

PHOTONICS WEST

TECHNICAL PROGRAM

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THE MOSCONE CENTER
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Conferences + Courses: 1-6 February 2020
BIOS Expo: 1-2 February 2020
Photonics West Exhibition: 4-6 February 2020

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WEST

BRAIN APPLICATIONS

Developing diffuse correlation spectroscopic tools for continuous, real-time, spatially-resolved monitoring of spinal cord blood flow
Paper 11229-28

Author(s): David R. Busch, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA), et al.
Conference 11229: Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVIII
Session 6: Spectroscopy and Other Techniques
Date and Time: 2/3/20 11:20 AM

Diffuse optical tomography with a source-detector grid with 6.5 mm spacing for high-performance imaging of human brain hemodynamics
Paper 11226-8

Author(s): Zachary E. Markow, Washington Univ. in St. Louis (USA), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 2: Diffused Optical Imaging
Date and Time: 2/3/20 11:30 AM

Quantification of blood-brain barrier permeability with multiphoton fluorescence imaging
Paper 11244-28

Author(s): Lingyan Shi, Univ. of California, San Diego (USA), et al.
Conference 11244: Multiphoton Microscopy in the Biomedical Sciences XX
Session 6: Technology and In Vivo Imaging I
Date and Time: 2/3/20 11:35 AM

Mapping deep brain stimulation's impact on cortical networks using high-density diffuse optical tomography
Paper 11226-9

Author(s): Arefeh Sherafati, Washington Univ. School of Medicine in St. Louis (USA), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 2: Diffused Optical Imaging
Date and Time: 2/3/20 11:50 AM

Large area functional and structural nonlinear brain imaging
Paper 11244-31

Author(s): Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy), et al.
Conference 11244: Multiphoton Microscopy in the Biomedical Sciences XX
Session 7: Technology and In Vivo Imaging II
Date and Time: 2/3/20 1:30 PM

Applications of liquid crystals in brain study
Paper 11303-1

Author(s): Tigran Galstian, Ctr. d'optique, photonique et laser (Canada), et al.
Conference 11303: Emerging Liquid Crystal Technologies XV
Session 1: Liquid Crystal Lenses and Microlens Arrays
Date and Time: 2/3/20 1:30 PM

Using fNIRS to study the brain activation and networks associated with Chinese character recognition
Paper 11226-11

Author(s): Zhen Yuan, Univ. of Macau (Macao, China), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 3: Human Brain
Date and Time: 2/3/20 2:20 PM

Applications of single-cell Raman microspectroscopy in cancer cell
Paper 11252-64

Author(s): Tong Yu, Univ. of Oxford (United Kingdom), et al.
Conference 11252: Advanced Chemical Microscopy for Life Science and Translational Medicine
Session 11: CARS, SRS, Raman Innovation and Applications IV
Date and Time: 2/3/20 2:35 PM

fNIRS examination of mental workload changes during N-back tasks
Paper 11226-12

Author(s): Kosar Khaksari, National Institutes of Health (USA), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 3: Human Brain
Date and Time: 2/3/20 2:40 PM

Functional brain mapping in preschool-age children with high density diffuse optical tomography
Paper 11226-13

Author(s): Kalyan Tripathy, Washington Univ. School of Medicine in St. Louis (USA), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 3: Human Brain
Date and Time: 2/3/20 3:00 PM

Projection-specific neuronal recordings at deep layers of visual cortex via three-photon microscopy in awake mice
Paper 11226-14

Author(s): Murat Yildirim, Massachusetts Institute of Technology (USA), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 4: Awake Animals
Date and Time: 2/3/20 3:50 PM

AMCoherence gated, time-of-flight resolved measurements of human brain blood flow dynamics
Paper 11228-21

Author(s): Oybek Kholiqov, Univ. of California, Davis (USA), et al.
Conference 11228: Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXIV
Session 4: Brain and Neural Imaging
Date and Time: 2/3/20 4:00 PM

Miniaturized device for whole cortex mesoscale imaging in freely behaving mice
Paper 11226-15

Author(s): Suhasa Kodandaramaiah, Univ. of Minnesota, Twin Cities (USA), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 4: Awake Animals
Date and Time: 2/3/20 4:10 PM

Label-free characterization of attenuation lengths of cortical regions via three-photon microscopy in awake mice
Paper 11244-38

Author(s): Murat Yildirim, Massachusetts Institute of Technology (USA), et al.
Conference 11244: Multiphoton Microscopy in the Biomedical Sciences XX
Session 8: SHG/THG Microscopy
Date and Time: 2/3/20 4:30 PM

Label-free neurophotonics: electro-plasmonic biosensors for ultrasensitive detection of electrogenic activity of cells
Paper 11257-26

Author(s): Ahsan Habib, Univ. of California, Santa Cruz (USA), et al.
Conference 11257: Plasmonics in Biology and Medicine XVII
Session 5: Plasmonic Detection and Sensing
Date and Time: 2/3/20 4:30 PM

Mesoscale imaging of neuronal activity coupled with light-evoked motor mapping reveal movement-specific spatiotemporal patterns of cortical activation in awake mice
Paper 11226-17

Author(s): Francesco A. Resta, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy), et al.
Conference 11226: Neural Imaging and Sensing 2020
Session 4: Awake Animals
Date and Time: 2/3/20 4:50 PM

Quantifying changes in murine fetal brain vasculature due to prenatal exposure to teratogens with in utero optical coherence tomography
Paper 11228-25

Author(s): Raksha Raghunathan, Univ. of Houston (USA), et al.
Conference 11228: Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXIV
Session 4: Brain and Neural Imaging
Date and Time: 2/3/20 5:00 PM

Effect of contrast agents and enhancement of cerebrovasculature on mouse brain microvasculature studies using 800nm Gaussian and Polarization sensitive (PS) OCT system
Paper 11228-26

Author(s): Mounika Rapolu, Institute of Physical Chemistry (Poland), et al.
Conference 11228: Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXIV
Session 4: Brain and Neural Imaging
Date and Time: 2/3/20 5:15 PM

TRANSLATIONAL RESEARCH APPLICATIONS

The transposition of caffeine in skin layers, visualization at a molecular scale by molecular dynamics simulations

Paper 11211-37

Author(s): Neila Machado, Univ. Federal do ABC (Brazil), et al.
Conference 11211: Photonics in Dermatology and Plastic Surgery 2020
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Optical simulations for determining efficacy of new light source designs for excitation-scanning high-speed hyperspectral imaging systems

Paper 11216-30

Author(s): Craig M. Browning, Univ. of South Alabama (USA), et al.
Conference 11216: Multiscale Imaging and Spectroscopy
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Quantitative analysis of vascular complexity in OCTA of diabetic retinopathy

Paper 11218-75

Author(s): Minhaj Nur Alam, Univ. of Illinois at Chicago (USA), et al.
Conference 11218: Ophthalmic Technologies XXX
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Photodynamic priming to attenuate ovarian cancer cell migration

Paper 11220-23

Author(s): Aaron Sorrin, Univ. of Maryland, College Park (USA), et al.
Conference 11220: Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXIX
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Pupillary sensor for ocular cranial nerve monitoring

Paper 11225-18

Author(s): Bridget Slomka, The Univ. of Arizona (USA), et al.
Conference 11225: Clinical and Translational Neurophotonics 2020
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Laser biospeckle metrology in investigating plant-sound interactions

Paper 11238-38

Author(s): Minoru Hirai, Shibaura Institute of Technology (Japan), et al.
Conference 11238: Optical Interactions with Tissue and Cells XXXI
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Ultrahigh accurate Statistical Interferometric Technique utilizing uniformity of speckle phase in the study of plant physiology

Paper 11238-40

Author(s): Uma M. Rajagopalan, Shibaura Institute of Technology (Japan), et al.
Conference 11238: Optical Interactions with Tissue and Cells XXXI
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Fast fourier transform versus wavelet transform analyses on photoacoustic spectral data of breast tumor progression

Paper 11238-45

Author(s): Jackson Rodrigues, Manipal Academy of Higher Education (India), et al.
Conference 11238: Optical Interactions with Tissue and Cells XXXI
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Polyvinyl chloride-plastisol: a soft tissue-mimicking phantom dedicated to multi-modality elastography

Paper 11242-40

Author(s): Amir Nahas, Lab. des sciences de l'Ingénieur, de l'Informatique et de l'Imagerie (France), et al.
Conference 11242: Optical Elastography and Tissue Biomechanics VII
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

A high-fat diet impacts collagen organization in breast tumor tissues but not in healthy ones

Paper 11244-67

Author(s): Yang Zhang, Tufts Univ. (USA), et al.
Conference 11244: Multiphoton Microscopy in the Biomedical Sciences XX
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Optical parameter scans of scattering media using multispectral spatial frequency domain imaging under a curvilinear coordinates system

Paper 11253-20

Author(s): Jose E. Calderon, Univ. de Puerto Rico Mayagüez (USA), et al.
Conference 11253: Biomedical Applications of Light Scattering X
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Application of laser speckle contrast imaging in laparoscopic surgery

Paper 11253-22

Author(s): Wido Heeman, Univ. of Groningen (Netherlands), et al.
Conference 11253: Biomedical Applications of Light Scattering X
Session PSun: Posters-Sunday
Date and Time: 2/2/20 5:30 PM

Monday 3 February 2020

OCT oximetry in retinal capillaries

Paper 11228-1

Author(s): Shaohua Pi, Oregon Health & Science Univ. (USA), et al.
Conference 11228: Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXIV
Session 1: OCT Angiography
Date and Time: 2/3/20 8:30 AM

Cholesteryl ester-rich lipid droplet is a prognostic marker and therapeutic target for human metastatic melanoma

Paper 11252-53

Author(s): Hyeon Jeong Lee, The Boston Univ. Photonics Ctr. (USA), et al.
Conference 11252: Advanced Chemical Microscopy for Life Science and Translational Medicine
Session 9: Translation into Clinic
Date and Time: 2/3/20 9:20 AM

A label-free study of murine gut dysbiosis with fluorescence lifetime spectroscopy and imaging

Paper 11223-4

Author(s): Alba Alfonso García, Univ. of California, Davis (USA), et al.
Conference 11223: Photonic Diagnosis, Monitoring, Prevention, and Treatment of Infections and Inflammatory Diseases 2020
Session 1: Photonic Diagnosis I
Date and Time: 2/3/20 9:40 AM

Copper systemamine: a new sensitizer for x-ray induced photodynamic therapy

Paper 11224-5

Author(s): Wei Chen, The Univ. of Texas at Arlington (USA), et al.
Conference 11224: Optics and Ionizing Radiation
Session 1: X-ray Dynamic Therapy
Date and Time: 2/3/20 9:45 AM

CARSA: Fast & accurate antibiotic susceptibility testing tool by coherent anti-stokes Raman scattering imaging of D2O metabolism

Paper 11252-55

Author(s): Pu Wang, Vibronix, Inc. (USA), et al.
Conference 11252: Advanced Chemical Microscopy for Life Science and Translational Medicine
Session 9: Translation into Clinic
Date and Time: 2/3/20 9:50 AM

Multiphoton and FLIM imaging in quantifying ex vivo and in vivo body organ kinetics of solutes

Paper 11244-27

Author(s): Michael S. Roberts, Univ. of South Australia (Australia), et al.
Conference 11244: Multiphoton Microscopy in the Biomedical Sciences XX
Session 6: Technology and In Vivo Imaging I
Date and Time: 2/3/20 11:15 AM



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CONFERENCE 11215

LOCATION: ROOM 54 (LOWER MEZZANINE SOUTH)

Saturday–Sunday 1–2 February 2020 • Proceedings of SPIE Vol. 11215

Diagnostic and Therapeutic Applications of Light in Cardiology 2020

Conference Chairs: **Kenton W. Gregory**, 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); **Guillermo J. Tearney**, Massachusetts General Hospital (USA)

SATURDAY 1 FEBRUARY

SESSION 1

LOCATION: ROOM 54 (LOWER MEZZANINE SOUTH) . . SAT 8:00 AM TO 10:10 AM

Optical Coherence Tomography

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

8:00 am: **Hybrid intravascular imaging of coronary atherosclerosis: what is expected to be the role of hybrid imaging catheters in the clinical practice and research?** (*Invited Paper*), Christos V. Bourantas, Barts Heart Ctr., Univ. College London (United Kingdom) [11215-1]

8:30 am: **Intravascular optical coherence elastography: simultaneous mechanical and morphological imaging of atherosclerotic plaques**, Tianshi Wang, Erasmus MC (Netherlands); Tom Pfeiffer, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Ali Akyildiz, Heleen van Beusekom, Erasmus MC (Netherlands); Wolfgang Wieser, Optores GmbH (Germany); A.F.W. van der Steen, Erasmus MC (Netherlands) and Chinese Academy of Sciences (China) and Delft Univ. of Technology (Netherlands); Robert Huber, Institut für Biomedizinische Optik, Univ. zu Lübeck (Germany); Gijs van Soest, Erasmus MC (Netherlands) [11215-2]

8:50 am: **Lipid sensitive OCT**, Laurin Ginner, Johanna Gesperger, Barbara Messner, Matthias Salas, Michael Niederleithner, Bettina Kapsch, Rainer Leitgeb, Medizinische Univ. Wien (Austria) [11215-3]

9:10 am: **A dual modality imaging system integrating optical frequency domain imaging (OFDI) and intravascular ultrasound imaging (IVUS) for intravascular diagnosis**, Jian Ren, Milen Shishkov, Martin Villiger, Kenichiro Otsuka, Brett Bouma, Wellman Ctr. for Photomedicine (USA) [11215-4]

9:30 am: **Deep learning segmentation used in IVOCCT images to guide optical attenuation imaging for plaque characterization**, Shengnan Liu, Erasmus MC (Netherlands); Denis Shamonin, Leiden Univ. Medical Ctr. (Netherlands); Guillaume Zahnd, Computer Aided Medical Procedures, Technische Univ. München (Germany); Joost Daemen, A.F.W. van der Steen, Theo van Walsum, Gijs van Soest, Erasmus MC (Netherlands) [11215-5]

9:50 am: **Reproducibility and efficacy of attenuation-compensated optical coherence tomography for assessing external elastic membrane border and plaque composition in native and stented segments**, Anantharaman Ramasamy, Barts Health NHS Trust (United Kingdom); Jaryl Ng, National Univ. of Singapore (Singapore); Stephen White, Manchester Metropolitan Univ. (United Kingdom); Thomas W. Johnson, Bristol Royal Infirmary (United Kingdom); Nicolas Foin, Dept of Biomedical Engineering (Singapore); Michael J. A. Girard, National Univ. of Singapore (Singapore); Jouke Dijkstra, Leiden Univ. Medical Ctr. (Netherlands); Rajiv Amersey, Dept. of Cardiology (United Kingdom); Simon Scoltock, Univ. of Bristol (United Kingdom); Sudheer Koganti, Citizens Specialty Hospital, Hyderabad (India); Daniel A. Jones, Chongying Jin, Dept. of Cardiology (United Kingdom); Lorenz Rüber, Univ. Bern (Switzerland); Patrick W. Serruys, National Heart and Lung Institute (United Kingdom); Ryo Torii, Univ. College London (United Kingdom); Tom Crake, Dept. of Cardiology (United Kingdom); Roby D. Rakhit, The Royal Free Hospital (United Kingdom); Andreas Baumbach, Anthony Mathur, Christos V. Bourantas, Dept. of Cardiology (United Kingdom) [11215-6]

Coffee Break. Sat 10:10 am to 10:40 am

SESSION 2

LOCATION: ROOM 54 (LOWER MEZZANINE SOUTH) . SAT 10:40 AM TO 12:00 PM

Optical Imaging Guided Therapy

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

10:40 am: **Quantifying differences in cardiac tissue structure related to patient characteristics using an optical coherence tomography cardiac tissue atlas**, Theresa H. Lye, Darnel Theagene, Columbia Univ. (USA); Charles C. Marboe, Columbia Univ. Medical Ctr. (USA); Christine P. Hendon, Columbia Univ. (USA) [11215-7]

11:00 am: **Polarization sensitive optical coherence tomography-guided percutaneous radiofrequency ablation in left atrium of living swine**, Xiaowei Zhao, Case Western Reserve Univ. (USA); Ohad Ziv, MetroHealth Medical Ctr. (USA); Reza Mohammadpour, Benjamin Crosby, Case Western Reserve Univ. (USA); Walter J. Hoyt, Kaushal Dosani, Univ. Hospitals Rainbow Babies & Children's Hospital (USA); Michael W. Jenkins, Case Western Reserve Univ. (USA); Christopher Snyder, Univ. Hospitals Rainbow Babies & Children's Hospital (USA); Kenneth R. Laurita, Andrew M. Rollins, Case Western Reserve Univ. (USA) [11215-8]

11:20 am: **Segmentation of cardiac tissues on optical coherence tomography via convolutional neural networks**, Ziyi Huang, Columbia Univ. (USA); Yu Gan, The Univ. of Alabama (USA); Theresa H. Lye, Darnel Theagene, Simeran Virdi, Spandana Chintapalli, Andrew Laine, Columbia Univ. (USA); Elsa Angelini, Imperial College London (United Kingdom) and Columbia Univ. (USA); Christine P. Hendon, Columbia Univ. (USA) [11215-9]

11:40 am: **Real-time fiber-bundle based multispectral imaging of cardiac tissue structure and monitoring of radiofrequency ablation therapy**, Soo Young Park, Rajinder P. Singh-Moon, Christine P. Hendon, Columbia Univ. (USA) [11215-10]

Lunch/Exhibition Break Sat 12:00 pm to 1:30 pm

SESSION 3

LOCATION: ROOM 54 (LOWER MEZZANINE SOUTH) . . . SAT 1:30 PM TO 3:10 PM

Optical Spectroscopy

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

1:30 pm: **Spatial frequency domain imaging of hemodynamic parameters in a murine model of hindlimb ischemia**, Katherine Leyba, Purdue Univ. (USA); Sandhya Vasudevan, Thomas O'Sullivan, Univ. of Notre Dame (USA); Craig Goergen, Purdue Univ. (USA) [11215-11]

1:50 pm: **Analysis diffusion and glycation rate of artery in high concentration sugar condition via autofluorescence of advanced glycation end products**, Chih-Ju Lin, National Taiwan Univ. (Taiwan); Jeon Woong Kang, Laser Biomedical Research Ctr., Massachusetts Institute of Technology (USA); Peter T. C. So, Laser Biomedical Research Ctr., Massachusetts Institute of Technology (USA); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) and Molecular Imaging Ctr., National Taiwan Univ. (Taiwan) [11215-12]

2:10 pm: **Visualization and quantification of biochemical markers of atherosclerotic plaque progression using intravascular fluorescence lifetime**, Julien Bec, Univ. of California, Davis (USA); Deborah Vela, The Texas Heart Institute (USA); Jennifer E. Phipps, Michael Agung, Jakob Unger, Univ. of California, Davis (USA); Kenneth B. Margulies, Cardiovascular Institute, Perelman School of Medicine, Univ. of Pennsylvania (USA); Maximilian Buja, The Texas Heart Institute (USA); Laura Marcu, Univ. of California, Davis (USA) [11215-13]

SUNDAY 2 FEBRUARY

SESSION 5

LOCATION: ROOM 54 (LOWER MEZZANINE SOUTH) . . SUN 8:00 AM TO 10:10 AM

Blood and Oximetry

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

8:00 am: **Optical sensing of haemostasis** (*Invited Paper*), Seemantini K. Nadkarni, Wellman Ctr. for Photomedicine (USA) [11215-20]

8:30 am: **Surface-enhanced Raman spectroscopy of human platelets as a perspective tool for antiplatelet therapy effectiveness prediction**, Andrey Y. Zyubin, Vladimir Rafalskiy, Ekaterina Moiseeva, Anna Tcibulnikova, Karina Matveeva, Alina Tsapkova, Iliia Samusev, Valery Bryukhanov, Immanuel Kant Baltic Federal Univ. (Russian Federation) [11215-21]

8:50 am: **Monitoring of platelets function using the laser speckle aggregometry**, Diane M. Tshikudi, Asael Papour, John Barranco, Matthew Applegate, Carlos Gomez, Ashvin Pande, Darren Roblyer, Boston Univ. (USA) [11215-22]

9:10 am: **Non-invasive estimation of arterial and venous oxygen saturation using ultra-fast frequency-domain oximetry (UFO)**, Raef Isifan, Matthew Applegate, Carlos Gomez, Ashvin Pande, Darren Roblyer, Boston Univ. (USA) [11215-23]

9:30 am: **Probing renal ischemia reperfusion-induced cardiac hypertrophy by a Raman spectroscopy**, Gabrielle L. J. T. Nepomuceno, Marcela Carneiro-Ramos, Herculano S. da Silva Martinho, Univ. Federal do ABC (Brazil) [11215-24]

9:50 am: **Optical spectroscopy to assess muscle oxygenation in infants undergoing extracorporeal life support**, Kenneth A. Schenkman, Univ. of Washington (USA); Andrew D. Mesher, Univ. of Colorado Denver (USA); D. Michael McMullan, Wayne A. Ciesielski, Faith J. Ross, Lorilee S. L. Arakaki, Univ. of Washington (USA) [11215-25]

Coffee Break. Sun 10:10 am to 10:40 am

SESSION 6

LOCATION: ROOM 54 (LOWER MEZZANINE SOUTH) . SUN 10:40 AM TO 12:00 PM

Microscopy

Session Chair: **Stanislav Y. Emelianov**, Georgia Tech Research Institute (USA)

10:40 am: **Live imaging and manipulation of cardiodynamics in mouse embryos** (*Invited Paper*), Irina V. Larina, Baylor College of Medicine (USA) [11215-28]

11:00 am: **Analysis of coronary microvasculature and myocardial nuclei orientation in embryonic hearts**, Maryse Lapiere-Landry, Case Western Reserve Univ. (USA); Hana Kolesova, Charles Univ. (Czech Republic); Yehe Liu, Michiko Watanabe, Michael W. Jenkins, Case Western Reserve Univ. (USA) [11215-29]

11:20 am: **Deep tissue contractility sensing with bio-integrated micro- and nanolaser**, Marcel Schubert, Univ. of St. Andrews (United Kingdom); Lewis Woolfson, Isla R. M. Barnard, Amy Dorward, Becky Casement, Andrew Morton, Gavin B. Robertson, Gareth B. Miles, Samantha J. Pitt, Univ. of St. Andrews (United Kingdom); Carl S. Tucker, The Univ. of Edinburgh (United Kingdom); Malte C. Gather, Univ. of St. Andrews (United Kingdom) . . [11215-30]

11:40 am: **Development of a polarized hyperspectral microscope for cardiac fiber orientation imaging**, Ximing Zhou, James D. Dormer, The Univ. of Texas at Dallas (USA); Baowei Fei, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) [11215-31]

BIOS SUNDAY PLENARY

LOCATION: ROOM 206/214 (SOUTH LEVEL TWO) SUN 7:15 PM TO 8:00 PM

Welcome and Award Presentation

John G. Greivenkamp, Univ. of Arizona (United States), 2020 SPIE President

Presentation of 2020 SPIE Biophotonics Technology Innovator Award
THE 2020 RECIPIENT

Nirmala Ramanujam,

Duke University, Durham, North Carolina, USA

Talk by 2014 Nobel Prize Winner in Physics:
Spying on the Secret Lives of Cells

Eric Betzig, Univ. of California, Berkeley and Howard Hughes Medical Institute (USA)

2:30 pm: **NIRF-IVUS molecular-structural intravascular imaging of coronary arteries using a miniaturized catheter**, Stephan Kellnberger, Mazen Albaghdadi, Wenzhuo Li, Adam Mauskapf, Vasilis Ntziachristos, Farouc A. Jaffer, Massachusetts General Hospital (USA) [11215-14]

2:50 pm: **Rapid optical spectroscopic quantification and mapping of human epicardial adipose tissue and lesion deposition**, Rajinder P. Singh-Moon, Diego Song Cho, Columbia Univ. (USA); Agastya Vaidya, Emory Univ. (USA); Charles C. Marboe, Elaine Y. Wan, Columbia Univ. Medical Ctr. (USA); Christine P. Hendon, Columbia Univ. (USA) [11215-15]

Coffee Break. Sat 3:10 pm to 3:40 pm

SESSION 4

LOCATION: ROOM 54 (LOWER MEZZANINE SOUTH) . . . SAT 3:40 PM TO 5:00 PM

New Techniques and Methods

Session Chair: **Gijs van Soest**, Erasmus Univ. Rotterdam (Netherlands)

3:40 pm: **Novel broadband freeform micro-optics for multimodal FLIm-OCT intravascular catheter**, Julien Bec, Cai Li, Laura Marcu, Univ. of California, Davis (USA) [11215-16]

4:00 pm: **FLIm guided Raman imaging for detecting bovine pericardium cross-links and calcification**, Tanveer Ahmed Shaik, Leibniz-Institut für Photonische Technologien e.V. (Germany); Alba Alfonso García, Xiangnan Zhou, Anne K. Haudenschield, Univ. of California, Davis (USA); Christoph Krafft, Leibniz-Institut für Photonische Technologien e.V. (Germany); Laura Marcu, Univ. of California, Davis (USA); Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany) [11215-17]

4:20 pm: **Biomechanical analysis of the embryonic mouse heart by optogenetic control**, Andrew L. Lopez III, Shang Wang, Irina V. Larina, Baylor College of Medicine (USA) [11215-18]

4:40 pm: **Design and assembly of InGaN LED matrix illumination scheme for ex-vivo optogenetics cardiac tissue pacing**, Ida Izadi, Abdulaziz Takrouni, Noreen Nudds, Kamil Gradkowski, Peter O'Brien, Brian Corbett, Tyndall National Institute (Ireland) [11215-19]

BIOS HOT TOPICS

LOCATION: ROOM 206/214 (SOUTH LEVEL TWO) SAT 7:00 PM TO 9:30 PM

7:00 PM: **Welcome and Opening Remarks**
BIOS 2020 Symposium Chair
Jennifer Barton, The Univ. of Arizona (USA)
BIOS 2020 Symposium Chair
Wolfgang Drexler, Medical Univ. of Vienna (Austria)

7:05 PM: **Presentation of 2019 Britton Chance Biomedical Optics Award by SPIE President**

7:10 PM: **Presentation by Steven Jacques, Univ. of Washington (USA); 2020 Britton Chance Biomedical Optics Award Winner**

7:30 PM: **Hot Topics Facilitator Remarks**
Sergio Fantini, Tufts Univ. (USA)

7:35 PM: **Optical Coherence Tomography from Research to Clinical Practice**
James Fujimoto, Massachusetts Institute of Technology (USA)

7:45 PM: **Computational Microscopy**
Laura Waller, Univ. of California, Berkeley (USA)

7:55 PM: **Seeing Early Cancer in a New Light**
Sarah Bohndiek, Univ. of Cambridge (United Kingdom)

8:05 PM: **Multiscale QPI**
Gabriel Popescu, Univ. of Illinois at Urbana-Champaign (USA)

8:15 PM: **Photoacoustic Imaging Assistants for Minimally Invasive Surgeries and Procedures**
Muyinatu A. Lediju Bell, Johns Hopkins Univ. (USA) *Journal of Biomedical Optics Speaker*

8:25 PM: **Interface of Radiation-Optical Interactions and Nanotechnology: Future Clinical Perspectives**
Ewa Goldys, Univ. of New South Wales (Australia)

8:35 PM: **Imaging the Proteome in Living Cells**
Bo Huang, Univ. of California, San Francisco (USA)

8:45 PM: **X-Induced Photodynamic Therapy**
Shawn Chen, NIH/NBIB (USA)

8:55 PM: **AI Cell Sorting**
Keisuke Goda, Univ. of Tokyo (Japan)

SUNDAY 2 FEBRUARY

SESSION 4

LOCATION: ROOM 202 (LEVEL 2 SOUTH) SUN 10:10 AM TO 12:00 PM

Imaging and Spectroscopy through Time and Space: Longitudinal Studies

Session Chair: **Darren M. Roblyer**, Boston Univ. (USA)

10:10 am: **Non-invasive intracranial pressure monitoring and neurovascular coupling assessment in the context of brain injury** (*Invited Paper*), Jana M. Kainerstorfer, Carnegie Mellon Univ. (USA) [11216-15]

10:40 am: **Key features in the optical properties of tissue during and after radiofrequency ablation**, Francis Kalloor Joseph, Univ. of Twente (Netherlands); Pranav Lanka, Politecnico di Milano (Italy); Hindrik Kruit, Univ. of Twente (Netherlands); Sanathana Konugolu Venkata Sekar, Andrea Farina, Rinaldo Cubeddu, Politecnico di Milano (Italy); Srirang Manohar, Univ. of Twente (Netherlands); Antonio Pifferi, Politecnico di Milano (Italy) ... [11216-16]

11:00 am: **Development of DRS-DCS system for measurement of oxygenation change in a rat model under anesthesia state**, Yoonho Oh, Gwangju Institute of Science and Technology (Korea, Republic of); Myeongsu Seong, Shanghai Jiao Tong Univ. (China); Sungchul Kim, Seonghyun Kim, Jae Gwan Kim, Gwangju Institute of Science and Technology (Korea, Republic of) [11216-17]

11:20 am: **High optode-density wearable probe for monitoring breast tumor hemodynamics: normal volunteer and initial clinical results**, Samuel Spink, Fei Teng, Vivian E. Pera, Hannah M. Peterson, Boston Univ. (USA); Adam T. Eggebrecht, Washington Univ. School of Medicine in St. Louis (USA); Naomi Yu Ko, Boston Medical Ctr. (USA); Darren M. Roblyer, Boston Univ. (USA) [11216-18]

11:40 am: **Separating scalp and brain layer hemodynamics on a single channel diffuse optical spectroscopy**, Sungchul Kim, Jae Gwan Kim, Gwangju Institute of Science and Technology (Korea, Republic of) .. [11216-19]

Lunch/Exhibition Break Sun 12:00 pm to 1:30 pm

SESSION 5

LOCATION: ROOM 202 (LEVEL 2 SOUTH) SUN 1:30 PM TO 3:20 PM

Multiscale Imaging in Oncology

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

1:30 pm: **Fluorescence lifetime techniques in oncology** (*Invited Paper*), Laura Marcu, Univ. of California, Davis (USA) [11216-20]

2:00 pm: **Electron transport chain protein knockouts induce changes in the autofluorescence of NAD(P)H and FAD**, Amani A. Gillette, Univ. of Wisconsin-Madison (USA); Jarred Rensvold, Morgridge Institute for Research (USA); Peter F. Favreau, Ava VanDommelen, Univ. of Wisconsin-Madison (USA); David Pagliarini, Melissa C. Skala, Morgridge Institute for Research (USA) and Univ. of Wisconsin-Madison (USA) [11216-21]

2:20 pm: **Spatial frequency domain imaging (SFDI) can identify treatment response earlier and with higher accuracy than tumor volume changes in a preclinical subcutaneous tumor model**, Syeda M. Tabassum, Fay Wang, David J. Waxman, Darren M. Roblyer, Boston Univ. (USA) [11216-22]

2:40 pm: **Label-free Raman spectroscopy to study radiation-induced biomolecular changes in animal model of head and neck cancer**, Sina Dadgar, Joel Rodríguez Troncoso, April F. Jules, Austin R. Dotson, Narasimhan Rajaram, Univ. of Arkansas (USA) [11216-23]

3:00 pm: **Heterogeneity of organelle morphology in 2D cell culture and 3D bioprinted breast tumor systems**, Ling Wang, Jamie Ward, Megan Boueya, Kate Tubbesing, Albany Medical College (USA); Cassie Roberge, David T. Corr, Rensselaer Polytechnic Institute (USA); Margarida Barroso, Albany Medical College (USA) [11216-24]

Coffee Break Sun 3:20 pm to 3:50 pm

SESSION 6

LOCATION: ROOM 202 (LEVEL 2 SOUTH) SUN 3:50 PM TO 5:40 PM

Emerging Sources of Multiscale Imaging Contrast

Session Chair: **Kristen C. Maitland**, Texas A&M Univ. (USA)

3:50 pm: **Cherenkov imaging to quantify radiation dose in human tissue** (*Invited Paper*), Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) [11216-25]

4:20 pm: **Hyperspectral shortwave infrared spatial frequency domain imaging for the extraction of water, lipids, and collagen concentrations in tissue and blood**, Anahita Pilvar, Boston Univ. (USA); Yanyu Zhao, Caltech (USA); Matthew B. Applegate, Samuel Spink, Boston Univ. (USA); Mark C. Pierce, Rutgers, The State Univ. of New Jersey (USA); Darren M. Roblyer, Boston Univ. (USA) [11216-26]

4:40 pm: **Investigation of a high-resolution optical inspection system for fabricated metallic nanostructures using structured illuminations**, Taerim Yoon, Heesang Ahn, Taeyeon Kim, 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) [11216-27]

5:00 pm: **Estimating receptor availability in altered tumor vasculature using MRI-coupled paired-agent fluorescence tomography**, Boyu Meng, Rendall R. Strawbridge, Kimberley S. Samkoe, Dartmouth College (USA); Negar Sadeghipour, Kenneth M. Tichauer, Illinois Institute of Technology (USA); Scott C. Davis, Dartmouth College (USA) [11216-28]

5:20 pm: **Advances in two-dimensional spatial frequency modulation imaging (SPIFI)**, Alyssa Allende Motz, Colorado School of Mines (USA); Randy A. Bartels, Colorado State Univ. (USA); John Czerski, Colorado School of Mines (USA); Jeffrey J. Field, Colorado State Univ. (USA); Daniel Scarbrough, Colorado School of Mines (USA); Patrick A. Stockton, Colorado State Univ. (USA); Jeffrey A. Squier, Colorado School of Mines (USA); Keith A. Wernsing, Colorado State Univ. (USA) [11216-29]

POSTERS-SUNDAY

LOCATION: MOSCONE CENTER, LEVEL 3 WEST SUN 5:30 PM TO 7:00 PM

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.

Poster Setup: Sunday 10:00 AM – 4:30 PM

View poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>

Optical simulations for determining efficacy of new light source designs for excitation-scanning high-speed hyperspectral imaging systems, Craig M. Browning, Joshua Deal, Samanitha Gunn Mayes, Marina Parker, Thomas C. Rich, Silas J. Leavesley, Univ. of South Alabama (USA) .. [11216-30]

Optical coherence microscopy using topography mapping, Kibeom Park, Yujin Ahn, Jung Kweon Bae, Gahyang Lee, Myung-Ju Kim, Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of) [11216-31]

Automatic time gating for time-domain diffuse correlation spectroscopy, Akhil Goel, MIT Lincoln Lab. (USA) and Georgia Institute of Technology (USA); Lorenzo C. Vigano, Massachusetts Institute of Technology (USA); Mitchell B. Robinson, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA) and Harvard-MIT Health Sciences and Technology (USA); Stefan A. Carp, Maria A. Franceschini, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Megan H. Blackwell, MIT Lincoln Lab. (USA) [11216-32]

Multimodal and multiscale visualization of cancerous tissue using coherence gating optical imaging and computed tomography, Myung-Ju Kim, Kibeom Park, Yujin Ahn, Ga Hyang Lee, Soo-Ah Park, Ulsan National Institute of Science and Technology (Korea, Republic of); Jin Seok Kang, Namseoul Univ. (Korea, Republic of); Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of) [11216-33]

Femtosecond third-order sum frequency and four-wave mixing imaging, Evan P. Perillo, NanoString Technologies, Inc (USA); Mary E. Phipps, Los Alamos National Lab. (USA); Jennifer Martinez, Northern Arizona Univ. (USA); Anatoly Efimov, Los Alamos National Lab. (USA) [11216-34]

Dynamic range enhancement for diffuse optical spectroscopy in breast scanning applications, Mi Zhou, Zhi Yih Lim, Farid Golnaraghi, Majid Shokoufi, Simon Fraser Univ. (Canada) [11216-35]

BIOS

CONFERENCE 11218

LOCATION: ROOM 303 (LEVEL 3 SOUTH)

Saturday–Sunday 1–2 February 2020 • Proceedings of SPIE Vol. 11218

Ophthalmic Technologies XXX

Conference Chairs: **Fabrice Manns**, Univ. of Miami (USA); **Arthur Ho**, Brien Holden Vision Institute (Australia); **Per G. Söderberg**, Uppsala Univ. (Sweden)

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 Farsiu**, 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**, Saratov State Univ. (Russian Federation), Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control of the RAS (Russian Federation); **Robert J. Zawadzki**, Univ. of California, Davis (USA)

SATURDAY 1 FEBRUARY

SESSION 1

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SAT 8:15 AM TO 10:00 AM

Imaging, Surgery, and Therapy: New Technologies I

Session Chairs: **Robert J. Zawadzki**, Univ. of California, Davis (USA); **Georg Schuele**, Johnson & Johnson Vision (USA)

8:15 am: **Ultrafast, precise and robust human eye motion detection with a novel MEMS-based retinal tracker.** Maciej M. Bartuzel, Nicolaus Copernicus Univ. (Poland); Michal Meina, Maciej Nowakowski, AM2M Sp. z.o.o. sp. k. (Poland); Krystian Wrobel, Szymon Tamborski, Nicolaus Copernicus Univ. (Poland); Krzysztof Dalasi?ski, Anna Szkulmowska, AM2M Sp. z.o.o. sp. k. (Poland); Maciej Szkulmowski, Nicolaus Copernicus Univ. (Poland) ... [11218-1]

8:30 am: **Feasibility of oblique scanning laser ophthalmoscope (oSLO) on a human eye model.** Wenjun Shao, Boston Univ. (USA)..... [11218-2]

8:45 am: **Motion-free optical coherence tomography imaging of retinal disease using Lissajous scanning pattern.** Shuichi Makita, Univ. of Tsukuba (Japan); Masahiro Miura, Ibaraki Medical Ctr., Tokyo Medical Univ. (Japan); Toshihiro Mino, Topcon Corp. (Japan); Shinnosuke Azuma, Univ. of Tsukuba (Japan) and Topcon Corp. (Japan); Tatsuo Yamaguchi, Topcon Corp. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan)..... [11218-3]

9:00 am: **In-vivo quantification of the nerve fiber layer with transscleral optical phase imaging.** Timothé Laforest, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Mathieu Künzi, EarlySight SA (Switzerland); Florentino Caetano Dos Santos, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Laura Kowalczyk, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Hôpital ophtalmique Jules-Gonin, Univ. de Lausanne (Switzerland); Irmela Mantel, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Francine Behar-Cohen, INSERM (France); Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland)..... [11218-4]

9:15 am: **Holographic display for optical retinal prosthesis: design and validation.** Shani Rosen, Moshe Gur, Technion-Israel Institute of Technology (Israel); Shy Shoham, NYU Langone Health (USA)..... [11218-5]

9:30 am: **Photoablation of human vitreous opacities by light-induced vapor nanobubbles.** Félix Sauvage, Juan C. Fraire, Katrien Remaut, Univ. Gent (Belgium); Jerry Sebag, VMR Institute (USA); Karen Peynshaert, Univ. Gent (Belgium); Frans J. Van de Velde, Schepens Eye Institute (USA); Ranhua Xiong, Univ. Gent (Belgium); Marie-José Tassinon, Univ. Ziekenhuis Antwerpen (Belgium); Toon Brans, Kevin Braeckmans, Stefaan C. De Smedt, Univ. Gent (Belgium)..... [11218-6]

9:45 am: **Real-time temperature controlled retinal laser therapies.** Ralf Brinkmann, Medizinisches Laserzentrum Lübeck GmbH (Germany)..... [11218-7]

Coffee Break.....Sat 10:00 am to 10:30 am

SESSION 2

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SAT 10:30 AM TO 11:30 AM

Angiography and Blood Flow

Session Chair: **Yuankai Kenny K. Tao**, Vanderbilt Univ. (USA)

10:30 am: **Automated choroidal neovascularization diagnosis and quantification using convolutional neural networks in OCT angiography.** Jie Wang, Tristan Hormel, Liqin Gao, Pengxiao Zang, Yukun Guo, Steven T. Bailey, Yali Jia, Oregon Health & Science Univ. (USA)..... [11218-51]

10:45 am: **Visible light optical coherence tomography angiography (vis-OCTA) in human retina for small vessel blood oxygenation.** Weiye Song, Boston Univ. (USA); Steven Ness, Manishi Desai, Boston Medical Ctr. (USA); Ji Yi, Boston Univ. (USA)..... [11218-9]

11:00 am: **Non-invasive optical measurement of hemoglobin concentration in human retinal vessels.** Johannes Kübler, Vrije Univ. Amsterdam (Netherlands) and Heidelberg Engineering GmbH (Germany); Mathi Damodaran, Vrije Univ. Amsterdam (Netherlands) and Philips Research (Netherlands); Arjen Amelink, TNO (Netherlands); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands)..... [11218-10]

11:15 am: **Clinical trial of retinal and choroidal angiography by laser Doppler holography.** Michael Atlan, Leo Puyo, Institut Langevin Ondes et Images (France); Michel Paques, José-Alain Sahel, Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France); Mathias Fink, Institut Langevin Ondes et Images (France)..... [11218-11]

PASCAL ROL LECTURE

LOCATION: ROOM 303 (LEVEL 3 SOUTH) 11:30 AM TO 12:15 PM

Session Chair: **Per G. Söderberg**, Uppsala Univ. (Sweden)

11:30 am: **Achievements and need for technologies to advance retinal disease management in children and image-guided retinal surgery (Invited Paper).** Cynthia A. Toth, Duke Univ. Medical Ctr. (USA)..... [11218-12]

Lunch/Exhibition Break.....Sat 12:15 pm to 1:45 pm

CONFERENCE 11218

SESSION 3

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SAT 1:45 PM TO 3:30 PM

Ophthalmic Imaging and Diagnosis: Clinical

Session Chair: **Marco Ruggeri**, Bascom Palmer Eye Institute (USA)

1:45 pm: **Clinical Megahertz-OCT for ophthalmic applications.** Michael Niederleithner, Anja Britten, Laurin Ginner, Matthias Salas, Medizinische Univ. Wien (Austria); Hugang Ren, Muzammil A. Arain, Rick A. Williams, Carl Zeiss Meditec, Inc. (USA); Wolfgang Drexler, Rainer A. Leitgeb, Medizinische Univ. Wien (Austria); Tilman Scholl, Carl Zeiss Meditec, Inc. (USA) [11218-13]

2:00 pm: **360 degree reconstruction of Schlemm's Canal using swept-source OCT at 1060 nm.** Xinwen Yao, Kavya Devarajan, Singapore Eye Research Institute (Singapore); Damon Wong, Nanyang Technological Univ. (Singapore); Jacqueline Chua, Bingyao Tan, Leopold Schmetterer, Singapore Eye Research Institute (Singapore) [11218-14]

2:15 pm: **In vivo vitreous imaging using optical coherence tomography.** Daniel Ruminski, Ashish Gupta, Nicolaus Copernicus Univ. (Poland); Jerry Sebag, VMR Institute (USA); Silvestre Manzanera, Pablo Artal, Univ. de Murcia (Spain); Ireneusz Grulkowski, Nicolaus Copernicus Univ. (Poland) [11218-15]

2:30 pm: **In vivo quantification of Bruch's membrane in humans with visible light OCT.** Tingwei Zhang, Aaron Kho, Univ. of California, Davis (USA); Vyas Akondi, Alfredo Dubra, Stanford Univ. (USA); Vivek Srinivasan, Univ. of California, Davis (USA) [11218-16]

2:45 pm: **Fully automatic estimation of the angular distribution of the waist of the nerve fiber layer in the optic nerve head.** Gabriel Carrizo, Uppsala Univ. (Finland); Zhaohua Yu, Uppsala Univ. (Sweden); Chunliang Wang, KTH Royal Institute of Technology (Sweden); Camilla Sandström Melin, Per G. Söderberg, Uppsala Univ. (Sweden) [11218-17]

3:00 pm: **Quantitative curvature maps of the ocular posterior segment utilizing OCT with demonstration of local shape change over time.** Ryan P. McNabb, Alice S. Liu, Sidney M. Gospe III, Mays El Dairi, Charlene James, Robin R. Vann, Duke Univ. School of Medicine (USA); Joseph A. Izatt, Duke Univ. (USA) and Duke Univ. School of Medicine (USA); Anthony N. Kuo, Duke Univ. School of Medicine (USA) and Duke Univ. (USA) [11218-18]

3:15 pm: **Real time volumetric intrasurgical optical coherence tomography with 4D visualization of surgical maneuvers.** Christian Viehland, Al-Hafeez Z. Dhalla, Jianwei D. Li, Moseph Jackson-Atogi, Duke Univ. (USA); Lejla Vajzovic, Duke Univ. School of Medicine (USA); Anthony N. Kuo, Cynthia A. Toth, Joseph A. Izatt, Duke Univ. (USA) [11218-19]

Coffee Break Sat 3:30 pm to 4:00 pm

SESSION 4

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SAT 4:00 PM TO 6:00 PM

Ophthalmic Imaging: Cellular

Session Chairs: **Donald T. Miller**, Indiana Univ. (USA); **Kostadinka Bizheva**, Univ. of Waterloo (Canada)

4:00 pm: **In vivo corneal endothelium imaging using ultrahigh resolution OCT.** Xinwen Yao, Kavya Devarajan, Singapore Eye Research Institute (Singapore); René Werkmeister, Valentin Aranha dos Santos, Medizinische Univ. Wien (Austria); Amutha Barathi Veluchamy, Marcus Ang, Singapore Eye Research Institute (Singapore); Anthony N. Kuo, Duke Univ. (USA); Damon Wong, Nanyang Technological Univ. (Singapore); Jacqueline Chua, Bingyao Tan, Singapore Eye Research Institute (Singapore); Leopold Schmetterer, Singapore Eye Research Institute (Singapore) and Medizinische Univ. Wien (Austria) and Nanyang Technological Univ. (Singapore) [11218-20]

4:15 pm: **Investigating corneal nerve structures using micro optical coherence tomography.** Andreas Wartak, Harvard Medical School (USA); Carolin Elhardt, Christian M. Wertheimer, Jie Zhao, Wellman Ctr. for Photomedicine (USA); Hui Min Leung, Biwei Yin, Harvard Medical School (USA); Stefan A. Kassumeh, Merle S. Schenk, Wellman Ctr. for Photomedicine (USA); Guillermo J. Tearney, Harvard Medical School (USA); Reginald Birngruber, Wellman Ctr. for Photomedicine (USA) [11218-21]

4:30 pm: **Curved-field optical coherence tomography: a tool for large field imaging of corneal cells and nerves.** Viacheslav Mazlin, Institut Langevin Ondes et Images (France); Kristina Irsch, Institut de la Vision, Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France); Mathias Fink, Claude Boccara, Institut Langevin Ondes et Images (France) [11218-22]

4:45 pm: **In-vivo, non-contact, cellular resolution imaging of the human limbus with line-field SD-OCT at 2.5 kHz frame rate.** Le Han, Zohreh Hosseinaee, Lin Kun Chen, Kostadinka Bizheva, Univ. of Waterloo (Canada) [11218-23]

5:00 pm: **Characterizing retinal ganglion cell morphology in glaucomatous eyes with adaptive optics: optical coherence tomography.** Zhuolin Liu, U.S. Food and Drug Administration (USA); Ricardo Villanueva, Univ. of Maryland School of Medicine (USA); Anant Agrawal, U.S. Food and Drug Administration (USA); Osamah Saeedi, Univ. of Maryland School of Medicine (USA); Daniel X. Hammer, U.S. Food and Drug Administration (USA) [11218-24]

5:15 pm: **Fully automatic quantification of individual ganglion cells from AO-OCT volumes via weakly supervised learning.** Somayeh Soltanian-Zadeh, Duke Univ. (USA); Kazuhiro Kurokawa, Indiana Univ. (USA); Zhuolin Liu, Daniel X. Hammer, U.S. Food and Drug Administration (USA); Donald T. Miller, Indiana Univ. (USA); Sina Farsiu, Duke Univ. (USA) [11218-25]

5:30 pm: **In-vivo demonstration of AO-OCT with a 3-sided pyramid wavefront sensor.** Elisabeth F. Brunner, Medizinische Univ. Wien (Austria); Iulia Shatokhina, Johannes Kepler Univ. Linz (Austria); Muhammad Faizan Shirazi, Wolfgang Drexler, Christoph K. F. Hitzenberger, Rainer A. Leitgeb, Medizinische Univ. Wien (Austria); Ronny Ramlau, Johannes Kepler Univ. Linz (Austria); Michael Pircher, Medizinische Univ. Wien (Austria) [11218-26]

5:45 pm: **Increased field-of-view full-field OCT for 3D high-resolution retinal imaging.** Pedro Mecé, Kassandra Groux, Jules Scholler, Mathias Fink, Institut Langevin Ondes et Images (France); Kate Grieve, Ctr. Hospitalier National d'Ophthalmologie des Quinze-Vingts (France); Claude Boccara, Institut Langevin Ondes et Images (France) [11218-27]

BIOS HOT TOPICS

LOCATION: ROOM 206/214 (SOUTH LEVEL TWO) SAT 7:00 PM TO 9:30 PM

- 7:00 PM: **Welcome and Opening Remarks**
BIOS 2020 Symposium Chair
Jennifer Barton, The Univ. of Arizona (USA)
BIOS 2020 Symposium Chair
Wolfgang Drexler, Medical Univ. of Vienna (Austria)
- 7:05 PM: **Presentation of 2019 Britton Chance Biomedical Optics Award by SPIE President**
- 7:10 PM: **Presentation by Steven Jacques, Univ. of Washington (USA); 2020 Britton Chance Biomedical Optics Award Winner**
- 7:30 PM: **Hot Topics Facilitator Remarks**
Sergio Fantini, Tufts Univ. (USA)
- 7:35 PM: **Optical Coherence Tomography from Research to Clinical Practice**
James Fujimoto, Massachusetts Institute of Technology (USA)
- 7:45 PM: **Computational Microscopy**
Laura Waller, Univ. of California, Berkeley (USA)
- 7:55 PM: **Seeing Early Cancer in a New Light**
Sarah Bohndiek, Univ. of Cambridge (United Kingdom)
- 8:05 PM: **Multiscale QPI**
Gabriel Popescu, Univ. of Illinois at Urbana-Champaign (USA)
- 8:15 PM: **Photoacoustic Imaging Assistants for Minimally Invasive Surgeries and Procedures**
Muyinatu A. Lediju Bell, Johns Hopkins Univ. (USA) *Journal of Biomedical Optics Speaker*
- 8:25 PM: **Interface of Radiation-Optical Interactions and Nanotechnology: Future Clinical Perspectives**
Ewa Goldys, Univ. of New South Wales (Australia)
- 8:35 PM: **Imaging the Proteome in Living Cells**
Bo Huang, Univ. of California, San Francisco (USA)
- 8:45 PM: **X-Induced Photodynamic Therapy**
Shawn Chen, NIH/NBIB (USA)
- 8:55 PM: **AI Cell Sorting**
Keisuke Goda, Univ. of Tokyo (Japan)

SUNDAY 2 FEBRUARY

SESSION 5

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SUN 8:20 AM TO 10:00 AM

Ocular Biomechanics

Joint Session with Conferences 11242 and 11218

Session Chairs: **Kirill V. Larin**, Univ. of Houston (USA);
Giuliano Scarcelli, Univ. of Maryland, College Park (USA)

8:20 am: **Clinical assessment of ocular biomechanics** (*Invited Paper*),
Cynthia J. Roberts, The Ohio State Univ. (USA) [11242-20]

8:40 am: **Characterization of biomechanical properties of crystalline lens using Brillouin microscopy and optical coherence elastography**,
Yogeshwari Ambekar, Univ. of Houston (USA); Jitao Zhang, Univ. of Maryland, College Park (USA); Achuth Nair, Manmohan Singh, Salavat R. Aglyamov, Univ. of Houston (USA); Giuliano Scarcelli, Univ. of Maryland, College Park (USA); Kirill V. Larin, Univ. of Houston (USA) [11218-28]

8:55 am: **All-optical correlative micro-spectroscopies in the investigation of stromal collagen morpho-mechanics**, Raffaella Mercatelli, Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Sara Mattana, Istituto Nazionale di Ottica (Italy); Laura Capozzoli, Istituto di Fisica Applicata "Nello Carrara", Consiglio Nazionale delle Ricerche (Italy) and Istituto di Chimica dei Composti Organometallici (Italy); Fulvio Ratto, Istituto di Fisica Applicata "Nello Carrara" (Italy); Francesca Rossi, Istituto di Fisica Applicata "Nello Carrara", Consiglio Nazionale delle Ricerche (Italy); Roberto Pini, Istituto di Fisica Applicata "Nello Carrara" (Italy); Daniele Fioretto, Univ. degli Studi di Perugia (Italy); Francesco Saverio Pavone, Istituto Nazionale di Ottica (Italy) and Univ. degli Studi di Firenze (Italy); Silvia Caponi, Istituto Officina dei Materiali, Consiglio Nazionale delle Ricerche (Italy); Riccardo Cicchi, Istituto Nazionale di Ottica (Italy) [11218-29]

9:10 am: **Customized swept-source optical coherence tomography system for air-puff induced corneal deformation imaging on multiple meridians**,
Andrea Curatolo, Judith Birkenfeld, Eduardo Martínez, James A. Germann, Consejo Superior de Investigaciones Científicas (Spain); Jesús Palací, 2Eyes Vision SL (Spain); Daniel Pascual, Geethika Muralidharan, Consejo Superior de Investigaciones Científicas (Spain); Jędrzej Solarski, Karol Karnowski, Maciej Wojtkowski, Institute of Physical Chemistry (Poland); Susana Marcos, Consejo Superior de Investigaciones Científicas (Spain) [11218-30]

9:25 am: **Phase-decorrelation OCT for detection of corneal softening in an enzymatic ex vivo model of ectasia**, Brecken J. Blackburn, John P. Murray, Case Western Reserve Univ. (USA); Matthew R. Ford, Cleveland Clinic (USA); Michael W. Jenkins, Case Western Reserve Univ. (USA); William J. Dupps Jr., Cleveland Clinic (USA); Andrew M. Rollins, Case Western Reserve Univ. (USA) [11218-31]

9:40 am: **Corneal dynamic imaging and second harmonic generation to evaluate in vivo corneal cross-linking** (*Invited Paper*), Susana Marcos, Instituto de Óptica "Daza de Valdés" (Spain) [11242-21]

Coffee Break. Sun 10:00 am to 10:30 am

SESSION 6

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SUN 10:30 AM TO 11:45 AM

Imaging, Surgery, and Therapy: New Technologies II

Session Chairs: **Ezra Maguen**, American Eye Institute (USA);
Daniel V. Palanker, Stanford Univ. (USA)

10:30 am: **Wavefront sensorless multimodal handheld adaptive optics scanning laser ophthalmoscope for in vivo imaging of human retinal cones**, Kristen Hagan, Theodore DuBose, David Cunefare, Gar Waterman, Jongwan Park, Ryan P. McNabb, Anthony N. Kuo, Joseph A. Izatt, Sina Farsiu, Duke Univ. (USA) [11218-32]

10:45 am: **OCT on a chip: in-vivo retinal imaging using Photonic Integrated Circuit based spectral domain and swept source OCT at 840nm**,
Elisabet A. Rank, Ryan Sentosa, Anna Gaugutz, Matthias Salas, Danielle J. Harper, Medizinische Univ. Wien (Austria); Stefan Nevlacsil, Alejandro Maese-Novo, Paul Mueller, Rainer Hainberger, AIT Austrian Institute of Technology GmbH (Austria); Dana Seyringer, FH Vorarlberg (Austria); Moritz Eggeling, AIT Austrian Institute of Technology GmbH (Austria); Stefan Partel, FH Vorarlberg (Austria); Marcus Duell, Stefan Gloor, EXALOS AG (Switzerland); Nanko Verwaal, Fraunhofer-Institut für Integrierte Schaltungen IIS (Germany); Gerhard Meinhardt, Martin Sagmeister, Jochen Kraft, ams AG (Austria); Moises A. Jezzini de Anda, Zhiheng Guan, Tyndall National Institute (Ireland); Stefan Richter, Michael Kempe, Carl Zeiss AG (Germany); Rainer A. Leitgeb, Wolfgang Drexler, Medizinische Univ. Wien (Austria) [11218-33]

11:00 am: **The EVOKON study: detecting AMD biomarkers with OA-FF-TD OCT**, Peter Koch, Helge Sudkamp, Michael Münst, Moritz Moltmann, Medizinisches Laserzentrum Lübeck GmbH (Germany); Claus von der Burchard, Universitätsklinikum Schleswig-Holstein (Germany); Reginald Birngruber, Medizinisches Laserzentrum Lübeck GmbH (Germany); Johann Roeder, Universitätsklinikum Schleswig-Holstein (Germany); Gereon Huettmann, Malte vom Endt, Medizinisches Laserzentrum Lübeck GmbH (Germany) [11218-34]

11:15 am: **Combined OCT and wavefront aberrometer using a single beam delivery system**, Marco Ruggeri, Bascom Palmer Eye Institute (USA) and Univ. of Miami (USA); Giulia Belloni, Bascom Palmer Eye Institute (USA) and Univ. degli Studi di Modena e Reggio Emilia (Italy); Brandon Chou, Larissa L. Meza, Yu-Cherng Channing, Heather A. Durkee, Jean-Marie Parel, Fabrice Manns, Bascom Palmer Eye Institute (USA) and Univ. of Miami (USA) [11218-35]

11:30 am: **Low-cost, portable confocal scanning laser ophthalmoscope for remote screening and telemedicine applications**, Al-Hafeez Z. Dhalla, Jongwan Park, Christian Viehland, Sina Farsiu, Anthony N. Kuo, Joseph A. Izatt, Duke Univ. (USA) [11218-36]

Lunch/Exhibition Break Sun 11:45 am to 1:15 pm

SESSION 7

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SUN 1:15 PM TO 3:15 PM

Ophthalmic Imaging: Functional

Session Chairs: **Yuankai Kenny K. Tao**, Vanderbilt Univ. (USA);
Luigi Rovati, Univ. degli Studi di Modena e Reggio Emilia (Italy)

1:15 pm: **Adaptive optics line-scan OCT for high-speed imaging of retinal structure and function**, Vimal Prabhu Pandiyan, Aiden M. Bertelli, James Kuchenbecker, Univ. of Washington (USA); Kevin C. Boyle, Tong Ling, Stanford Univ. (USA); B. Hyle Park, Univ. of California, Riverside (USA); Daniel Palanker, Stanford Univ. (USA); Austin Roorda, Univ. of California, Berkeley (USA); Ramkumar Sabesan, Univ. of Washington (USA) ... [11218-37]

1:30 pm: **Investigating the functional response of human photoreceptors with combined adaptive optics SLO-OCT system**, Mehdi Azimipour, Denise Valente, Kari V. Vienola, John S. Werner, Robert J. Zawadzki, Ravi S. Jonnal, UC Davis Medical Ctr. (USA) [11218-38]

1:45 pm: **Label-free imaging of neural function in the living human retina using phase sensitive adaptive optics optical coherence tomography**, Kazuhiro Kurokawa, Furu Zhang, James A. Crowell, Marcel T. Bernucci, Donald T. Miller, Indiana Univ. (USA) [11218-39]

2:00 pm: **Measuring dysfunction of cone photoreceptors in retinitis pigmentosa with phase-sensitive AO-OCT**, Ayoub Lassoued, Furu Zhang, Kazuhiro Kurokawa, James A. Crowell, Donald T. Miller, Indiana Univ. (USA) [11218-40]

2:15 pm: **Investigating the influence of cone function and relative proportions of cone types on color perception using phase-sensitive adaptive optics optical coherence tomography**, Furu Zhang, Kazuhiro Kurokawa, Marcel T. Bernucci, Hae Won Jung, James A. Crowell, Donald T. Miller, Indiana Univ. (USA) [11218-41]

2:30 pm: **Measuring the spectral sensitivity of cone photoreceptors in human subjects with phase-sensitive AO-OCT**, Marcel T. Bernucci, Furu Zhang, Kazuhiro Kurokawa, James A. Crowell, Donald T. Miller, Indiana Univ. (USA) [11218-42]

2:45 pm: **Microglia distribution and motility in human eyes measured with adaptive optics - optical coherence tomography (AO-OCT)**, Daniel X. Hammer, U.S. Food and Drug Administration (USA); Ricardo Villanueva, Univ. of Maryland School of Medicine (USA); Anant Agrawal, U.S. Food and Drug Administration (USA); Osamah Saeedi, Univ. of Maryland School of Medicine (USA); Zhuolin Liu, U.S. Food and Drug Administration (USA) [11218-43]

3:00 pm: **Method to evaluate spatial dynamics of inner retinal neurons near arcuate scotomas in glaucomatous patients**, Hae Won Jung, Kazuhiro Kurokawa, John C. Hinely, James A. Crowell, Furu Zhang, Brett J. King, William H. Swanson, Donald T. Miller, Indiana Univ. (USA) [11218-44]

Coffee Break. Sun 3:15 pm to 3:45 pm

CONFERENCE 11218

SESSION 8

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SUN 3:45 PM TO 5:00 PM

Small Animal Models

Session Chairs: **Marco Ruggeri**, Bascom Palmer Eye Institute (USA);
Roberto Pini, Istituto di Fisica Applicata "Nello Carrara" (Italy)

3:45 pm: **Effect of a mild, diffuse central retinal edema on light evoked outer retina optophysiology signals measured in vivo in mice with optical coherence tomography**, Robert J. Zawadzki, Pengfei Zhang, Ratheesh K. Meleppat, Edward N. Pugh Jr., Univ. of California, Davis (USA) [11218-45]

4:00 pm: **Longitudinal structural and microvascular observation in RCS rat eyes using Optical Coherence Tomography Angiography**, Bingyao Tan, Xinwen Yao, Amutha Barathi Veluchamy, Anita Chan, Gavin Tan, Leopold Schmetterer, Singapore Eye Research Institute (Singapore) [11218-46]

4:15 pm: **Characterization of retinal changes in a mouse model of Alzheimer's disease using multi-contrast optical coherence tomography**, Bernhard Baumann, Danielle J. Harper, Antonia Lichtenegger, Johanna Gesperger, Medizinische Univ. Wien (Austria); Tanja Himmel, Veterinaermedizinische Univ. Wien (Austria); Martina Muck, Conrad W. Merkle, Pablo Eugui, Medizinische Univ. Wien (Austria); Stefan Kummer, Veterinaermedizinische Univ. Wien (Austria); Adelheid Woehrer, Medizinische Univ. Wien (Austria); Martin Glösmann, Veterinaermedizinische Univ. Wien (Austria); Marco Augustin, Medizinische Univ. Wien (Austria) [11218-47]

4:30 pm: **Combined scattering and fluorescent measurement of the retina in vivo reveals disease-dependent changes in intrinsic fluorophores of retinal pigment epithelium**, Ratheesh K. Meleppat, Gabriel Peinado, Kaitryn E. Ronning, Sarah J. Karlen, Pengfei Zhang, Edward N. Pugh Jr., Robert J. Zawadzki, Univ. of California, Davis (USA) [11218-48]

4:45 pm: **OCT and fluorescence SLO for guided laser delivery and longitudinal imaging in a murine model of targeted retinal laser injury**, Joseph D. Malone, Edward M. Levine, Yuankai K. Tao, Vanderbilt Univ. (USA) [11218-49]

SESSION 9

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SUN 5:00 PM TO 6:00 PM

Ophthalmic Diagnosis: Contrast and Biomarkers

Session Chairs: **Arthur Ho**, Brien Holden Vision Institute (Australia);
Ralf Brinkmann, Medizinisches Laserzentrum Lübeck GmbH (Germany)

5:00 pm: **Ocular surface squamous neoplasia characterization using non-invasive multispectral autofluorescence imaging**, Abbas Habibalahi Sr., The Univ. of New South Wales (Australia); Alexandra Allende, Macquarie Univ. (Australia); Ayad Anwer, The Univ. of New South Wales (Australia); Chandra Bala, Macquarie Univ. (Australia); Eva Goldys, The Univ. of New South Wales (Australia) [11218-50]

5:15 pm: **Analysing birefringence in the retinal nerve fiber layer of diabetic patients using polarization sensitive OCT**, Sylvia Desissaire, Andreas Pollreis, Felix Datlinger, Dorotya Hajdu, Stefan Steiner, Clemens Vass, Michael Pircher, Ursula Schmidt-Erfurth, Christoph K. F. Hitznerberger, Medizinische Univ. Wien (Austria) [11218-8]

5:30 pm: **Retinal pigment epithelium-melanin specific contrast imaging by multi-contrast OCT**, Masahiro Miura, Ibaraki Medical Ctr., Tokyo Medical Univ. (Japan); Shuichi Makita, Univ. of Tsukuba (Japan); Shinnosuke Azuma, Univ. of Tsukuba (Japan) and Topcon Corp. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan); Toshihiro Mino, Tatsuo Yamaguchi, Topcon Corp. (Japan); Satoshi Sugiyama, Tomey Corp. (Japan); Takuya Iwasaki, Tokyo Medical Univ. (Japan) [11218-52]

5:45 pm: **Visualizing orientation of retinal nerves and depolarization in the choroid using polarization-sensitive optical coherence tomography**, Joy Willems, Johannes F. de Boer, Maximilian Gräfe, Vrije Univ. Amsterdam (Netherlands); Aleid van de Kreeke, Frank Verbraak, Amsterdam UMC (Netherlands) [11218-53]

POSTERS-SUNDAY

LOCATION: MOSCONE CENTER, LEVEL 3 WEST SUN 5:30 PM TO 7:00 PM

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.

Poster Setup: Sunday 10:00 AM – 4:30 PM

View poster presentation guidelines and set-up instructions at
<http://spie.org/PWPosterGuidelines>

Employing toric eye model and wavefront measurement technology to study soft contact lens on-eye wrapping properties, Minghan Chen, Xin Wei, Philippe Jubin, Johnson & Johnson Vision Care, Inc. (USA) . [11218-54]

Application of an enhanced deep super-resolution network in retinal image analysis, Tanmay Gulati, Manipal Institute of Technology (India); Sourya Sengupta, Vasudevan Lakshminarayanan, School of Optometry and Vision Science, Univ. of Waterloo (Canada) [11218-55]

Analysis of tear film break-up time based on the tear film surface quality obtained using Placido rings images, Lucas Orlandi de Oliveira, André Orlandi de Oliveira, Jarbas Caiado de Castro Neto, Univ. de São Paulo (Brazil) [11218-56]

Expanded visualization of the human crystalline lens and suspensory ligament using the large-angle oblique illumination OCT, Byeong-Joo Song, Hyung-Jin Kim, Youngwoon Choi, Beop-Min Kim, Korea Univ. (Korea, Republic of) [11218-57]

Prototype for blue light blocking tests in sunglasses, Artur D. Loureiro, Liliane Ventura, Univ. de São Paulo (Brazil) [11218-58]

Comparison of foveal avascular zone in diabetic retinopathy, high myopia and normal fundus images, Jothi J. Balaji, Medical Research Foundation, Sankara Nethralaya (India); Arpit Agarwal, Indian Institute of Technology Kanpur (India); Vasudevan Lakshminarayanan, Univ. of Waterloo (Canada) .. [11218-59]

Deep learning for detection of diabetic retinopathy in OCTA, David Le, Minhaj Nur Alam, Jennifer I. Lim, R.V. Paul Chan, Xincheng Yao, Univ. of Illinois at Chicago (USA) [11218-60]

UV and BLUE light protection on sunglasses after aging process, Liliane Ventura, Mauro Masili, Univ. de São Paulo (Brazil) [11218-61]

A new technique for estimating the foveal avascular zone dimensions, Arpit Agarwal, Indian Institute of Technology Kanpur (India); Jothi J. Balaji, Elite School of Optometry (India); Vasudevan Lakshminarayanan, Univ. of Waterloo (Canada) [11218-62]

Tracking longitudinal retinal changes in an ocular hypertension mouse model by visible and near-infrared optical coherence tomography (vnOCT), Weiye Song, Sipei Fu, Shangshang Song, Boston Univ. (USA); Sui Zhang, Dana-Farber Cancer Institute (USA); Lei Zhang, Boston Univ. (USA); Steven Ness, Manishi Desai, Boston Medical Ctr. (USA); Ji Yi, Boston Univ. (USA) [11218-63]

Morphological diversity of lacrimal canaliculus observed by dynamic OCT with extrinsic contrast agent, Reiko Yoshimura, Dong-hak Choi, Kitasato Univ. (Japan); Masahiro Fujimoto, Akihito Uji, Kyoto Univ. Graduate School of Medicine (Japan); Kohji Ohbayashi, Advanced Imaging Co., Ltd. (Japan) and Systems Engineering Inc. (Japan); Fumiko Hiwatashi, Systems Engineering Inc. (Japan) [11218-64]

An optical design for choriocapillaris visualization with OCTA using tracking scanning laser ophthalmoscope, Kari V. Vienola, Ravi S. Jonnal, John S. Werner, Robert J. Zawadzki, Univ. of California, Davis (USA) [11218-65]

SS-OCT reveals crystalline lens sutures, Ashish Gupta, Nicolaus Copernicus Univ. (Poland) [11218-66]

New high-resolution wave front sensing ophthalmic technique for the characterization of ocular optics, Sergio Bonaque-González, Jan O. Gaudestad, Juan Manuel Trujillo-Sevilla, Oscar Casanova-Gonzalez, David Carmona-Ballester, Miguel Sicilia-Cabrera, Sabato Ceruso, Jose-Manuel Rodríguez-Ramos, Wootpix, S.L. (Spain) [11218-67]

In vitro optical quality measurement of three different intraocular lenses in various spherical aberration conditions, Soohyun Park, Seunghun Lee, Bumju Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Myoung Joon Kim, Lib Lab. (Korea, Republic of); Ki Hean Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [11218-68]

High power microsecond laser induced effects on the retina, Eric Seifert, Medizinisches Laserzentrum Lübeck GmbH (Germany); Svenja Sonntag, Universitätsklinikum Schleswig-Holstein (Germany); Philipp Kleingarn, Dirk Theisen-Kunde, Medizinisches Laserzentrum Lübeck GmbH (Germany); Yoko Miura, Universitätsklinikum Schleswig-Holstein (Germany) and Univ. zu Lübeck (Germany); Ralf Brinkmann, Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany) [11218-69]

Ultrahigh speed areal and tomographic imaging with a full-field adaptive optics retina camera. Denise Valente, Mehdi Azimipour, Robert J. Zawadzki, Ravi S. Jonnal, UC Davis Medical Ctr. (USA) [11218-70]

Differential phase contrast corneal microscopy. Timothy D. Weber, Jerome Mertz, Boston Univ. (USA) [11218-71]

Corneal filler for correction of astigmatism. Stefan A. Kassumeh, Wellman Ctr. for Photomedicine (USA) and Klinikum der Univ. München, Ludwig-Maximilians-Univ. München (Germany); Katharina Brandt, Wellman Ctr. for Photomedicine (USA) and Institut für Biomedizinische Optik (Germany); Christian M. Wertheimer, Wellman Ctr. for Photomedicine (USA) and Klinikum der Univ. München, Ludwig-Maximilians-Univ. München (Germany); Merle S. Schenk, Richard R. Anderson, Wellman Ctr. for Photomedicine (USA); Reginald Birngruber, Wellman Ctr. for Photomedicine (USA) and Institut für Biomedizinische Optik (Germany) [11218-72]

Estimating visual acuity from a single wavefront measurement. Derek Nankivil, Johnson & Johnson Vision Care, Inc. (USA); Thomas D. Raymond, Johnson & Johnson Vision (USA); Greg J. Hofmann, Johnson & Johnson Vision Care, Inc. (USA); Daniel R. Neal, Johnson & Johnson Vision (USA) [11218-73]

Estimating retinal vascular permeability from fluorescein videoangiography data despite signal saturation in large vessels in low-dynamic range systems. Elif Kayaalp-Nalbant, Wenqiang Liu, Hande Pehlivan, Shailee Shah, Anessa Puskar, Meghna Sampath, Illinois Institute of Technology (USA); William F. Mieler, Univ. of Illinois at Chicago (USA); Jennifer J. Kang-Mieler, Kenneth M. Tichauer, Illinois Institute of Technology (USA) ... [11218-74]

Quantitative analysis of vascular complexity in OCTA of diabetic retinopathy. Minhaj Nur Alam, David Le, Jennifer I. Lim, Xincheng Yao, Univ. of Illinois at Chicago (USA) [11218-75]

Multimodal photoacoustic microscopy and optical coherence tomography imaging of laser-induced choroidal neovascularization in the rabbit retina. Van Phuc Nguyen, Wen Fan, Yanxiu Li, Univ. of Michigan-Kellogg Eye Ctr. (USA); Sydney Jones, Thomas Qian, Univ. of Michigan Kellogg Eye Ctr. (USA); Wei Zhang, Univ. of Michigan-Kellogg Eye Ctr. (USA); Xueding Wang, Univ. of Michigan (USA); Yannis Paulus, Univ. of Michigan-Kellogg Eye Ctr. (USA) [11218-76]

Corneal collagen crosslinking and treatment outcome evaluation based on femtosecond lasers. Ana Batista, Univ. des Saarlandes (Germany); Hans Georg Breunig, Univ. des Saarlandes (Germany) and JenLab GmbH (Germany); Elias Flockerzi, Berthold Seitz, Karsten König, Univ. des Saarlandes (Germany) [11218-78]

Imaging depth extension for optical coherence tomography for imaging the anterior and posterior segments of rabbit eyes. Ruiming Kong, Wenjuan Wu, Rui Qiu, Lei Gao, Fengxian Du, Shanghai Institute of Technology (China); Ailin Liu, Fudan Univ. (China); Xiangning Wang, Xuan Cai, Shanghai Sixth People's Hospital (China); Cuixia Dai, Shanghai Institute of Technology (China) [11218-79]

Diagnosis of corneal pathologies using deep learning. Amr Elsaywy, Univ. of Miami (USA); Taher Elejwa, Bascom Palmer Eye Institute (USA); Mohamed Abdel-Mottaleb, Univ. of Miami (USA); Mohamed Abou Shousha, Bascom Palmer Eye Institute (USA) [11218-80]

Precise movement registration for retinal-based eye tracker without reference frame. Michal Meina, Nicolaus Copernicus Univ. (Poland); Maciej Nowakowski, AM2M Sp. z.o.o. sp. k. (Poland); Maciej M. Bartuzel, Krystian Wróbel, Szymon Tamborski, Nicolaus Copernicus Univ. (Poland); Krzysztof Dalasiński, Anna Szkulmowska, AM2M Sp. z.o.o. sp. k. (Poland); Maciej Szkulmowski, Nicolaus Copernicus Univ. (Poland) [11218-81]

GANgio: a conditional generative adversarial network for optical coherence tomography angiography. Matthias Salas, Michael Niederleithner, Antonia Lichtenegger, Laurin Ginner, Bernhard Baumann, Wolfgang Drexler, Rainer A. Leitgeb, Medizinische Univ. Wien (Austria) [11218-83]

3D visualization of cataractous lesions in the murine crystalline lens by in vivo optical coherence tomography. Pablo Eugui, Danielle J. Harper, Marco Augustin, Medizinische Univ. Wien (Austria); Johanna Gesperger, Medizinische Univ. Wien (Austria) and Institute of Neurology, General Hospital (Austria); Tanja Himmel, Veterinaermedizinische Univ. Wien (Austria); Antonia Lichtenegger, Conrad W. Merkle, Medizinische Univ. Wien (Austria); Adelheid Woehrer, Institute of Neurology, General Hospital (Austria); Martin Glösmann, Veterinaermedizinische Univ. Wien (Austria); Bernhard Baumann, Medizinische Univ. Wien (Austria) [11218-84]

Hyperspectral reflectivity of individual mouse retinal layers. Danielle J. Harper, Medizinische Univ. Wien (Austria); Martin Glösmann, Veterinaermedizinische Univ. Wien (Austria); Pablo Eugui, Antonia Lichtenegger, Marion Gröger, Bernhard Baumann, Medizinische Univ. Wien (Austria) [11218-85]

Simultaneous optical coherence tomography measurements at two arbitrary meridians. Karol Karnowski, Jędrzej Solarski, Alejandra Consejo, Maciej Wojtkowski, Institute of Physical Chemistry (Poland) [11218-86]

Safe puncture optimized tool (SPOT) to safely inject clot-dissolving drug into the retinal vein. Andrea Lovera, FEMTOprint SA (Switzerland); Mohamed Zanaty, Thomas Fussinger, Arno Rogg, David Lambelet, Ilan Vardi, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Thomas Wolfensberger, Hôpital ophtalmique Jules-Gonin, Univ. de Lausanne (Switzerland); Charles Baur, Simon Hensein, Yves Bellouard, Sacha Pollonghini, Lisa Bonnefoy, Hubert Pierre-Marie Benoit Schneegans, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [11218-87]

Large aperture deformable lenses for ophthalmic applications. Giulio Bursi, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Francesco Mazzocco, Dynamic Optics S.r.l. (Italy); Tommaso Furiere, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Stefano Bonora, Dynamic Optics S.r.l. (Italy) [11218-88]

PASCAL ROL AWARD

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SUN 6:00 PM TO 6:15 PM

Session Chair: **Arthur Ho**, Brien Holden Vision Institute (Australia)

DISCUSSION

LOCATION: ROOM 303 (LEVEL 3 SOUTH) SUN 6:15 PM TO 6:30 PM

Session Chair: **Fabrice Manns**, Univ. of Miami (USA)

BIOS SUNDAY PLENARY

LOCATION: ROOM 206/214 (SOUTH LEVEL TWO) SUN 7:15 PM TO 8:00 PM

Welcome and Award Presentation

John G. Greivenkamp, Univ. of Arizona (United States), 2020 SPIE President

Presentation of 2020 SPIE Biophotonics Technology Innovator Award

THE 2020 RECIPIENT

Nirmala Ramanujam,

Duke University, Durham, North Carolina, USA

Talk by 2014 Nobel Prize Winner in Physics: Spying on the Secret Lives of Cells

Eric Betzig, Univ. of California, Berkeley and Howard Hughes Medical Institute (USA)

CONFERENCE 11223

LOCATION: ROOM 103 (LEVEL 1 SOUTH LOBBY)

Monday–Tuesday 3–4 February 2020 • Proceedings of SPIE Vol. 11223

Photonic Diagnosis, Monitoring, Prevention, and Treatment of Infections and Inflammatory Diseases 2020



Conference Chairs: Tianhong Dai, Wellman Ctr. for Photomedicine (USA), Massachusetts General Hospital (USA), Harvard Medical School (USA); Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany); Mei X. Wu, Harvard Medical School (USA)

Program Committee: Alessandro M. Deana, UNINOVE (Brazil); Pu-Ting Dong, Boston Univ. (USA); Walfre Franco, Wellman Ctr. for Photomedicine (USA); Michael R. Hamblin, Wellman Ctr. for Photomedicine (USA); Kristen C. Maitland, Texas A&M Univ. (USA); Akilan Palanisami, Wellman Ctr. for Photomedicine (USA), Massachusetts General Hospital (USA), Harvard Medical School (USA); Wei-Chuan Shih, Univ. of Houston (USA); Ying Wang, Chinese PLA General Hospital (China)

MONDAY 3 FEBRUARY

SESSION 1

LOCATION: ROOM 103 (LEVEL 1 SOUTH LOBBY) MON 8:25 AM TO 10:10 AM

Photonic Diagnosis I

Session Chair: **Mei X. Wu**, Harvard Medical School (USA)

8:25 am: **Deuterium uptake in combination with Raman spectroscopy as a tool to investigate antibiotic susceptibility of bacteria** (*Invited Paper*), Christoph Haisch, David Bauer, Li Qiu, Karin Wieland, Technische Univ. München (Germany); Anna-Catherine Neumann-Cip, Andreas Wieser, Max von Pettenkofer Institute, Ludwig-Maximilians-Univ. München (Germany) and Univ. Hospital, Ludwig-Maximilians-Univ. München (Germany); Giuseppe Magistro, Christian Stief, Ludwig-Maximilians-Univ. München (Germany) [11223-1]

8:50 am: **Chip based sample preparation methods for the Raman spectroscopic identification of bacteria** (*Invited Paper*), Susanne Pahlow, Friedrich-Schiller-Univ. Jena (Germany) and Leibniz-Institut für Photonische Technologien e.V. (Germany); Thomas G. Mayerhöfer, Uwe Hübner, Karina Weber, Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany) [11223-2]

9:15 am: **Quantitative fluorescence spectroscopy to detect and identify bacteria and to monitor their viability** (*Invited Paper*), Frédérique Vanholsbeeck, Julia Robertson, Fang Ou, Claire Honney, Rachel Guo, Simon Swift, Cushla M. McGoverin, The Univ. of Auckland (New Zealand) [11223-3]

9:40 am: **A label-free study of murine gut dysbiosis with fluorescence lifetime spectroscopy and imaging**, Alba Alfonso García, Stephanie A. Cevallos, Julien Bec, Xiangnan Zhou, Alisha E. Miller, Andreas Baumler, Laura Marcu, Univ. of California, Davis (USA) [11223-4]

9:55 am: **A label-free localized surface plasmon resonance (LSPR) aptasensor for the detection of mycotoxins**, Min-Gon Kim, Jin-Ho Park, Bobin Lee, Su-Ji Ha, Gwangju Institute of Science and Technology (Korea, Republic of) [11223-5]

Coffee Break Mon 10:10 am to 10:40 am

SESSION 2

LOCATION: ROOM 103 (LEVEL 1 SOUTH LOBBY) MON 10:40 AM TO 11:45 AM

Photonic Diagnosis II

Session Chair: **Christoph Haisch**, Technische Univ. München (Germany)

10:40 am: **Simultaneous detection of different sepsis biomarkers: from the lab to the hospital** (*Invited Paper*), Francesco Baldini, Cosimo Trono, Sara Tombelli, Simone Berneschi, Ambra Giannetti, Barbara Adinolfi, Francesco Chiavaioli, Istituto di Fisica Applicata “Nello Carrara” (Italy); Romeo Bernini, Gianluca Persichetti, Genni Testa, Istituto per il Rilevamento Elettromagnetico dell’Ambiente (Italy); Giampiero Porro, Datamed S.r.L. (Italy); Jürgen Popp, Ute Neugebauer, Leibniz-Institut für Photonische Technologien e.V. (Germany); Daniel Thomas-Rüddel, Michael Kiehnopf, Anuradha Ramoji, Universitätsklinikum Jena (Germany) [11223-6]

11:05 am: **Non-contact Raman spectroscopic pH measurement of cerebrospinal fluid: in vivo rat and perimortem swine models** (*Invited Paper*), Seth Fillioe, Kyle K. Bishop, Syracuse Univ. (USA); Josh Satalin, Sarah Blair, SUNY Upstate Medical Univ. (USA); Charles M. Peterson, Syracuse Univ. (USA); Gary Nieman, SUNY Upstate Medical Univ. (USA); Alexander V. Jannini, Jon J. Kim, Richard T. McDonough, Steve Ortiz, Jerry Goodisman, Julie M. Hasenwinkel, Joseph Chaiken, Syracuse Univ. (USA) [11223-7]

11:30 am: **The PVOH device: our first stop on the path to small and very small physical embodiments of the PV[O]H algorithm**, David Rice, Jeffrey Bebernes, Sheryl Bebernes, John Fayos, Jonathan Cormier, Critical Link, LLC (USA); Michael Houk, Howard Ammenheuser, Bristol Instruments, Inc. (USA); Seth Fillioe, Charles M. Peterson, Joseph Chaiken, Syracuse Univ. (USA) [11223-8]

Lunch Break Mon 11:45 am to 1:30 pm

SESSION 3

LOCATION: ROOM 103 (LEVEL 1 SOUTH LOBBY) MON 1:30 PM TO 3:20 PM

Photonic Diagnosis III

Session Chair: **Francesco Baldini**, Istituto di Fisica Applicata “Nello Carrara” (Italy)

1:30 pm: **Rapid antibiotic susceptibility testing by single bacterium stimulated Raman metabolic imaging** (*Invited Paper*), Ji-Xin Cheng, Boston Univ. (USA) [11223-10]

1:55 pm: **Rapid detection of antibiotic-resistant bacteria at the single-cell level using two-photon excitation fluorescence and coherent anti-Stokes Raman scattering microscopy**, Chi Zhang, Jungeun Won, Stephen A. Boppart, Univ. of Illinois (USA) [11223-11]

2:10 pm: **Rapid antibiotic susceptibility testing of pathogenic bacteria using heavy-water-labeled single-cell Raman spectroscopy in clinical samples**, Li Cui, Kai Yang, Yong-Guan Zhu, Institute of Urban Environment (China) [11223-12]

2:25 pm: **Phage susceptibility testing with lensless imaging technique**, Prisca Perlemonne, CEA-Grenoble (France); Emmanuel Picard, Emmanuel Hadji, Univ. Grenoble Alpes (France) and CEA - Institut de Recherche Interdisciplinaire de Grenoble (France); Marc Zelsmann, Alexis Maire, Univ. Grenoble Alpes (France) and Lab. des Technologies de La Microélectronique (France); Eric Lacot, Univ. Grenoble Alpes (France) and Lab. Interdisciplinaire de Physique (France); Pierre Marcoux, Univ. Grenoble Alpes (France) and Lab. d’Electronique de Technologie de l’Information (France) [11223-13]

2:40 pm: **Shining a light on antibiotic selection: optimised live/dead fluorescence spectrometry for rapid antimicrobial susceptibility testing**, Julia Robertson, Fang Ou, Cushla M. McGoverin, Frédérique Vanholsbeeck, Simon Swift, The Univ. of Auckland (New Zealand) [11223-14]

2:55 pm: **A paradigm shift in chronic wound assessment: incorporating bacterial fluorescence imaging into standard of care** (*Invited Paper*), Thomas Serena, SerenaGroup (USA) [11223-15]

CONFERENCE 11226

LOCATION: ROOM 101 (LEVEL 1 SOUTH LOBBY)

Monday–Wednesday 3–5 February 2020 • Proceedings of SPIE Vol. 11226

Neural Imaging and Sensing 2020

Conference Chairs: **Qingming Luo**, Hainan Univ. (China); **Jun Ding**, Stanford Univ. Medical Ctr. (USA); **Ling Fu**, Huazhong Univ. of Science and Technology (China)

Program Committee: **David A. Boas**, Boston Univ. (USA); **Shih-Chi Chen**, The Chinese Univ. of Hong Kong (Hong Kong, China); **Yu Chen**, Univ. of Maryland, College Park (USA); **Javier DeFelipe**, Univ. Politécnic de Madrid (Spain); **Hongwei Dong**, Univ. of California, Los Angeles (USA); **Congwu Du**, Stony Brook Univ. (USA); **Na Ji**, Univ. of California, Berkeley (USA); **Beop-Min Kim**, Korea Univ. (Korea, Republic of); **Pengcheng Li**, HUST-Suzhou Institute for Brainmatics (China); **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**, Zhejiang Univ. (China); **Oxana V. Semyachkina-Glushkovskaya**, Saratov State Univ. (Russian Federation); **Shy Shoham**, Technion-Israel Institute of Technology (Israel); **Shaoqun Zeng**, Huazhong Univ. of Science and Technology (China)

MONDAY 3 FEBRUARY

SESSION 1

LOCATION: ROOM 101 (LEVEL 1 SOUTH LOBBY) MON 8:20 AM TO 10:10 AM

Microscopy I

Session Chair: **Shaoqun Zeng**,
Britton Chance Ctr. for Biomedical Photonics (China)

8:20 am: **25 plane multifocus microscopy for fast and live 3D imaging** (*Invited Paper*), Eduardo Hirata Miyasaki, Univ. of California, Santa Cruz (USA); Gustav M. Pettersson, KTH Royal Institute of Technology (Sweden); Khant Zaw, Univ. of California, Santa Cruz (USA); Demis D. John, Brian Thibeault, Univ. of California, Santa Barbara (USA); Brandon Lynch, Juliana Hernandez, Sara Abrahamsson, Univ. of California, Santa Cruz (USA) [11226-1]

8:50 am: **Two-photon Bessel beam scanning microscope for neural activities**, Dongli Xu, Stanford Univ. (USA); Leilei Peng, The Univ. of Arizona (USA); Jun Ding, Stanford Univ. (USA) [11226-2]

9:10 am: **Two-photon high-speed light-sheet volumetric imaging of brain activity during sleep in zebrafish larvae**, Giuseppe de Vito, Univ. degli Studi di Firenze (Italy) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Chiara Fornetto, Pietro Ricci, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Caroline Müllenbroich, Univ. of Glasgow (United Kingdom) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Giuseppe Sancataldo, Lapo Turrini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. degli Studi di Firenze (Italy); Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Natascia Tiso, Univ. degli Studi di Padova (Italy); Leonardo Sacconi, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Duccio Fanelli, Univ. degli Studi di Firenze (Italy); Ludovico Silvestri, 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); Francesco Vanzì, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and 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) [11226-3]

9:30 am: **Speed considerations for large field two-photon microscopy in brains**, Hunter B. Banks, Jonathan R. Bumstead, Lindsey M. Brier, Annie R. Bice, Joseph P. Culver, Washington Univ. in St. Louis (USA) . [11226-4]

9:50 am: **Adaptive optics two-photon microendoscopy for high-resolution and deep-brain imaging in vivo**, Congping Chen, Zhongya Qin, Sicong He, Wanjie Wu, Ye Wang, Kam Fai Tam, Nancy Y. Ip, Jianan Y. Qu, Hong Kong Univ. of Science and Technology (Hong Kong, China) [11226-5]

Coffee Break Mon 10:10 am to 10:40 am

SESSION 2

LOCATION: ROOM 101 (LEVEL 1 SOUTH LOBBY) MON 10:40 AM TO 12:10 PM

Diffused Optical Imaging

Session Chair: **Eduardo Hirata Miyasaki**,
Univ. of California, Santa Cruz (USA)

10:40 am: **Phase dual-slopes for enhanced depth sensitivity in diffuse optical imaging** (*Invited Paper*), Sergio Fantini, Angelo Sassaroli, Giles Blaney, Thao Pham, Cristianne Fernandez, Tufts Univ. (USA) [11226-6]

11:10 am: **Functional interferometric diffusing wave spectroscopy (fiDWS) of human brain activity**, Wenjun Zhou, Oybek Kholiqov, Vinh Nguyen Du Le, Vivek Srinivasan, Univ. of California, Davis (USA) [11226-7]

11:30 am: **Diffuse optical tomography with a source-detector grid with 6.5 mm spacing for high-performance imaging of human brain hemodynamics**, Zachary E. Markow, Jason W. Trobaugh, Edward J. Richter, Kalyan Tripathy, Sean M. Rafferty, Alexa M. Svoboda, Mariel L. Schroeder, Washington Univ. in St. Louis (USA); Tracy M. Burns-Yocum, Indiana Univ. (USA); Karla M. Bergonzi, Broc A. Burke, Washington Univ. in St. Louis (USA); Mark A. Anastasio, Univ. of Illinois (USA); Adam T. Eggebrecht, Joseph P. Culver, Washington Univ. in St. Louis (USA) [11226-8]

11:50 am: **Mapping deep brain stimulation's impact on cortical networks using high-density diffuse optical tomography**, Arefeh Sherafati, Adam T. Eggebrecht, Washington Univ. School of Medicine in St. Louis (USA); Tracy M. Burns-Yocum, Indiana Univ. (USA); Heather M. Lugar, Anagha Narayanan, Tasha Doty, Alexa M. Svoboda, Mariel L. Schroeder, Abraham Z. Snyder, Mwiza Ushe, Joseph P. Culver, Tamara Hershey, Washington Univ. School of Medicine in St. Louis (USA) [11226-9]

Lunch/Exhibition Break Mon 12:10 pm to 1:50 pm

SESSION 3

LOCATION: ROOM 101 (LEVEL 1 SOUTH LOBBY) MON 1:50 PM TO 3:20 PM

Human Brain

Session Chair: **Shy Shoham**, NYU Langone Health (USA)

1:50 pm: **Fast volumetric mapping of human brain slices** (*Invited Paper*), Luca Pesce, Annunziata Laurino, Vladislav Gavryusev, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. degli Studi di Firenze (Italy); Giacomo Mazzamuto, Univ. degli Studi di Firenze (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Giuseppe Sancataldo, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. degli Studi di Firenze (Italy); Matteo Roffilli, Bioretics srl (Italy); Ludovico Silvestri, 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); Irene Costantini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and 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) [11226-10]

2:20 pm: **Using fNIRS to study the brain activation and networks associated with Chinese character recognition**, Zhen Yuan, Zhishan Hu, Univ. of Macau (Macao, China) [11226-11]

2:40 pm: **fNIRS examination of mental workload changes during N-back tasks**, Kosar Khaksari, Emma Condy, John Millerhagen, Afrouz Anderson, Viswanath Gorti, Hadis Dashtestani, Amir Gandjbakhche, National Institutes of Health (USA) [11226-12]

SESSION 3

LOCATION: ROOM 157 (UPPER MEZZANINE SOUTH) . . . MON 1:30 PM TO 3:30 PM

Ophthalmic New Technology

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

1:30 pm: **Robotically-aligned optical coherence tomography with 5-degree of freedom eye tracking for subject motion and gaze compensation**, Pablo Ortiz, Mark Draelos, Ryan P. McNabb, Anthony N. Kuo, Joseph A. Izatt, Duke Univ. (USA) [11228-13]

1:45 pm: **Improved functional imaging of ganglion neuronal and photoreceptor cell layers in living human retina**, Gereon M. Hüttmann, Clara Pfäffle, Hendrik Spahr, Lisa Kutzner, Sazan Burhan, Felix Hilge, Yoko Miura, Univ. zu Lübeck (Germany); Dierck Hillmann, Thorlabs GmbH (Germany) [11228-14]

2:00 pm: **Ultrahigh-resolution imaging of the human retina with scan modulation visible light optical coherence tomography**, Hao F. Zhang, Ian Rubinoff, Northwestern Univ. (USA); Yuanbo Wang, Opticent Health (USA); Zeinab Ghassabi, Hiroshi Ishikawa, Joel Schuman, New York Univ. (USA); Roman Kuranov, Northwestern Univ. (USA) [11228-15]

2:15 pm: **Quantitative measurements of intraocular structures including subretinal microinjection bleb volumes using intraoperative optical coherence tomography**, Jianwei D. Li, Duke Univ. (USA); William Raynor, Ananth Sastry, Duke Univ. Medical Ctr. (USA); Al-Hafeez Dhalla, Duke Univ. (USA); Cynthia Toth, Duke Univ. Medical Ctr. (USA); Christian Viehland, Duke Univ. (USA); Lejla Vajzovic, Duke Univ. Medical Ctr. (USA); Joseph A. Izatt, Duke Univ. (USA) and Duke Univ. Medical Ctr. (USA) [11228-16]

2:30 pm: **Handheld spectrally encoded coherence tomography and reflectometry for point-of-care ophthalmic OCT and OCTA**, Eric M. Tang, Joseph D. Malone, Josh Albert H. Miller, Ipek Oguz, Yuankai K. Tao, Vanderbilt Univ. (USA) [11228-17]

2:45 pm: **In-vivo, non-contact, cellular resolution imaging of the human cornea with line-field SD-OCT at 2.5 kHz frame rate**, Le Han, Lin Kun Chen, Zohreh Hosseinaee, Kostadinka Bizheva, Univ. of Waterloo (Canada) [11228-18]

3:00 pm: **Whole anterior segment/retinal SS-OCT system for comprehensive imaging and biometry of the eye**, Ana Rodríguez Aramendía, Instituto de Microcirugía Ocular (Spain) and Univ. Politècnica de Catalunya (Spain); Fernando Díaz-Doutón, Pol Falgueras, Jaume Pujol, Univ. Politècnica de Catalunya (Spain); José Luis Güell, Instituto de Microcirugía Ocular (Spain); Ireneusz Grulkowski, Nicolaus Copernicus Univ. (Poland) [11228-19]

3:15 pm: **Ophthalmic space division multiplexing optical coherence tomography**, Jason Jerwick, Zhao Dong, Yongyang Huang, Lehigh Univ. (USA); Adrienne Saludades, Joan DuPont, Alexander Brucker, Univ. of Pennsylvania (USA); Chao Zhou, Washington Univ. in St. Louis (USA) [11228-20]

Coffee Break Mon 3:30 pm to 4:00 pm

SESSION 4

LOCATION: ROOM 157 (UPPER MEZZANINE SOUTH) . . . MON 4:00 PM TO 6:00 PM

Brain and Neural Imaging

Session Chair: **Maciej Wojtkowski**, Polish Academy of Sciences (Poland)

4:00 pm: **Coherence gated, time-of-flight resolved measurements of human brain blood flow dynamics**, Oybek Kholiqov, Wenjun Zhou, Du Le, Vivek J. Srinivasan, Univ. of California, Davis (USA) [11228-21]

4:15 pm: **Functional imaging of neuronal layers in the human retina**, Clara Pfäffle, Hendrik Spahr, Lisa Kutzner, Sazan Burhan, Felix Hilge, Univ. zu Lübeck (Germany); Yoko Miura, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany); Gereon M. Hüttmann, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany) and Deutsches Zentrum für Lungenforschung (Germany); Dierck Hillmann, Univ. zu Lübeck (Germany) and Thorlabs GmbH (Germany) [11228-22]

4:30 pm: **Detection of cortical optical changes during seizure activity using optical coherence tomography**, Danielle Ornelas, Md. Hasan, Jenny Szu, Univ. of California, Riverside (USA); Oscar Gonzalez, Univ. of California, San Diego (USA); Timothy Myers, Koji Hirota, Melissa Eberle, Univ. of California, Riverside (USA); Maksim Bazhenov, Univ. of California, San Diego (USA); Devin Binder, B. Hyle Park, Univ. of California, Riverside (USA) [11228-23]

4:45 pm: **In vivo mouse brain imaging through the thinned skull with 1700 nm optical coherence microscopy**, Jun Zhu, Vivek J. Srinivasan, Univ. of California, Davis (USA) [11228-24]

5:00 pm: **Quantifying changes in murine fetal brain vasculature due to prenatal exposure to teratogens with in utero optical coherence tomography**, Raksha Raghunathan, Chih-Hao Liu, Amur Kouka, Yogeshwari Ambekar, Connie Yan, Noemi Bustamante, Manmohan Singh, Univ. of Houston (USA); Rajesh C. Miranda, Texas A&M Health Science Ctr. (USA); Kirill V. Larin, Univ. of Houston (USA) [11228-25]

5:15 pm: **Effect of contrast agents and enhancement of cerebrovascular on mouse brain microvasculature studies using 800nm Gaussian and Polarization sensitive (PS) OCT system**, Mounika Rapolu, Institute of Physical Chemistry (Poland); Hubert Dolezyczek, Nencki Institute of Experimental Biology PAS (Poland); Karol Karnowski, Paulina Niedzwiedziuk, Dawid Borycki, Monika Malinowska, Institute of Physical Chemistry PAS (Poland); Grzegorz Wilczynski, Nencki Institute of Experimental Biology PAS (Poland); Maciej Wojtkowski, Institute of Physical Chemistry PAS (Poland) [11228-26]

5:30 pm: **In vivo imaging of human peripheral nerves using optical coherence tomography compared to histopathology slices**, Jens Möller, Ruhr-Univ. Bochum (Germany); Anne C. Carolus, Johannes van de Nes, Univ. Knappschaftskrankenhaus Bochum GmbH (Germany); Marcel Lenz, Ruhr-Univ. Bochum (Germany); Christopher Brenke, Kirsten Schmieder, Univ. Knappschaftskrankenhaus Bochum GmbH (Germany); Hubert Welp, Technische Fachhochschule Georg Agricola zu Bochum (Germany); Nils C. Gerhardt, Martin R. Hofmann, Ruhr-Univ. Bochum (Germany) [11228-91]

5:45 pm: **1.7- μ m swept-source OCT system for deep brain tumor margin detection**, Tae Il Yoon, Gwangju Institute of Science and Technology (Korea, Republic of); Jae Sung Park, Seoul St. Mary's Hospital, The Catholic Univ. of Korea (Korea, Republic of); Byeong Ha, Gwangju Institute of Science and Technology (Korea, Republic of); Tae Joong Eom, Advanced Photonics Research Institute (Korea, Republic of) [11228-28]

POSTERS-MONDAY

LOCATION: MOSCONE CENTER, LEVEL 3 WEST MON 5:30 PM TO 7:00 PM

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.

Poster Setup: Monday 10:00 AM – 4:30 PM

View poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>

Spatiotemporal optical coherence (STOC) manipulation achieves better performance than angular compounding in full-field swept-source optical coherence tomography, Piotr Wegrzyn, Institute of Physical Chemistry (Poland) and Univ. of Warsaw (Poland); Dawid Borycki, Julia Sudyka, Maciej Wojtkowski, Institute of Physical Chemistry (Poland) [11228-85]

Multimodal optical coherence tomography for quantitative diagnosis in breast cancer subtypes, Ekaterina V. Gubarkova, Privolzhsky Research Medical Univ. (Russian Federation); Alexander Sovetsky, Alexander A. Moiseev, Vladimir Y. Zaitsev, Institute of Applied Physics (Russian Federation); Dmitriy Vorontsov, Nizhny Novgorod Regional Oncology Hospital (Russian Federation); Lev A. Matveev, Alexander Matveyev, Institute of Applied Physics (Russian Federation); Sergey Kuznetsov, Marina A. Sirotkina, Privolzhsky Research Medical Univ. (Russian Federation); Alexey Vorontsov, Nizhny Novgorod Regional Oncology Hospital (Russian Federation); Gregory V. Gelikonov, Institute of Applied Physics (Russian Federation); Elena V. Zagaynova, Natalia D. Gladkova, Privolzhsky Research Medical Univ. (Russian Federation) [11228-86]

High-speed maximum a posteriori birefringence estimator for Jones matrix optical coherence tomography by GPU implementation, Atsushi Kubota, Sky Technology Inc. (Japan); Shuichi Makita, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) [11228-87]

Acceleration of eye motion correction processing utilizing Lissajous scanning pattern in optical coherence tomography with GPGPU, Toshihiro Mino, Masahiro Shibutani, Shinnosue Azuma, Topcon Corp. (Japan); Shuichi Makita, Univ. of Tsukuba (Japan); Masahiro Miura, Tokyo Medical Univ. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan); Tatsuo Yamaguchi, Topcon Corp. (Japan) [11228-88]

Development of mouse retina test standards with glaucoma-like tissue alterations for performance analysis of high resolution OCT systems, Álvaro Barroso Peña, Steffi Ketelhut, Björn Kemper, Jürgen Schnekenburger, Westfälische Wilhelms-Universität Münster (Germany) [11228-89]

SESSION 6

LOCATION: ROOM 157 (UPPER MEZZANINE SOUTH) . TUE 10:30 AM TO 12:00 PM

Clinical Applications

Session Chair: **Kostadinka Bizheva**, Univ. of Waterloo (Canada)

10:30 am: **Endobronchial optical coherence tomography for in vivo microscopic diagnosis of pulmonary fibrosis**, Lida P. Hariri, Sreyankar Nandy, Benjamin W. Roop, David C. Adams, Ashok Muniappan, Colleen M. Keyes, John C. Wain, Christopher R. Morse, Michael Lanuti, Hugh G. Auchincloss, Massachusetts General Hospital (USA); Thomas V. Colby, Mayo Clinic (USA); Angela Shih, Mari Mino-Kenudson, Eugene J. Mark, Richard L. Kradin, Amita Sharma, Lloyd Liang, Diane Davies, Margit V. Szabari, Andrew M. Tager, Melissa J. Suter, Massachusetts General Hospital (USA). [11228-35]

10:45 am: **Endoscopic polarization-sensitive optical coherence tomography in multiple lung diseases**, Joy Willemse, Vrije Univ. Amsterdam (Netherlands); Reinier Wener, The Netherlands Cancer Institute (Netherlands); Fabio Feroldi, Margherita Vaselli, Maximilian G. O. Graefe, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands). [11228-36]

11:00 am: **Integration of light-induced autofluorescence and optical coherence tomography for dental applications**, Nhan Le, Shaozhen Song, Univ. of Washington (USA); Hrebesh M. Subhash, Latonya Kilpatrick, Colgate-Palmolive Co. (USA); Ruikang Wang, Univ. of Washington (USA) [11228-37]

11:15 am: **Stokes non-local-means despeckling in intravascular polarization-sensitive optical coherence tomography in vivo**, Carlos Cuartas-Vélez, Univ. EAFIT (Colombia) and Univ. of Twente (Netherlands); René Restrepo, Univ. EAFIT (Colombia) and Instituto Nacional de Técnica Aeroespacial (Spain); Martin Villiger, David C. Adams, Massachusetts General Hospital, Harvard Medical School (USA); Brett E. Bouma, Massachusetts General Hospital, Harvard Medical School (USA) and Massachusetts Institute of Technology (USA); Néstor Uribe-Patarroyo, Massachusetts General Hospital, Harvard Medical School (USA) [11228-38]

11:30 am: **Stable fiber-based polarization sensitive optical coherence tomography/optical microangiography system for simultaneous birefringent and microvascular imaging**, Peijun Tang, Ruikang Wang, Univ. of Washington (USA) [11228-39]

11:45 am: **Optical coherence tomography for complex diagnosis of vulvar diseases**, Marina A. Sirotkina, Privolzhsky Research Medical Univ. (Russian Federation); Lev A. Matveev, Institute of Applied Physics (Russian Federation); Nelly N. Vagapova, Nizhny Novgorod Regional Clinical Hospital named after N.A. Semashko (Russian Federation); Ivan K. Safonov, Privolzhsky Research Medical Univ. (Russian Federation); Irina A. Kuznetsova, Privolzhsky Research Medical Univ. (Russian Federation) and Nizhny Novgorod Regional Clinical Hospital named after N.A. Semashko (Russian Federation); Dmitry A. Karashtin, Alexander A. Moiseev, Grigory V. Gelikonov, Institute of Applied Physics (Russian Federation); Elena V. Zagaynova, Privolzhsky Research Medical Univ. (Russian Federation); Vladimir Y. Zaitsev, Institute of Applied Physics (Russian Federation); Natalia D. Gladkova, Privolzhsky Research Medical Univ. (Russian Federation) [11228-40]

Lunch/Exhibition Break Tue 12:00 pm to 1:30 pm

SESSION 7

LOCATION: ROOM 157 (UPPER MEZZANINE SOUTH) . . . TUE 1:30 PM TO 3:30 PM

OCT New Technology

Session Chair: **Johannes F. de Boer**, Vrije Univ. Amsterdam (Netherlands)

1:30 pm: **Switchable vertical/horizontal section imaging with line-field confocal optical coherence tomography**, Jonas Ogien, Olivier Leveccq, Hicham Azimani, DAMAE Medical (France); Arnaud Dubois, Lab. Charles Fabry (France) [11228-41]

1:45 pm: **Multibeam OCT imaging based on an integrated, free-space interferometer architecture**, Benjamin J. Vakoc, Yongjoo Kim, Norman Lippok, Wellman Ctr. for Photomedicine (USA) [11228-42]

2:00 pm: **Directly measuring spectrometer resolution from excess noise correlations**, Aaron M. Kho, Tingwei Zhang, Univ. of California, Davis (USA); Conrad W. Merkle, Univ. of California, Davis (USA) and Medizinische Univ. Wien (Austria); Vivek J. Srinivasan, Univ. of California, Davis (USA). [11228-43]

2:15 pm: **From master-slave to down-conversion optical coherence tomography**, Adrian Podoleanu, Adrian Bradu, Ramona Cernat, Manuel Jorge M. Marques, Univ. of Kent (United Kingdom) [11228-44]

2:30 pm: **Quantum-inspired detection for spectral domain OCT**, Sylwia M. Kolenderska, The Univ. of Auckland (New Zealand); Piotr Kolenderski, Nicolaus Copernicus Univ. (Poland); Frédérique Vanholsbeeck, The Univ. of Auckland (New Zealand) [11228-45]

2:45 pm: **Synthesizing scanning-mode image formation in full-wave modelling of OCT**, Callum M. Macdonald, Peter R. T. Munro, Univ. College London (United Kingdom) [11228-46]

3:00 pm: **Robust complex conjugate artifact removal in OCT using circularly polarized light as reference**, Xinyu Liu, Xinwen Yao, Leopold Schmetterer, Bingyao Tan, Singapore Eye Research Institute (Singapore) [11228-47]

3:15 pm: **Extended focus, spectral-domain optical coherence tomography system for in-vivo imaging of the human cornea**, Zohreh Hosseinaee, Univ. of Waterloo (Canada); Paul-James Marchand, Polytechnique Montréal (Canada); Le Han, Lin Kun Chen, Kostadinka Bizheva, Univ. of Waterloo (Canada) [11228-48]

Coffee Break. Tue 3:30 pm to 4:00 pm

SESSION 8

LOCATION: ROOM 157 (UPPER MEZZANINE SOUTH) . . . TUE 4:00 PM TO 6:00 PM

Signal/Image Processing

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

4:00 pm: **Volumetric motion correction in high-speed catheter-based OCT**, Tan Huu Nguyen, Osman O. Ahsen, Kaicheng Liang, Jason Zhang, Massachusetts Institute of Technology (USA); Hiroshi Mashimo, VA Boston Healthcare System (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) [11228-49]

4:15 pm: **Signal-to-noise corrected depolarization index and the detection of multiply scattered light**, Pelham Keahey, Wellman Ctr. for Photomedicine (USA); Felix Fanjul-Vélez, Univ. de Cantabria (Spain); Norman Lippok, Brett E. Bouma, Martin Villiger, Wellman Ctr. for Photomedicine (USA) [11228-50]

4:30 pm: **Virtual multi-directional optical coherence tomography**, Daisuke Oida, Kensuke Oikawa, Univ. of Tsukuba (Japan); Tai-Ang Wang, Meng-Tsan Tsai, Chang Gung Univ. (Taiwan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . [11228-51]

4:45 pm: **Achieving the ideal point spread in swept source OCT**, Bart C. Johnson, Tim N. Ford, Seungbum Woo, Walid Atia, AXSUN Technologies Inc. (USA); Muzammil A. Arain, Tilman Schmall, Rick A. Williams, Carl Zeiss Meditec, Inc. (USA); Peter Whitney, AXSUN Technologies Inc. (USA). [11228-52]

5:00 pm: **Optimal decorrelation estimation for OCT velocimetry**, Maximilian G. O. Gräfe, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) [11228-53]

5:15 pm: **Exact image-formation theory for high-NA high-resolution optical coherence tomography by four-dimensional formulation**, Naoki Fukutake, Nikon Corp. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan) [11228-54]

5:30 pm: **Motion correction in 600 kHz scanning 4D microscopic OCT**, Malte vom Endt, Medizinisches Laserzentrum Lübeck GmbH (Germany); Michael Münter, Univ. zu Lübeck (Germany); Gereon M. Hüttmann, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany) and Deutsches Zentrum für Lungenforschung (Germany); Hinnerk Schulz-Hildebrandt, Medizinisches Laserzentrum Lübeck GmbH (Germany) and Univ. zu Lübeck (Germany) [11228-55]

5:45 pm: **Cardiac optical coherence tomography image restoration**, Ziyi Huang, Columbia Univ. (USA); Yu Gan, The Univ. of Alabama (USA); Theresa Lye, Christine P. Hendon, Columbia Univ. (USA) [11228-56]

WEDNESDAY 5 FEBRUARY

SESSION 9

LOCATION: ROOM 157 (UPPER MEZZANINE SOUTH) . WED 8:30 AM TO 10:00 AM

Full Field OCT

Session Chair: **Zhongping Chen**, Beckman Laser Institute and Medical Clinic (USA)

8:30 am: **Crosstalk-free in vivo volumetric retinal imaging with Fourier-domain full-field OCT**, Egidijus Aukorius, Dawid Borycki, Maciej Wojtkowski, Institute of Physical Chemistry (Poland) [11228-57]

8:45 am: **Motion artifact removal and signal enhancement to achieve in vivo dynamic full field OCT**, Jules Scholler, Pedro Mecé, Cassandra Groux, Viacheslav Mazlin, Claude Boccara, Institut Langevin Ondes et Images (France); Kate Grieve, Ctr. Hospitalier National d'Ophtalmologie des Quinze-Vingts (France) and Institut de la Vision (France) [11228-58]

9:00 am: **Adaptive glasses-assisted Full-Field OCT for SNR enhanced 3D high-resolution retinal imaging**, Pedro Mecé, Jules Scholler, Cassandra Groux, Mathias Fink, Institut Langevin Ondes et Images (France); Kate Grieve, Institut de la Vision, Ctr. Hospitalier National d'Ophtalmologie des Quinze-Vingts (France); Claude Boccara, Institut Langevin Ondes et Images (France) [11228-59]

CONFERENCE 11229

LOCATION: ROOM 312 (LEVEL 3 SOUTH)

Sunday–Tuesday 2–4 February 2020 • Proceedings of SPIE Vol. 11229

Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVIII

BIOS

Conference Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

Program Committee: **Daniel X. Hammer**, U.S. Food and Drug Administration (USA); **Dirk J. Faber**, Amsterdam UMC (Netherlands); **Christine P. Hendon**, Columbia Univ. (USA); **Zhiwei Huang**, National Univ. of Singapore (Singapore); **Beop-Min Kim**, Korea Univ. (Korea, Republic of); **Muyinatu A. Lediju Bell**, Johns Hopkins Univ. (USA); **Hui Min Leung**, Massachusetts General Hospital (USA); **Francisco E. Robles**, Georgia Institute of Technology & Emory Univ. School of Medicine (USA); **Tuan Vo-Dinh**, Fitzpatrick Institute For Photonics, Duke Univ. (USA)

SUNDAY 2 FEBRUARY

SESSION 1

LOCATION: ROOM 312 (LEVEL 3 SOUTH) SUN 8:50 AM TO 10:10 AM

Clinical Applications of Fluorescence I

Session Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA)

8:50 am: **Fluorescence Lifetime Imaging (FLIm) for intraoperative pathology detection in transoral robotic surgery**, Brent W. Weyers, Mark Marsden, Tianchen Sun, Julien Bec, Univ. of California, Davis (USA); Arnaud F. Bewley, Regina F. Gaudour-Edwards, Michael G. Moore, D. Gregory Farwell, Laura Marcu, UC Davis Medical Ctr. (USA) [11229-1]

9:10 am: **Augmented reality visualization for intraoperative guidance and tumor delineation based on fluorescence lifetime**, Tianchen Sun, Univ. of California, Davis (USA); Jakob Unger, trinamiX GmbH (Germany); Richard J. Bold, Morgan A. Darrow, UC Davis Medical Ctr. (USA); Kwan-Liu Ma, Laura Marcu, Univ. of California, Davis (USA) [11229-2]

9:30 am: **Multispectral fluorescence lifetime imaging system with Si avalanche photodiode: better image at lower cost**, Xiangnan Zhou, Julien Bec, Diego R. Yankelevich, Laura Marcu, Univ. of California, Davis (USA) [11229-3]

9:50 am: **Deep UV fluorescence scanning microscopy for breast tumor margin detection**, Tongtong Lu, Marquette Univ. (USA); Julie Jorns, Mollie Patton, Medical College of Wisconsin (USA); Renee Fisher, Marquette Univ. (USA) and Medical College of Wisconsin (USA); Amanda Emmrich, Medical College of Wisconsin (USA); Todd Doehring, Abemis LLC (USA); Taly Gilat-Schmidt, Marquette Univ. (USA) and Medical College of Wisconsin (USA); Dong Hye Ye, Marquette Univ. (USA); Tina Yen, Medical College of Wisconsin (USA); Bing Yu, Marquette Univ. (USA) and Medical College of Wisconsin (USA) [11229-5]

Coffee Break Sun 10:10 am to 10:40 am

SESSION 2

LOCATION: ROOM 312 (LEVEL 3 SOUTH) SUN 10:40 AM TO 12:00 PM

Clinical Applications of Fluorescence II

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

10:40 am: **Physicochemical characterization of near infrared autofluorescence present in parathyroid glands**, Giju Thomas, Melanie A. McWade, Emmanuel A. Mannoh, Vanderbilt Univ. (USA); Christine M. O'Brien, Dorota Grabowska, Washington Univ. School of Medicine in St. Louis (USA); Naira Baregamian, Carmen C. Solorzano, Vanderbilt Univ. Medical Ctr. (USA); Melinda E. Sanders, Washington Univ. School of Medicine in St. Louis (USA); W. Hayes McDonald, Vanderbilt Univ. (USA); Samuel Achilefu, Washington Univ. School of Medicine in St. Louis (USA); Anita Mahadevan-Jansen, Vanderbilt Univ. (USA) [11229-6]

11:00 am: **Development of a portable imager for intraoperative real-time localization of parathyroid glands**, Eugene Oh, Children's National Medical Ctr. (USA) and Johns Hopkins Univ. (USA); Wan Wook Kim, Kyungpook National Univ. Medical Ctr. (Korea, Republic of); So-Hyun Nam, Dong-A Univ. Medical Ctr. (Korea, Republic of); Gyeong Woo Cheon, GE Global Research (USA); Bo Ning, Children's National Medical Ctr. (USA); Jaepyeong Cha, Children's National Health System (USA) and The George Washington Univ. (USA) [11229-7]

11:20 am: **Development of phase-sensitive near-infrared autofluorescence detector for sensing of parathyroid glands during parathyroid/thyroidectomy**, Yikeun Kim, Pukyong National Univ. (Korea, Republic of); Sung Won Kim, Kang-Dae Lee, Kosin Univ. (Korea, Republic of); Yeh-Chan Ahn, Pukyong National Univ. (Korea, Republic of) [11229-8]

11:40 am: **Development of methylene blue specific fluorescence imaging system: from evaluation to clinical application**, Chong Zhang, Institute of Automation (China); Daqing Jiang, Bo Huang, Yahong Luo, China Medical Univ. Hospital (China); Kun Wang, Jie Tian, Institute of Automation (China) [11229-9]

Lunch/Exhibition Break Sun 12:00 pm to 1:30 pm

SESSION 3

LOCATION: ROOM 312 (LEVEL 3 SOUTH) SUN 1:30 PM TO 3:10 PM

OCT Applications

Session Chair: **Caroline Boudoux**, Polytechnique Montréal (Canada)

1:30 pm: **Application of optical coherence tomography for real-time lung tumor-located precise interspecimen tissue sampling before evaluation of pathological frozen section**, Miao Hui Lin, Tien-Yu Hsiao, Chia-Wei M. Sun, National Chiao Tung Univ. (Taiwan); Hung-Chang Liu, Mackay Memorial Hospital (Taiwan) [11229-10]

1:50 pm: **Real-time angiographic OCT for guiding dermal filler injection**, Jungbin Lee, Seonghan Kim, Ikyong Park, Pohang Univ. of Science and Technology (Korea, Republic of); Byungho Oh, Yonsei Univ. College of Medicine (Korea, Republic of); Ki Hean Kim, Pohang Univ. of Science and Technology (Korea, Republic of) [11229-11]

2:10 pm: **Ultrahigh-speed, high-resolution, large-area optical coherence tomography (OCT) imaging for rapid evaluation of breast cancer surgical specimens**, Diana Mojahed, Columbia Univ. (USA); Matthew B. Applegate, Boston Univ. (USA); Richard Ha, Hanina Hibshoosh, Columbia Univ. Medical Ctr. (USA); Christine P. Hendon, Columbia Univ. (USA) [11229-12]

2:30 pm: **In vivo imaging of renal microvasculature in murine ischemia-reperfusion injury models using optical coherence tomography angiography**, Woojae Kang, Inho Shin, KAIST (Korea, Republic of); Se-Hyun Oh, Eun-Joo Oh, Jang-Hee Cho, Kyungpook National Univ. (Korea, Republic of); Wang-Yuhl Oh, KAIST (Korea, Republic of) [11229-13]

2:50 pm: **Common-path optical coherence tomography-guided autonomous "Big Bubble" device for cornea transplant surgery**, Shoujing Guo, Johns Hopkins Univ. (USA); Nicolas Sarfaraz, Department of Mechanical Engineering, University of Maryland, College Park (USA); William G. Gensheimer, Warfighter Eye Center, Malcolm Grow Medical Clinics and Surgery Center (USA); Axel Krieger, Department of Mechanical Engineering (USA); Jin U. Kang, Department of Electrical and Computer Engineering, Johns Hopkins University (USA) [11229-14]

Coffee Break Sun 3:10 pm to 3:40 pm

SESSION 4

LOCATION: ROOM 312 (LEVEL 3 SOUTH) SUN 3:40 PM TO 5:40 PM

Deep Learning

Session Chair: **Muyinatu A. Lediju Bell**, Johns Hopkins Univ. (USA)

3:40 pm: **Deep learning for classification of breast cancer in optical coherence tomography (OCT) imaging**, Rohan Bareja, Diana Mojahed, Christine P. Hendon, Columbia Univ. (USA) [11229-15]

4:00 pm: **Point-of-care Lyme serodiagnostic using a multiplexed vertical flow assay and deep learning**, Hyou-Arm Jeung, Zachary S. Ballard, Jing Wu, Derek K. Tseng, Hailemariam Teshome, Linghao Zhang, Univ. of California, Los Angeles (USA); Raymond J. Dattwyler, Paul M. Amaboldi, New York Medical College (USA); Omai Garner, Dino Di Carlo, Aydogan Ozcan, Univ. of California, Los Angeles (USA) [11229-16]

CONFERENCE 11234

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH)

Sunday–Wednesday 2–5 February 2020 • Proceedings of SPIE Vol. 11234

Optical Biopsy XVIII: 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); **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom)

Program Committee: **Nicole J. Crane**, Naval Medical Research Ctr. (USA); **Amir Gandjbakhche**, National Institutes of Health (USA); **Israel Gannot**, Johns Hopkins Univ. (USA), Tel Aviv Univ. (Israel); **Michael G. Giacomelli**, Univ. of Rochester (USA); **Zhiwei Huang**, National Univ. of Singapore (Singapore); **Nicusor V. Iftimia**, Physical Sciences Inc. (USA); **Richard M. Levenson**, Univ. of California, Davis (USA); **Igor V. Meglinski**, Univ. of Oulu (Finland); **Yang Pu**, MicroPhotoAcoustics, Inc. (USA); **Milind Rajadhyaksha**, Memorial Sloan-Kettering Cancer Ctr. (USA); **Lingyan Shi**, Univ. of California, San Diego (USA); **Gennady B. Shvets**, Cornell Univ. (USA); **Ganesan Singaravelu**, Anna Univ., Chennai (India); **Min Xu**, Hunter College (USA)

Conference Co-Sponsors:



SUNDAY 2 FEBRUARY

SESSION 1

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . SUN 10:00 AM TO 10:15 AM

Supercontinuum 50th Birthday

Session Chair: **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom)

10:00 am: **History of supercontinuum discovery: 50 years ago**, Robert R. Alfano, The City College of New York (USA) [11234-1]

SESSION 2

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . SUN 10:15 AM TO 11:15 AM

Supercontinuum Field: Introduction

Session Chair: **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom)

10:15 am: **The science and technology of supercontinuum source development**, James R. Taylor, Imperial College London (United Kingdom). [11234-2]

10:45 am: **Generation of spectrally bright broad-band light in photonic crystal fibres**, Philip St. John Russell, Max-Planck-Institut für die Physik des Lichts (Germany). [11234-3]

SESSION 3

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . SUN 11:15 AM TO 12:15 PM

Supercontinuum in Biomedical Science: Introduction

Session Chair: **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom)

11:15 am: **Supercontinuum-enabled label-free optical biopsy of tumor margins, markers, and the microenvironment**, Stephen A. Boppart, Beckman Institute for Advanced Science and Technology (USA) [11234-4]

11:45 am: **Dependence of ultrahigh resolution optical coherence tomography using supercontinuum**, Norihiko Nishizawa, Nagoya Univ. (Japan). [11234-5]

Lunch/Exhibition Break Sun 12:15 pm to 1:30 pm

SESSION 4

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . . . SUN 1:30 PM TO 2:45 PM

Cutting Edge Supercontinuum and Biomedical Science

Session Chair: **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom)

1:30 pm: **Brain metabolism monitoring through CCO measurements using all-fiber-integrated super-continuum source**, Mohammed N. Islam, Univ. of Michigan (USA). [11234-64]

2:15 pm: **Brighter, broader and better white laser light**, Alex Risos, The Univ. of Auckland (New Zealand) [11234-7]

SESSION 5

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . . . SUN 2:45 PM TO 3:15 PM

Fiber Mid-Infrared Supercontinuum: Introduction

Session Chair: **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom)

2:45 pm: **Window of opportunity: exploiting the mid-infrared with chalcogenide active and passive glass fiber-optics for biomedical applications.**, Angela B. Seddon, David Furniss, Zhuoqi Tang, David Mabwa, Joel Nunes, Richard Crane, The Univ. of Nottingham (United Kingdom); Harriet Parnell, Granta Design Ltd. (United Kingdom) and ANSYS UK Ltd. (United Kingdom); Sindy Phang, Emma Barney, Mark Farries, Trevor Benson, The Univ. of Nottingham (United Kingdom); Lukasz Sojka, Wroclaw Univ. of Science and Technology (Poland); Slawomir Sujecki, The Univ. of Nottingham (United Kingdom). [11234-8]

Coffee Break Sun 3:15 pm to 3:45 pm



WEDNESDAY 5 FEBRUARY

SESSION 12

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . WED 8:10 AM TO 10:00 AM

Optical Histology I

Session Chairs: **Yang Pu**, MicroPhotoAcoustics, Inc. (USA);
Lingyan Shi, Univ. of California, San Diego (USA)

8:10 am: **Label-free multiphoton microscopy in human tissue enabled by an Er:fiber-laser based tunable source** (*Invited Paper*), Hsiang-Yu Chung, Deutsches Elektronen-Synchrotron (Germany) [11234-32]

8:40 am: **Quantitative detection of breast cancer using confocal fluorescence polarization imaging**, Peter R. Jermain, Univ. of Massachusetts Lowell (USA); Dina Kandil, Univ. of Massachusetts Medical School (USA); Ashraf Khan, Baystate Medical Ctr. (USA); Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA) [11234-33]

9:00 am: **Terbium ion as RNA tag for slide-free histology with deep-ultraviolet excitation fluorescence**, Yasuaki Kumamoto, Kyoto Prefectural Univ. of Medicine (Japan) [11234-34]

9:20 am: **Pilot study of micro optical coherence tomography for detection of invasive and pre-invasive cervical lesions**, Elham Abouei, The Univ. of British Columbia (Canada); Joseph A. Gardecki, Massachusetts General Hospital (USA); Michele Follen, King's County Hospital (USA); Calum MacAulay, The Univ. of British Columbia (USA); Jed Cutler, Lisa Ricketts-Holcomb, King's County Hospital (USA); Guillermo J. Tearney, Harvard Medical School (USA) [11234-35]

9:40 am: **Development of a novel, label-free, depth-resolved Raman imaging approach for breast cancer margin assessment**, Rishikesh Pandey, CytoVeris Inc. (USA); Guoan Zheng, Shaowei Jiang, Pouria Hoveida, Univ. of Connecticut (USA); David Fournier, Alan D. Kersey, CytoVeris Inc. (USA) [11234-36]

Coffee Break Wed 10:00 am to 10:30 am

SESSION 13

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . WED 10:30 AM TO 11:20 AM

Optical Histology II

Session Chairs: **Yang Pu**, MicroPhotoAcoustics, Inc. (USA);
Yasuaki Kumamoto, Osaka Univ. (Japan)

10:30 am: **Optical imaging of heavy water metabolism in cells and animals** (*Invited Paper*), Lingyan Shi, Univ. of California, San Diego (USA); Wei Min, Columbia Univ. (USA) [11234-37]

11:00 am: **Low cost hand scanning OCT probe for biopsy guidance**, Gopi Maguluri, Mark Scimone, Jesung Park, John Grimbble, Physical Sciences Inc. (USA); Savitri Krishnamurthy, The Univ. of Texas M. D. Anderson Cancer Ctr. (USA); Nicusor V. Iftimia, Physical Sciences Inc. (USA) [11234-38]

Lunch/Exhibition Break Wed 11:20 am to 1:20 pm

SESSION 14

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . . WED 1:20 PM TO 3:10 PM

Optical Histology III

Session Chairs: **Anna N. Yaroslavsky**, Univ. of Massachusetts Lowell (USA); **Angela B. Seddon**, The Univ. of Nottingham (United Kingdom)

1:20 pm: **DUET, a novel, simple, rapid microscopy method for evaluation of fibrosis from donor-kidney frozen section slides**, Farzad Fereidouni, Austin Todd, Kuang-Yu Jen, Richard Levenson, Univ. of California, Davis (USA) [11234-40]

1:40 pm: **Rapid label-free computational staining for cancer histopathology**, Bo Gao, Hunter College (USA); Xin Xie, Fairfield Univ. (USA); Ashraf Talukder, Hunter College (USA); Run Li, Fairfield Univ. (USA); Min Xu, Hunter College (USA) [11234-41]

2:00 pm: **Imaging metabolic activities of deuterium labeled glucose with stimulated Raman scattering microscopy**, Lingyan Shi, Univ. of California, San Diego (USA); Wei Min, Columbia Univ. (USA) [11234-42]

2:20 pm: **550 nm bandwidth optical coherence tomography system for simultaneous spectroscopic and structural imaging in the near infrared**, Mikkel Jensen, Niels M. Israelsen, Technical Univ. of Denmark (Denmark); Ole Bang, Technical Univ. of Denmark (Denmark) and NKT Photonics A/S (Denmark) [11234-43]

2:40 pm: **Optical access to the brain through a transparent cranial implant** (*Invited Paper*), Mildred S. Cano-Velázquez, Univ. Nacional Autónoma de México (Mexico); Nami Davoodzadeh, David L. Halaney, Carrie R. Jonak, Devin K. Binder, Guillermo Aguilar, Univ. of California, Riverside (USA); Juan Hernández-Cordero, Univ. Nacional Autónoma de México (Mexico) [11234-44]

Coffee Break Wed 3:10 pm to 3:40 pm

SESSION 15

LOCATION: ROOM 160 (UPPER MEZZANINE SOUTH) . . WED 3:40 PM TO 5:40 PM

Optical Bioassay Platforms

Session Chairs: **Stavros G. Demos**, Lab. for Laser Energetics (USA);
Nicusor V. Iftimia, Physical Sciences Inc. (USA)

3:40 pm: **Quantitative assessment of acute mesenteric ischemia in preclinical models using laser speckle contrast imaging (LSCI)**, So Hyun Nam, Children's National Health System (USA); Gyeong Woo Cheon, GE Global Research (USA); Eugene Oh, Bo Ning, Yujeong Cho, Jae-Ho Han, Timothy Kane, Anthony Sandler, Jaepyeong Cha, Children's National Health System (USA) [11234-45]

4:00 pm: **Evaluation of blood circulation ability based on fNIRS in ECMO patients**, Yi-Chih Chen, Tzu-Hsin Fan, Chun-Jung Huang, National Chiao Tung Univ. (Taiwan); Hsiao-Huang Chang, Taipei Veterans General Hospital (Taiwan); Chia-Wei Sun, National Chiao Tung Univ. (Taiwan) [11234-46]

4:20 pm: **Correlation of metabolites in saliva and in vivo tissue of oral cancer patients based on fluorescence spectral deconvolution**, Raja Pappu, Einstein Gnanatheepam, Anna Univ., Chennai (India); Sangeetha Ramamoorthy, Tamil Nadu Government Dental College and Hospital (India); Aruna Prakasarao, Anna Univ., Chennai (India); Jayachandran Sadaksharam, Tamil Nadu Government Dental College and Hospital (India); Ganesan Singaravelu, Anna Univ., Chennai (India) . . [11234-47]

4:40 pm: **Brain metabolism changes in cases of impaired breathing or blood circulation in rodents evaluated by real time optical spectroscopy methods**, Gennadii A. Pivchenko, Orel State Univ. named after I.S. Turgenev (Russian Federation) and Sechenov Univ. (Russian Federation); Evgeniya S. Seryogina, Ksenia Yu Kandurova, Valery V. Shupletsov, Olga A. Stelmashchuk, Orel State Univ. named after I.S. Turgenev (Russian Federation); Evgeny A. Zherebtsov, Viktor V. Dremin, Orel State Univ. named after I.S. Turgenev (Russian Federation) and Univ. of Oulu (Finland); Aleksander G. Alekseyev, Andrey V. Dunayev, Orel State Univ. named after I.S. Turgenev (Russian Federation); Igor V. Meglinski, Univ. of Oulu (Finland) [11234-6]

5:00 pm: **Feasibility study of cerebral hypoxia evaluation through a transparent nanocrystalline yttria-stabilized zirconia cranial implant using Monte Carlo method**, Fredy Miranda-Casasola, Univ. Nacional Autónoma de México (Mexico); Nami Davoodzadeh, Univ. of California, Riverside (USA); Celia Sánchez-Pérez, Univ. Nacional Autónoma de México (Mexico); Guillermo Aguilar, Univ. of California, Riverside (USA); Enoch Gutierrez-Herrera, Univ. Nacional Autónoma de México (Mexico) and Univ. of California, Riverside (USA) [11234-48]

5:20 pm: **Lipid metabolic imaging opens new avenue for human cancer diagnosis**, Shuhua Yue, Shuo Zhang, Beihang Univ. (China); Lin Yao, Liqun Zhou, Peking Univ. First Hospital (China) [11234-49]

WEDNESDAY 5 FEBRUARY

SESSION 9

LOCATION: ROOM 159 (UPPER MEZZANINE SOUTH) . WED 8:20 AM TO 10:30 AM

Spectral Imaging I

Session Chair: **Attila Tárnok**, Univ. Leipzig (Germany)

8:20 am: **Fluorescence Resonance Energy Transfer (FRET)-based polymer dots for multicolor imaging under single excitation wavelength**, Ji-Eun Jeong, Hee-Chang Kim, Sang-Hee Shim, Han Young Woo, Korea Univ. (Korea, Republic of)..... [11243-38]

8:40 am: **Ultrathin multi-aperture microscope**, Stephan Schacke, Fraunhofer-Projektzentrum für Mikroelektronische und Optische Systeme für die Biomedizin (Germany); René Berlich, Bernd Höfer, Peter Dannberg, Ben Zaage, Erik Beckert, Norbert Danz, Fraunhofer-Institut für Angewandte Optik und Feinmechanik IOF (Germany)..... [11243-39]

9:00 am: **Partial wave spectroscopy study of the structural properties of human prostate tumor tissues obtained by xenografting of drug-sensitive and drug-resistant prostate cancer cells**, Prakash Adhikari, Mississippi State Univ. (USA); Prashanth K. B. Nagesh, The Univ. of Texas Rio Grande Valley (USA); Fatemah Alharthi, Mississippi State Univ. (USA); Murali M. Yallapu, The Univ. of Texas Rio Grande Valley (USA); Prabhakar Pradhan, Mississippi State Univ. (USA)..... [11243-40]

9:20 am: **Fiber-based instrument for simultaneous exogenous fluorescence and endogenous fluorescence lifetime imaging of engineered vascular tissue**, Cai Li, Alba Alfonso Garcia, Lauren Uyesaka, Benjamin E. Sherlock, Univ. of California, Davis (USA); Leigh G. Griffiths, Mayo Clinic (USA); Laura Marcu, Univ. of California, Davis (USA).... [11243-41]

9:40 am: **Optical, label-free metabolic imaging (Invited Paper)**, Irene Georgakoudi, Tufts Univ. (USA)..... [11243-79]

10:10 am: **Optical imaging methods for label free detection of microplastics in cells, tissues and environmental organisms**, Alvaro Barroso Pena, Steffi Ketelhut, Westfälische Wilhelms-Univ. Münster (Germany); Matthias Godejohann, MG Optical Solutions GmbH (Germany); Björn Kemper, Jürgen Schnekenburger, Westfälische Wilhelms-Univ. Münster (Germany)..... [11243-43]

Coffee Break.....Wed 10:30 am to 10:50 am

SESSION 10

LOCATION: ROOM 159 (UPPER MEZZANINE SOUTH) . WED 10:50 AM TO 12:30 PM

Spectral Imaging II

Session Chair: **Irene Georgakoudi**, Tufts Univ. (USA)

10:50 am: **Enfaced multimodal endoscopic system based on multispectral and high-frequency ultrasound imaging for in situ tumor characterizations**, Jihun Kim, Sangyeon Youn, Hahmin Lew, Multimodal Biomedical Imaging and System Lab. (Korea, Republic of); Jin-Hyung Park, Sungkyunkwan Univ. (Korea, Republic of); Jin Ho Chang, Sogang Univ. (Korea, Republic of); Jae Youn Hwang, Multimodal Biomedical Imaging and System Lab. (Korea, Republic of)..... [11243-44]

11:10 am: **Deep UV microscopy of prostate cancer tissue**, Soheil Soltani, Ashkan Ojaghi, Atsute Kludze, Francisco E. Robles, Georgia Institute of Technology (USA)..... [11243-45]

11:30 am: **Optical manipulation of neuronal activity using thermo-plasmonic nano-transducer attached optical fiber**, Hongki Kang, KAIST (Korea, Republic of); Woongki Hong, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of); Yujin Jin An, Yoonkey Nam, KAIST (Korea, Republic of)..... [11243-76]

11:50 am: **INS-FOCT: a label-free, all-optical method for simultaneously manipulating and mapping brain function**, Ying Zhang, Fen Yang, Lin Yao, Xuemei Song, Zhejiang Univ. (China); Anna Wang Roe, Zhejiang Univ. (China) and Oregon Health & Science Univ. (USA); Peng Li, Zhejiang Univ. (China)..... [11243-47]

12:10 pm: **Laser-assisted cell transfection in a microfluidic setup**, Hans Georg Breunig, Univ. des Saarlandes (Germany) and JenLab GmbH (Germany); Ana Maria Gonçalves Batista, Univ. des Saarlandes (Germany); Karsten König, Univ. des Saarlandes (Germany) and JenLab GmbH (Germany)..... [11243-48]

Lunch Break..... Wed 12:30 pm to 2:00 pm

2:10 pm: **Optimizing white blood cell contrast in graded-field capillaroscopy using capillary tissue phantoms**, Gregory N. McKay, Taylor L. Bobrow, Srivathsan Kalyan, Soojung Claire Hur, Nicholas J. Durr, Johns Hopkins Univ. (USA)..... [11243-27]

2:30 pm: **Genomics imaging and nanoscale analysis (GINA) platform bridges 4-D chromatin organization with molecular function**, Adam Eshein, Yue Li, Ranya Virk, Luay M. Almassalha, Wenli Wu, Jane Frederick, Greta Wodarczyk, Scott Gladstein, Aya Eid, David VanDerway, Vasundhara Agrawal, John E. Chandler, Nicholas Anthony, The-Quyen Nguyen, Allen Taflove, Vinayak P. Dravid, Cheng Sun, Hao F. Zhang, Igal Szleifer, Vadim Backman, Northwestern Univ. (USA)..... [11243-28]

2:50 pm: **Flow cytometry visualisation and real-time processing with a CMOS SPAD array and high-speed hardware implementation algorithm**, Hanning Mai, The Univ. of Edinburgh (United Kingdom); Simon P. Poland, King's College London (United Kingdom); Francesco Mattioli Della Rocca, Ahmet T. Erdogan, The Univ. of Edinburgh (United Kingdom); Richard Walker, Photon Force Ltd. (United Kingdom); Istvan Gyongy, The Univ. of Edinburgh (United Kingdom); Simon M. Ameer-Beg, King's College London (United Kingdom); Robert K. Henderson, The Univ. of Edinburgh (United Kingdom)..... [11243-29]

3:10 pm: **Instance segmentation of immune cells in human lupus nephritis using deep learning: Comparing performance on sample preparation and staining panels**, Madeleine S. Durkee, Adam R. Sibley, Benjamin A. Cifu, Junting Ai, Rebecca Abraham, The Univ. of Chicago (USA); Vladimir M. Liarski, The Univ. of Chicago Medicine (USA); Marcus R. Clark, Maryellen L. Giger, The Univ. of Chicago (USA)..... [11243-30]

Coffee Break..... Tue 3:30 pm to 4:00 pm

SESSION 8

LOCATION: ROOM 159 (UPPER MEZZANINE SOUTH) ... TUE 4:00 PM TO 6:10 PM

Cytomics III

Session Chair: **Attila Tárnok**, Univ. Leipzig (Germany)

4:00 pm: **Multi-wavelength diffractive beam shaper for rectangular flattop spots in flow cytometer (Invited Paper)**, Jingjing Zhao, Stanford Univ. (USA); Yong Han, Zeheng Jiao, Zixi Chao, Tsinghua Univ. (China); Attila Tárnok, Institut für Medizinische Informatik, Statistik und Epidemiologie (Germany) and Fraunhofer-Institut für Zelltherapie und Immunologie IZI (Germany) and Tsinghua Univ. (China); Zheng You, Tsinghua Univ. (China)..... [11243-31]

4:30 pm: **Dynamic signatures of lipid droplets reveal cellular metabolic changes associated with stimuli and drug treatments**, Chi Zhang, Stephen A. Boppart, Univ. of Illinois (USA)..... [11243-32]

4:50 pm: **Time-gated fluorescence imaging and sensing using long lifetime near infrared quantum dots**, Thomas Pons, Sophie Bouccara, Manon Debayle, Vincent Lorient, Nicolas Lequeux, Alexandra Fragola, Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (France)..... [11243-33]

5:10 pm: **High-throughput three-dimensional imaging cytometer for subnuclear foci quantification**, Cheng Zheng, Massachusetts Institute of Technology (USA); Dushan N. Wadduwa, Harvard Univ. (USA); Jong Park, Christy Chao, Jenny Kay, Norah Owiti, Massachusetts Institute of Technology (USA); Zachary Nagel, Harvard Univ. (USA); Bevin P. Engelward, Peter T. C. So, Massachusetts Institute of Technology (USA)..... [11243-34]

5:30 pm: **Comparison of spectral FRET microscopy approaches for single-cell analysis**, Joshua Deal, John Robert Griswold, Malvika Lall, Alia Tayara, Aliyah Odom, Craig M. Browning, Marina Parker, Thomas C. Rich, Silas J. Leavesley, Univ. of South Alabama (USA)..... [11243-35]

5:50 pm: **Oblique plane microscope platereader for time lapse 3D imaging of live cells in collagen**, Nathan Curry, Hugh Sparks, Imperial College London (United Kingdom); Lucas Dent, Vicky Bousgouni, The Institute of Cancer Research (United Kingdom); Vincent Maioli, Ranjeet Kumar, Sunil Kumar, Imperial College London (United Kingdom); Chris Bakal, The Institute of Cancer Research (United Kingdom); Christopher W. Dunsby, Imperial College London (United Kingdom)..... [11243-36]

SESSION 11

LOCATION: ROOM 159 (UPPER MEZZANINE SOUTH) . . . WED 2:00 PM TO 3:20 PM

Monitoring and Regenerative Medicine I

Session Chair: **Attila Tárnok**, Univ. Leipzig (Germany)

2:00 pm: **FLIM and Raman imaging for detecting micro-environmental changes in bovine pericardium upon genipin cross-linking**, Tanveer Ahmed Shaik, Leibniz-Institut für Photonische Technologien e.V. (Germany); Alba Alfonso Garcia, Univ. of California, Davis (USA); Martin Richter, Friedrich-Schiller-Univ. Jena (Germany); Florian Korinth, Leibniz-Institut für Photonische Technologien e.V. (Germany); Anne K. Haudenschild, James F. Mcmasters, Univ. of California, Davis (USA); Christoph Krafft, Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany); Laura Marcu, Univ. of California, Davis (USA) [11243-49]

2:20 pm: **Classification of meat freshness based on deep learning using data from diffuse reflectance spectroscopy**, Youngjoo Lee, Sungho Shin, Sungchul Kim, Gwangju Institute of Science and Technology (Korea, Republic of); Nguyen Thien, Gwangju Institute of Science and Technology (Viet Nam); Kyoobin Lee, Jae Gwan Kim, Gwangju Institute of Science and Technology (Korea, Republic of) [11243-50]

2:40 pm: **Probing metabolic alteration of differentiating induced pluripotent stem cells using label-free FLIM**, Aleksandra V. Meleshina, Svetlana A. Rodimova, Privolzhsky Research Medical Univ. (Russian Federation); Erdem Dashinimaev, Koltzov Institute of Developmental Biology (Russian Federation); Dmitry Reunov, Elena V. Zagaynova, Privolzhsky Research Medical Univ. (Russian Federation) [11243-51]

3:00 pm: **Fabrication protocol of personalized engineered cornea using optical coherence tomography (OCT) imaging and 3D printing**, Yujin Ahn, Ulsan National Institute of Science and Technology (Korea, Republic of); Sang Woo Kim, Univ. of Ulsan College of Medicine (Korea, Republic of); Jun Woo Lim, Jae Hyun Jung, Soongsil Univ. (Korea, Republic of); Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of) [11243-52]

Coffee Break. Wed 3:20 pm to 3:50 pm

SESSION 12

LOCATION: ROOM 159 (UPPER MEZZANINE SOUTH) . . . WED 3:50 PM TO 5:30 PM

Monitoring and Regenerative Medicine II

Session Chair: **Attila Tárnok**, Univ. Leipzig (Germany)

3:50 pm: **Near-field scanning optical microscopy study of living cells**, Medet Shatayev, Yingqiu Xie, Haiyan Fan, Nazarbayev Univ. (Kazakhstan); Giovanni Dietler, Sergey K. Sekatskii, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Kanat Dukenbayev, Nazarbayev Univ. (Kazakhstan) [11243-53]

4:10 pm: **Imaging biomarkers quantify therapeutic effect in 3D-printed skin cancer constructs**, Daniel S. Gareau, James Browning, The Rockefeller Univ. (USA); Marc Ferrer, National Institutes of Health (USA); John A. Carucci, New York Univ. (USA) [11243-54]

4:30 pm: **Value of scanning electron microscopy in liver tissue engineering**, Laila M. Montaser, Sherin M. Fawzy, Menoufia Univ. (Egypt) [11243-55]

4:50 pm: **Multiscale multimodal biomicroscopic system based on confocal optical and high-frequency ultrasound imaging for 3D spheroid characterizations**, Seonho Shin, Jihun Kim, Jae Youn Hwang, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of) . . [11243-56]

5:10 pm: **Discrimination between acute otitis media and otitis media with effusion using a multimode smartphone-based otoscope**, Thiago Cavalcanti Coutinho, Sewoong Kim, Jae Youn Hwang, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of) . . [11243-42]

THURSDAY 6 FEBRUARY

SESSION 13

LOCATION: ROOM 159 (UPPER MEZZANINE SOUTH) . . . THU 8:30 AM TO 9:30 AM

Bioinformatics and Analysis

Session Chair: **Attila Tárnok**, Univ. Leipzig (Germany)

8:30 am: **Fully automatic deep learning-based model for quantification of time-resolved calcium response of cells to ultrasound stimulation**, Kyungsu Lee, Jae Youn Hwang, Multimodal Biomedical Imaging and System Lab. (Korea, Republic of) [11243-57]

8:50 am: **Convolutional neural network (CNN) based needle-tracking for OCT-guided cornea "Big Bubble" procedure**, Ruizhi Zuo, Jin U. Kang, Soohyun Lee, Shoujing Guo, Shuwen Wei, Johns Hopkins Univ. (USA) [11243-58]

9:10 am: **Automated 4-D myocardial nuclei segmentation method to quantify cardiac contractility for understanding Notch signaling during development**, Tanveer Ashwini Teranikar, Nabid Salehin, Cheng-Jen Chuong, Juhyun Lee, The Univ. of Texas at Arlington (USA) [11243-77]

Coffee Break. Thu 9:30 am to 10:00 am

9:30 am: **Imaging of periodontal tissue using swept-source optical coherence tomography for measurement of gingival sulcus depth**, Jaeyul Lee, Jaeseok Park, Kyungpook National Univ. (Korea, Republic of); Muhammad Faizan Shirazi, Medizinische Univ. Wien (Austria); Hosung Jo, Pilun Kim, Kyungpook National Univ. (Korea, Republic of); Ruchire Eranga H. Wijesinghe, Kyungil Univ. (Korea, Republic of); Mansik Jeon, Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of) [11243-21]

SESSION 14

LOCATION: ROOM 159 (UPPER MEZZANINE SOUTH) . THU 10:00 AM TO 11:50 AM

Functional Imaging III

Session Chair: **Daniel L. Farkas**, Univ. of Southern California (USA), SMI (USA)

10:00 am: **Raman spectroscopy for the analysis of exosomes (Invited Paper)**, Sebastian Wachsmann-Hogiu, McGill Univ. (Canada) [11243-80]

10:30 am: **Lymph node micrometastases detection is improved using a paired agent staining and rinsing protocol**, Chengyue Li, Veronica C. Torres, Yusheng He, Illinois Institute of Technology (USA); Xiaochun Xu, Dartmouth College (USA); Jovan G. Brankov, Kenneth M. Tichauer, Illinois Institute of Technology (USA) [11243-12]

10:50 am: **Development of a time lapse tumor cell spheroid imaging system with a high-resolution spectral-domain optical coherence microscopy system**, You-Nan Tsai, Yu-Wei Chang, Chia-Chun Ni, Ting-Hao Chen, Ting-Yen Tsai, Ying-Peng Huang, Chih-Chung Yang, Hsiang-Chieh Lee, National Taiwan Univ. (Taiwan) [11243-13]

11:10 am: **Structural remodeling of fibrillar collagens in posterior tibial tendinopathy in three dimensional space identified using multiphoton and second harmonic generation imaging**, Thomas Abraham, Rebecca Koob, Nurgul Carkaci-Salli, Umur Aydogan, Penn State College of Medicine (USA) [11243-14]

11:30 am: **Increased sensitivity of photoacoustic imaging by resonance frequency of microbubble**, Haemin Kim, Jinwoo Kim, Hohyeon Lee, Hyuncheol Kim, Jin Ho Chang, Sogang Univ. (Korea, Republic of) . . [11243-75]

CONFERENCE 11246

LOCATION: ROOM 152 (UPPER MEZZANINE SOUTH)

Saturday–Sunday 1–2 February 2020 • Proceedings of SPIE Vol. 11246

Single Molecule Spectroscopy and Superresolution Imaging XIII

Conference Chairs: **Ingo Gregor**, Georg-August-Univ. Göttingen (Germany); **Felix Koberling**, PicoQuant GmbH (Germany); **Rainer Erdmann**, PicoQuant GmbH Berlin (Germany)

Program Committee: **Andrea M. Armani**, The Univ. of Southern California (USA); **Michael Börsch**, Friedrich-Schiller-Univ. Jena (Germany); **Christian Eggeling**, Univ. of Oxford (United Kingdom), Friedrich-Schiller Univ. Jena (Germany); **Jörg Enderlein**, Georg-August-Univ. Göttingen (Germany); **Paul M. W. French**, Imperial College London (United Kingdom); **Ewa M. Goldys**, The Univ. of New South Wales (Australia); **Zygmunt Karol Gryczynski**, Univ. of North Texas Health Science Ctr. at Fort Worth (USA), Texas Christian Univ. at Fort Worth (USA); **Mike Heilemann**, Goethe-Univ. Frankfurt am Main (Germany); **Johan Hofkens**, KU Leuven (Belgium); **Zhen-Li Huang**, Huazhong Univ. of Science and Technology (China); **Markus Sauer**, Univ. Bielefeld (Germany); **Shimon Weiss**, Univ. of California, Los Angeles (USA); **Andong Xia**, Institute of Chemistry (China)

Conference Co-Sponsor:



SATURDAY 1 FEBRUARY

LOCATION: ROOM 152 (UPPER MEZZANINE SOUTH) 8:55 AM TO 9:00 AM

Welcome & Introduction

Rainer Erdmann gives welcome and introduction

SESSION 1

LOCATION: ROOM 152 (UPPER MEZZANINE SOUTH) . . SAT 9:00 AM TO 10:20 AM

Biological or Multimodal Applications

Session Chair: **Rainer Erdmann**, PicoQuant GmbH (Germany)

9:00 am: **Novel semiconductor-laser-integrated AFM active optical probe with ultrashort pulses and nanoscale aperture**, Alexander A. Ukhanov, Fei-Hung Chu, Gennady A. Smolyakov, Kevin J. Malloy, Actoprobe LLC (USA) [11246-1]

9:20 am: **ElastoTweezers: A novel platform for high-precision cell elasticity measurements**, Karsten Gall, Andy Sischka, Ionovation GmbH (Germany); Sebastian Knust, Univ. Bielefeld (Germany); Hendrik Milting, Herz- und Diabeteszentrum Nordrhein-Westfalen (Germany); Bastien Venzac, Séverine Le Gac, Univ. of Twente (Netherlands); Elwin Vrouwe, Micronit Microfluidics B.V. (Netherlands); Martina Viefhues, Dario Anselmetti, Univ. Bielefeld (Germany) [11246-2]

9:40 am: **Feedback enabled pinpoint force fluorescence microscope**, Patrick Schmidt, Benjamin Reichert, John Lajoie, Iowa State Univ. of Science and Technology (USA); Sanjeevi Sivasankar, Univ. of California, Davis (USA) [11246-3]

10:00 am: **Super-resolution imaging of pathological tissue reveals higher-order chromatin folding in cancer development**, Yang Liu, Univ. of Pittsburgh (USA) [11246-4]

Coffee Break Sat 10:20 am to 10:50 am

SESSION 2

LOCATION: ROOM 152 (UPPER MEZZANINE SOUTH) . SAT 10:50 AM TO 12:10 PM

FLIM, FRET & FCS I

Session Chair: **Mike Heilemann**, Goethe-Univ. Frankfurt am Main (Germany)

10:50 am: **Fluorescence lifetime image scanning microscopy**, Ingo Gregor, Niels Radmacher, Jörg Enderlein, Georg-August-Univ. Göttingen (Germany) [11246-5]

11:10 am: **Scanning FCS and super-resolution microscopy on 2D lipid membranes**, Uwe Ortman, PicoQuant GmbH (Germany); Mariano Gonzalez Pisfil, PicoQuant GmbH (Germany) and Humboldt-Univ. (Germany); Marcelle König, Rhys Dowler, Benedikt Krämer, Sumeet Rohilla, Felix Koberling, Rainer Erdmann, PicoQuant GmbH (Germany) [11246-6]

11:30 am: **Fast and compact time-correlated single photon counting system for high-speed measurement with low distortion**, Giulia Acconcia, Serena Farina, Ivan G. Labanca, Massimo Ghioni, Ivan Rech, Politecnico di Milano (Italy) [11246-7]

11:50 am: **Efficient wide-field FLIM and image modulation using Pockels cells**, Adam Bowman, Mark A. Kasevich, Stanford Univ. (USA) [11246-8]

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

SESSION 3

LOCATION: ROOM 152 (UPPER MEZZANINE SOUTH) . . . SAT 1:40 PM TO 3:10 PM

FLIM, FRET & FCS II

Session Chair: **Felix Koberling**, PicoQuant GmbH (Germany)

1:40 pm: **Efficient light harvesting biotic-abiotic nano-hybrid system incorporating atomically thin van Der Waals transition metal dichalcogenides (Invited Paper)**, Mircea Cotlet, Mingxing Li, Brookhaven National Lab. (USA) [11246-9]

2:10 pm: **Dual-color super-resolution imaging for FRET measurements: Energy transfer among donor/acceptor pairs of quantum dots**, Duncan Ryan, Los Alamos National Lab. (USA); Megan K. Dunlap, Colorado State Univ. (USA); Somak Majumder, Chris J. Sheehan, James H. Werner, Jennifer A. Hollingsworth, Los Alamos National Lab. (USA); Martin P. Gelfand, Alan K. Van Orden, Colorado State Univ. (USA); Peter M. Goodwin, Los Alamos National Lab. (USA) [11246-10]

2:30 pm: **Elucidation of the protein conformational changes occurring during assembly of P22 bacteriophage coat protein**, Sanchari Banerjee, Carolyn Teschke, Univ. of Connecticut (USA) [11246-11]

2:50 pm: **Ultrafast fluorescence lifetime imaging microscopy by frequency-division multiplexing**, Hiroshi Kanno, The Univ. of Tokyo (Japan); Hideharu Mikami, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan); Keisuke Goda, The Univ. of Tokyo (Japan) and Univ. of California (USA) and Wuhan Univ. (China) [11246-12]

Coffee Break Sat 3:10 pm to 3:40 pm

CONFERENCE 11247

POSTERS-MONDAY

LOCATION: MOSCONE CENTER, LEVEL 3 WEST MON 5:30 PM TO 7:00 PM

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.

Poster Setup: Monday 10:00 AM – 4:30 PM

View poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>

RGC imaging and fluorescence image comparison using reflection-type DIC microscopy. Subeen Park, Korea Institute of Science and Technology (Korea, Republic of) and Kookmin Univ. (Korea, Republic of); Byeongho Park, Youngho Cho, Korea Institute of Science and Technology (Korea, Republic of); Hyung Min Kim, Kookmin Univ. (Korea, Republic of); Kyoung Min Lee, Da Young Song, Boramae Medical Ctr., Seoul National Univ. Hospital (Korea, Republic of); Robert J. Zawadzki, Univ. of California, Davis (USA); Dae Yu Kim, Inha Univ. (Korea, Republic of); Seok Hwan Kim, Seoul National Univ. Hospital (Korea, Republic of); Jae Hun Kim, Korea Institute of Science and Technology (Korea, Republic of). [11247-16]

Lens-free holographic microscopy for complete blood analysis on a chip. Yi-Chun Chen, National Central Univ. (Taiwan). [11247-17]

Photoplethysmography for bovine heat detection: the preliminary results. Blaž Cugmas, Univ. of Latvia (Latvia); Aleksandar Plavšić, VETS4SCIENCE d.o.o. (Slovenia); Eva Štruc, Vetamplify, SIA (Latvia); Janis Spigulis, Univ. of Latvia (Latvia). [11247-18]

Detection of glucose by chitosan coated nanogold array on u-shaped optical sensor platform. Begum Balkan, Cansu Canbek Ozdil, Murat Gülsoy, Bogaziçi Univ. (Turkey). [11247-19]

CONFERENCE 11251

LOCATION: ROOM 305 (LEVEL 3 SOUTH)

Saturday–Tuesday 1–4 February 2020 • Proceedings of SPIE Vol. 11251

Label-free Biomedical Imaging and Sensing (LBIS) 2020

Conference Chairs: **Natan T. Shaked**, Tel Aviv Univ. (Israel); **Oliver Hayden**, Technische Univ. München (Germany)

Program Committee: **Shi-Wei Chu**, National Taiwan Univ. (Taiwan); **Adam de la Zerda**, Stanford Univ. School of Medicine (USA); **Pietro Ferraro**, Istituto di Scienze Applicate e Sistemi Intelligenti “Eduardo Caianiello” (Italy); **Jochen R. Guck**, TU Dresden (Germany); **Bahram Jalali**, Univ. of California, Los Angeles (USA); **Ori Katz**, The Hebrew Univ. of Jerusalem (Israel); **Alexander T. Khmaladze**, Univ. at Albany (USA); **Pierre P. Marquet**, Ctr. de Recherche de l’Univ. Laval Robert-Giffard (Canada); **Aydogan Ozcan**, Univ. of California, Los Angeles (USA); **Jürgen Popp**, Friedrich-Schiller-Univ. Jena (Germany); **Francisco E. Robles**, Georgia Institute of Technology & Emory Univ. School of Medicine (USA); **Melissa C. Skala**, Univ. of Wisconsin-Madison (USA); **Valery V. Tuchin**, Saratov State Univ. (Russian Federation), Tomsk State Univ. (Russian Federation), Institute of Precision Mechanics and Control of the RAS (Russian Federation); **Yihui Wu**, Changchun Institute of Optics, Fine Mechanics and Physics (China); **Yizheng Zhu**, Virginia Polytechnic Institute and State Univ. (USA)

SATURDAY 1 FEBRUARY

OPENING REMARKS

LOCATION: ROOM 305 (LEVEL 3 SOUTH) SAT 8:00 AM TO 8:30 AM

Opening remarks by Conference Chairs:
Natan T. Shaked, Tel Aviv Univ. (Israel);
Oliver Hayden, Technische Univ. München (Germany)

SESSION 1

LOCATION: ROOM 305 (LEVEL 3 SOUTH) SAT 8:30 AM TO 10:00 AM

Spontaneous Raman I

Session Chairs: **Natan T. Shaked**, Tel Aviv Univ. (Israel);
Oliver Hayden, Technische Univ. München (Germany)

8:30 am: **Rapid theranostics by multicontast spectroscopy/imaging** (*Keynote Presentation*), Jürgen Popp, Leibniz-Institut für Photonische Technologien e.V. (Germany) [11251-1]

9:15 am: **Detection of the differentiation state of salivary gland organoids for tissue engineering by Raman spectroscopy**, Ting Chean Khoo, Nicholas Moskwa, Georgios A. Athanassiadis, Anna V. Sharikova, Melinda Larsen, Alexander Khmaladze, Univ. at Albany (USA) [11251-2]

9:30 am: **1064 nm Raman microscopy using a multifocal excitation pattern**, Haojie Ji, Marcos A. Soares de Oliveira, Che-Wei Chang, James W. Chan, Univ. of California, Davis (USA) [11251-3]

9:45 am: **Quantitative monitoring of live cell engineered bone in 3D printed resorbable calcium-phosphate implant in vitro using fiber-optic Raman spectroscopy**, Anders R. Walthers, Morten Ø. Andersen, Martin A. B. Hedegaard, Univ. of Southern Denmark (Denmark) [11251-4]

Coffee Break Sat 10:00 am to 10:30 am

SESSION 2

LOCATION: ROOM 305 (LEVEL 3 SOUTH) SAT 10:30 AM TO 12:30 PM

Spectroscopy and Scattering I

Session Chair: **Oliver Hayden**, Technische Univ. München (Germany)

10:30 am: **Intracellular Doppler spectroscopy for label-free functional imaging of living tissue** (*Invited Paper*), David D. Nolte, Purdue Univ. (USA) [11251-5]

11:00 am: **Highly sensitive low-frequency Raman spectroscopy enabled by Sagnac-enhanced impulsive stimulated Raman scattering**, Walker Peterson, The Univ. of Tokyo (Japan); Kotaro Hiramatsu, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan); Keisuke Goda, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan) and Univ. of California, Los Angeles (USA) [11251-6]

11:15 am: **Towards intracellular phase transitions in ALS disease by noncontact Brillouin microscopy**, Giuseppe Antonacci, IMEC (Belgium); Valeria de Turris, Istituto Italiano di Tecnologia (Italy); Alessandro Rosa, Giancarlo Ruocco, Sapienza Univ. di Roma (Italy) [11251-7]

11:30 am: **High resolution spectral measurements of the numerical aperture induced effects in Brillouin imaging**, Roni Shaashoua, Alberto Bilencia, Ben-Gurion Univ. of the Negev (Israel) [11251-8]

11:45 am: **Label-free classification of acute myeloid Leukemia by Raman with microsphere assisted imaging** (*Invited Paper*), Yihui Wu, Mingbo Chi, Changchun Institute of Optics, Fine Mechanics and Physics (China); Huaming Xing, Wenchao Zhou, Changchun Institute of Optics, Fine Mechanics, and Physics (China) [11251-9]

12:15 pm: **Spectral phasor analysis of autofluorescence responses from cells embedded in turbid media containing collagen**, Max Kreider, Andrew I. Rodriguez, Karthik Vishwanath, Paul Urayama, Miami Univ. (USA) [11251-10]

Lunch Break Sat 12:30 pm to 2:15 pm

SESSION 3

LOCATION: ROOM 305 (LEVEL 3 SOUTH) SAT 2:15 PM TO 5:00 PM

Autofluorescence, Nonlinear, and Multiphoton Imaging

Session Chair: **Melissa C. Skala**, Morgridge Institute for Research (USA)

2:15 pm: **Quantitative melanin imaging using label-free third-harmonic-generation enhancement-ratio microscopy** (*Invited Paper*), Chi-Kuang Sun, National Taiwan Univ. (Taiwan); Yi-Hua Liao, National Taiwan Univ. Hospital (Taiwan) [11251-11]

2:45 pm: **Assessment of neuropathology of Alzheimer’s disease brain with high-resolution, label-free multi-harmonic generation microscopy**, Sandeep Chakraborty, Pei-Che Wu, Sheng-Tse Chen, National Taiwan Univ. (Taiwan); Ming-Jang Chiu, National Taiwan Univ. Hospital (Taiwan); Chi-Kuang Sun, National Taiwan Univ. (Taiwan) [11251-13]

3:00 pm: **Real-time intraoperative diagnosis by deep neural network driven multiphoton virtual histology**, Sixian You, Yi Sun, Jaena Park, Haohua Tu, Marina Marjanovic, Stephen A. Boppart, Beckman Institute for Advanced Science and Technology (USA) [11251-14]

3:15 pm: **Multispectral characterisation of mesenchymal stem cells: Age, cell cycle, senescence and pluripotency**, Jared M. Campbell, ARC Ctr. of Excellence for Nanoscale BioPhotonics (Australia) and The Univ. of New South Wales (Australia); Abbas Habibalahi, Saabah B. Mahbub, The Univ. of New South Wales (Australia); Martin E. Gosnell, Quantitative Pty Ltd. (Australia) and The Univ. of New South Wales (Australia); Ayad G. Anwer, The Univ. of New South Wales (Australia); Sharon Paton, The Univ. of Adelaide (Australia); Stan Gronthos, Mesenchymal Stem Cell Lab. (Australia); Ewa M. Goldys, The Univ. of New South Wales (Australia) [11251-15]

Coffee Break Sat 3:30 pm to 4:00 pm

4:00 pm: **Label-free investigation of human collagen morpho-mechanics by correlative SHG, Brillouin and Raman microscopy**, Raffaella Mercatelli, Sara Mattana, Istituto Nazionale di Ottica (Italy); Laura Capozzoli, Istituto di Chimica dei Composti Organometallici (Italy); Fulvio Ratto, Francesca Rossi, Roberto Pini, Istituto di Fisica Applicata “Nello Carrara” (Italy); Daniele Fioretto, Univ. degli Studi di Perugia (Italy); Francesco S. Pavone, Univ. degli Studi di Firenze (Italy) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Silvia Caponi, Istituto dei Materiali, Consiglio Nazionale delle Ricerche (Italy); Riccardo Cicchi, Istituto Nazionale di Ottica (Italy) and LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) [11251-17]

SESSION 10

LOCATION: ROOM 305 (LEVEL 3 SOUTH) MON 2:45 PM TO 4:15 PM

Spontaneous Raman II

Session Chair: **Alexander Khmaladze**, Univ. at Albany (USA)

2:45 pm: **Sensitivity analysis of wavefront shaping based Raman endoscopy**, Liubov Amitonova, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) [11251-51]

3:00 pm: **Raman hyperspectral imaging of transferrin-bound iron in T47D and MDA-MB-231 breast cancer cells**, Ting Chean Khoo, Univ. at Albany (USA); Kate Tubbesing, Alena Rudkouskaya, Albany Medical College (USA); Georgios A. Athanassiadis, Anna V. Sharikova, Univ. at Albany (USA); Margarida Barroso, Albany Medical College (USA); Alexander Khmaladze, Univ. at Albany (USA) [11251-52]

Coffee Break Mon 3:15 pm to 3:45 pm

3:45 pm: **Multimodal, label-free histopathology for improving the diagnosis of Hirschsprung disease**, Marcos A. Soares de Oliveira, Laura A. Galganski, Che-Wei Chang, Christopher D. Pivetti, Karen E. Matsukuma, Bo Zhang, Alexandro Lopez, Payam Saadai, James W. Chan, Univ. of California, Davis (USA) [11251-53]

4:00 pm: **Molecular imaging of extracellular vesicles in vitro via Raman metabolic labelling**, Conor C. Horgan, Anika Nagelkerke, Thomas E. Whittaker, Valeria Nele, Lucia Massi, Ulrike Kauscher, Jelle Penders, Mads S. Bergholt, Imperial College London (United Kingdom); Steve R. Hood, GlaxoSmithKline (United Kingdom); Molly M. Stevens, Imperial College London (United Kingdom) [11251-54]

POSTERS-MONDAY

LOCATION: MOSCONE CENTER, LEVEL 3 WEST MON 5:30 PM TO 7:00 PM

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.

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View poster presentation guidelines and set-up instructions at <http://spie.org/PWPPosterGuidelines>

Scanning Offset-Emission Hyperspectral Microscopy (SOHM) of waveguiding in single ZnO nanorod, Bonghwan Chon, National Institute of Standards and Technology (USA) and Georgetown Univ. (USA); Johnson T. Truong, Matthew Hansen, Jong-in Hahm, Georgetown Univ. (USA); Young Jong Lee, National Institute of Standards and Technology (USA) [11251-76]

Study of the red blood cell aggregation by coherent anti-Stokes Raman spectroscopy, Martín A. Toderi, Gustavo E. Galizzi, Bibiana D. Riquelme, Instituto de Física Rosario (Argentina) and Univ. Nacional de Rosario (Argentina); Dominique Dumas, Univ. de Lorraine (France) and CNRS (France) and Institut National de la Santé et de la Recherche Médicale (France) [11251-77]

A label-free study of focal adhesions using deep learning in interference reflection microscopy, Lisa Sophie Kölln, Univ. of Strathclyde (United Kingdom); Carsten G. Hansen, The Univ. of Edinburgh (United Kingdom); Gail McConnell, Univ. of Strathclyde (United Kingdom) [11251-78]

Epithelial mesenchymal transition of prostate cancer cells monitored with a photonic crystal biosensor, Melissa Cadena, Frank De Luna, 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) [11251-79]

High-speed digital holography for monitoring the Daphnia heart rate in environmental toxicity test, Sang-Won Lee, Ik Hwan Kwon, Tae Geol Lee, Korea Research Institute of Standards and Science (Korea, Republic of) [11251-80]

Line scan Raman microspectroscopy for label-free diagnosis of ex vivo pituitary adenoma biopsies, Daniela Bovenkamp, Jeremias Püls, Fabian Placzek, Alexander Micko, Stefan Wolfberger, Romana Höftberger, Greisa Vila, Rainer A. Leitgeb, Wolfgang Drexler, Marco Andreana, Angelika Unterhuber, Medizinische Univ. Wien (Austria) [11251-81]

In vivo optical coherence tomography of cerebral microvessels in medaka, Takashi Suzuki, Tomohiro Ueno, Naoya Oishi, Kyoto Univ. Graduate School of Medicine (Japan); Hidenao Fukuyama, Beijing Institute of Technology Human Brain Research Lab. and Intelligent Robotics Institute (China) and Nagoya City Univ. Graduate School of Medical Sciences and Medical School (Japan) [11251-82]

Snapshot polarization microscopy for imaging of brain tissue, Marco Augustin, Antonia Lichtenegger, Johanna Gesperger, Pablo Eugui, Adelheid Wöhrer, Bernhard Baumann, Medizinische Univ. Wien (Austria) [11251-83]

Label-free ultrasensitive detection of Amyloid- β using microtoroid resonators for early detection of Alzheimer's disease, Adley Gin, Phuong-Diem Nguyen, Judith Su, The Univ. of Arizona (USA) [11251-84]

Birefringence microscopy for imaging the structural integrity of myelin, Nathan Blanke, Irving J. Bigio, Boston Univ. (USA) [11251-85]

Volumetric visualization of spinal cord using optical coherence tomography and tissue clearing technique, Woohee Shin, Ga Hyang Lee, Yujin Ahn, Kibeom Park, Hyunmo Yang, Woonggyu Jung, Ulsan National Institute of Science and Technology (Korea, Republic of) [11251-86]

Real-time measurement of hemoglobin concentration in continuous-wave diffusion optical spectroscopy using the least-squares method, Yikeun Kim, Pukyong National Univ. (Korea, Republic of); Chang Su Kim, Hyung Hwan Moon, Kosin Univ. (Korea, Republic of); HyunSeo Park, Pukyong National Univ. (Korea, Republic of); Eun-Kee Park, Kosin Univ. (Korea, Republic of); Yeh-Chan Ahn, Pukyong National Univ. (Korea, Republic of) [11251-87]

Quantitative analysis of the microvasculature flow speed using optical coherence tomography angiography technique and variable interscan time algorithm, Ting-Hao Chen, Ting-Yen Tsai, Yin-Peng Huang, Chuan-Bor Chueh, Meng-Shan Wu, Yi-Chun Wu, Ching-Yu Wang, Yi-Ping Hung, National Taiwan Univ. (Taiwan); Meng-Tsan Tsai, Chang Gung Univ. (Taiwan); Hsiang-Chieh Lee, National Taiwan Univ. (Taiwan) ... [11251-88]

A sub-sampling image acquisition strategy for single pixel imaging with low signal-to-noise ratio, Fangyuan Sha, Nanyang Technological Univ. (Singapore); Sujit K. Sahoo, Nanyang Technological Univ. (Singapore) and Indian Institute of Technology Goa (India); Cuong H. Dang, Nanyang Technological Univ. (Singapore) [11251-89]

Incorrect submission due to confusing. We want to cancel this paper., Yikeun Kim, Pukyong National University (Korea, Republic of) [11251-90]

Computer-aided label-free fluorescence lifetime skin cancer screening, Renan A. Romano, Ramon G. T. Rosa, Instituto de Física de São Carlos (Brazil); Ana Gabriela Salvo, Hospital Amaral Carvalho (Brazil); Javier A. Jo, Texas A&M Univ. (USA) and The Univ. of Oklahoma (USA); Cristina Kurachi, Instituto de Física de São Carlos (Brazil) [11251-91]

Enhancement of label-free biosensing of cardiac troponin I, Chase Christenson, Kwaku Baryeh, The Univ. of Texas at San Antonio (USA); Samad Ahadian, Rohollah Nasiri, Mehmet R. Dokmeci, Marcus Goudie, Ali Khademhosseini, Univ. of California, Los Angeles (USA); Jing Yong Ye, The Univ. of Texas at San Antonio (USA) [11251-93]

Deep learning algorithms enable the automated chondrocyte viability assessment of cartilage with autofluorescence and second harmonic generation imaging, Tong Ye, Xun Chen, Yang Li, Nicole Wyman, Clemson Univ. (USA) [11251-94]

Polarization recovery in full thickness bone allows for discrimination of diseased state, Emily G. Pendleton, Ruth P. Barrow, Ana D. Maslesa, Kayvan F. Tehrani, Luke J. Mortensen, The Univ. of Georgia (USA) ... [11251-95]

3D printed portable holographic microscope for biomedical particle ensemble investigations, Nikolay V. Petrov, Alexandra O. Georgieva, Dmitriy V. Ladaniy, Alexander P. Khurchak, ITMO Univ. (Russian Federation) [11251-97]

Label-free ex-vivo intravital 3D imaging of human hair follicles with optical coherence tomography, Janin Lehmann, Monasterium Lab. Skin & Hair Research Solutions GmbH (Germany); Álvaro Barroso Pena, Björn Kemper, Jürgen Schnekenburger, Westfälische Wilhelms-Univ. Münster (Germany); Ralf Paus, Monasterium Lab. Skin & Hair Research Solutions GmbH (Germany) and Univ. of Manchester (United Kingdom); Marta Bertolini, Monasterium Lab. Skin & Hair Research Solutions GmbH (Germany); Jeremy Chéret, Univ. of Miami (USA) and Monasterium Lab. Skin & Hair Research Solutions GmbH (Germany) [11251-98]

Ultrafast plasmonic and real-time label-free polymerase chain reaction, Padideh Mohammadyousef, McGill Univ. (Canada); Miltiadis Paliouras, Mark Trifiro, Lady Davis Institute for Medical Research, Jewish General Hospital (Canada); Andrew G. Kirk, McGill Univ. (Canada) [11251-99]

Label-free characterization of mitochondria assembly in oocyte of Caenorhabditis elegans by two-photon excited autofluorescence, Tao Chen, Yi-tang Lee, Dinghuan Deng, Meng C. Wang, Baylor College of Medicine (USA) [11251-100]

Raman spectroscopy and gold thin film for biosensing and detection, Saturnin S. Ombinda-Lemboumba, Lebogang Thobakgale, Sello L. Manoto, Masixole Y. Lugongolo, CSIR National Laser Ctr. (South Africa); Patience T. Mithunzi-Kufa, CSIR National Laser Ctr. (South Africa) and Univ. of South Africa (South Africa) and Univ. of KwaZulu-Natal (South Africa) [11251-92]

CONFERENCE 11254

LOCATION: ROOM 210 (LEVEL 2 SOUTH)

Sunday–Monday 2–3 February 2020 • Proceedings of SPIE Vol. 11254

Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications XVII

Conference Chairs: **Dror Fixler**, Bar-Ilan Univ. (Israel); **Ewa M. Goldys**, The Univ. of New South Wales (Australia)

Conference Co-Chair: **Sebastian Wachsmann-Hogiu**, Univ. of California, Davis (USA)

Program Committee: **Vasily N. Astratov**, The Univ. of North Carolina at Charlotte (USA); **Lorena Betancor**, Univ. ORT Uruguay (Uruguay); **Henry Hess**, Columbia Univ. (USA); **Malgorzata J?drzejewska-Szczerska**, Gdansk Univ. of Technology (Poland); **Sung Jin Kim**, Univ. of Miami (USA); **James F. Leary**, Purdue Univ. (USA); **Brian D. MacCraith**, Dublin City Univ. (Ireland); **Alzbeta Marcek Chorvatova**, International Laser Ctr. (Slovakia); **Paras N. Prasad**, Univ. at Buffalo (USA); **Sharon M. Weiss**, Vanderbilt Univ. (USA)

Conference Co-Sponsor: **Prizmatix**

SUNDAY 2 FEBRUARY

SESSION 1

LOCATION: ROOM 210 (LEVEL 2 SOUTH) SUN 8:30 AM TO 12:20 PM

Multifunctional Nanoparticles

Session Chair: **Ewa M. Goldys**, The Univ. of New South Wales (Australia)

8:30 am: **Biosensing the presence of nanoparticles using endogenous fluorescence in live algae**, Alzbeta Mar?ek Chorvatová, International Laser Ctr. (Slovakia) and Univ. of SS. Cyril and Methodius (Slovakia); Dusan Chorvat, International Laser Ctr. (Slovakia); Tibor Teplicky, Faculty of Medicine at Comenius Univ. in Bratislava (Slovakia); Anton Mateasik, International Laser Ctr. (Slovakia); Martin Valica, Ss. Cyril and Methodius Univ. (Slovakia) [11254-1]

8:50 am: **Neuron photostimulation using quantum funnels**, Hooman Bahmani Jalali, Onuralp Karatum, Rustamzhon Melikov, Ugur Meric Dikbas, Sadra Sadeghi, Erdost Yildiz, Itir Bakis Dogru, Guncem Ozgun Eren, Cagla Ergun, Afsun Sahin, Ibrahim Halil Kavakli, Sedat Nizamoglu, Koç Univ. (Turkey) [11254-2]

9:10 am: **Particle shape analysis using whispering gallery mode polarization sensing**, Cheng Li, Jiang Qiu, Adley Gin, Phuong-Diem Nguyen, Judith Su, The Univ. of Arizona (USA) [11254-3]

9:30 am: **Interaction-free quantum imaging**, Eliahu Cohen, Bar-Ilan Univ. (Israel) [11254-4]

9:50 am: **Nanoplasmonic imaging biosensor for digital detection of disease biomarkers**, Alexander Belushkin, Filiz Yesilkoy, Hatice Altug, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [11254-5]

10:10 am: **Sharper and dipper laser beam shaping for super-resolved imaging in silicon**, Moshe Sinvani, Nadav Shabairou, Maor Tiferet, Zeev Zalevsky, Bar-Ilan Univ. (Israel) [11254-6]

Coffee Break Sun 10:30 am to 11:00 am

11:00 am: **High signal-to-noise, nonbleaching subdiffraction nanoscale imaging**, Yunbo Liu, Somn Eunice Lee, Univ. of Michigan (USA) [11254-7]

11:20 am: **Spatially resolving mucus concentration for respiratory disease via translational and rotational diffusion rates of plasmonic gold nanorods using Diffusion-Sensitive OCT**, Richard L. Blackmon, Elon Univ. (USA); Kelsey Oeler, The Univ. of North Carolina at Chapel Hill (USA); Brittany Barton, Elon Univ. (USA); Brian Lynch, Joseph Tracy, North Carolina State Univ. (USA); David B. Hill, Amy Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) [11254-8]

11:40 am: **Photoacoustic monitoring of drug release from PLGA nanocarriers for tumor treatment**, Jeanne Lemaster, Univ. of California, San Diego (USA) [11254-9]

12:00 pm: **Nitrogen vacancy based detection of ultra-low para-magnetic particle concentrations in tissues**, Mark A. Keppler, Philip R. Hemmer, Vladislav V. Yakovlev, Texas A&M Univ. (USA) [11254-10]

Lunch Break Sun 12:20 pm to 2:00 pm

SESSION 2

LOCATION: ROOM 210 (LEVEL 2 SOUTH) SUN 2:00 PM TO 6:00 PM

Nanoscale Imaging I

Session Chair: **Dror Fixler**, Bar-Ilan Univ. (Israel)

2:00 pm: **Interferometric spectrally encoded endoscopy – nanometric imaging of tissue vibrations in vivo** (*Invited Paper*), Dvir Yelin, Technion-Israel Institute of Technology (Israel) [11254-11]

2:30 pm: **Label-free super-resolution imaging with hyperbolic materials** (*Invited Paper*), Evgenii E. Narimanov, Purdue Univ. (USA) [11254-12]

3:00 pm: **A practical theoretical framework for optimizing spontaneous super-resolution on confocal microscopes**, Martin Ploschner, ARC Ctr. of Excellence for Nanoscale BioPhotonics (Australia) and Macquarie Univ. (Australia) and The Univ. of Queensland (Australia); Denitza Denkova, ARC Ctr. of Excellence for Nanoscale BioPhotonics (Australia) and Macquarie Univ. (Australia) and Institute for Bioengineering of Catalonia (Spain); Minakshi Das, Lindsay M. Parker, Xianlin Zheng, Yiqing Lu, ARC Ctr. of Excellence for Nanoscale BioPhotonics (Australia) and Macquarie Univ. (Australia); Antony Orth, ARC Ctr. of Excellence for Nanoscale BioPhotonics (Australia) and RMIT Univ. (Australia); Nicolle H. Packer, ARC Ctr. of Excellence for Nanoscale BioPhotonics (Australia) and Macquarie Univ. (Australia) and Institute for Glycomics, Griffith Univ. (Australia); James A. Piper, ARC Ctr. of Excellence for Nanoscale BioPhotonics (Australia) and Macquarie Univ. (Australia) . [11254-13]

3:20 pm: **Wide-field dual-probe imaging approach validated using QDs and skin mimicking phantoms**, Alexander Saeboe, Keyi Han, Joshua Kays, Reyhaneh Toufanian, Allison Dennis, Boston Univ. (USA) [11254-14]

Coffee Break Sun 3:40 pm to 4:10 pm

4:10 pm: **NIR-II fluorescence in vivo functional bioimaging** (*Invited Paper*), Jun Qian, Zhejiang Univ. (China) [11254-15]

4:40 pm: **Internalization by PMMA nanoparticle-mediated endocytosis of a survivin molecular beacon as a theranostic agent in human cancer cells**, Barbara Adinolfi, Sara Tombelli, Cosimo Trono, Ambra Giannetti, Mario Pellegrino, Giovanna Sotgiu, Greta Varchi, Marco Ballestri, Francesco Baldini, Consiglio Nazionale delle Ricerche (Italy) [11254-16]

5:00 pm: **Remote optical sensing of neuronal tissue vibrations during regeneration**, Nisan Ozana, Sharon Cohen, Ariel Halevi, Roy Rozenman, Orit Shefi, Zeev Zalevsky, Bar-Ilan Univ. (Israel) [11254-17]

5:20 pm: **AgNP-decorated 3D nano-bowl structures for SERS detection of urea and exosomes**, Juanjuan Liu, Meruyert Imanbekova, Sebastian Wachsmann-Hogiu, McGill Univ. (Canada) [11254-18]

CONFERENCE 11266

SESSION 4

LOCATION: ROOM 202 (LEVEL 2 SOUTH) TUE 1:30 PM TO 3:15 PM

Kerr Optical Frequency Microcombs with WGM

Session Chair: **Jonathan M. Ward**, Okinawa Institute of Science and Technology Graduate Univ. (Japan)

1:30 pm: **Nonlinear filtering with dissipative Kerr solitons** (*Invited Paper*), Victor Brasch, CSEM SA (Switzerland); Ewelina Obrzud, CSEM SA (Switzerland) and Univ. de Genève (Switzerland); Steve Lecomte, Tobias Herr, CSEM SA (Switzerland) [11266-12]

1:55 pm: **Silicon oxynitride microresonators for Kerr frequency combs**, Dongyu Chen, Andre Kovach, The Univ. of Southern California (USA); Feifei Lian, Sumiko Poust, Vincent Gambin, Northrop Grumman Corp. (USA); Andrea M. Armani, The Univ. of Southern California (USA) [11266-13]

2:15 pm: **Frequency comb generation in non-centrosymmetric optical microresonators**, Jan Szabados, Univ. of Freiburg (Germany); Ingo Breunig, Karsten Buse, Univ. of Freiburg (Germany) and Fraunhofer-Institut für Physikalische Messtechnik IPM (Germany) [11266-14]

2:35 pm: **Continuous scanning of a dissipative Kerr micro-resonator soliton comb**, Naoya Kuse, IMRA America, Inc. (USA) and Tokushima Univ. (Japan); Tomohiro Tetsumoto, IMRA America, Inc. (USA); Gabriele Navickaite, Michael Geiselmann, LiGenTec SA (Switzerland); Martin E. Fermann, IMRA America, Inc. (USA) [11266-15]

2:55 pm: **Advances in optical frequency comb generation using whispering-gallery mode resonators**, Yanne K. Chembo, Univ. of Maryland, College Park (USA) [11266-16]

Coffee Break Tue 3:15 pm to 3:45 pm

SESSION 5

LOCATION: ROOM 202 (LEVEL 2 SOUTH) TUE 3:45 PM TO 5:35 PM

Configurable WGM and Excitation

Session Chair: **Yanne K. Chembo**, Univ. of Maryland, College Park (USA)

3:45 pm: **All-optically triggerable organic/inorganic photonic devices** (*Invited Paper*), Andrea M. Armani, Jinghan He, Andre Kovach, Patrick Saris, The Univ. of Southern California (USA) [11266-17]

4:10 pm: **Point-and-play: Fiber optic nano-antenna for excitation and collection of whispering gallery modes** (*Invited Paper*), Jonathan M. Ward, Fuchuan Lei, Sile Nic Chormaic, Okinawa Institute of Science and Technology Graduate Univ. (Japan); Jochen Fick, Institut NÉEL, Ctr. National de la Recherche Scientifique (France) and Grenoble INP (France) and Univ. Grenoble Alpes (France); Samir Mondal, Council of Scientific & Industrial Research (India); Pooj Gupta, Academy of Scientific & Innovative Research (India); Stephy Vincent, Okinawa Institute of Science and Technology Graduate Univ. (Japan) [11266-18]

4:35 pm: **Generation of arbitrary higher order Poincare beams from a visible metasurface laser**, Hend Sroor, Univ. of Shanghai for Science and Technology (China); Yao-Wei Huang, Harvard John A. Paulson School of Engineering and Applied Sciences, Harvard Univ. (USA) and National Univ. of Singapore (Singapore); Bereneice Sephton, Univ. of the Witwatersrand, Johannesburg (South Africa); Darryl Naidoo, CSIR National Laser Ctr. (South Africa) and Univ. of the Witwatersrand, Johannesburg (South Africa); Adam Valles, Univ. of the Witwatersrand, Johannesburg (South Africa); Cheng-Wei Qiu, National Univ. of Singapore (Singapore); Qiwen Zhan, Univ. of Shanghai for Science and Technology (China); Antonio Ambrosio, Ctr. for Nanoscale Systems, Harvard Univ. (USA); Federico Capasso, Harvard John A. Paulson School of Engineering and Applied Sciences, Harvard Univ. (USA); Andrew Forbes, Univ. of the Witwatersrand, Johannesburg (South Africa) [11266-19]

4:55 pm: **Optically tunable on-chip microresonator**, Andre Kovach, Jinghan He, Dongyu Chen, Patrick Saris, Andrea M. Armani, The Univ. of Southern California (USA) [11266-20]

5:15 pm: **Exciting whispering gallery modes in liquid micro-cavities using sub-micron size tapered fibers**, Meenakshi Gaira, C. S. Unnikrishnan, Tata Institute of Fundamental Research (India) [11266-21]

POSTERS-TUESDAY

LOCATION: MOSCONE CENTER, LEVEL 3 WEST 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.

Poster Setup: Tuesday 10:00 AM–5:00 PM

View poster presentation guidelines and set-up instructions at <http://spie.org/PWPosterGuidelines>

Extra-cavity laser beam shaping using an amplifier, Lebohang T. Bell, Council of Scientific & Industrial Research (South Africa) [11266-49]

Versatile bio-organism detection using microspheres for bio-degradation and bio-remediation studies, Logan Echeveria, Univ. of California, Davis (USA); Sean Gilmore, Sara Harrison, Allan Chang, Lawrence Livermore National Lab. (USA); Payal Singh, Univ. of California, San Diego (USA); Kenneth Heinz, Tiziana C. Bond, Lawrence Livermore National Lab. (USA) [11266-50]

MicroResonators for Compact Optical Sensors (uRCOS), Tiziana C. Bond, Lawrence Livermore National Lab. (USA); Payal Singh, Univ. of California, San Diego (USA); Sara Harrison, Allan Chang, Kenneth Heinz, Sara Levenson, Lawrence Livermore National Lab. (USA); Logan Echeveria, Univ. of California, Davis (USA) [11266-51]

A stretched-pulse mode-locked laser source at a central wavelength of 1250 nm, Onur Caki, Izmir Biomedicine and Genome Ctr., Dokuz Eylül Univ. (Turkey) and Izmir Institute of Technology (Turkey); Ibrahim Akkaya, Serhat Tozburun, Izmir Biomedicine and Genome Ctr., Dokuz Eylül Univ. (Turkey) [11266-52]

Micro-bottle resonator as sensors using whispering gallery modes, Yusra Jat, Carleton Univ. (Canada) [11266-53]

Random lasers using cracks, Itir Bakis Dogru, Emir Salih Magden, Erkan Senses, Sedat Nizamoglu, Koç Univ. (Turkey) [11266-54]

Design of efficient Gauss to top-hat converters using geometrical phase elements inscribed in the glass by femtosecond laser pulses, Pavel Gotovski, Ctr. for Physical Sciences and Technology (Lithuania); Ernestas Nacius, Ctr. for Physical Sciences and Technology (Lithuania) and Workshop of Photonics (Lithuania); Vytautas Jukna, Vilnius Univ. (Lithuania) and Ctr. for Physical Sciences and Technology (Lithuania); Sergej Orlov, Ctr. for Physical Sciences and Technology (Lithuania); Orestas Ulcinas, Workshop of Photonics (Lithuania); Justas Baltrukonis, Ctr. for Physical Sciences and Technology (Lithuania) and Workshop of Photonics (Lithuania); Titas Gertus, Light Conversion Ltd. (Lithuania) [11266-55]

Sub-ms reaction detection using sweep source laser based whispering gallery mode sensor, Seunghun Lee, Heesang Ahn, Hyerin Song, Taeyeon Kim, Kyujung Kim, Pusan National Univ. (Korea, Republic of) [11266-56]

Miniature bimorph deformable mirror for laser beam shaping, Julia V. Sheldakova, Ilya Galaktionov, Alexander N. Nikiitin, Alexey Rukosuev, Vadim Samarkin, Vladimir Toporovsky, Institute of Dynamics of Geospheres (Russian Federation); Alexis Kudryashov, Institute of Dynamics of Geospheres (Russian Federation) and Moscow Polytechnic Univ. (Russian Federation) [11266-57]

Iron- to zinc selenide laser, pumping with pulse width that is shorter than or comparable to the population-inversion lifetime, Alan H. Paxton, Chunte Lu, Ron Kaspi, Air Force Research Lab. (USA) [11266-58]

Repetition rate tuning of dissipative Kerr soliton in microresonators, Chunhua Dong, Univ. of Science and Technology of China (China) ... [11266-59]

CONFERENCE 11270

LOCATION: SATURDAY-SUNDAY: ROOM 104 (LEVEL 1 SOUTH LOBBY) /
MONDAY: ROOM 154 (UPPER MEZZANINE SOUTH)

Saturday–Tuesday 1–4 February 2020 • Proceedings of SPIE Vol. 11270

Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XX

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 Belloard**, 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); **Aleks Ovsianikov**, Technische Univ. Wien (Austria); **Christopher B. Schaffer**, Cornell Univ. (USA); **Jan Siegel**, Instituto de Optica “Daza de Valdés” (Spain); **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 Co-Sponsors:



SATURDAY 1 FEBRUARY

SESSION 1

LOCATION: ROOM 104 (LEVEL 1 SOUTH LOBBY) SAT 8:10 AM TO 10:00 AM

Biomedical Applications for Ultrafast Lasers

Session Chair: **Michel Meunier**, Polytechnique Montréal (Canada)

8:10 am: **Laser induced forward transfer as a tool for precise bioprinting** (*Invited Paper*), Marianneza Chatzipetrou, Valentina Leva, National Technical Univ. of Athens (Greece); George Tsekenis, Biomedical Research Foundation, Academy of Athens (Greece); Ioanna Zergioti, National Technical Univ. of Athens (Greece) [11270-1]

8:40 am: **Aluminum oxide membrane as a functional element for filtering bioparticles in micro hydraulic devices**, Yatin K. Patel, Arvydas Palevičius, Giedrius Janušas, Vytenis Naginevičius, Kaunas Univ. of Technology (Lithuania); Judita Liaudanskaite, USC Kauno stakles (Lithuania) [11270-2]

9:00 am: **Increase in efficacy of near-infrared LIRIC in corneal tissue with sodium fluorescein and riboflavin: comparison of two repetition rates**, Sara M. Campaign, Wayne H. Knox, Univ. of Rochester (USA) [11270-3]

9:20 am: **Er:ZBLAN power amplifier design for minimally invasive laser osteotomy**, Ferda Canbaz, Lina M. Beltran Bernal, Univ. Basel (Switzerland); Georg Rauter, University of Basel (Switzerland); Philippe C. Cattin, Azhar Zam, Univ. Basel (Switzerland) [11270-4]

9:40 am: **Scattering properties and femtosecond laser ablation thresholds of human and canine vocal folds**, Liam P. Andrus, Adela Ben-Yakar, The Univ. of Texas at Austin (USA); Ted Mau M.D., The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) [11270-5]

Coffee Break. Sat 10:00 am to 10:30 am

SESSION 2

LOCATION: ROOM 104 (LEVEL 1 SOUTH LOBBY) SAT 10:30 AM TO 12:00 PM

Ultrafast Lasers for the Manipulation of Cells

Session Chair: **Ioanna Zergioti**, National Technical Univ. of Athens (Greece)

10:30 am: **Nanofluidics fabricated by femtosecond laser 3D processing for mechanism study of cancer cell metastasis** (*Invited Paper*), Koji Sugioka, RIKEN Ctr. for Advanced Photonics (Japan); Felix Sima, Institutul National pentru Fizica Laserilor, Plasmei si Radiatiei (Romania); Hiroyuki Kawano, Atsushi Miyawaki, RIKEN Ctr. for Brain Science (Japan) [11270-6]

11:00 am: **Femtosecond laser induced densification within cell-laden hydrogels results in cellular alignment**, Zheng Xiong, Haiyan Li, Puscal Kunwar, Yin Zhu, Rafael Ramos, Shannon McLoughlin, Tackla Winston, Zhen Ma, Pranav Soman, Syracuse Biomaterials Institute (USA) [11270-7]

11:20 am: **Controlled plasmonic cell fusion and its implications on the actin cytoskeleton**, Julia Belansky, Limor Minai, Dvir Yelin, Technion-Israel Institute of Technology (Israel) [11270-8]

11:40 am: **Targeted siRNA delivery with gold nanostars-assisted optoporation using a supercontinuum pulsed picosecond laser**, Morteza Hasanzadeh Kafshgari, Sergiy Patskovsky, Michel Meunier, Jacynthe Francoeur, Polytechnique Montréal (Canada) [11270-9]

Lunch/BiOS Expo Break Sat 12:00 pm to 1:30 pm

SESSION 3

LOCATION: ROOM 104 (LEVEL 1 SOUTH LOBBY) SAT 1:30 PM TO 3:30 PM

Ultrafast Laser-Matter Interaction

Session Chair: **Koji Sugioka**, RIKEN Ctr. for Advanced Photonics (Japan)

1:30 pm: **Uncovering the mechanism of the ultrafast UV-energy dissipation in the eumelanin pigment**, Aleksandra Iliina, Karen E. Thorn, Paul A. Hume, Justin M. Hodgkiss, Victoria Univ. of Wellington (New Zealand) [11270-10]

1:50 pm: **Role of wavelength on femtosecond laser ablation of dielectrics: From 258 nm to 2 μ m**, Mario García Lechuga, Oliver Utéza, Nicolas Sanner, M. David Grojo, Lab. Lasers, Plasmas et Procédés Photoniques (France) [11270-11]

2:10 pm: **Processing bulk silicon with femtosecond laser pulses at 2- μ m wavelength**, Maxime Chambonne, Markus Blothe, Friedrich-Schiller-Univ. Jena (Germany); Vladimir Yu Fedorov, Texas A&M Univ. at Qatar (Qatar) and P. N. Lebedev Physical Institute (Russian Federation); Tobias Heuermann, Gabor Matthäus, Friedrich-Schiller-Univ. Jena (Germany); Alessandro Alberucci, Abbe Ctr. of Photonics (Germany); Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany) and Fraunhofer Institute for Applied Optics and Precision Engineering (Germany); Stylianos Tzortzakis, Texas A&M Univ. at Qatar (Qatar) and Foundation for Research and Technology-Hellas (Greece) and Univ. of Crete (Greece); Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) [11270-12]

2:30 pm: **Investigation of laser-matter interaction in transparent multilayer thin films**, Ruben Ricca, Yves Belloard, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [11270-13]

2:50 pm: **Synergistic effects of ultrashort optical pulses and nanosecond pulsed electric fields on the material's breakdown**, Vladislav V. Yakovlev, Zachary Coker, Texas A&M Univ. (USA) [11270-14]

3:10 pm: **Lasing without population inversion in singly ionized nitrogen molecules**, Rostyslav Danylo, Ecole Polytechnique (France) [11270-15]

Coffee Break. Sat 3:30 pm to 4:00 pm

CONFERENCE 11278

LOCATION: ROOM 308 (LEVEL 3 SOUTH)

Sunday–Tuesday 2–4 February 2020 • Proceedings of SPIE Vol. 11278

Ultrafast Phenomena and Nanophotonics XXIV

Conference Chairs: **Markus Betz**, Technische Univ. Dortmund (Germany); **Abdulahakem Y. Elezabi**, Univ. of Alberta (Canada)

Program Committee: **Alan D. Bristow**, West Virginia Univ. (USA); **Keshav Dani**, Okinawa Institute of Science and Technology Graduate Univ. (Japan); **Jeff Davis**, Swinburne Univ. of Technology (Australia); **Kimberley C. Hall**, Dalhousie Univ. (Canada); **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); **James Lloyd-Hughes**, The Univ. of Warwick (United Kingdom); **Torsten Meier**, Univ. Paderborn (Germany); **Frank J. Meyer zu Heringdorf**, Univ. Duisburg-Essen (Germany); **Walter Pfeiffer**, Univ. Bielefeld (Germany); **Pascal Ruello**, Le Mans Univ. (France); **Volker J. Sorger**, The George Washington Univ. (USA); **Fabrice Vallee**, Institut Lumière Matière (France); **Kam Sing Wong**, Hong Kong Univ. of Science and Technology (Hong Kong, China)

Conference Co-Sponsor:



SUNDAY 2 FEBRUARY

SESSION 1

LOCATION: ROOM 308 (LEVEL 3 SOUTH) SUN 8:30 AM TO 10:00 AM

2D Materials I

Session Chair: **Markus Betz**, Technische Univ. Dortmund (Germany)

8:30 am: **Ultrafast photocurrents from transient interlayer exciton states in twisted and stacked 2D materials** (*Invited Paper*), Hial Patel, Kyle T. Vogt, Matt W. Graham, Oregon State Univ. (USA) [11278-1]

9:00 am: **Single photons, phonons, and spins in atomically thin WSe₂** (*Invited Paper*), Ajit Srivastava, Emory Univ. (USA) [11278-2]

9:30 am: **Ultrafast hot-electron transfer in metallic VSe₂/graphene van der Waals heterostructures**, Tae Gwan Park, KAIST (Korea, Republic of); Byong Ki Choi, The Univ. of Seoul (Korea, Republic of); Junho Park, KAIST (Korea, Republic of); Jungdae Kim, Univ. of Ulsan (Korea, Republic of); Young Jun Chang, The Univ. of Seoul (Korea, Republic of); Fabian Rotermund, KAIST (Korea, Republic of) [11278-3]

9:45 am: **Dominance of Pauli-blocking signals over biexciton formation in monolayer MoS₂ at 4K observed with ultrafast spectroscopy**, Ryan Wood, Lawson T. Lloyd, Fauzia Mujid, Richard J. Mazuski, Lili Wang, Hui Gao, Jiwoong Park, Gregory S. Engel, The Univ. of Chicago (USA) [11278-4]

Coffee Break Sun 10:00 am to 10:30 am

SESSION 2

LOCATION: ROOM 308 (LEVEL 3 SOUTH) SUN 10:30 AM TO 12:00 PM

Metamaterials

Session Chair: **Matt W. Graham**, Oregon State Univ. (USA)

10:30 am: **Electrically tunable metasurface with independent amplitude and phase control for arbitrary wavefront manipulation** (*Invited Paper*), Junghyun Park, Byung Gil Jeong, Sun Il Kim, Duhyun Lee, Kyoungho Ha, Hyuck Choo, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) [11278-5]

11:00 am: **Highly efficient color routing and focusing in the submicron regime based on metaphotonic phase engineering** (*Invited Paper*), Seokho Yun, Sookyoung Roh, Samsung Advanced Institute of Technology (Korea, Republic of); Hongkyu Park, Samsung Advanced Institute of Technology (Kosovo, Republic of); Minwoo Lim, Hyuck Choo, Samsung Advanced Institute of Technology (Korea, Republic of) [11278-6]

11:30 am: **Epsilon-near-zero metamaterials realized using metal-dielectric stacks as a potential candidate for nonlinear applications at visible wavelength**, Sisira Suresh, Orad Reshef, M. Zahirul Alam, Jeremy Upham, Mohammad Karimi, Univ. of Ottawa (Canada); Robert Boyd, Univ. of Ottawa (Canada) and Univ. of Rochester (USA) [11278-7]

11:45 am: **Anapolar metasurfaces for ultrastrong coupling in Landau polaritons**, Felice Appugliese, Institute for Quantum Electronics, ETH Zurich (Switzerland); Shima Rajabali, Johan Andberger, Josefine Enkner, Matthias Beck, Giacomo Scalari, Jérôme Faist, ETH Zurich (Switzerland) [11278-8]

Lunch Break Sun 12:00 pm to 1:30 pm

SESSION 3

LOCATION: ROOM 308 (LEVEL 3 SOUTH) SUN 1:30 PM TO 3:30 PM

Photovoltaic Materials

Session Chair: **Sarah Houver**, ETH Zurich (Switzerland)

1:30 pm: **Ultrafast transient absorption spectroscopy studies of new dumbbell-shaped platinum (Pt) systems composed of “weight” and “bar” chromophores** (*Invited Paper*), David Lee Phillips, Lili Du, Wenjuan Xiong, Wai-Kin Chan, Runhui Liang, The Univ. of Hong Kong (Hong Kong, China) [11278-9]

2:00 pm: **Ultrafast coherent dynamics in photovoltaic materials probed by two-dimensional electronic spectroscopy** (*Invited Paper*), Antonietta De Sio, Carl von Ossietzky Univ. Oldenburg (Germany) [11278-10]

2:30 pm: **Charge separation in non-fullerene acceptor solar cells** (*Invited Paper*), Frédéric Laquai, King Abdullah Univ. of Science and Technology (Saudi Arabia) [11278-11]

3:00 pm: **Interferometric 3D tracking of energy carriers in heterogeneous optoelectronic materials at the nanoscale** (*Invited Paper*), Milan Delor, Hannah L. Weaver, James K. Utterback, QinQin Yu, Naomi S. Ginsberg, Univ. of California, Berkeley (USA) [11278-12]

Coffee Break Sun 3:30 pm to 4:00 pm

SESSION 4

LOCATION: ROOM 308 (LEVEL 3 SOUTH) SUN 4:00 PM TO 6:15 PM

THz Spectroscopy I

Session Chair: **Frederic Laquai**, King Abdullah Univ. of Science and Technology (Saudi Arabia)

4:00 pm: **Ultrafast photocurrents in the Weyl semimetal TaAs** (*Invited Paper*), Nicholas Sirica, Rohit Prasankumar, Dmitry Yarotski, Jianxin Zhu, Los Alamos National Lab. (USA) [11278-13]

4:30 pm: **Terahertz light-wave control of non-equilibrium phases and collective modes in multi-band superconductors** (*Invited Paper*), Martin Mootz, Ilias E. Perakis, The Univ. of Alabama at Birmingham (USA); Jigang Wang, Iowa State Univ. of Science and Technology (USA) and Ames Lab. (USA) [11278-14]

5:00 pm: **Resonators for enhancing THz light-matter interaction at the nanoscale** (*Invited Paper*), Luca Razzari, Institut National de la Recherche Scientifique (Canada) [11278-15]

5:30 pm: **Transient photoconductivity and photo-excited carrier dynamics in (Bi_{1-x}In_x)₂Se₃ thin films**, Teng Shi, Kateryna Kushnir, Worcester Polytechnic Institute (USA); Zhengtianyue Wang, Stephanie Law, Univ. of Delaware (USA); Lyubov V. Titova, Worcester Polytechnic Institute (USA) [11278-16]

5:45 pm: **Zero-valent Au, Cu and Sn intercalation into GeS nanoribbons: tailoring ultrafast photoconductive response**, Kateryna Kushnir, Teng Shi, Worcester Polytechnic Institute (USA); Leticia Damian, California State Univ., San Marcos (USA); Guangjiang Li, Worcester Polytechnic Institute (USA); Auddy Anilao II, Kristie J. Koski, Univ. of California, Davis (USA); Lyubov V. Titova, Worcester Polytechnic Institute (USA) [11278-17]

CONFERENCE 11288

LOCATION: ROOM 302 (LEVEL 3 SOUTH)

Sunday–Thursday 2–6 February 2020 • Proceedings of SPIE Vol. 11288

Quantum Sensing and Nano Electronics and Photonics XVII

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

Conference Co-Chairs: **Jay S. Lewis**, Defense Advanced Research Projects Agency (USA); **Giti A. Khodaparast**, Virginia Polytechnic Institute and State Univ. (USA); **Pedram Khalili**, Northwestern Univ. (USA)

Program Committee: **Amir H. Atabaki**, Massachusetts Institute of Technology (USA); **Jason M. Auxier**, U.S. Naval Research Lab. (USA); **Henri-Jean Drouhin**, Ecole Polytechnique (France); **Jérôme Faist**, ETH Zürich (Switzerland); **Riad Haïdar**, ONERA (France); **Amr S. Helmy**, Univ. of Toronto (Canada); **Sven Höfling**, Julius-Maximilians-Univ. Würzburg (Germany); **John E. Hubbs**, Ball Aerospace (USA); **Jean-Pierre Huignard**, Jphopto (France); **M. Saif Islam**, Univ. of California, Davis (USA); **Woo-Gwang Jung**, Kookmin Univ. (Korea, Republic of); **Tsukuru Katsuyama**, Sumitomo Electric Industries, Ltd. (Japan); **Kwok Keung Law**, Naval Air Warfare Ctr. Weapons Div. (USA); **Giuseppe Leo**, Lab. Matériaux et Phénomènes Quantiques (France); **Amy W. K. Liu**, IQE Inc. (USA); **Ryan McClintock**, Northwestern Univ. (USA); **Jerry R. Meyer**, U.S. Naval Research Lab. (USA); **Maya P. Mikhaliyova**, Ioffe Institute (Russian Federation); **Minh Nguyen**, HRL Labs., LLC (USA); **Jill A. Nolde**, U.S. Naval Research Lab. (USA); **Shanee Pacley**, Air Force Research Lab. (USA); **Jean-Luc Pelouard**, Ctr. de Nanosciences et de Nanotechnologies (France); **Edik U. Rafailov**, Aston Univ. (United Kingdom); **Fengbo Ren**, Arizona State Univ. (USA); **Isabelle Ribet-Mohamed**, ONERA (France); **James P. Shaffer**, The Univ. of Oklahoma (USA), Quantum Valley Ideas Labs. (Canada); **Meimei Z. Tidrow**, U.S. Army Night Vision & Electronic Sensors Directorate (USA); **Joseph G. Tischler**, U.S. Naval Research Lab. (USA); **Cunzhu Tong**, Changchun Institute of Optics, Fine Mechanics and Physics (China); **Eric Tournié**, Univ. de Montpellier (France); **Miriam S. Vitiello**, CNR-NANO (Italy)

SUNDAY 2 FEBRUARY

WELCOME AND OPENING REMARKS

LOCATION: ROOM 302 (LEVEL 3 SOUTH) 9:00 AM TO 9:30 AM

Manijeh Razeghi, Northwestern Univ. (USA);

Jay S. Lewis, Defense Advanced Research Projects Agency (USA)

SESSION 1

LOCATION: ROOM 302 (LEVEL 3 SOUTH) SUN 9:30 AM TO 10:30 AM

Quantum Engineered Devices for Detectors

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

9:30 am: **QWIPs, SLS, Landsat and the International Space Station (Keynote Presentation)**, Murzy D. Jhabvala, NASA Goddard Space Flight Ctr. (USA); Kwong-kit Choi, Space Systems and Applications (USA); Sarath Gunapala, Jet Propulsion Lab (USA); Manijeh Razeghi, Northwestern University (USA); mani Sundaram, QmagiQ, LLC (USA) [11288-1]

10:05 am: **III-nitride-based solar-blind avalanche photodetectors (Invited Paper)**, Ryan McClintock, Samy Annabi, Alexandre G. Jaud, Manijeh Razeghi, Northwestern Univ. (USA) [11288-2]

Coffee Break Sun 10:30 am to 11:00 am

SESSION 2

LOCATION: ROOM 302 (LEVEL 3 SOUTH) SUN 11:00 AM TO 11:55 AM

Detectors and Sensors

Session Chairs: **John E. Hubbs**, Ball Aerospace (USA); **Riad Haïdar**, ONERA (France)

11:00 am: **Advanced SWIR photon-sensing integrated circuit heterojunction phototransistor-based focal plane array for space applications (Invited Paper)**, Narasimha S. Prasad, NASA Langley Research Ctr. (USA) [11288-3]

11:25 am: **64x48 pixel backside illuminated SPAD detector array for LiDAR applications**, Jennifer Ruskowski, Charles Thattil, Jan Drewes, Werner Brockherde, Fraunhofer-Institut für Mikroelektronische Schaltungen und Systeme IMS (Germany) [11288-5]

11:40 am: **Room-temperature heterodyne detection up to 70GHz with patch-antenna QWIP detectors at 10.3µm**, Michael Haki, Quyang Lin, Institut d'Electronique de Microélectronique et de Nanotechnologie, CNRS (France); Stefano Pirota, Raffaele Colombelli, Ctr. de Nanosciences et de Nanotechnologies (France) and CNRS (France); Wenjian Wan, Hua Li, Jun-Cheng Cao, Shanghai Institute of Microsystem and Information Technology (China); Jean-François Lampin, Emilien Peytavit, Stefano Barbieri, Institut d'Electronique de Microélectronique et de Nanotechnologie (France) and CNRS (France) [11288-6]

Lunch Break Sun 11:55 am to 1:30 pm

SESSION 3

LOCATION: ROOM 302 (LEVEL 3 SOUTH) SUN 1:30 PM TO 3:05 PM

Quantum Cascade Lasers I

Session Chairs: **Tsukuru Katsuyama**, Sumitomo Electric Industries, Ltd. (Japan); **Frédéric Grillot**, Télécom ParisTech (France)

1:30 pm: **Enabling low-cost QCL by large scale fabrication on CMOS pilot line (Invited Paper)**, Jean-Guillaume Coutard, CEA-LETI (France) and Univ. Grenoble Alpes (France); Mickaël Brun, mirSense (France); Maryse Fournier, Olivier Lartigot, Florian Fedeli, CEA-LETI (France) and Univ. Grenoble Alpes (France); Grégory Maisons, mirSense (France); Jean-Marc Fédéli, Sergio Nicoletti, CEA-LETI (France) and Univ. Grenoble Alpes (France); Mathieu Carras, mirSense (France); Laurent Duraffourg, CEA-LETI (France) and Univ. Grenoble Alpes (France) [11288-7]

1:55 pm: **Thermal modeling of quantum cascade lasers with 3D anisotropic heat transfer analysis**, Farhat Abbas, The Univ. of Texas at Dallas (USA); Binay Jung Pandey, Kevin Clark, Max-IR Labs., LLC (USA); Kevin Lascola, Yamac Dikmelik, Thorlabs Quantum Electronics (USA); Dennis Robbins, David Hinojos, Kimari L. Hodges, Max-IR Labs., LLC (USA); Katy Roodenko, Max-IR Labs., LLC (USA) and The Univ. of Texas at Dallas (USA); Qing Gu, The Univ. of Texas at Dallas (USA) [11288-8]

2:10 pm: **Measurement concept to reduce environmental impact in direct time-of-flight LiDAR sensors**, Jan F. Haase, Andre Buchner, Sara Grollius, Jennifer Ruskowski, Holger Vogt, Fraunhofer-Institut für Mikroelektronische Schaltungen und Systeme IMS (Germany) [11288-9]

2:25 pm: **Peculiarities and predictions of rogue waves in mid-infrared quantum cascade lasers under conventional optical feedback**, Olivier Spitz, Télécom ParisTech (France) and mirSense (France); Andreas Herdt, Technische Univ. Darmstadt (Germany); Jiagui Wu, Univ. of California, Los Angeles (USA) and Southwest Univ. (China); Grégory Maisons, Mathieu Carras, mirSense (France); Chee-Wei Wong, Univ. of California, Los Angeles (USA); Wolfgang E. Elsässer, Technische Univ. Darmstadt (Germany); Frédéric Grillot, Télécom ParisTech (France) and The Univ. of New Mexico (USA) [11288-10]

2:40 pm: **Title to be determined (Invited Paper)**, Miriam S. Vitiello, Istituto Nanoscienze (Italy) [11288-11]

Coffee Break Sun 3:05 pm to 3:35 pm

SESSION 4

LOCATION: ROOM 302 (LEVEL 3 SOUTH) SUN 3:35 PM TO 5:15 PM

Quantum Sensors and Photonic Systems I

Session Chairs: **Edik U. Rafailov**, Aston Univ. (United Kingdom);
Isabelle Ribet-Mohamed, ONERA (France)

3:35 pm: **Quantum devices: QWIPs/QDIPs, QCLs/ICLs, and topological excitations** (*Keynote Presentation*), Jason M. Auxier, U.S. Naval Research Lab. (USA) [11288-12]

4:10 pm: **Efficient light emission from inelastic tunneling junctions** (*Invited Paper*), Zhaowei Liu, Univ. of California, San Diego (USA) ... [11288-13]

4:35 pm: **Investigation of individual subwavelength-sized thermal emitters with infrared spatial modulation spectroscopy** (*Invited Paper*), Yannick De Wilde, Institut Langevin Ondes et Images (France); Claire Li, Institut Langevin Ondes et Images (France) and ONERA (France); Valentina Krachmalnicoff, Rémi Carminati, Institut Langevin Ondes et Images (France); Riad Haïdar, Patrick Bouchon, ONERA (France); Joris Doumouro, Institut Langevin Ondes et Images (France); Houssein Kallel, Karl Joulain, Institut Pprime (France); Nathalie Bardou, Ctr. de Nanosciences et de Nanotechnologies (France) [11288-14]

5:00 pm: **Contrasting quantum sensing light sources generating different photo-current-pulse statistics**, ChandraSekhar Roychoudhuri, Gayanath Fernando, Univ. of Connecticut (USA); Negussie Tirfessa, Manchester Community College (USA); Narasimha S. Prasad, NASA Langley Research Ctr. (USA) [11288-15]

MONDAY 3 FEBRUARY

OPTO PLENARY SESSION

LOCATION: ROOM 207/215 (SOUTH LEVEL TWO) MON 8:00 AM TO 10:05 AM

8:00 am: **Welcome and Opening Remarks**
Sailing He, KTH Royal Institute of Technology (Sweden) and Zhejiang Univ. (China); **Yasuhiro Koike**, Keio Univ. (Japan)

8:05 am: **The future of optical components and materials in the fibre** (*Plenary*)
David N. Payne, Optoelectronics Research Ctr., Univ. of Southampton (United Kingdom)

8:45 am: **Efficient light emission from hexagonal SiGe** (*Plenary*)
Erik P. A. M. Bakkers, Eindhoven Univ. of Technology (Netherlands)

9:25 am: **Product design for the next wave of computing** (*Plenary*)
Trond Wuellner, Google (USA)

Coffee Break Mon 10:05 am to 10:30 am

SESSION 5

LOCATION: ROOM 302 (LEVEL 3 SOUTH) MON 10:30 AM TO 12:00 PM

Quantum Sensing I

Session Chairs: **Jason M. Auxier**, U.S. Naval Research Lab. (USA);
Shanee Pacley, Air Force Research Lab. - Wright Patterson AFB (USA)

10:30 am: **Next-generation imaging sensors** (*Keynote Presentation*), Whitney Mason, Defense Advanced Research Projects Agency (USA) [11288-16]

11:05 am: **Performance and limitations of NIR and extended wavelength eSWIR InP/InGaAs image sensors** (*Invited Paper*), Roger E. DeWames, MTEQ, Inc. (USA); Jonathan Schuster, U.S. Army Research Lab. (USA) [11288-17]

11:30 am: **Cooling-free infrared sensors with high-performance thermoelectric materials**, Kotaro Hirose, Masahiro Adachi, Sumitomo Electric Industries, Ltd. (Japan); Makoto Murata, Sumitomo Electric Industries (Japan); Yoshiyuki Yamamoto, Sumitomo Electric Industries, Ltd. (Japan); Tsunehiro Takeuchi, Toyota Technological Institute (Japan) [11288-19]

11:45 am: **Cerium dioxide (CeO₂) quantum dots as hole blocking layer for avalanche amorphous selenium photodetector**, Haripriya Kannan, NYU Tandon School of Engineering (USA); Jann Stavro, Atreyo Mukherjee, Stony Brook Univ. (USA); Sébastien Léveillé, Analogic Canada Corp. (Canada); Lizhu Guan, New York Univ. (USA) and Harbin Univ. of Science and Technology (China); Wei Zhao, Stony Brook Medicine (USA); Ayaskanta Sahu, New York Univ. (USA); Amir H. Goldan, Stony Brook Univ. School of Medicine (USA) [11288-20]

Lunch Break Mon 12:00 pm to 1:30 pm

SESSION 6

LOCATION: ROOM 302 (LEVEL 3 SOUTH) MON 1:30 PM TO 2:50 PM

Quantum Sensing II

Session Chairs: **Joan Manel Ramírez**, III-V Lab. (France);
M. Saif Islam, Univ. of California, Davis (USA)

1:30 pm: **Antimonides T2SL mid-wave and long-wave infrared focal plane arrays for Earth remote sensing applications** (*Invited Paper*), Sarath D. Gunapala, David Z. Ting, Sir B. Rafol, Alexander Soibel, Arezou Khoshakhlagh, Sam A. Keo, Brian J. Pepper, Anita M. Fisher, Cory J. Hill, Thomas Pagano, Jet Propulsion Lab. (USA); Paul Lucey, Robert Wright, Miguel Nunes, Luke Flynn, Univ. of Hawaii at Manoa (USA); Sachidananda Babu, Parminder Ghuman, NASA Earth Science Technology Office (USA) [11288-21]

1:55 pm: **Broad-spectral-bandwidth high-resolution dual-comb spectroscopy with single photons** (*Invited Paper*), Zaijun Chen, Theodor W. Hänsch, Nathalie Picqué, Max-Planck-Institut für Quantenoptik (Germany) [11288-22]

2:20 pm: **High-performance integrated circuits for fast and picosecond-precision measurements with single-photon avalanche diodes**, Giulia Acconcia, Angelo Gulinatti, Massimo Ghioni, Ivan Rech, Politecnico di Milano (Italy) [11288-23]

2:35 pm: **Research on the high-resolution infrared quantum spectral detection imaging technology**, Siwen Bi, Institute of Remote Sensing and Digital Earth (China) [11288-25]

Coffee Break Mon 2:50 pm to 3:20 pm

SESSION 7

LOCATION: ROOM 302 (LEVEL 3 SOUTH) MON 3:20 PM TO 5:25 PM

Spin-Based Devices

Session Chairs: **Henri Jaffrès**, Unité Mixte de Physique CNRS/Thales (France); **Giovanni Finocchio**, Univ. degli Studi di Messina (Italy)

3:20 pm: **Putting spin into photonics** (*Invited Paper*), Igor Zutic, Gaofeng Xu, Univ. at Buffalo (USA); Markus Lindemann, Ruhr-Univ. Bochum (Germany); Paulo E. Faria Junior, Univ. Regensburg (Germany); Martin R. Hofmann, Nils C. Gerhardt, Ruhr-Univ. Bochum (Germany) [11288-26]

3:45 pm: **Voltage-controlled MRAM for unconventional computing: recent progress and perspectives** (*Invited Paper*), Pedram Khalili, Northwestern Univ. (USA) [11288-27]

4:10 pm: **Low-threshold pure circular-polarization-electroluminescence from spin-light-emitting diodes consisting of oxidized Al/AIAs tunneling barriers** (*Invited Paper*), Hiro Muneakata, Tokyo Institute of Technology (Japan) [11288-28]

4:35 pm: **Ultrafast polarization modulation in birefringent spin-VCSELs** (*Invited Paper*), Markus Lindemann, Natalie Jung, Ruhr-Univ. Bochum (Germany); Tobias Pusch, Univ. Ulm (Germany); Gaofeng Xu, Igor Zutic, Univ. at Buffalo (USA); Rainer Michalzik, Univ. Ulm (Germany); Martin R. Hofmann, Nils C. Gerhardt, Ruhr-Univ. Bochum (Germany) [11288-29]

5:00 pm: **Theory of excitonic states in lead salt quantum dots** (*Invited Paper*), Mikhail Nestoklon, Ivan D. Avdeev, Ioffe Institute (Russian Federation); Serguei V. Goupalov, Ioffe Institute (Russian Federation) and Jackson State Univ. (USA) [11288-30]

OPTO