs. global optimization. Techniques for improving an optical design are illustrated with easy-to-understand examples. The optical fabrication and tolerancing process is explored including an example comparison between a simple copier lens and a complex lithography lens (used to print computer circuit boards) to help explain why some optical designs require precision mechanics and precision assembly and some do not.

LEARNING OUTCOMES

This course will enable you to:

- specify and evaluate a lens system
- describe the source and correction of aberrations
- interpret ray-intercept plots
- classify the limits imposed by aberration theory
- determine how to improve a design
- use optical design software to its best advantage
- design toleranced, easily manufacturable lenses

INTENDED AUDIENCE

This course is intended for engineers, scientists, managers, technicians, and students whose main job function is not lens design, but are occasionally called upon to specify, design, analyze, or review an optical system and would like to have a better understanding of the subject. No previous knowledge of geometrical optics, optical design, and computer optimization is assumed.

INSTRUCTOR

Julie Bentley is an Associate Professor at The Institute of Optics, University of Rochester and has been teaching undergraduate and graduate level courses in geometrical optics, optical design, and product design for more than 15 years. She received her B.S., M.S., and PhD in Optics from the The Institute of Optics, University of Rochester. After graduating she spent two years at Hughes Aircraft Co. in California designing optical systems for the defense industry and then twelve years at Corning Tropol Corporation in Fairport, New York designing and manufacturing precision optical assemblies such as microlithographic inspection systems. She has experience designing a wide variety of optical systems from the UV to the IR, refractive and reflective configurations, for both the commercial and military markets.

COURSE PRICE INCLUDES the text *Field Guide to Lens Design* (SPIE Press, 2012) by Julie Bentley and Craig Olson.

The Very Least You Need To Know About Optics

SC1170 • Course Level: Introductory
CEU: 0.2 • \$175 Members • \$200 Non-Members USD
SPIE Student Members: \$110
Monday 10:30 am to 12:30 pm

This course is tailored to the thousands of professionals working in the optics industry who are not engineers. The curriculum develops a foundational understanding of the core principles of optics by relying on visual examples rather than mathematics. Upon completion of the course, students will be able to follow the thread of most technical optical presentations, and they will be well-positioned to study more specialized topics related to specific industries.

LEARNING OUTCOMES

This course will enable you to:

- define the law of reflection
- define the law of refraction (Snell's Law)
- classify different types of optical elements visually
- explain the impacts of dispersion on optical systems

INTENDED AUDIENCE

This course is intended for non-engineers, particularly sales professionals, who need a rapid, non-mathematical introduction to the core principles of optics. No prior scientific or mathematical background is assumed.

INSTRUCTOR

Damon Diehl is the founder and owner of DIEHL Research Grant Services. He has a Ph.D. in optical engineering from the University of Rochester's Institute of Optics and a B.A. in physics from the University of Chicago. He recently served as academic coordinator for the "reboot" of the Optical Systems Technology program at Monroe Community College in Rochester, NY — the oldest program of its type in the United States. This course is based on twenty years of research experience.

Fundamentals of Optical Engineering ^{NEW}

SC1224 • Course Level: Introductory
CEU: 0.4 • \$175 Members • \$200 Non-Members USD
SPIE Student Members: \$110
Monday 8:30 am to 10:30 am

This course explains fundamental principles and applications of optics. The basic characteristics and the design of optical components and systems will be discussed. For perspective, general topics such as the history of optics and the presence of optical phenomenon in our everyday lives will be included. All information will be presented in a conversational format, with no requirement for dealing with complex theories or mathematics. This course will include hands-on demonstrations of optics phenomena.

LEARNING OUTCOMES

This course will enable you to:

- explain fundamental concepts of optics
- identify basic optical components
- describe basic optical systems
- compare relative optical performance
- describe how concepts in optics play a role in applications or devices found in modern society
- explain the functioning of the human visual system

INTENDED AUDIENCE

Engineers, technicians, sales professionals, and support staff interested in learning more about optics. Attendance will enhance the understanding and specification of basic optical principles, components, and systems.

INSTRUCTOR

Alexis Vogt Ph.D. is Endowed Chair and Associate Professor of Optics at Monroe Community College. In addition to teaching responsibilities, Dr. Vogt was appointed to her role at MCC in September 2015 to strengthen and grow the optics and photonics program – the nation's oldest two-year degree program for training technicians to work in the optics and photonics industry. Dr. Vogt received her B.S. as well as her Ph.D. in Optics from the University of Rochester Institute of Optics where her research focused on polarization engineering, coherence theory, and microscopy. Prior to joining MCC, Dr. Vogt was the Applications & Business Development Manager at Melles Griot and previous to that, designed contact lenses and intraocular lenses for Bausch + Lomb. In addition to her industry experience, Dr. Vogt holds three patents and has authored numerous papers, presentations, and publications in the field, including the definitions of “light” and “polarization” for The World Book Encyclopedia.

Basic Optics for Non-Optics Personnel

SC609 • Course Level: Introductory
CEU: 0.2 • \$175 Members • \$200 Non-Members USD
SPIE Student Members: \$110
Monday 1:30 pm to 3:30 pm

This course is also available in online format.

This course will provide the technical manager, sales engineering, marketing staff, or other non-optics personnel with a basic, non-mathematical introduction to the terms, specifications, and concepts used in optical technology to facilitate effective communication with optics professionals on a functional level. Topics to be covered include basic concepts such as imaging, interference, diffraction, polarization and aberrations, definitions relating to color and optical quality, and an overview of the basic measures of optical performance such as MTF and wavefront error. The material will be presented with a minimal amount of math, rather emphasizing working concepts, definitions, rules of thumb, and visual interpretation of specifications. Specific applications will include defining basic imaging needs such as magnification, depth-of-field, and MTF as well as the definitions of radiometric terms.

LEARNING OUTCOMES

This course will enable you to:

- read optical system descriptions and papers
- ask the right questions about optical component performance
- describe basic optical specifications for lenses, filters, and other components
- assess differences in types of filters, mirrors and beam directing optics
- describe how optics is used in our everyday lives

INTENDED AUDIENCE

This course is intended for the non-optical professional who needs to understand basic optics and interface with optics professionals.

INSTRUCTOR

Kevin Harding has been active in the optics industry for over 38 years, and has taught machine vision and optical methods for over 30 years in over 70 workshops and tutorials, including engineering workshops on machine vision, metrology, NDT, and interferometry used by vendors and system houses to train their own engineers. He has been recognized for his leadership in optics and machine vision by the Society of Manufacturing Engineers, Automated Imaging Association, and Engineering Society of Detroit. Kevin is a Fellow of SPIE and was the 2008 President of the Society.

Optomechanics**Introduction to Optical Alignment Techniques**

SC010 • Course Level: Introductory
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Tuesday 8:30 am to 5:30 pm

This course discusses the equipment, techniques, tricks, and skills necessary to align optical systems and devices. You learn to identify errors in an optical system, and how to align lens systems.

LEARNING OUTCOMES

This course will enable you to:

- determine if errors in the optical system are due to misalignment errors or other factors such as fabrication, design, or mounting problems
- recognize and understand the fundamental imaging errors associated with optical systems
- diagnose (qualitatively and quantitatively) what is wrong with an optical system by simply observing these fundamental imaging errors
- use the variety of tools available for aligning optical systems, and more importantly, how to “tweak” logically the adjustments on these devices so that the alignment proceeds quickly and efficiently
- align basic lens systems and telescopes
- align more complex optical systems such as those containing off-axis aspheric surfaces, and maintain alignment using automatic mounting techniques

INTENDED AUDIENCE

This course is directed toward engineers and technicians needing basic practical information and techniques to achieve alignment of simple optical systems, as well as seemingly more complicated off-axis aspheric mirrors. To benefit most from this course you will need a basic knowledge of the elementary properties of lenses and optical systems (i.e. focal lengths, f/numbers, magnification, and other imaging properties) and a working knowledge of simple interferometry. Some familiarity with the basic aberrations such as spherical aberration, coma, and astigmatism will be helpful.

INSTRUCTOR

Kenneth Castle Ph.D. is president of Ruda-Cardinal, Inc., an optical engineering consulting firm located in Tucson, Arizona. Ken has worked with Mitch Ruda, the originator of this course, for 28 years. Mitch passed away August 31, 2013, and Ruda-Cardinal is continuing the tradition of this course in his memory.

Introduction to Optomechanical Design

SC014 • Course Level: Introductory
CEU: 1.3 • \$1,050 Members • \$1,305 Non-Members USD
SPIE Student Members: \$552
Sunday - Monday 8:30 am to 5:30 pm

This course is also available in online format.

This course will provide the training needed for the optical engineer to work with the mechanical features of optical systems. The emphasis is on providing techniques for rapid estimation of optical system performance. Subject matter includes material properties for optomechanical design, kinematic design, athermalization techniques, window design, lens and mirror mounting.

LEARNING OUTCOMES

This course will enable you to:

- select materials for use in optomechanical systems
- determine the effects of temperature changes on optical systems, and develop design solutions for those effects
- design high performance optical windows
- design low stress mounts for lenses
- select appropriate mounting techniques for mirrors and prisms
- describe different approaches to large and lightweight mirror design

COURSES

INTENDED AUDIENCE

Engineers who need to solve optomechanical design problems. Optical designers will find that the course will give insight into the mechanical aspects of optical systems. The course will also interest those managing projects involving optomechanics. SPIE live course SC690 Optical System Design: Layout Principles and Practice or online course SC1102 Optical System Design: First Order Layout - Principles and Practices, or a firm understanding of their content, is required as background to this course.

INSTRUCTOR

Daniel Vukobratovich is a senior principal engineer at Raytheon. He has over 30 years of experience in optomechanics, is a founding member of the SPIE working group in optomechanics, and is fellow of SPIE. He has taught optomechanics in 11 countries, consulted with over 50 companies and written over 50 publications in optomechanics.

Attendee testimonial:

Class was excellent! I learned far more than I anticipated. Daniel Vukobratovich seems incredibly knowledgeable about a wide range of optomechanical topics and was able to answer questions and provide examples that were relevant and engaging.

Fastening Optical Elements with Adhesives

SC015 • Course Level: Intermediate

CEU: 0.4 • \$315 Members • \$370 Non-Members USD

SPIE Student Members: \$178

Monday 8:30 am to 12:30 pm

Optomechanical systems require secure mounting of optical elements. Adhesives are commonly used, but rarely addressed in the literature. This course has compiled an overview of these adhesives, their properties, and how to test them. How to use them is addressed in detail with guidelines and examples provided. A summary of common adhesives is presented with justification for their use. Consideration and analysis of adhesive strength, reliability, and stability are included. Different design approaches to optimize the application are presented and discussed. Many examples are described as well as lessons learned from past experience. Discussions are encouraged to address current problems of course attendees.

LEARNING OUTCOMES

This course will enable you to:

- describe and classify adhesives and how they work (epoxy, urethane, silicone, acrylic, RTV, VU-cure, etc.)
- obtain guidance in: adhesive selection, surface preparation, application, and curing
- develop a basis for analysis of stress and thermal effects
- recognize contamination/outgassing and how to avoid it
- review design options
- create and use an adhesive check list

INTENDED AUDIENCE

This course is for engineers, managers, and technicians. This course provides a foundation for the correct design for successful optical mounting; an understanding of the best options to employ for each application, and the selection and approach conducive to production. A bound course outline (that is a good reference text) is provided, including summaries of popular adhesives and their properties.

INSTRUCTOR

John Daly has 35 years of experience in lasers and optomechanics. Over this period, he has worked optical bonding problems since his thesis projects, as an employee of several major corporations, and now as a consultant. His academic background in mechanical engineering and applied physics compliments this discipline. His work experience has been diverse covering areas such as: military lasers, medical lasers, spectroscopy, point and standoff detection, and E-O systems. His roles over these years have included analysis, design, development, and production. He is an SPIE member, with numerous publications, and is a committee member of the SPIE Optomechanical Engineering Program.

Attendee testimonial:

That was an amazing amount of material!! Possibly the most applicable & easy to apply short course I've ever taken.

Optomechanical Systems Engineering

SC1085 • Course Level: Introductory

CEU: 0.7 • \$620 Members • \$730 Non-Members USD

SPIE Student Members: \$322

Thursday 8:30 am to 5:30 pm

This course emphasizes a systems-level overview of optomechanical engineering. Starting with the fundamentals of imaging, it reviews how optical system concepts flow down into optomechanical requirements on optical fabrication, alignment, structural design, mechanics of materials (metals, composites, and glasses), structural vibrations, thermal management, and kinematic mounts. The focus is on real-world design problems, as well as the commercial off-the-shelf (COTS) components used to solve them.

LEARNING OUTCOMES

This course will enable you to:

- utilize the basic concepts and terminology of optical engineering required for the development of optomechanical components
- read conventional and ISO-10110 drawings used for the fabrication of lenses
- develop an alignment plan with an emphasis on critical tolerances, alignment mechanisms, and “go-no go” decisions for adjusting tilt, decenter, despace, and defocus
- quantify the ability of a structural design to maintain alignment using efficient architectures and lightweight materials; compare low-strain lens and mirror mounts for reducing wavefront error (WFE)
- utilize the results of STOP (structural-thermal-optical) analysis for the deflection and distortion of optical components under static loads; estimate the impact of stress concentrations and contact stresses; select optical materials with appropriate structural properties
- estimate the effects of vibration environments on the alignment of optomechanical systems; select COTS components for vibration isolation
- predict the effects of conductive, convective, and radiative thermal environments on the performance of optical systems; select materials and off-the-shelf hardware to manage the effects of heat loads and temperature changes
- compare kinematic and semi-kinematic mounts and the limitations of COTS hardware

INTENDED AUDIENCE

Intended for engineers (systems, optical, mechanical, and electrical), scientists, technicians, and managers who are developing, specifying, or purchasing optical, electro-optical, infrared, or laser systems.

INSTRUCTOR

Keith Kasunic has more than 30 years of experience developing optical, electro-optical, infrared, and laser systems. He holds a Ph.D. in Optical Sciences from the University of Arizona, an MS in Mechanical Engineering from Stanford University, and a BS in Mechanical Engineering from MIT. He has worked for or been a consultant to a number of organizations, including Lockheed Martin, Ball Aerospace, Sandia National Labs, and Nortel Networks. He is currently the Technical Director of Optical Systems Group, LLC. He is also the author of three textbooks [Optical Systems Engineering (McGraw-Hill, 2011), Optomechanical Systems Engineering (John Wiley, 2015), and Laser Systems Engineering (SPIE Press, 2016)], an Adjunct Professor at Univ. of Central Florida's CREOL, an Affiliate Instructor with Georgia Tech's SENSIAAC, and an Instructor for the Optical Engineering Certificate Program at Univ. of California – Irvine.

COURSE PRICE INCLUDES the text *Optomechanical Systems Engineering* (Wiley, 2015) by Keith Kasunic.

Metrology & Standards

Optics Surface Inspection Workshop

SC1017 • Course Level: Introductory
CEU: 0.4 • \$415 Members • \$470 Non-Members USD
SPIE Student Members: \$218
Tuesday 1:30 pm to 5:30 pm

Understanding the correct way to inspect optical surfaces is one of the most important skills anyone working with or around optics can have, including technicians, material handlers, engineers, managers, and buyers. While understanding the specifications is the first step, learning how to actually perform the inspection is just as important. This hands-on workshop will allow attendees to learn the “Best Practice” for cleaning and inspecting optical surfaces. The course has many demonstrations and labs and gives attendees practice handling and inspecting optics to develop a high level of proficiency.

This course was designed to bring photonics personnel up to an immediate working knowledge on the correct methods to conduct a surface inspection in accordance with MIL, ANSI, and ISO standards. It is designed to complement SC700 Understanding Scratch and Dig Specifications and provide hands-on experience applying the specification and inspection parameters covered in that course.

LEARNING OUTCOMES

This course will enable you to:

- perform a visual review of the surface
- create a surface map
- safely clean the surface using air only, and the drag method
- assess when magnification or high-intensity light is allowed or required
- conduct a visual inspection according to MIL-PRF-13830B
- conduct a visual inspection according to ANSI OP1.002
- conduct a visual inspection according to ISO 10110-7 and ISO 14997 standards
- acquire and apply the accumulation rules
- review the tools available for microscope-based inspection to ANSI and ISO standards
- evaluate a surface and determine if a surface passes or fails

INTENDED AUDIENCE

This course is designed for all optical practitioners who need to handle and evaluate optics or optical assemblies. Other suggested attendees include mechanical engineers, purchasing agents, quality assurance personnel and other persons working with or around optical components. **SC700 Understanding Scratch and Dig Specifications is a pre-requisite for the course.**

INSTRUCTOR

David Aikens a.k.a “the scratch guy”, is among the foremost experts on surface imperfection standards and inspection. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

COURSE PRICE includes a copy of the OP1.002 the American National Standard for surface imperfections on optics, if desired.

Due to the hands-on nature of this course, class size is limited to 12 participants. **Early registration is recommended.**

Attendee testimonial:

Wonderful! I've learned many skills that I can use every day.

Modern Optical Testing

SC212 • Course Level: Intermediate
CEU: 0.4 • \$350 Members • \$405 Non-Members USD
SPIE Student Members: \$192
Monday 8:30 am to 12:30 pm

This course describes the basic interferometry techniques used in the evaluation of optical components and optical systems. It discusses interferogram interpretation, computer analysis, and phase-shifting interferometry, as well as various commonly used wavefront-measuring interferometers. The instructor describes specialized techniques such as testing windows and prisms in transmission, 90-degree prisms and corner cubes, measuring index inhomogeneity, and radius of curvature. Testing cylindrical and aspheric surfaces, determining the absolute shape of flats and spheres, and the use of infrared interferometers for testing ground surfaces are also discussed. The course also covers state-of-the-art direct phase measurement interferometers.

LEARNING OUTCOMES

This course will enable you to:

- better specify optical components and systems
- produce higher-quality optical systems
- determine if an optics supplier can actually supply the optics you are ordering
- evaluate optical system performance
- explain basic interferometry and interferometers for optical testing
- analyze interferograms
- test flat and spherical surfaces
- test ground and aspheric surfaces
- make absolute measurements
- discuss state-of-the-art direct phase-measurement interferometers

INTENDED AUDIENCE

Engineers and technical managers who are involved with the construction, analysis or use of optical systems will find this material useful.

INSTRUCTOR

James Wyant is Professor Emeritus of Optical Sciences at the University of Arizona. He is currently Chairman of the Board of 4D Technology. He was a founder of the WYKO Corporation and served as its president from 1984 to 1997. Dr. Wyant was the 1986 President of SPIE.

COURSE PRICE INCLUDES the text *Field Guide to Interferometric Optical Testing* (SPIE Press, 2006) by Eric P. Goodwin and James C. Wyant.

Understanding Scratch and Dig Specifications

SC700 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Tuesday 8:30 am to 12:30 pm

Surface imperfection specifications (i.e. Scratch-Dig) are among the most misunderstood, misinterpreted, and ambiguous of all optics component specifications. This course provides attendees with an understanding of the source of ambiguity in surface imperfection specifications, and provides the context needed to properly specify surface imperfections using a variety of specification standards, and to evaluate a given optic to a particular level of surface imperfection specification. The course will focus on the differences and application of the Mil-PRF-13830, ISO 10110-7, and BSR/OP1.002. Many practical and useful specification examples are included throughout, as well as a hands-on demonstration on visual comparison evaluation techniques.

The course is followed by SC1017 Optics Surface Inspection Workshop, which provides hands-on experience conducting inspections using the specification information provided in this course.

LEARNING OUTCOMES

This course will enable you to:

- describe the various surface imperfection specifications that exist today

COURSES

- compose a meaningful surface imperfection specification for cosmetic imperfections using ISO, ANSI, or Mil standards
- identify the different illumination methods and comparison standards for evaluation
- demonstrate a surface imperfection visual inspection
- understand the options available for controlling surface imperfections in a vendor/supplier relationship

INTENDED AUDIENCE

This material is intended for anyone who needs specify, quote, or evaluate optics for surface imperfections. Those who either design their own optics or who are responsible for optics quality control will find this course valuable.

INSTRUCTOR

David Aikens a.k.a “the scratch guy”, is among the foremost experts on surface imperfection standards and inspection. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

COURSE PRICE INCLUDES a copy of the latest ANSI approved surface imperfections specification standard.

Imaging

Use of CCD and CMOS Sensors in **NEW** Visible Imaging Applications

SC068 • Course Level: Introductory
CEU: 0.4 • \$390 Members • \$445 Non-Members USD
SPIE Student Members: \$208
Tuesday 8:30 am to 12:30 pm

This course will describe the imaging capabilities of visible sensors and illustrate their use with examples as varied as satellite imaging and commercial color scanning applications. The methodology for configuring and specifying a visible imaging system will be described, including the role of charge-coupled device (CCD), and complementary metal-oxide-silicon (CMOS) focal plane technologies.

LEARNING OUTCOMES

This course will enable you to:

- explain the fundamentals of CCD and CMOS imaging operation, pixel signal formation, charge-to-voltage conversion, multiplexing and formation of the video signal
- compare CCDs with other competing visible imaging device architectures [e.g. CMOS imagers and Charge Injection Devices (CID)]
- describe the processing functions of the video signal chain through analog-to-digital conversion
- describe signal propagation through a visible sensor and define the key imager/camera noise components
- define the key modulation transfer function (MTF) components of a visible imaging system
- analyze system imaging capability by the joint use of the system MTF and signal-to-noise ratio using an imaging simulation approach
- describe a detailed example of tailoring of a visible sensor system for a multispectral pushbroom satellite imaging application
- list important technical criteria for specifying the design, fabrication, and verification for state-of-the-art visible imaging devices
- have access to a bibliography on CCDs, visible imaging devices, and other related subjects
- have access to an appendix that describes in detail an example of tailoring a CCD-based imaging system for motion-picture to High Definition Television (HDTV) signal conversion (Telecine)
- have access to an appendix that describes image formation, signal manipulation and processing, and noise effects for intensified (low-light level) imaging systems

INTENDED AUDIENCE

Engineers, scientists, and managers who are interested in utilizing CCD, CMOS or CID sensors in advanced camera and imaging applications.

INSTRUCTOR

Terrence Lomheim holds the position of Distinguished Engineer at The Aerospace Corp. He has 39 years of hardware and analysis experience in visible and infrared electro-optical systems, focal plane technology, and applied optics, and has authored and co-authored 64 publications in these technical areas. He is a Fellow of the SPIE.

COURSE PRICE INCLUDES the text *CMOS/CCD Sensors and Camera Systems* by Gerald C. Holst and Terrence S. Lomheim (SPIE Press, 2007).

Deep Learning and Its Applications **NEW** in Image Processing

SC1222 • Course Level: Introductory
CEU: 0.7 • \$550 Members • \$660 Non-Members USD
SPIE Student Members: \$294
Sunday 8:30 am to 5:30 pm

This course provides a broad introduction to the basic concept of the classical neural networks (NN) and its current evolution to deep learning (DL) technology. The primary goal of this course is to introduce the well-known deep learning architectures and their applications in image processing for object detection, identification, verification, action recognition, scene understanding and biometrics using a single modality or multimodality sensor information. This course will describe the history of neural networks and its progress to current deep learning technology. It covers several DL architectures such the classical multi-layer feed forward neural networks, convolutional neural networks (CNN), restricted Boltzmann machines (RBM), auto-encoders and recurrent neural networks such as long term short memory (LSTM). Use of deep learning architectures for feature extraction and classification will be described and demonstrated. Examples of popular CNN-based architectures such as AlexNet, VGGNet, GooGleNet (inception modules), ResNet, DeepFace, Highway Networks, FractalNet and their applications to defense and security will be discussed. Advanced architectures such as Siamese deep networks, coupled neural networks, auto-encoders, fusion of multiple CNNs and their applications to object verification and classification will also be covered.

LEARNING OUTCOMES

This course will enable you to:

- identify the fundamental concepts of neural networks and deep learning
- describe the major differences between neural network and current deep learning architectures
- explain the stochastic gradient descent algorithm to train deep learning networks with different regularizations methods
- describe the popular CNN-based architectures (i.e., AlexNet, VGGNet, GooGleNet, ResNet)
- compare the relative merits of various deep learning architectures, MLP, CNN, RBM and LSTM
- formulate CNN and auto-encoders for feature extraction
- demonstrate the use of deep learning framework for object, face, pedestrian detection, pose estimation and face identification
- differentiate between Siamese and coupled deep learning architectures and their use for object verification and identification
- design multiple deep learning architectures for multi-view face identification and multimodal biometrics applications

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about deep learning architectures and their applications in image processing and machine learning. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Nasser Nasrabadi is a professor in the Lane Computer Science and Electrical Engineering Department at West Virginia University. He was senior research scientist (ST) at US Army Research Laboratory (ARL). He is actively engaged in research in deep learning, image processing, automatic target recognition and hyperspectral imaging for defense and security. He has published over 300 papers in journals and conference proceedings. He has been an associate editor for the IEEE Transactions on Image Processing, IEEE Transactions on Circuits and Systems for Video Technology and IEEE Transactions for Neural Networks. He is a Fellow of IEEE and SPIE.

Designing and Specifying Digital Cameras ^{NEW}

SC1231 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Wednesday 8:30 am to 12:30 pm

LEARNING OUTCOMES

This course will enable you to:

- discuss the difference between rectilinear, fisheye, and telecentric lenses.
- explain how to calculate the required focal length to yield a desired field of view.
- explain how to calculate the field of view that a focal length will yield.
- explain how to specify the appropriate lens performance for a given sensor.
- discuss aliasing, Nyquist, oversampling, and the limits of oversampling.
- discuss terms like MTF, diffraction limited, PSF and how to specify them.
- explain how aperture affects lens performance.
- describe chief ray angle, and what happens when the CRA is mismatched.
- explain the difference between spherical lenses and aspherical lenses.
- discuss when to use stock lenses, and when to consider custom or semi-custom optics.
- gain familiarization with different lens production methods, and when to consider each.
- demonstrate the difference between rolling shutter and globally shuttered imagers.

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn how to specify a camera, the lens and the sensor, from a system perspective to satisfy a particular requirement. Managers and engineers who want to talk to lens designers or camera vendors with a higher level of understanding. No prerequisites.

INSTRUCTOR

Leo Baldwin has been designing lenses and camera systems for three decades starting with Leitz (Leica) and including Indal Technologies (Curtiss-Wright), Emhart, Electro-Scientific Industries, GoPro and Amazon. Leo is the named inventor on 69 US patents and has delivered numerous presentations, keynote addresses, chaired conferences, moderated panels and taught courses from one hour to one week in duration. Leo's expertise covers lens design and production, sensor design and integration, and camera design for defense applications, industrial machine vision, and for consumer products. Leo has designed products that have shipped in the dozens and in the millions. Some of Leo's designs are still shipping after three decades.

Camera Image Quality Benchmarking ^{NEW}

SC1233 • Course Level: Introductory
CEU: 0.4 • \$315 Members • \$370 Non-Members USD
SPIE Student Members: \$178
Wednesday 1:30 pm to 5:30 pm

The purpose of this short course is to show that it is possible to compare the image quality of consumer imaging systems in a perceptually relevant manner. Because image quality is multi-faceted, generating a concise and relevant evaluative summary of photographic systems can be challenging. Indeed, benchmarking the image quality of still and video imaging systems requires that the assessor understands not only the capture device itself, but also the imaging applications for the system. This course explains how objective metrics and subjective methodologies are used to benchmark image quality of photographic still image and video capture devices. The course will review key image quality attributes and the flaws that degrade those attributes, including causes and consequences of the flaws on perceived quality. Content will touch on various subjective evaluation methodologies as well as objective measurement methodologies relying on existing standards from ISO, IEEE/CPIQ, ITU and beyond. The course focus is on consumer imaging systems, so the emphasis will be on the value of using objective metrics which are perceptually correlated and generating benchmark data from the combination of objective and subjective metrics.

LEARNING OUTCOMES

This course will enable you to:

- identify defects that degrade image quality in natural images and what component of the camera should/could be improved for better image quality
- discuss existing image quality standards and metrics
- judge the overall image quality of a camera
- evaluate the impact various output use cases can have on overall image quality
- describe an image quality lab and measurement protocols
- compare the image quality of a set of cameras

INTENDED AUDIENCE

Image scientists, engineers, or managers who wish to learn more about image quality and how to evaluate still and video cameras for various applications. A good understanding of imaging and how a camera works is assumed.

INSTRUCTOR

Jonathan Phillips is a staff image scientist at Google. His involvement in the imaging industry spans over 25 years, including two decades at Eastman Kodak Company as well as work at NVIDIA. His focus has been on photographic quality, with an emphasis on psychophysical testing for both product development and fundamental perceptual studies. His broad experience has included image quality work with capture, display, and print technologies. He received the 2011 I3A Achievement Award for his work on camera phone image quality and headed up the 2012 revision of ISO 20462 – Psychophysical experimental methods for estimating image quality - Part 3: Quality ruler method. He completed his graduate work in color science in the Center for Imaging Science at Rochester Institute of Technology and his undergraduate studies in chemistry and music at Wheaton College (IL).

Henrik Eliasson is an image analysis and image sensor specialist working at Eclipse Optics in Sweden. He has extensive experience in image quality assessment, previously working as a camera systems engineer at Sony Ericsson/Sony Mobile Communications and Axis Communications. He has been a key contributor in the CPIQ initiative, now run by IEEE, and a Swedish delegate to the ISO TC42 committee on photography standards. He has published work in a broad range of camera related areas, from optical simulations to camera color characterization and image sensor crosstalk investigations. Dr. Eliasson is a Senior member of SPIE.

COURSES

MTF in Optical and Electro-Optical Systems

SC157 • Course Level: Introductory
CEU: 0.7 • \$595 Members • \$705 Non-Members USD
SPIE Student Members: \$312
Wednesday 8:30 am to 5:30 pm

Modulation transfer function (MTF) is used to specify the image quality achieved by an imaging system. It is useful in analysis of situations where several independent subsystems are combined. This course provides a background in the application of MTF techniques to performance specification, estimation and characterization of optical and electro-optical systems.

LEARNING OUTCOMES

This course will enable you to:

- list the basic assumptions of linear systems theory, including the concept of spatial frequency
- identify relationship between impulse response, resolution, MTF, OTF, PTF, and CTF
- estimate the MTF for both diffraction-limited and aberration-limited systems
- explain the relationship between MTF, line response, and edge response functions
- identify MTF contributions from finite detector size, crosstalk, charge transfer inefficiency, and electronics
- summarize the effects of noise

INTENDED AUDIENCE

Engineers, scientists, and managers who need to understand and apply the basic concepts of MTF to specifying, estimating, or characterizing performance. Some prior background in Fourier concepts is helpful.

INSTRUCTOR

Glenn Boreman is the Chairman of the Department of Physics and Optical Science at the University of North Carolina at Charlotte since 2011. He received a BS in Optics from Rochester and PhD in Optics from Arizona. Prof. Boreman served on the faculty of University of Central Florida for 27 years, with 25 PhD students supervised to completion. His research interests are in infrared detectors, infrared metamaterials, and electro-optical sensing systems. Prof. Boreman is a Fellow of SPIE, OSA, and the Military Sensing Symposium, and is the 2015 Vice-President of SPIE.

COURSE PRICE INCLUDES the e-book *Modulation Transfer Function in Optical and Electro-Optical Systems* (SPIE Press, 2001) by Glenn D. Boreman.

High Dynamic Range Imaging: Sensors and Architectures

SC967 • Course Level: Intermediate
CEU: 0.7 • \$595 Members • \$705 Non-Members USD
SPIE Student Members: \$312
Monday 8:30 am to 5:30 pm

This course provides attendees with knowledge of high dynamic range image sensors and techniques for industrial and non-industrial applications, for example automotive, surveillance, homeland security, medical and drones. The course starts with an in-depth introduction to dynamic range and image sensor design and continues into various specific pixel designs and sensor architectures to achieve high dynamic range imaging. Then software approaches to make high dynamic range images out of lower dynamic range sensors or image sets are introduced. Some methods for automatic control of exposure and dynamic range of image sensors and other issues like color and glare will be introduced. The testing and validation of HDR systems is also discussed. The course has an intermediate to high technical level but does not require any prerequisites. It is also a very complete course on CMOS image sensor technology.

LEARNING OUTCOMES

This course will enable you to:

- describe various approaches to achieve high dynamic range imaging
- predict the behavior of a given sensor or architecture on a scene
- specify the sensor or system requirements for a high dynamic range application
- classify a high dynamic range application into one of several standard types
- understand how CMOS image sensors work

INTENDED AUDIENCE

This material is intended for anyone who needs to learn more about quantitative side of high dynamic range imaging. Optical engineers, electronic engineers and scientists will find useful information for their next high dynamic range application.

INSTRUCTOR

Arnaud Darmont is the founder of Aphesa, a company founded in 2008 and specializing in custom camera development, image sensor and camera consulting, the EMVA1288 standard, HDR imaging, camera benchmarking and imaging technology training. He holds a degree in Electronic Engineering from the University of Liège (Belgium) and an Advanced Vision Professional Certification from AIA. Prior to founding Aphesa, he worked for over 7 years in the field of CMOS image sensors and high dynamic range imaging. He is the author of several publications, books and patents. He is a member of the EMVA1288 working group and chair of conferences.

COURSE PRICE INCLUDES the text *High Dynamic Range Imaging: Sensors and Architectures* (SPIE Press, 2012) by Arnaud Darmont.

Snapshots: 2 Hour Courses for Non-Technical Staff

The Very Least You Need To Know About Optics

SC1170 • Course Level: Introductory
CEU: 0.2 • \$175 Members • \$200 Non-Members USD
SPIE Student Members: \$110
Monday 10:30 am to 12:30 pm

This course is tailored to the thousands of professionals working in the optics industry who are not engineers. The curriculum develops a foundational understanding of the core principles of optics by relying on visual examples rather than mathematics. Upon completion of the course, students will be able to follow the thread of most technical optical presentations, and they will be well-positioned to study more specialized topics related to specific industries.

LEARNING OUTCOMES

This course will enable you to:

- define the law of reflection
- define the law of refraction (Snell's Law)
- classify different types of optical elements visually
- explain the impacts of dispersion on optical systems

INTENDED AUDIENCE

This course is intended for non-engineers, particularly sales professionals, who need a rapid, non-mathematical introduction to the core principles of optics. No prior scientific or mathematical background is assumed.

INSTRUCTOR

Damon Diehl is the founder and owner of DIEHL Research Grant Services. He has a Ph.D. in optical engineering from the University of Rochester's Institute of Optics and a B.A. in physics from the University of Chicago. He recently served as academic coordinator for the "reboot" of the Optical Systems Technology program at Monroe Community College in Rochester, NY — the oldest program of its type in the United States. This course is based on twenty years of research experience.

Fundamentals of Optical Engineering ^{NEW}

SC1224 • Course Level: Introductory

CEU: 0.4 \$175 Members • \$200 Non-Members USD

SPIE Student Members: \$110

Monday 8:30 am to 10:30 am

This course explains fundamental principles and applications of optics. The basic characteristics and the design of optical components and systems will be discussed. For perspective, general topics such as the history of optics and the presence of optical phenomenon in our everyday lives will be included. All information will be presented in a conversational format, with no requirement for dealing with complex theories or mathematics. This course will include hands-on demonstrations of optics phenomena.

LEARNING OUTCOMES

This course will enable you to:

- explain fundamental concepts of optics
- identify basic optical components
- describe basic optical systems
- compare relative optical performance
- describe how concepts in optics play a role in applications or devices found in modern society
- explain the functioning of the human visual system

INTENDED AUDIENCE

Engineers, technicians, sales professionals, and support staff interested in learning more about optics. Attendance will enhance the understanding and specification of basic optical principles, components, and systems.

INSTRUCTOR

Alexis Vogt Ph.D. is Endowed Chair and Associate Professor of Optics at Monroe Community College. In addition to teaching responsibilities, Dr. Vogt was appointed to her role at MCC in September 2015 to strengthen and grow the optics and photonics program – the nation's oldest two-year degree program for training technicians to work in the optics and photonics industry. Dr. Vogt received her B.S. as well as her Ph.D. in Optics from the University of Rochester Institute of Optics where her research focused on polarization engineering, coherence theory, and microscopy. Prior to joining MCC, Dr. Vogt was the Applications & Business Development Manager at Melles Griot and previous to that, designed contact lenses and intraocular lenses for Bausch + Lomb. In addition to her industry experience, Dr. Vogt holds three patents and has authored numerous papers, presentations, and publications in the field, including the definitions of "light" and "polarization" for The World Book Encyclopedia.

Introduction to VR, AR, MR and Smart Eyewear: Market Expectations, Hardware Requirements and Investment Patterns ^{NEW}

SC1234 • Course Level: Introductory

CEU: 0.2 • \$175 Members • \$200 Non-Members USD

SPIE Student Members: \$110

Tuesday 1:30 pm to 3:30 pm

This course serves as a high level introduction to the various categories of Head Mounted Displays (HMDs) available today: Smart Glasses or Smart Eyewear, Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and provides a synthetic overview of both current hardware architectures and related markets (enterprise and consumer).

Products limitations and next generation hardware and functionality requirements to fulfill the expected market will be reviewed in a synthetic way.

LEARNING OUTCOMES

This course will enable you to:

- explain the current product offerings and be able to compare performances of different products as in visual and wearable comfort, display immersion and costs.
- describe current HMD optical sensors, including head tracking, gaze tracking, gesture sensing and depth mapping.

- explain current HMD hardware ecosystem, from end product design houses, to product integrators, contract manufacturers, optical building blocks vendors, down to mass fabrication equipment providers.
- explain the shortcomings of current immersive 3D display architectures.
- anticipate next generation HMD hardware revisions and product re-definitions.
- explain why it is going to be a long ride towards the ultimate consumer product.
- anticipate the rise of new optical building block technologies able to sustain successive hardware revs.
- anticipate the fall of existing optical building block technologies unable to sustain successive hardware revs.
- identify new niche market segment growths based on next generation features and functionality expectations

INTENDED AUDIENCE

This 2 hours course is structured to be synthetic with a broad overview of the topics. It is intended for a wide audience, ranging from marketing and business development managers, market analysts and venture capital bankers, to product/project managers and engineers in various fields (OE, EE, ME, CR, SWE).

The companion day-long course (SC1218) is more specifically intended for Optical Engineers.

INSTRUCTOR

Bernard Kress Over the past two decades, Bernard Kress has made significant scientific contributions as an engineer, researcher, associate professor, consultant, instructor, and author. He has been instrumental in developing numerous optical sub-systems for consumer and industrial products, generating IP, teaching and transferring technological solutions to industry. Application sectors include laser materials processing, optical anti-counterfeiting, biotech sensors, optical telecom devices, optical data storage, optical computing, optical motion sensors, digital displays systems, and eventually HUD and HMD displays (smart glasses, AR/MR/VR). Bernard has been specifically involved in the field of micro-optics, wafer scale optics, holography and nano-photonics. He has published half a dozen books and has more than 35 patents granted. He is a short course instructor for the SPIE and has been chair of various SPIE conferences. He is an SPIE fellow since 2013 and has been elected to the board of Directors of SPIE (2017-19). Bernard has joined Google [X] Labs. in 2011 as the Principal Optical Architect on the Google Glass project, and is since 2015 the Partner Optical Architect at Microsoft Corp. on the Hololens project.

Additive Manufacturing of Metals – Powder Bed Fusion and Directed Energy Deposition ^{NEW}

SC1237 • Course Level: Introductory

CEU: 0.2 • \$175 Members • \$200 Non-Members USD

SPIE Student Members: \$110

Monday 10:30 am to 12:30 pm

Additive manufacturing (AM) is rapidly being adopted by industry as a means to fabricate once-impossible components in a matter of days-weeks rather than months. This course presents the key elements of powder bed fusion and directed energy deposition AM. With a focus on the these two, most popular, AM processes, the course will first guide the audience through the digital thread for component fabrication, then to the consequences of hardware implementations, and the effects of post-processing on part quality. In-process sensing and post-process non-destructive evaluation methods will also be covered. Audience members will leave with a high-level understanding of the technology and an appreciation for the many benefits and challenges of metals additive manufacturing.

LEARNING OUTCOMES

- identify the key digital-processing steps in transforming a design to a printed component
- determine essential process variables and their impact on part quality

COURSES

- evaluate in-situ sensing and control methodologies and commercially-available solutions
- summarize necessary post-processing procedures for metal components
- appreciate the role of in-process and post-process sensing in evaluating part quality
- estimate the cost of component fabrication via available AM techniques

recognize good versus bad use-cases for the technology

INTENDED AUDIENCE

Sales staff, executives, marketing staff, engineers, technicians, or managers who wish to learn more about the state-of-the-art of metals additive manufacturing. Some undergraduate training in science or engineering may be helpful but is not necessary.

INSTRUCTOR

Abdalla Nassar PhD. is an expert in additive manufacturing (AM) of metal and laser-materials processing. As a Research Associate with the Applied Research Laboratory at Penn State and a member of the Graduate Faculty of the Engineering Science Department at Penn State, he has led and worked on programs addressing many topics relevant to AM, including the digital thread concept, process-microstructure relations, thermal and optical sensing, support removal, closed-loop control, and spectroscopy for defect detection. His work has led to six patent filings along with numerous publications.

Biomedical Optics: Imaging Biomarker **NEW** Basics

SC1238 • Course Level: Introductory
CEU: 0.2 • \$175 Members • \$200 Non-Members USD
SPIE Student Members: \$110
Monday 1:30 pm to 3:30 pm

A biomarker is a “defined characteristic that is measured as an indicator of normal biological processes, pathogenic processes, or responses to an exposure or intervention”. New sensing technologies seek to measure biomarkers, usually with the goal of improving patient management, however, there remains a widespread misunderstanding over how biomarkers can be used in the context of biomedical imaging.

This course covers the basics of imaging biomarkers from the perspective of biomedical optics. The course will underscore the importance of accurately defining and validating imaging biomarkers, drawing on examples from standard radiological imaging modalities as well as emerging optical modalities. Using several interactive activities, attendees will see examples of: how imaging biomarkers are currently used in clinical practice; the pitfalls often encountered when introducing new biomarkers; and where novel optical imaging biomarkers have the potential to impact future patient care.

LEARNING OUTCOMES

This course will enable you to:

- define a modality, a technique and a biomarker;
- describe the process undertaken to translate a novel imaging biomarker into clinical application;
- explain the key challenges in imaging biomarker development;
- summarise the particular challenges faced by the biomedical optics community, as distinct from conventional radiological imaging;
- formulate a plan for validation of a novel optical imaging biomarker.

LEARNING OUTCOMES

Sales staff, executives, and marketing staff who want to be conversational on the topic of routes to clinical translation for technologies in biomedical optics.

INSTRUCTOR

Sarah E. Bohndiek completed her PhD in Radiation Physics at University College London in 2008 and then worked in both the UK (at Cambridge) and the USA (at Stanford) as a postdoctoral fellow in molecular imaging of cancer. In 2013, she returned to the UK and established the VISIONLab (www.visionlabuk.org) at the University of Cambridge, developing novel imaging approaches for early cancer detection and evaluation of disease prognosis based on low cost optics and photonics technologies.

Basic Optics for Non-Optics Personnel

SC609 • Course Level: Introductory
CEU: 0.2 • \$175 Members • \$200 Non-Members USD
SPIE Student Members: \$110
Monday 1:30 pm to 3:30 pm

This course is also available in online format

This course will provide the technical manager, sales engineering, marketing staff, or other non-optics personnel with a basic, non-mathematical introduction to the terms, specifications, and concepts used in optical technology to facilitate effective communication with optics professionals on a functional level. Topics to be covered include basic concepts such as imaging, interference, diffraction, polarization and aberrations, definitions relating to color and optical quality, and an overview of the basic measures of optical performance such as MTF and wavefront error. The material will be presented with a minimal amount of math, rather emphasizing working concepts, definitions, rules of thumb, and visual interpretation of specifications. Specific applications will include defining basic imaging needs such as magnification, depth-of-field, and MTF as well as the definitions of radiometric terms.

LEARNING OUTCOMES

This course will enable you to:

- read optical system descriptions and papers
- ask the right questions about optical component performance
- describe basic optical specifications for lenses, filters, and other components
- assess differences in types of filters, mirrors and beam directing optics
- describe how optics is used in our everyday lives

INTENDED AUDIENCE

This course is intended for the non-optical professional who needs to understand basic optics and interface with optics professionals.

INSTRUCTOR

Kevin Harding has been active in the optics industry for over 38 years, and has taught machine vision and optical methods for over 30 years in over 70 workshops and tutorials, including engineering workshops on machine vision, metrology, NDT, and interferometry used by vendors and system houses to train their own engineers. He has been recognized for his leadership in optics and machine vision by the Society of Manufacturing Engineers, Automated Imaging Association, and Engineering Society of Detroit. Kevin is a Fellow of SPIE and was the 2008 President of the Society.

Industry Workshops

Concurrent Design for Optical and Mechanical Engineers with Zemax Virtual Prototyping

WS9005 • Course Level: Introductory
CEU: 0 • \$0 Members • \$0 Non-Members USD
SPIE Student Members: \$0
Wednesday 1:00 pm to 5:00 pm

CEU Credits are NOT available for this workshop.

Virtual prototyping helps optical and mechanical engineers design, communicate, and collaborate on building their optical product right the first time by flagging potential problems early in the product development process. Virtual prototyping from Zemax links the preferred software design tools used by the optical engineer with the preferred design tools used by the mechanical engineer. By using the same virtual prototype for design and simulations, optical and mechanical engineers can create a complete model of a product and validate the effectiveness of the design.

LEARNING OUTCOMES

This course will enable you to:

- optimize, analyze, and tolerance a sequential system in OpticStudio
- optimize a sequential design for conversion to non-sequential mode
- load a sequential design into SOLIDWORKS using LensMechanix
- package, analyze, and validate your complete optomechanical design
- open a completed LensMechanix design in OpticStudio
- optimize a complete optomechanical design

INTENDED AUDIENCE

Optical Engineers, Optomechanical Engineers, and Engineering Department Leaders

SPONSORED BY: **HAMAMATSU**

Photodetectors, Raman Spectroscopy, and SiPMs versus PMTs: One-day Workshop

WS9006 • Course Level: Introductory
CEU: 0 • \$0 Members • \$0 Non-Members USD
SPIE Student Members: \$0
Wednesday 8:30 am to 5:30 pm

CEU Credits are NOT available for this workshop.

Hamamatsu is holding a free one-day workshop that covers three topics. Come for each session or come for the entire day.

DAILY SCHEDULE

PART I • 8:30 to 10:00 am**Photodetectors: Theory, Practice, Applications, and Selection**

Photodetectors are essential components in a vast array of modern scientific and commercial instruments and devices; technological progress will make them even more ubiquitous. Understanding their opto-electronic properties, regimes of operation, circuit requirements, and noise characteristics is essential to a practitioner to make a proper photodetector selection for a given application.

The purpose of this presentation is to provide guidance in this process by discussing the above considerations for the four most common point photodetectors: photomultiplier tube, photodiode, avalanche photodiode, and silicon photomultiplier.

PART II • 1:00 to 2:45 pm**Raman Spectroscopy: Theory and Practice**

Information about the system under investigation may be contained in the spectrum of light received from it. Spectroscopy is an umbrella term referring to a multitude of measurement techniques that can be employed to access the information.

This presentation mentions several major dispersive and non-dispersive spectroscopic techniques such as, for example, fluorescence, Fourier transform, laser-induced breakdown, time-resolved, and discusses in greater detail three forms of Raman spectroscopy: normal, resonant, and surface enhanced. The discussion of Raman spectroscopy includes the theory behind the technique, the hardware components of a working setup, and the most common applications.

PART III • 3:00 to 5:00 pm**Single-photon detection: SiPMs versus PMTs**

Since early 1990's, a silicon photomultiplier has become a viable alternative to a photomultiplier tube in selecting a photodetector for applications where the light signal may consist of few hundred photons per second.

This presentation reviews the physics of operation of both devices, describes their key opto-electric characteristics, compares their performance, and reports the latest advancements in the design of silicon photomultipliers. It ends with a discussion of several applications for which the choice between using either silicon photomultipliers or photomultiplier tubes may be very subtle.

COURSES

Laser Optics & Polarizers, PLDs & APDs, and IR Detectors: One-day Workshop

WS9007 • Course Level: Introductory
CEU: 0 • \$0 Members • \$0 Non-Members USD
SPIE Student Members: \$0
Wednesday 8:30 am to 5:30 pm

CEU Credits are **NOT** available for this workshop.

The team from Laser Components is holding a free one-day workshop that covers three topics. Come for each session or come for the entire day.

DAILY SCHEDULE

PART I

8:30 to 10:00 am

How to Specify High-power Laser Optics and Polarizers

Specifying the correct optical component may determine the success of an application. This session focuses on high-power laser optics and polarizers, their functional principles, essential properties, and corresponding effects depending on the application.

8:30 to 09:00 am

High-power laser optics

Advantages and disadvantages of different coating technologies, tradeoffs of laser optics specifications, Laser Induced Damage Threshold (LIDT) / Absorption for UV wavelengths, Surface flatness of laser optics after coating

9:00 to 10:00 am

Polarizers

Explain the matter of polarization and list different types of polarizers, characterize polarizers by their specifications, describe the polarizers mode of operation in various applications, define key parameters for a polarizer in an intended application

INSTRUCTORS

Barbara Herd, Laser Components and Andre Volke, CODIXX

PART II

11:00 am to 12:00 pm

Hybrid Pulsed Laser Diodes (PLDs) and Silicon Avalanche Photodiodes (APDs)

How to set the optimal device performance for laser scanning and LiDAR applications

Many electro-optical systems using a time-of-flight concept require temporally fast optical pulses to achieve the distance resolution and detectors that can amplify very weak signals coming from the targets. This session provides an overview of challenges faced when switching high peak current fast switch hybrid laser diode circuits, on the one hand. On the other hand, Silicon Avalanche Photodiodes will be explained in terms of structure, internal gain mechanism, and noise and speed of operation.

11:00 to 11:30 am

Driving FET-based Pulsed Laser Hybrid Circuits

An understanding of the various elements of field-effect transistors (FET) driver design for optimized device performance

11:30 am to 12:00 Noon

Silicon APD array structure and operation

APD arrays requirements for special photosensitive area sizes, contours, gain variations and gaps between elements and their effects on performance

INSTRUCTORS

Dragan Grubisic and Ran Zhu, Laser Components

PART III

1:00 to 5:00 pm

IR Detectors: What are the Best New IR Technologies For Your Company

Choosing the right infrared detector can often be quite daunting as there are many to choose from; each with their own modes of operation, ideal performance conditions, variations, and limitations. This session will provide an overview of the different types of IR detectors available on the market today & cover their usage in industrial gas sensing applications, spectroscopy, radiation thermography and non-destructive inspection processes. This will include the following technologies:

InGaAs, Extended InGaAs, and InAs Photodiodes; PbS & PbSe (Lead Salt) Photoconductors; Pyroelectric Detectors

1:00 to 2:00 pm

Selecting an IR detector for Gas Sensing Applications

An understanding of the main advantages and disadvantages of common IR detector technologies covering operation, ideal conditions, available versions, and limitations of each technology; how to specify a detector for your project; typical gas sensing setups for each technology; how to get the best out of your detector; upcoming sensor technologies & "exotic" materials

2:00 to 2:30 pm

Part II: High speed InGaAs Arrays for SD-OCT and machine vision

Understanding the specifications of 512, 1024 and 2048-pixel InGaAs Line-arrays with up to 400 KHz line rates, surpassing the speed requirements of medical (3D SD-OCT) and machine vision applications, consuming limited power while exhibiting stellar noise performance

2:30 to 3:00 pm

Use of Extended InGaAs linear arrays

To develop an understanding of the capability of 1.7 μm , 2.2 μm , and 2.6 μm cut-off wavelength linear InGaAs arrays; and the factors that influence sensitivity

4:00 to 4:30 pm

Recent improvements in PbS/PbSe detector technology

How PbS/PbSe detectors constructed, the internal structure of PbS/PbSe, what material mechanisms effect device performance, old vs. new, how modern manufacturing techniques effected overall detector performance

4:30 to 5:00 pm

Differential Pyroelectric Detectors

Understanding the operation of pyroelectric detectors in the true differential mode, which provides doubling of signal and an increase in D^* by a factor of around $\sqrt{2}$.

INSTRUCTORS

Elliott Martyn Chick and Lowell Snyder, Laser Components and Patrick Merken, Xenics

SPONSORED BY:



Professional Development Workshops

The Seven Habits of Highly Effective Project Managers

WS1208 • Course Level: Introductory
CEU: 0.4 • \$125 Members • \$175 Non-Members USD
SPIE Student Members: \$100
Monday 8:30 am to 12:30 pm

Why do some engineering projects succeed, while others fail? There are many different factors that can influence the outcome of any given project, but one of the most important is the combined skills and qualifications of the project manager (PM) at its helm. But what exactly makes a project manager “skilled and qualified?” Asked another way, are there common best practices, philosophies, and/or techniques that the most successful PMs share, and if so, what are they? The short answer is yes, the majority of successful engineering project managers have many skills and character traits in common. The longer answer is there are at least seven of these key traits, or “habits” that many successful PMs implement within their respective projects.

This course explains what those habits are. More importantly, this course teaches a student how to implement these best practices into their own projects, large or small. From scope, quality, budget, and schedule management, to risk mitigation strategies, building a strong project team, engaged stakeholder management, and general leadership skills, this course will give both new and experienced project managers new tools and techniques to help them not only succeed, but excel within their projects.

LEARNING OUTCOMES

This course will enable you to:

- manage scope, quality, budgets, and schedule in the most efficient and effective ways
- identify what’s important in procurements and contract management—and recognize what’s not
- identify the vital importance of proactive risk management, including how to turn realized problems into beneficial opportunities
- build and maintain the most powerful asset you have as the PM—your project team
- engage and leverage the power of your key external stakeholders
- explain communication techniques that ensure your team is working and collaborating in the most efficient and effective ways possible
- identify the most important leadership techniques and traits that your project needs for its success

INTENDED AUDIENCE

INSTRUCTOR

Mark Warner PE, PMP. is the Deputy Project Manager for the \$350M Daniel K. Inouye Solar Telescope (DKIST) design-build construction project. He is a degreed and licensed professional engineer (PE), and has a project management professional (PMP) certification. His career spans 35 years as both engineer and engineering project manager. His expertise includes aerospace engineering, management of large-scale construction projects, design and fabrication of scientific instrumentation and precision machinery, and the oversight and management of complex large-scale science and engineering projects. Mark has lived and worked throughout North America, Europe, and Hawaii, and currently resides in Tucson, Arizona. His project management blog can be found at www.TheProjectManagementBlueprint.com

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SPIE



GENERAL INFORMATION

Registration

ONSITE REGISTRATION AND BADGE PICK-UP HOURS

Moscone West Level 1 Lobby

Saturday 27 January	7:00 am to 5:00 pm
Sunday 28 January	7:15 am to 5:00 pm
Monday 29 January	7:15 am to 5:00 pm
Tuesday 30 January	7:30 am to 5:00 pm
Wednesday 31 January	7:30 am to 5:00 pm

Moscone North Lobby

Monday 29 January	7:15 am to 5:00 pm
Tuesday 30 January	7:30 am to 5:00 pm
Wednesday 31 January	7:30 am to 5:00 pm
Thursday 1 February	7:30 am to 4:00 pm

*Exhibition Only Attendees may pick up badges at either North or West Lobby during Registration hours listed above.

CONFERENCE REGISTRATION

Includes admission to all conference sessions, plenaries, panels, technical events, poster sessions, both BIOS Expo and Photonics West exhibition, industry sessions, welcome reception, and choice of online proceedings or online collections.

COURSE AND WORKSHOP REGISTRATION

Moscone West Level 1 Lobby

Courses and workshops are priced separately. Course-only registration includes your selected course(s), course notes, coffee breaks, and admittance to the exhibition. Course prices include applicable taxes. Onsite, please go to Course Materials after you pick up your badge.

Multiple facilities may be used for courses; allow yourself enough time to register, pick up your materials, and possibly walk to a nearby facility before your course begins.

EXHIBITION AND INDUSTRY EVENT REGISTRATION

Exhibition Only visitor registration is complimentary and attendees may pick up badges at either Moscone West or Moscone North during the respective registration hours.

EARLY REGISTRATION PRICING AND DATES

Conference registration prices increase by US\$150 (Students, \$50) and course prices increase \$75 **after 12 January 2018**. The online form will automatically display the increased prices.

SPIE MEMBER, SPIE STUDENT MEMBER, AND STUDENT PRICING

- SPIE Members receive conference and course registration discounts. Discounts are applied at the time of registration.
- SPIE Student Members receive a 50% discount on all courses.
- Student registration rates are available only to undergraduate and graduate students who are enrolled full time and have not yet received their Ph.D. Post-docs may not register as students. A student ID number or proof of student status is required with your registration.

PRESS REGISTRATION

For credentialed press and media representatives only. Please email contact information, title, and organization to media@spie.org.

SPIE CASHIER

Moscone North Lobby and West Level 1 Lobby
Open during registration hours

REGISTRATION PAYMENTS

If you are planning to register onsite, your credit card payment will be processed at the onsite station. If you wish to pay with cash or check, register at the onsite stations and you will be directed to the Cashier once you have completed registration except final payment. If you have already registered and wish to add a course, workshop or special event, you may do so at onsite registration.

RECEIPT AND CERTIFICATE OF ATTENDANCE

Preregistered attendees who need a copy of their receipt or a Certificate of Attendance can get those at Badge Corrections and Receipts.

BADGE CORRECTIONS

Badge corrections can be made at the Badge Corrections station in Moscone West and North Lobbies. Please have your badge removed from the badge holder and marked with your changes before approaching the counter.

REFUND INFORMATION

There is a US\$50 service charge for processing refunds. Requests for refunds must be received by 18 January 2018; all registration fees will be forfeited after this date. Membership dues, SPIE Digital Library subscriptions, or Special Events purchased are not refundable.

U.S. GOVERNMENT CREDIT CARDS

U.S. Government credit card users: have your purchasing officer contact the credit card company and get prior authorization before attempting to register. Advise your purchasing agent that SPIE is considered a 5968 company for authorization purposes.

Onsite Services

WIRELESS

All Moscone Lobbies and Conference Rooms

Complimentary wireless access is also available; instructions will be posted onsite.

SPIE CONFERENCE APP

Download Now

Search and browse the program, special events, participants, exhibitors, courses, and more. Free Conference Apps also available for iPhone and Android smart phones.

SPIE BOOKSTORE

North Lower Lobby (Exhibit Level)

West Level 2 Lobby

The SPIE Bookstore is your source for the latest SPIE Press Books, Proceedings, and Education and Professional Development materials. Become an SPIE member, explore the Digital Library, take home a free SPIE poster, or buy a souvenir (tie, t-shirt, educational toys, and more).

SPIE EDUCATION SERVICES / COURSE MATERIALS DESK

West Level 1 Lobby Saturday through Wednesday

North Lobby Thursday

Browse course offerings and the other education services available: SPIE courses, videos, and CDs as well as customized in-company courses.

SPIE PRESS ROOM

West Level 1 Lobby

Upper Mezzanine

Open during Registration hours

For Registered Press only. The Press Room provides meeting space, refreshments, access to exhibitor press releases, and Internet connections. Press are urged to register before the meeting by emailing name, contact information, and name of publication to media@spie.org. Preregistration closes approximately 10 days before the start of the event.

SPIE LUGGAGE + COAT CHECK

West Level 1 Lobby Saturday through Wednesday

Room 104 (South Level 1) Monday through Thursday

Complimentary luggage, package, and coat storage are available. Please note posted hours; no late pickup available.

BUSINESS CENTER

Near Exhibition Hall D on the Exhibit Level . . Tuesday through Thursday

The Moscone Business Center provides full service business needs for your convenience. Their services include photocopying, faxing, computer workstations and printing services.

RESTAURANT & CITY INFORMATION

North Lobby

Monday through Wednesday 9:00 am to 5:00 pm

The San Francisco Travel Association will have Visitor's guides and maps available. Staff will be available during the posted hours to discuss city information including tips on local restaurants, the city's many attractions, sightseeing suggestions and transit information.

CHILD CARE SERVICES

Sitters Unlimited (408) 452-0225
San Francisco Bay Area

Rachael Osorio www.bayareasittersunlimited.com

Email: info@bayareasittersunlimited.com

NOTE: SPIE does not imply an endorsement nor recommendation of these services. They are provided on an "information only" basis for your further analysis and decision. Other services may be available.

URGENT MESSAGE LINE

An urgent message line is available during registration hours: 415.978.3700

LOST AND FOUND

Cashier - West Level 1 Lobby Saturday through Wednesday

Cashier - North Lobby Monday through Thursday

Found items will be kept at Cashier during the meeting and available only during registration hours. At the end of the meeting, all found items will be turned over to Moscone Security Control, **415.974.4021**.

COFFEE BREAKS

Complimentary coffee will be served twice daily, at 10:00 am and 3:00 pm. Check individual conference listings for exact times and locations.

Saturday am West Level 2 & 3

Saturday pm West Exhibition Hall

Sunday am & pm West Exhibition Hall

Monday am & pm Esplanade Foyer (Upper Mezzanine)
North Lower Lobby (North Exhibit Level)

Tuesday through Thursday Exhibition Halls A, B, C, D

FOOD & REFRESHMENTS FOR PURCHASE

Various Locations Saturday through Thursday

A variety of food outlets will serve hot and cold snacks, espresso, beverages, hot entrees, deli sandwiches, salads, and pastries. Cash and credit cards accepted.

FOOD OUTLETS OPEN IN THE EXHIBITION HALLS

West Exhibition Hall

Saturday 11:00 am to 3:00 pm

Sunday 11:00 am to 3:00 pm

Exhibition Halls A, B, C, D

Tuesday through Thursday 10:00 am to 4:00 pm

GENERAL INFORMATION

Author / Presenter Information

SPEAKER CHECK-IN AND PRESENTATION UPLOAD

Moscone West Level 2

Saturday through Wednesday 7:30 am to 5:00 pm

Room 105 South Level 1

Monday through Thursday 7:30 am to 5:00 pm

All presenters must stop by Speaker Check-In to upload their file(s) at least two hours before their scheduled talk. Authors are not able to present using their own devices. All conference rooms have a laptop, projector, screen, lapel microphone, and laser pointer.

POSTER SESSIONS

To find out which poster session you are scheduled for, check the individual conference programs.

Poster Sessions at Moscone West Level 2 & 3:

- Sunday 5:30 to 7:00 pm: select BIOS conferences
- Monday 5:30 to 7:30 pm: select BiOS conferences
- Tuesday 6:00 to 8:00 pm: all LASE conferences and select BiOS conferences
- Wednesday 6:00 to 8:00 pm: all OPTO conferences

POSTER SETUP INSTRUCTIONS

- Set up your poster from 10:00 am to 4:30 pm on the day of your assigned presentation.
- Paper numbers will be placed on the poster boards in numerical order; please find your paper number and put up your poster in the designated space.
- A poster author is required to stand by the poster during the scheduled poster session to answer questions from attendees.
- Presenters who have not placed their poster(s) on their assigned board by 60 minutes prior to the session on the day of their presentation will be considered a “no show” and their manuscript will not be published.
- Presenters must remove their posters immediately after the poster session. Any posters that are not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session.

Hotels

Conference Direct is the official housing vendor for SPIE Photonics West 2018.

Learn more and reserve your hotel room today.

<http://spie.org/PW-hotel>

Questions?

The Conference Direct Team is a great resource.

Phone: 704-445-6955 • Fax: 704-927-1439

Please do not call SPIE directly to arrange hotel accommodations.

Do not reserve rooms from any company that contacts you via phone or email.

IMPORTANT HOTEL DATES

- | | |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 6 June | Housing Opens |
| 20 October | Last day to submit sub-block request for multiple reservations |
| 17 November | The deadline to assign names to rooms. After this date, any rooms not assigned to a valid name will be released from your sub-block. |
| 18 December | Last day to make hotel reservations via SPIE Housing Reservation system |
| 3 January | Last day to make changes or cancellations to existing reservations via SPIE Housing Bureau |

Airports

San Francisco is serviced by two international airports:

San Francisco International Airport (SFO) is located approximately 15 miles from San Francisco downtown hotels (30-60 minute drive).

Oakland International Airport (OAK) is approximately 20 miles from San Francisco downtown hotels (30-50 minute drive).

Shuttles and Trains

There is a variety of transportation options in the San Francisco Bay area. From shuttles to the Bullet Express train (which travels between San Francisco and San Jose in under an hour), find one that works best for you travels.

Learn more at <http://spie.org/PW-travel>

Parking

Parking rates at Photonics West Hotels range from \$30 (self) to \$60 (valet), rates subject to change. Please check with your individual hotel for specific parking rates over PW18.

- Parking Panda provides 100% guaranteed reserved parking spaces throughout San Francisco. Use promo code PW18 for 10% off parking! To reserve a parking space around the Moscone Center, visit Moscone Center Parking.
- Parkopedia - lists all the publicly available parking lots, garages and information about street parking.
- Best Parking
- Union Square Parking

Car Rental



Hertz Car Rental is the official car rental agency for this event. To reserve a car, identify yourself as a Photonics West Conference attendee using the Hertz Meeting Code CV# 029B0023. Discount rates

apply for roundtrip rentals up to one week prior through one week after the conference dates. (Some one-way rentals qualify for the discount rates based on their pick-up and drop-off locations. Vehicles rented in Northern California can be returned to any corporate Hertz location within Northern California and vehicles rented in Southern California can be returned to any corporate Hertz location within Southern California). Note: When booking from International Hertz locations, the CV # must be entered with the letters CV before the number, i.e. CV029B0023.

BOOK HERTZ ONLINE

Contact Hertz:

- In the United States call 1-800-654-2240
- In Canada call 1-800-263-0600, or 1-416-620-9620 in Toronto
- In Europe and Asia call a Hertz Reservation Center or travel agent
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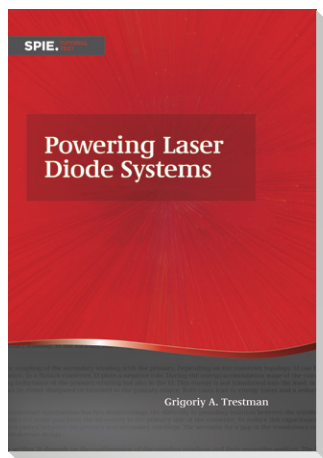
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THE MOSCONE CENTER

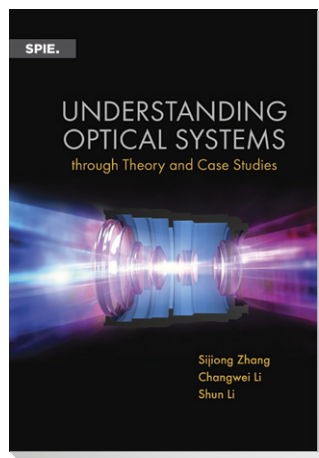
747 Howard Street
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San Francisco is a unique and breathtaking metropolis. With the famous icon of the Golden Gate Bridge, the city takes pride in its unrivaled attractions and its unique neighborhoods. Discover the variety of sites, shops, and restaurants that reflect the city's great ethnic and cultural diversity. [San Francisco Visitor Information](#)

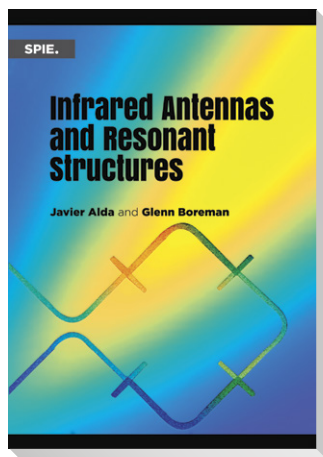
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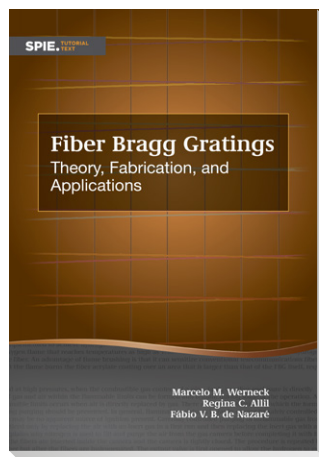
Powering Laser Diode Systems
Grigoriy A. Trestman
Vol. TT112
Print: \$46.75 / \$55.00
eBook (PDF, ePub, Kindle): \$39.95 / \$47.00



Understanding Optical Systems through Theory and Case Studies
Sijiong Zhang, Changwei Li, and Shun Li
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eBook (PDF, ePub, Kindle): \$50.15 / \$59.00



Infrared Antennas and Resonant Structures
Javier Alda and Glenn Boreman
Vol. PM281
Print: \$59.50 / \$70.00
eBook (PDF, ePub, Kindle): \$50.57 / \$59.50



Fiber Bragg Gratings: Theory, Fabrication, and Applications
Marcelo M. Werneck, Regina C. Allil, and Fábio V. B. de Nazaré
Vol. TT114
Print: \$62.05 / \$73.00
eBook (PDF, ePub, Kindle): \$52.70 / \$62.00

Price key: SPIE Member \$ / Nonmember \$

Visit the PW on-site bookstore www.spie.org/books

Proceedings.

Paid conference registration includes online Proceedings of SPIE. In the tables below you will find product order numbers to use on the registration form.

Available as part of registration:

Online Proceedings Volume—access to a single conference proceedings volume via the SPIE Digital Library. Available as papers are published.

Online Proceedings Collection—access to multiple related proceedings volumes via the SPIE Digital Library. Available as papers are published.

Conference Attendees: You may purchase additional online collections for \$175 each or additional online proceedings volumes for \$60 each. Print conference proceedings volumes are also available; see pricing below.

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To access your proceedings:

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Online Proceedings Collections

Product Order Number	Collection Title/Included Volumes <small>(See next page for volume titles and editors)</small>	Price for separate purchase
		Meeting Attendees
DLC674	Photonics West BIOS 2018: Photonic Therapeutics and Diagnostics <i>Includes Volumes 10467, 10468, 10469, 10470, 10471, 10472, 10473, 10474, 10475, 10476, 10477, 10478, 10479</i>	\$175.00
DLC675	Photonics West BIOS 2018: Clinical Technologies and Systems <i>Includes Volumes 10483, 10484, 10485, 10486, 10487, 10488, 10489, 10490, 10491</i>	\$175.00
DLC676	Photonics West BIOS 2018: Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering <i>Includes Volumes 10492, 10493, 10494, 10495, 10496</i>	\$175.00
DLC677	Photonics West BIOS 2018: Biomedical Spectroscopy, Microscopy, and Imaging; and Neurophotonics, Neurosurgery, and Optogenetics <i>Includes Volumes 10480, 10481, 10482, 10494, 10497, 10498, 10499, 10500, 10501, 10502, 10503, 10504, 10505</i>	\$175.00
DLC678	Photonics West BIOS 2018: Nano/Biophotonics <i>Includes Volumes 10506, 10507, 10508, 10509, 10510</i>	\$175.00
DLC679	Photonics West LASE 2018: Laser Sources; and Nonlinear Optics and Beam Guiding <i>Includes Volumes 10511, 10512, 10513, 10514, 10515, 10516, 10517, 10518</i>	\$175.00
DLC680	Photonics West LASE 2018: Micro/Nano Applications; and Macro Applications <i>Includes Volumes 10519, 10520, 10521, 10522, 10523, 10524, 10525</i>	\$175.00

Product Order Number	Collection Title/Included Volumes <small>(See next page for volume titles and editors)</small>	Price for separate purchase
		Meeting Attendees
DLC681	Photonics West OPTO 2018: Optoelectric Materials and Devices <i>Includes Volumes 10526, 10527, 10528, 10529, 10530, 10531, 10532, 10533, 10534</i>	\$175.00
DLC682	Photonics West OPTO 2018: Photonic Integration <i>Includes Volumes 10531, 10535, 10536, 10537, 10538, 10539</i>	\$175.00
DLC683	Photonics West OPTO 2018: Nanotechnologies in Photonics; and MOEMS-MEMS in Photonics <i>Includes Volumes 10491, 10502, 10540, 10541, 10542, 10543, 10544, 10545, 10546</i>	\$175.00
DLC684	Photonics West OPTO 2018: Advanced Quantum and Optoelectronic Applications <i>Includes Volumes 10540, 10543, 10547, 10548, 10549, 10550, 10551</i>	\$175.00
DLC685	Photonics West OPTO 2018: Semiconductor Lasers and LEDs <i>Includes Volumes 10514, 10515, 10526, 10532, 10552, 10553, 10554</i>	\$175.00
DLC686	Photonics West OPTO 2018: Displays and Holography <i>Includes Volumes 10555, 10556, 10557, 10558</i>	\$175.00
DLC687	Photonics West OPTO 2018: Optical Communications: Devices to Systems <i>Includes Volumes 10524, 10531, 10537, 10538, 10559, 10560, 10561</i>	\$175.00

Proceedings.

Online Proceedings Volumes

Conference Attendees: The price for additional online proceedings volumes is \$60 each.

Product Order Number		Volume Title/Volume Editors	Price for separate Print purchase
Print Volume	Online Volume		Meeting Attendees
10467	DL 10467	Photonics in Dermatology and Plastic Surgery 2018 <i>Bernard Choi, Haishan Zeng</i>	\$67.50
10468	DL 10468	Therapeutics and Diagnostics in Urology 2018 <i>Hyun Wook Kang, Kin Foong Chan</i>	\$52.50
10469	DL 10469	Optical Imaging, Therapeutics, and Advanced Technology in Head and Neck Surgery and Otolaryngology 2018 <i>Brian J. F. Wong, Justus F. Ilgner, Max J. Witjes</i>	\$60.00
10470	DL 10470	Endoscopic Microscopy XIII <i>Guillermo J. Tearney, Thomas D. Wang, Melissa J. Suter</i>	\$67.50
10471	DL 10471	Diagnostic and Therapeutic Applications of Light in Cardiology 2018 <i>Guillermo J. Tearney, Kenton W. Gregory, Laura Marcu</i>	\$60.00
10472	DL 10472	Diseases in the Breast and Reproductive System IV <i>Melissa C. Skala, Paul J. Campagnola</i>	\$60.00
10473	DL 10473	Lasers in Dentistry XXIV <i>Peter Rechmann, Daniel Fried</i>	\$60.00
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SPIE.



International Day of Light

16 May

Following the highly successful International Year of Light and Light-based Technologies 2015, The International Day of Light will be proclaimed at the General Conference of UNESCO in November 2017 and the first celebration will take place on 16 May 2018.

The broad theme of light will allow many different sectors of society around the world to participate in activities every 16 May to raise awareness of science and technology, art and culture, and their importance in achieving the goals of UNESCO – education, equality and peace.



SPIE supports the International Day of Light to promote awareness of life-saving, life-enhancing light.



SPIE IDL GRANTS

SPIE will provide seed funding up to US\$3,000 to organizations creating Day of Light 2018 activities. Apply by 15 December 2017.

[Apply online](#)



IDL MATERIALS

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SPIE PHOTO CONTEST

This SPIE annual photo contest seeks to raise awareness about the International Day of Light and the vital role that light and light-based technologies play in daily life. IDL 2017 winners will be announced 30 October 2017. The 2018 Contest opens 16 May 2018.

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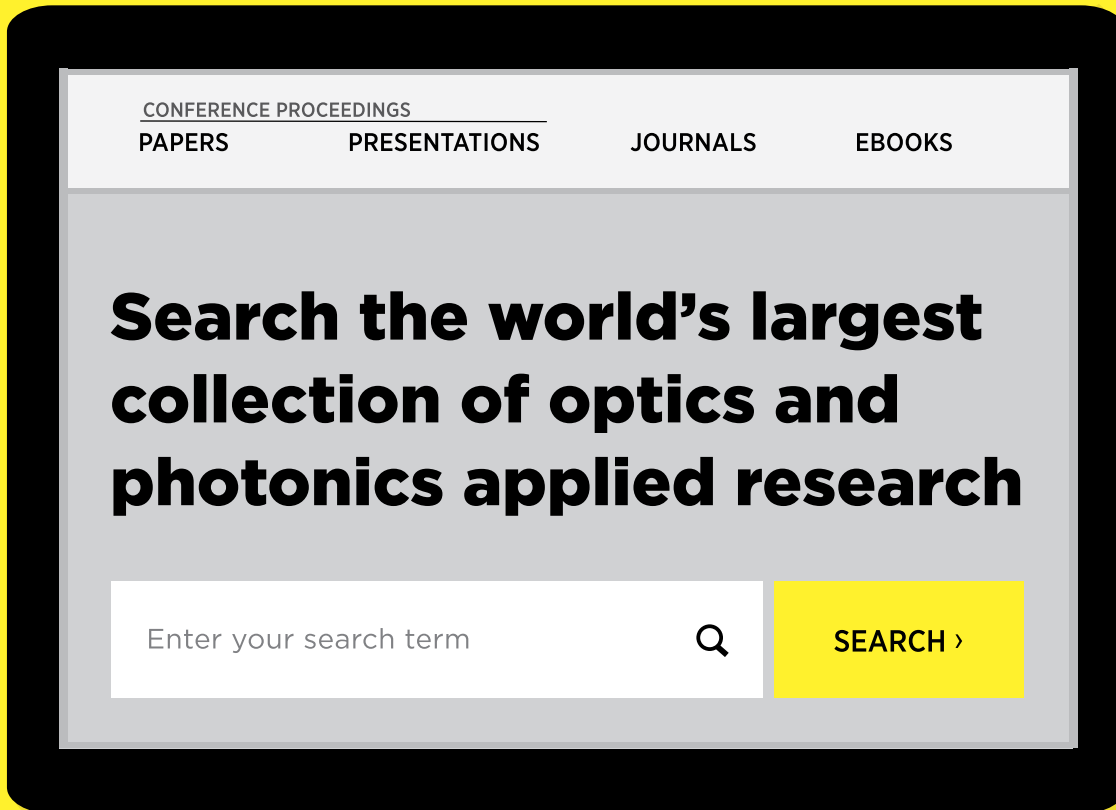
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