The 14th International Conference on Photonics and Imaging in Biology and Medicine, PIBM 2017

http://www.csoe.org.cn/meeting/PIBM2017/

September 26-28, 2017

Jinji Lake International Convention Centre, Suzhou China
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Advertisements

Official Two-dimensional Code:

Venue WIFI: JICC (password-less connection)
General Information

Conference Location
PIBM 2017 will be held at Jinji Lake International Convention Centre (JICC) (Hall A1 of Suzhou International Expo Centre), which is located at 688 E. Suzhou Avenue, Suzhou industrial Park, Suzhou, Jiang Su Province, P.R.China.

Registration
Tuesday 26 September
08:30-20:00, Registration Desk at Hall A1 of Suzhou International Expo.

Wednesday 27 September
07:30-12:00, Registration Desk at Hall A1 of Suzhou International Expo.
Meeting Room

A110-103 Meeting Room at 1F of Jinji Lake International Convention Centre (JICC).

A202 Meeting Room of at 2F Jinji Lake International Convention Centre (JICC).

Poster Presentation

Poster Area is located outside A110-103 Meeting Room at 1F of Jinji Lake International Convention Centre, please see the layout. Contributors should paste their papers on the assigned board from 08:00 to 19:00 of 26th Sept. The poster size should be 100cm (height) × 80cm (width) or 120cm (height) × 90cm (width). The poster presentation will be open from 13:30-15:00 of 27th Sept, the contributors are requested to stand by the poster board.

Meals

Lunch:
27th September, 12:30 to 13:30, at B1 Expo. Area
28th September, 12:00 to 13:00, at B1 Expo. Area

Dinner:
27th September, 17:50 to 18:50, at A109-110 Meeting Room of JICC
28th September, 17:30 to 18:30, at A109-110 Meeting Room of JICC

Welcome Reception (For Vip):
26th September, 18:00 to 19:30, at A109-110 Meeting Room of JICC

Contact Us

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Layout

Suzhou International Expo Centre

Jinji Lake International Convention Centre
Sponsored by
Chinese Society for Optical Engineering
The Optical Society
Huazhong University of Science and Technology
Wuhan National Laboratory for Optoelectronics

Organized by
Chinese Society for Optical Engineering
Britton Chance Center for Biomedical Photonics

Co-Organized by
Key Laboratory of Biomedical Photonics (HUST), Ministry of Education (China)
Virtual Research Center of Biomedical Photonics (HUST), Ministry of Education (China)
Biomedical Photonics Committee of Chinese Optics Society
Biomedical Photonics Committee of Chinese Biomedical Engineering Society
Shanghai Jiao Tong University
Fudan University
Zhejiang University
Journal of Innovative Optical Health Sciences

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Lihong V. Wang (California Institute of Technology, USA)
Valery V. Tuchin (Saratov National Research State University, Russia)

Program Chairs
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Zuhong Lu (Southeast University, China)
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## Daily Schedule

### Tuesday, 26 September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30-20:00</td>
<td>Registration</td>
<td>Hall A1 of Suzhou International Expo. Centre</td>
</tr>
<tr>
<td>18:00-19:30</td>
<td>Welcome Reception (For Vip)</td>
<td>A109-110 Meeting Room of Jinji Lake International Convention Centre (JICC)</td>
</tr>
</tbody>
</table>

### Wednesday, 27 September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00-08:30</td>
<td>PIBM Opening Ceremony</td>
<td>A101-103 Meeting Room of JICC</td>
</tr>
<tr>
<td>08:30-12:20</td>
<td>Plenary Session</td>
<td></td>
</tr>
<tr>
<td>09:50-10:20</td>
<td>Coffee Break, Group Photo</td>
<td>Coffee Break Area, Group Photo Location</td>
</tr>
<tr>
<td>12:30-13:30</td>
<td>Lunch Time</td>
<td>B1 Expo. Area</td>
</tr>
<tr>
<td>13:30-15:00</td>
<td>Poster Session</td>
<td>Poster Area</td>
</tr>
<tr>
<td>15:40-17:40</td>
<td>Session Conference</td>
<td>A101-102 Meeting Room, A103 Meeting Room</td>
</tr>
<tr>
<td>17:50-18:50</td>
<td>Dinner</td>
<td>A109-110 Meeting Room of JICC</td>
</tr>
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### Thursday, 28 September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30-12:05</td>
<td>Session Conference</td>
<td>A101-102 Meeting Room, A103 Meeting Room, A202 Meeting Room</td>
</tr>
<tr>
<td>09:50-10:20</td>
<td>Coffee Break</td>
<td>Coffee Break Area</td>
</tr>
<tr>
<td>12:05-13:00</td>
<td>Lunch Time</td>
<td>B1 Expo. Area</td>
</tr>
<tr>
<td>13:30-14:30</td>
<td>Student Competition</td>
<td>A101-102 Meeting Room</td>
</tr>
<tr>
<td>Time</td>
<td>Session/Activity</td>
<td>Location</td>
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<tr>
<td>14:30-16:10</td>
<td>Session Conference</td>
<td>A103 Meeting Room</td>
</tr>
<tr>
<td>16:10-16:20</td>
<td>Coffee Break</td>
<td>Coffee Break Area</td>
</tr>
<tr>
<td>16:20-17:00</td>
<td>Plenary Session</td>
<td>A101-102 Meeting Room</td>
</tr>
<tr>
<td>17:00-17:20</td>
<td>Award and Closing Ceremony</td>
<td></td>
</tr>
<tr>
<td>17:30-18:30</td>
<td>Dinner</td>
<td>A109-110 Meeting Room of JICC</td>
</tr>
</tbody>
</table>

**Explanation of Session Codes:**

The first letter of the code designates the meeting. The second element denotes the day of the week. The third element indicates the session series in that day (for instance, 1 would denote the first sessions in that day). Each day begins with the letter A in the fourth element and continues alphabetically through the parallel session. The lettering then restarts with each new series. The number on the end of the code (separated from the session code with a period) signals the position of the talk within the session (first, second, third, etc.). For example, a presentation coded W2B.4 indicates that this paper is being presented on Wednesday (W) in the second series of sessions (2), and is the second parallel session (B) in that series and the fourth paper (4) presented in that session.
Program Guide

Wednesday, 27 September

A101-103
08:00 -- 08:30
Opening Ceremony

08:30 -- 10:00
W1A • Plenary Session I
Presiders: Lihong Wang; California Inst. of Technology, USA and Arjun G. Yodh; Univ. of Pennsylvania, USA

W1A.1 • 08:30 (Plenary)
Optical Imaging in Radiation Therapy & Molecular-Guided Surgery for Cancer Treatment, Brian W. Pogue¹; ¹Dartmouth College, USA. Optical imaging is the largest economic sector of the medical imaging market, with endoscopy being the single largest modality utilized in medicine. While optical imaging has its core strengths in endoscopy, laparoscopy, ophthalmology, and pathology, there are still major innovations taking place, which provide the rationale for optical imaging in molecular guidance of procedures.

W1A.2 • 09:10 (Plenary)
Brainsmatics: Deciphering Brain Function with Brain-wide Networks, Qingming Luo¹; ¹Huazhong Univ. of Science and Technology, China. We propose a new approach: BRAINSMATICS, which refers to the integrated, systematic approach of measuring, analyzing, managing and displaying brain spatial data.

A101-103
10:20 -- 12:20
W2A • Plenary Session II
Presiders: Brian W. Pogue; Dartmouth College, USA and Qingming Luo; Huazhong Univ of Science and Technology, China

W2A.1 • 10:20 (Plenary)
Diffuse Optical Monitoring of Brain and Cancer Hemodynamics, Arjun G. Yodh¹; ¹Univ. of Pennsylvania, USA. Recent progress applying diffuse optical techniques to measure blood
oxygenation, blood flow, and oxygen metabolism during neoadjuvant breast cancer treatment will be described. Similar techniques, applied to cerebral autoregulation and hemodynamics, will also be discussed.

**W2A.2 • 11:00 (Plenary)**

Optical Tissue Diagnostics Based on Label-free, Functional Biomarkers Optical Tissue Diagnostics Based on Label-free, Functional Biomarkers, Irene Georgakoudi, Zhiyi Liu, Dimitra Pouli, Kyle Quinn, Carlo Alonzo; Tufts Univ., USA. Label-free, two photon imaging enables sensitive assessment of functional tissue properties, including cellular metabolism and collagen content and organization. Such biomarkers have the potential to transform the diagnosis and monitoring of numerous diseases, including cancer.

**W2A.3 • 11:40 (Plenary)**

*In vivo* 3-photon Imaging of the Mouse Brain, Chris Xu; Cornell Univ., USA. Over the last two decades, multiphoton microscopy has created a renaissance in the brain imaging community. It has changed how we visualize neurons by providing high-resolution, non-invasive imaging capability deep within intact brain tissue.

**Poster Area**

13:30 -- 15:00

**W3A • Poster Session**

Presiders: Wei Chen; Univ. of Central Oklahoma, USA and Dan Zhu; Wuhan National Lab for Optoelectronics, China

**W3A.1**

Fabrication of Agarose Based Micro Check Valves on Microfluidic Chips, Yi Qiao, Yuxiang Zhang, An Ju, Junji Li, Jing Tu, Zuhong Lu; State Key Laboratory of Bioelectronics, School of Biological Science and Medical Engineering, Southeast Univ., China. Assumption of check values usually requires complex process. We present a simple approach to fabricate micro ball check valves by using agarose droplets as spools, which provides high assembly efficiency and robust performance.

**W3A.2**

Magnetic Property of Macroscopically Assembled Nanoparticles for Potential Biomedical Applications, Jianfei Sun; Southeast Univ., China. We utilized the layer-by-layer (LBL) assembly and the magnetic field-directed assembly to fabricate the film-like and the stripe-like assemblies of iron oxide nanoparticles. The Poynting's theorem-based magnetothermal
property and magnetism-mediated effect upon cells were studied.

W3A.3  
**Nonlinear Photoacoustic Imaging Using Long Laser Pulse**, Fei Gao\(^2\),\(^1\) Nanyang Technological Univ., Singapore; \(^2\) ShanghaiTech Univ., China. In this paper, we report a long laser pulse induced dual photoacoustic (LDPA) nonlinear effect. An analytical model is derived to describe the generation of the dual photoacoustic pulses, which is experimentally proved in vivo.

W3A.4 • 13:30  
**Optical monitoring of calf muscle blood flow and oxygen extraction in patients with peripheral artery disease**, Zhe Li\(^1\), Wesley Baker\(^2\), Steven Schenkel\(^2\), Erin Englund\(^2\), Arjun G. Yodh\(^2\), Jinchao Feng\(^1\), Zhonghua Sun\(^1\), Pengyu Liu\(^1\), Kebin Jia\(^1\); \(^1\) Beijing Univ. of Technology, China; \(^2\) Univ. of Pennsylvania, USA. This paper reports non-invasive optical measurements of skeletal muscle blood flow and oxygen extraction dynamics before/during/after treadmill exercise in patients with peripheral artery disease patients who are experiencing claudication.

W3A.5  
**The Photoacoustic Tomography System Based on Medical Ultrasound Array**, Li Z. Ran\(^1\); \(^1\) Fujian Normal Univ., China. A system which combines photoacoustic tomography with ultrasonic array is developed, the system has fast data acquisition speed and good solution. The experiment shows that the method has the potential application value in clinic.

W3A.6  
**The SERS Applications of Star-shaped Gold Nanoparticles**, Weiping Qian\(^1\), Qianqian Su\(^1\); \(^1\) Southeast Univ., China. In this study, gold nanostars with controllable branchlengths were synthesized. The potential use of these nanostars in detection applications and analysis of living cells based on SERS were also investigated.

W3A.7  
**Two-photon Excited Fluorescence Imaging of Blood Flow in Live Mouse Dorsal Skin Window Chamber Model**, Shaozhuang Yang\(^1\); \(^1\) College of optoelectronic Engineering, Shenzhen Univ., China. In this study, a fast two-photon laser scanning microscopy system has been developed to obtain a series of real-time images of blood flow within dorsal skin window chamber in live mouse tumor model.

W3A.8  
**A Neighborhood Vector Principal Component Analysis Method for Small Defect Target**
Detection, Zhengzhou Wang\textsuperscript{2,1}, Qinye Yin\textsuperscript{2}, Jingwei Kou\textsuperscript{1}, Yanwen Xia\textsuperscript{3}, Bingliang Hu\textsuperscript{1}; \textsuperscript{1}Optics and Precision Mechanics of CAS, Optics and Precision Mechanics of CAS, China; \textsuperscript{2}School of Electronic & Information Engineering, Xi'an Jiaotong Univ., China; \textsuperscript{3}Research Center of Laser Fusion, China Academy of Engineering Physics, China. A new NVPCA in combination with a region-growing method, serving as a target enhancement and segmentation algorithm, respectively, which can detect most defect targets when the damaged regions are less than 2 pixels in size.

W3A.9

Effects of Low-level laser therapy (LLLT) on acute recovery after exhausting cycling exercise, Fang H. Li\textsuperscript{1}; \textsuperscript{1}Nanjing Normal Univ., China. LLLT applied to quadriceps muscles after exhausting cycling exercise decreased blood lactate level and heart rate and increased Wingate test performance, indicating that LLLT applied after fatigue may enhance acute recovery.

W3A.10

Age-related changes in effective connectivity as revealed by Dynamic Bayesian theory using near-infrared spectroscopy, Congcong Huo\textsuperscript{3}, Gongcheng Xu\textsuperscript{1}, Zengyong Li\textsuperscript{2}; \textsuperscript{1}Shandong Univ., China; \textsuperscript{2}National Research Center for Rehabilitation Technical Aids, China. The age-related changes in effective connectivity was analyzed based on dynamic Bayesian inference and graph theory using NIRS in resting-state. Directed interaction, capacity of functional specificity and integration were found to be attenuated with aging.

W3A.11

Effect of temperature on glucose photoacoustic detection based on the pulsed laser induced ultrasonic, Zhong Ren\textsuperscript{1,2}, Guodong Liu\textsuperscript{1}, Yu Ding\textsuperscript{1}; \textsuperscript{1}Key Laboratory of Optic-Electronic and Communication, Jiangxi Science and Technology Normal Univ., China; \textsuperscript{2}School of Mechanical and Electronics, Nanchang Univ., China. The effect of temperature on glucose photoacoustic detection was investigated. Results show photoacoustic values of glucose increase with temperature. Based on linear fitting, predicted concentration deviation is 4.1mg/dl when temperature shifts 0.1°C.

W3A.12

Silver nanoparticle-treated paper as a surface-enhanced Raman scattering (SERS) substrate for seminal plasma analysis, Zufang Huang\textsuperscript{1}, Gang Cao\textsuperscript{1}, Xuchao Miu\textsuperscript{1}, Yan Sun\textsuperscript{2}, Jinhua Chen\textsuperscript{3}, Yongzeng Li\textsuperscript{1}, Jinping Lei\textsuperscript{1}, Rong Chen\textsuperscript{1}; \textsuperscript{1}Fujian Normal Univ., China; \textsuperscript{2}Fujian provincial maternal and child health hospital, China; \textsuperscript{3}Fujian provincial hospital, China. Paper-based SERS substrate fabricated by soaking with silver colloids was characterized, and SERS spectra of seminal plasma
over different soaking time were obtained to optimize the performance. Our results showed that optimum SERS spectra of seminal plasma can be achieved to provide a great potential for detection and analysis of seminal plasmas.

W3A.13
Photoacoustic monitoring of traumatic brain injury and recovery by stem cells labeled with Prussian blue in vivo, Ronghe Chen¹, Jing Lv¹, Hongke Wang², Weitao Li², Liming Nie¹;¹Xiamen Univ., China; ²Nanjing Univ. of Aeronautics and Astronautics, China. Photoacoustic tomography (PAT) with Prussian blue (PB) was applied to non-invasively monitor brain injury and recovery with stem cell therapy. Hemorrhage was clearly imaged and PB-labeled stem cells were successfully visualized by PAT in vivo.

W3A.14
Photoacoustic imaging of mouse heart with myocardial infarction: comparison with ultrasound imaging and SPECT, Jing Lv¹, Ya Peng¹, Zhide Guo¹, Zijing Li¹, Qingliang Zhao¹, Liming Nie¹;¹Xiamen Univ., China. Photoacoustic tomography (PAT) equipped with 128 ultrasonic transducers was applied to image the mouse heart before and after myocardial infarction (MI) modeling. The results demonstrate that PAT is capable of MI diagnosis and injury localization.

W3A.15
Retrieval of Monochromatic Fringe Phase Shifts in Polychromatic Talbot-Lau Grating X-Ray Interferometry, Xizeng Wu¹, Aimin Yan¹, Hong Liu²;¹Univ. of Alabama at Birmingham, USA; ²Univ. of Oklahoma, USA. Exploring the non-linear relationship between polychromatic and monochromatic fringe shifts in grating phase contrast imaging, we developed a general analytic approach that enables ones to directly compute the monochromatic fringe shifts from polychromatic measurement.

W3A.16
Optimizing the Synthesis of Core/Shell Structured Au@Cu2S Nanocrystals as Contrast-Enhanced for Bioimaging Detection, Wei L. Liu¹;¹Shenzhen Univ., China. We reported Au@Cu2S nanocrystals in the aqueous phase with a core/shell structured, and we demonstrated that Au@Cu2S nanocrystals could be used for the Optical Coherence Tomography (OCT) test.

W3A.17
Optimizing the Synthesis of Core/Shell Structured Au@Cu2S Nanocrystals as Contrast-Enhanced for Bioimaging Detection, Wei L. Liu¹;¹Shenzhen Univ., China. We reported
Au@Cu2S nanocrystals in the aqueous phase with a core/shell structured, and we demonstrated that Au@Cu2S nanocrystals could be used for the Optical Coherence Tomography (OCT) test.

W3A.18
Effects of Ultrasonic Waves on Breast Cancer Cell Line (MCF-7) Coupled with Zinger Officinale (GINGER) Extract Using Cell Viability and Comet Assay Tests, Giermin Aj E. Sahagun¹, Romeric F. Pobre¹; ¹De la Salle Univ., Philippines. Effects of ultrasound and ginger on breast cancer cell line (MCF-7) were done using cell viability and comet assay tests. Results showed that specific ultrasound frequency has significant cell death.

W3A.19
Single-Step Fabrication of Metallic Micropatterns, Yi Zeng¹, Zhongze Gu¹; ¹Southeast Univ., State Key Laboratory of Bioelectronics, China. We have developed a method to fabricate metallic micropatterns with one step. The metallic micropatterns had a good enhancement to Raman signal. Besides, the abilities of encoding and forming droplet micropatterns spontaneously were also possessed by the metallic micropatterns.

W3A.20
An fMRI data analysis strategy for Seafarer's brain functional network study, Yuhu Shi¹, Weiming Zeng¹; ¹Shanghai Maritime Univ., China. A new strategy of functional connectivity detection is introduced to obtain more accurate brain functional networks using ICA with intrinsic priori information. The seafarers' fMRI data is used to evaluate the effectiveness through nonparametric Wilcoxon tests.

W3A.21
Optimized visual AuNP beacon for tracing mRNA changes in living cells, Siwen Li¹; ¹China pharmaceutical Univ., China. In this manuscript, we prepared a highly efficient molecular beacon by manipulating the number of sequences on AuNPs and surface modification with PEG and cell-penetrating peptide.

W3A.22
In vivo skin optical clearing efficiency of sucrose and fructose, Wei Feng¹, Rui Shi¹, Chao Zhang¹, Dan Zhu¹; ¹Wuhan National Lab for Optoelectronics, China. In vivo skin optical clearing efficiency of disaccharides attracts extensive attentions. Here, we employed laser speckle contrast imaging and optical coherence tomography for evaluating the in vivo skin optical clearing performance of sucrose and fructose.
W3A.23
Portable Surface Plasmon Resonance Biosensor and Its Applications, Pan Qi¹, Ying Li²,³, Shi P. Li²,⁴, Jin G. Zhong²,⁴, ¹Department of Electronics Engineering, Guangdong Communication Polytechnic, China; ²Laboratory of Optoelectronic Information and Sensing Technologies of Guangdong Higher Education Inst.s, Jinan Univ., China; ³Pre-Univ., Jinan Univ., China; ⁴Department of Optoelectronic Engineering, Jinan Univ., China. A self-constructed portable SPR biosensor is introduced. It was used to detect shrimp hemocyanin and microcystin. The experiment results show that the device has the application prospect in the field of food safety detection.

W3A.24
A portable phenotyping for maize plant using cellphone, Lingbo L. Liu², Wanneng Yang¹,³, Junli Ye², Qian Liu²; ¹National Key Laboratory of Crop Genetic Improvement and National Center of Plant Gene Research, China; ²Britton Chance Center for Biomedical Photonics, Wuhan National Laboratory for Optoelectronics, China; ³College of Engineering, Huazhong Agricultural Univ., China. We develop a cell phone application for maize phenotyping. We raise a new method to reduce the influence of the casual posture when the user is holding the cellphone. And we also develop a new algorithm to automatically segment every individual leaf from one plant.

W3A.25
Nanoliposomes for photodynamic therapy guided by fluorescence and computed tomography imaging, Hao Xu¹, Tymish Y.Ohulchanskyy¹, Junle Qu¹; ¹College of Optoelectronic Engineering, Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province, Shenzhen Univ., China. The efficacy of photodynamic therapy (PDT) can be enhanced by combining photosensitizers (PS) with medical imaging modality. In our research, CT imaging contrast agent and PS were coencapsulated in nanoliposome for fluorescence imaging and CT guided PDT. It offers great promise as a theranostic agents uniting diagnostic and therapeutic features.

W3A.26
Mechanism study on photoacoustic conversion efficiency of plasmon-mediated nanoprobes based on finite element analysis, Yujiao Shi¹, Sihua Yang¹, Da Xing¹; ¹South China Normal Univ., China. Highly efficient nanoprobes are desirable for good-performance photoacoustic molecular imaging. We present simulations of photoacoustic effect for plasmon-mediated nanoprobes based on finite element analysis, to provide deep understanding of the micromechanism of the photoacoustic conversion.
W3A.27
Dual-slit confocal light sheet microscopy for in vivo whole-brain imaging of larval zebrafish, Ling Fu\textsuperscript{1}; \textsuperscript{1}Huazhong Univ of Science and Technology, China. We developed a dual-slit confocal light sheet microscopy which enhanced the image SNR and obtained two-fold imaging rate compared with conventional line scanning confocal microscopy.

W3A.28
Nonlinear optical microendoscopy based on double-clad photonic crystal fiber driven by four-plate piezoelectric actuator, Ling Fu\textsuperscript{1}; \textsuperscript{1}Huazhong Univ. of Science and Technology, China. Here we presented an optimized actuator for driving a particular fiber cantilever in the view point of energy, which contributes to driving large diameter specialty fibers due to low energy dissipation.

W3A.29
A Confocal Endomicroscopy for Cellular Imaging, Ling Fu\textsuperscript{1}; \textsuperscript{1}Huazhong Univ. of Science and Technology, China. We present a prototype of confocal endomicroscopy, which can be compatible with biopsy channel of conventional endoscopy, with an immediate diagnosis that is virtually consistent with the histologic diagnosis with 8 fps imaging speed.

W3A.30
Characterization the biochemical specificity of mouse spinal cord by confocal Raman microspectral Imaging, Yuze Gong\textsuperscript{1,2}, Xu Zhang\textsuperscript{1,2}, Jie Li\textsuperscript{1,2}, Yaning Yin\textsuperscript{1,2}, Kaige Wang\textsuperscript{2}, Qingli He\textsuperscript{1}, Jintao Bai\textsuperscript{1,2}, Shuang Wang\textsuperscript{2}; \textsuperscript{1}Dept. of Physics, Northwest Univ., China; \textsuperscript{2}Inst. of Photonics and Photon-Technology, Northwest Universit, China. A longitudinal study was implemented to reveal a precise linkage between the spectral features and the molecular composition in ex vivo mouse spinal cord tissue by microspectral Raman imaging, which form a solid basis for the molecular investigation on pathology states of spinal cord injury.

W3A.31
Direct 3D imaging of an internal space encompassed by turbid layers using a surface quasi-point light source for precorrection, Honglin Liu\textsuperscript{1}, Mu Qiao\textsuperscript{1}, Guanghui Pang\textsuperscript{1}, Shensheng Han\textsuperscript{1}; \textsuperscript{1}Key Laboratory for Quantum Optics and Center for Cold Atom Physics, Shanghai Inst. of Optics and Fine Mechanics, Chinese Academy of Sciences, China. A method to noninvasively see inside an internal space encompassed by turbid layers, e.g., eggs, edema and bladders, using a surface quasi-point light source for precorrection is presented, which has equivalently infinite depth of field.
W3A.32
Dual-mode Micro-Optical Sectioning Tomography for simultaneously acquiring Golgi-stained neuronal morphology with co-located cytoarchitecture in the same brain, Xiao Chen¹,², Xiaoyu Zhang¹,², Qiuyuan Zhong¹,², Qingtao Sun¹,², Jie Peng¹,², Hui Gong¹,², Jing Yuan¹,², ¹Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory for Optoelectronics-Huazhong Univ. of Science and Technology, China; ²Britton Chance Center and MOE Key Laboratory for Biomedical Photonics, School of Engineering Sciences, Huazhong Univ. of Science and Technology, China. We developed dual-mode Micro-Optical Sectioning Tomography, to simultaneously image the reflective neural morphology and fluorescent cytoarchitecture of a Golgi-stained whole mouse brain at a single-neuron resolution in 4 days.

W3A.33
Photoacoustic Imaging Guide Efficiently Tumor Therapy by Microbubble Explosion Induced by Ultrasonication, Liming Nie¹, Honghui Li¹, Zhiyou Wu¹; ¹Xiamen Univ., China. We encapsulated photosensitizers in the microbubble, allowing synergistic physical burst therapy and photodynamic therapy. The results showed that the bubble explosion could bring mechanical impacts by its transient burst wave and improve the treatment.

W3A.34
Cross-sectional photoacoustic tomography of intracerebral haemorrhage in mice, Jinge Yang¹, Dan Wu¹, Guang Zhang¹, Huabei Jiang¹,²; ¹Univ of Electronic Science & Tech China, China; ²Univ. of South Florida, USA. In this study, we in vivo examined intracerebral haemorrhage (ICH) induced by collagenase in mice using cross-sectional photoacoustic tomography (csPAT). The PA images showed hematoma area that was cross-verified by histologic images.

W3A.35
Detection of Axillary Lymph Node Metastasis in Breast Cancer using Multiphoton Microscopy, Wu Yan¹, Lin Yuxiang², Lian Yuane³, Lin Peihua⁴, Shu Wang⁴, Zhuo Shangmu⁴, Fu Fangmeng², Wang Chuan², Jianxin Chen⁴; ¹Fujian Univ. of technology, China; ²Department of Breast Surgery, The Affiliated Union Hospital of Fujian Medical Univ., China; ³Department of Pathology, The Affiliated Union Hospital of Fujian Medical Univ., China; ⁴Fujian Normal Univ., China. Multiphoton microscopy (MPM) was applied to identify lymphocytes, metastatic cells and the tumor stroma in negative and positive axillary lymph node respectively, which facilitated the pathological analysis of lymph nodes in vivo.

W3A.36
Human tissue analysis based on Raman spectroscopy for nasopharyngeal cancer detection, Qiong Wu¹, Xiaosong Ge¹, Liqing Sun², Xueliang Lin¹, Zhihong Xu¹, Duo Lin¹; ¹Fujian Normal Univ., China; ²Affiliated Fuzhou First Hospital of Fujian Medical Univ., China. This article briefly reviews the applications of Raman spectroscopy technology for nasopharyngeal cancer tissue detection, especially presenting the corresponding work of our group in Fujian normal Univ., and discussing the perspective of this field.

W3A.37
Long-term ultra-low-level power STED nanoscopy, Xusan Yang¹; ¹Peking Univ., China. Through the strategic application of upconversion nanoparticles, we have reduced the intensity of STED nanoscopy by 2-3 orders of magnitude. It reveals a new mechanism of stimulated emission caused by the photon avalanche effect. With only 30 mW laser, resolution down to 28nm has been attained, which is 1/36 of the excitation wavelength.

W3A.38
UbasM: a simple, rapid and DiI-compatible optical clearing method for volume imaging, Lingling Chen¹, Guive Li¹, Yamin Li¹, Yingchao Li¹, Lina Liu¹, Ang Liu¹, Shuangchen Ruan¹; ¹Shenzhen Univ., China. We present a new, simple, convenient aqueous optical clearing agent, termed UbasM that rapidly renders fixed tissue samples highly transparent and reliably preserve emission from fluorescent proteins and lipophilic dyes in membrane integrity preserved tissues.

W3A.39
Reduction of acoustic distortions by multi-stencils fast marching method in the linear array transducer based photoacoustic tomography, Xiangwei Lin¹, Mingjian Sun¹, Naizhang Feng², Guangsong Wang¹, Yang Liu¹, Ying Fu¹, Ge Qu¹; ¹Harbin Inst. of Technology, China. The acoustic properties in biological tissue are inhomogeneous, resulting in the deterioration in the reconstructed photoacoustic image. By contrast, multi-stencils fast marching method could produce accurate speed map for the reduction of acoustic distortions.

W3A.40
Topological Photobiomodulation, Chengyi T. Liu¹; ¹South China Normal Univ., China. The phenomenology of photobiomodulation has not been resolved because it was based on P-values. The data were re-analyzed with topology in this paper, and it was found that photobiomodulation promotes the activation of self-limited process.

W3A.41
A general method for delivering cell-impermeable organic fluorescent probes into living cells for super-resolution imaging, Meng Zhang¹; ¹Wuhan National Laboratory for Optoelectr, China. Here we develop a general method that can deliver cell-impermeable fluorescent probes into living cells efficiently and specifically label various intracellular organelles. Based on our delivering method, we obtained live-cell super-resolution images of intracellular organelles.

W3A.42
A Stereological Quantitative Analysis of the Brain-wide Distribution of SOM Neurons in Whole Mouse Brain, Chen Zhang¹, Cheng Yan¹, Miao Ren¹, Anan Li¹, Tingwei Quan¹, Hui Gong¹, Jing Yuan¹; ¹HUST, China. This platform combined whole-brain optical imaging using the Brain-wide Positioning System (BPS) and stereological localization using NeuroGPS to generate an accurate stereological cell count of SOM-expressing neurons in a mouse brain.

W3A.43
Tomographic Diffractive Microscopy for Better 3D Imaging, Dashan Dong¹, Yanhui Cai¹, Ziheng Ji¹, Hong Yang¹, Qihuang Gong¹,², Kebin Shi¹,²; ¹State Key Laboratory for Mesoscopic Physics, Collaborative Innovation Center of Quantum Matter, School of Physics, Peking Univ., China; ²Collaborative Innovation Center of Extreme Optics, Shanxi Univ., China. We report on a fast three dimension refractive index imaging of INS-1 cells based on optical holographic tomography. The imaging speed is boosted by simultaneously controlling the rotation of light and raw imaging logging. A fast and robust algorithm is used to mapping the data in frequency domain.

W3A.44
A simple, rapid method to precisely locate mRNAs of intact mouse brain via fluorescence tomography, Wenyan n. Guo²,¹, Xiuli Liu²,¹, Yadong Gang²,¹, Fangfang Yin²,¹, Pei Li²,¹, Fei Huang²,¹, Ning Li²,¹, Qi Zhang²,¹, Xuyin Li²,¹, Yao Jia²,¹, Feng Xiong²,¹, Xiaojun Wang²,¹, Hui Gong²,¹, Qingming Luo²,¹, Shaoqun Zeng²,¹,¹Britton Chance Center and MOE Key Laboratory for Biomedical Photonics, School of Engineering Sciences, Huazhong Univ. of Science and Technology, China; ²Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science and Technology, China. To precisely locate mRNAs of mouse brain, a simple, rapid method was developed via combining whole mount in situ hybridization and fluorescence tomography, with cytoarchitectonic landmarks provided by propidium iodide real-time counterstaining during the imaging.

W3A.45
Simple, Cost-effective Blood Counting Without Needing Trained Users, Dengling Xie¹, Yaning
Li¹, Kaiqin Chu¹, Zachary Smith¹;¹Univ of Science and Tech of China, China. We present a single-step sample preparation protocol and automated imaging & analysis system for highly accurate blood counting at the point of care, appropriate for completely untrained users in rural and low-resource settings.

W3A.46
Photo-responsive Nanovehicle for Two Independent Wavelength-Triggered Sequential Release of P-gp shRNA and Doxorubicin to Optimize Synergistic Therapy of Multidrug-resistant Cancer Cells, Ming Wu¹, Xin Y. Lin¹, Xiaolong Liu¹;¹Mengchao Hepatobiliary Hospital of Fujia, China. Earlier release of RNA molecules than drugs is vital but still difficult for overcoming multidrug resistance of cancer cells. Herein, we reported photo-responsive mesoporous silica nanoparticles utilizing two independent light to control their sequential release.

W3A.47
Path-based preprocess method for accelerating decoupled fluorescence Monte Carlo simulation, Xu Jiang¹, Yong Deng¹, Qingming Luo¹;¹Wuhan National Laboratory for Optoelect, China. We developed a path-based preprocess method for accelerating decoupled fluorescence Monte Carlo (dfMC) simulation. By optimizing the storage of path-related quantities, the computational time of the dfMC method is significantly reduced.

W3A.48
In Situ Imaging Of Mitochondria In Living Zebrafish Embryos, Ying He¹, Zhigang Yang¹, Junle Qu¹;¹Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province, College of Optoelectronic Engineering, Shenzhen Univ., China. Our group design and synthesize a highly selective and cell-permeable fluorescent probe, which is target to the mitochondrion. Furthermore, we use the probe to get the imaging of mitochondria in living embryo cells of zebrafish.

W3A.49
Identification and quantitative evaluation of the scar formation in glaucoma post-operative filtration channel by Mueller matrix microscope, Xi Liu¹, Jialing Zhou²,³, Yang Dong²,³, Honghui He³, Hui Ma¹,²;¹Center for Precision Medicine and Healthcare, Tsinghua-Berkeley Shenzhen Inst., China;²Shenzhen Key Laboratory for Minimal Invasive Medical Technologies, Inst. of Optical Imaging and Sensing, Graduate School at Shenzhen, Tsinghua Univ., China;³Department of Biomedical Engineering, Tsinghua Univ., China. The Mueller matrix microscope has been applied for quantitative evaluation of glaucoma post-operative scar formation in rabbit eye. The
calculation and analysis of Mueller matrix transformation (MMT) parameter $\Phi$ indicate great potential in auxiliary diagnosis.

**W3A.50**
**Digital holographic imaging through turbid media**, Shiping Li$^{1,2}$, Pan Qi$^3$, Ying Li$^4$, Jin G. Zhong$^{1,2}$; $^1$Department of Optoelectronic Engineering, Jinan Univ., China; $^2$Key Laboratory of Optoelectronic Information and Sensing Technologies of Guangdong Higher Education Inst.s, Jinan Univ., China; $^3$Department of Electronics Engineering, Guangdong Communication Polytechnic, China; $^4$Pre-Univ., Jinan Univ., China. A method of imaging through turbid media using digital holography is presented. Theories of light propagation in turbid media and digital holography are described. Experiments to image the objects hidden in turbid media are given. The experimental results show that images of the objects can be achieved by use of digital holography.

**W3A.51**
**Enhancement of PEGylated Gold Nanoparticles Delivery to Mouse Brain in Vivo by Acupuncture**, Dan Wu$^{2,3}$, Ruihuan Cui$^{2,3}$, Xiuyun Guo$^{2,3}$, Qiuan Shang$^{2,3}$, Man Wu$^{2,3}$, Jinge Yang$^{2,3}$, Huabei Jiang$^{2,1}$; $^1$Department of Medical Engineering, Univ. of South Florida, USA; $^2$School of Physical Electronics, Univ. of Electronic Science and Technology of China, China; $^3$Center for Information in Medicine, Univ. of Electronic Science and Technology of China, China. We report on an effective drug delivery approach consisting of PEGylated gold nanoparticles (as the drug carrier), traditional Chinese medicine (TCM) acupuncture (as the auxiliary method), and photoacoustic tomography (PAT) as the imaging technique.

**W3A.52**
**Machine learning-based detection and segmentation of bioresorbable vascular scaffolds struts in intravascular OCT images**, Yifeng Lu$^1$, Yihui Cao$^1$, Jing Jing$^2$, Qinhua Jin$^2$, Yundai Chen$^2$, Rui Zhu$^1$, Jianan Li$^1$; $^1$Xi’an Inst. of Optics and Precision Mechanics of CAS, China; $^2$PLA General Hospital, China. We propose a machine learning-based method for struts detection in IVOCT images. Then, dynamic programing is used for struts segmentation. Based on the above results, struts malapposition analysis is conducted automatically.

**W3A.53**
**Photo-responsive hollow silica nanoparticles for light triggered gene and photodynamic synergistic therapy**, Xin Y. Lin$^1$, Ming Wu$^1$, Xiaolong Liu$^1$; $^1$Mengchao Hepatobiliary Hospital of Fujian Medical Univ., China. A novel photo-sensitive hollow silica nanoparticle based gene and photosensitizer (PS) co-delivery platform (HNP-Cou-PD) was proposed for synergistic gene and
PDT therapy triggering by dual wavelength light irradiation.

**W3A.54**
Circular scanning photoacoustic tomography based on a coplanar light illumination and ultrasonic detection, Xiangwei Lin¹, Jing Meng², Depeng Hu¹, Guanji Leng¹, Shaoheng Yu¹, Yang Liu¹, Riqiang Lin³, Xiaoyang Liu³, Chengbo Liu³, Xiaojing Gong³, Mingjian Sun¹; ¹Harbin Inst. of Technology, China; ²Qufu Normal Univ., China; ³Shenzhen Inst.s of Advanced Technology, Chinese Academy of Sciences, China. A circular scanning photoacoustic tomography using coplanar light illumination and ultrasonic detection is proposed by the aid of a translucent quartz bowl. Phantom experiments demonstrate this novel coplanar configuration could greatly expand the imaging scope.

**W3A.55**
Multifunctional small molecule fluorophore for long-duration tumor-targeted monitoring and dual modal phototherapy, Yi Ma¹, Yueqing Gu¹; ¹China pharmaceutical Univ., China. A specific tumor-targeted small molecular fluorophore for synchronous long-duration cancer imaging, photodynamic and photothermal therapy is synthesized, which presents a potential strategy to develop small-molecule-based cancer theranostic agents for simultaneous cancer targeting, imaging and therapy.

**W3A.56**
The Photoacoustic Tomography System Based on Medical Ultrasound Array, Li Zuoran¹, Wu Huaqin¹, Lin Yongping¹, Li Zhifang¹, Li Hui¹; ¹Fujian Normal Univ., China. A system which combines photoacoustic tomography with ultrasonic array is developed, the system has fast data acquisition speed and good solution. The experiment shows that the method has the potential application value in clinic.

**W3A.57**
In vivo imaging of melanoma by using noncontact all-optical photoacoustic microscopy, Zhongjiang Chen¹, Wangting Zhou¹; ¹South China Normal Univ., China. In this paper, we presented a noncontact all-optical photoacoustic microscopy for in vivo imaging of melanoma. The in vivo experiment results have demonstrated the noncontact all-optical photoacoustic microscopy system can image the melanoma in vivo.

**W3A.58**
Neural-vascular Coupling of Acute Ethanol Adminstration using Laser Speckle Contrast Imaging, Weitao Li¹, Yameng Zhang¹, Yuemei Zhao¹, Yan Zhang¹, Zhiyu Qian¹; ¹Nanjing Univ. of
Aeronautics and Astronautics, China. We applied a linear operator to obtain relative cerebral blood flow. Results showed that acute ethanol administration indeed caused a rise of blood flow compared with the saline group, and an opposite trend in the firing rate. It can be utilized to research the correlation between neuronal activity and hemodynamic responses.

W3A.59
Structure-guided design of mitochondria-targeting near-infrared fluorophore for dual modal phototherapy, Chunmeng Shi; Third Military Medical Univ., China. Mitochondria are recognized as the ideal target for cancer treatment and multifunctional near-infrared small-molecule photosensitizer (PS) is developed for synchronous cancer photodynamic therapy (PDT) and photothermal therapy (PTT) by targeting cancer-cell mitochondria.

W3A.60
Determination of gastric adenocarcinoma optical absorption coefficient based on focusing photoacoustic imaging, Huaqin Wu; Fujian normal Univ., China. We used PAT to quantify the difference optical absorption coefficient between gastric tumor and normal tissue, and verify the experiment results by inverse Monte Carlo simulation. This method is particularly useful to diagnose the gastric cancer.

W3A.61
Multispectral backscattering Mueller matrix imaging on thick fresh tissues, Yuanhuan Zhu, Yang Dong, Hui Ma; Tsinghua-Berkeley Shenzhen Inst., China; Tsinghua Univ., China. We use multispectral LED light sources of six different colors to take Mueller matrix images. Multispectral polarized light backscattering measurements can help to reveal more details on the microstructure of the sample.

W3A.62
Treatment Evaluation Indices for Laser Ablation Therapeutic Method: A Numerical Study, Yuhao Li, Jingyi Hu, Yi Gong, Jie Tang, Changcun Pan, Xinru Xiao, Yigang Qiu, Shaolong Kuang, Yue Wu, Baiquan Su; Beijing Univ. of Post and Telecommu, China; Beijing Tiantan Hospital, Capital Medical Univ., China; Soochow Univ., China; NAVY General Hospital, China. Future autonomous robotic laser therapeutic method depends on quantitative treatment evaluation. Three evaluation indices for treatment performance are defined and their effectiveness are demonstrate by presenting result of a spiral ablation trajectory on numerical study.

W3A.63
High-resolution Refractive Index Tomography Using Discrete Algebraic Reconstruction Technique, Moosung Lee¹, Seungwoo Shin¹, YongKeun Park¹, ¹KAIST, Korea. We develop a reconstruction algorithm in diffraction tomography, which exploits the prior information about homogeneous and uniform refractive index distributions of samples. The presented algorithm shows high-quality reconstructions of various samples in simulations and experiments.

W3A.64
Optical Clearing Agent for Enhanced Imaging Dorsal Blood Vessel in Nude Mice, Xiangyu Niu¹, Huabin He¹, Buhong Li¹, ¹Fujian normal Univ., China. Optical clearing agent (OCA) has been successfully used for improving optical imaging of dorsal blood vessel in mouse. In this study, the application of OCA for imaging dorsal blood vessel in nude mice was achieved.

W3A.65
Label-free Imaging of Gliomas with Multiphoton Microscopy, Na Fang¹, Zanyi Wu², Xingfu Wang³, Yuanxiang Lin², Lianhuang Li², Zhida Chen¹, Shanshan Shanshan Cai³, Xueyong Liu³, Yupei Chen³, Jianxin Chen¹, Dezhi Kang², ¹Fujian Normal Univ., China; ²Department of Neurosurgery, The First Affiliated Hospital of Fujian Medical Univ., China; ³Department of Pathology, The First Affiliated Hospital of Fujian Medical Univ., China. Multiphoton microscopy was used to image gliomas without fluorescent dyes. Our results demonstrated that MPM is able to discern between normal tissue, tumor and necrosis. Several features significant for the diagnosis were clearly visualised.

W3A.66
High-quality water-soluble and surface functionalized upconversion nanocrystals as luminescent probes for quantitative detection of microRNA-21 sequences, Yafeng Kang¹, Chengyu Li¹, Chongyang Song¹, Bei Zheng¹, Hongwu Tang¹; ¹Wuhan Univ., China. We show that octylamine-modified poly-(acrylic acid) is adopted to wrap hydrophobic upconversion nanoparticles (UCNPs), and the UCNPs are further biofunctionalized and applied to integrate luminescence imaging with optical tweezers for detecting microRNA-21 sequences.

W3A.67
Improving lateral resolution of selective plane illumination microscopy with an enhanced SOFI, Dong Liang¹; ¹SIOM, China. We present a modified super-resolution optical fluctuation imaging algorithm (SOFI) combined with SPIM which can quickly improve the lateral resolution of SPIM by two times with 50 frames of raw images.
Large Core Fiber Utilized to Optimize Output Beam of All-fiber Probe for Optical Coherence Tomography, Jianrong Qiu\textsuperscript{1}, Yi Shen\textsuperscript{1}, Zhihua Ding\textsuperscript{1};\textsuperscript{1}State Key Lab of Modern Optical Instrumentation, China. Using large core fiber (LCF) to optimize optical performances of all-fiber probe for optical coherence tomography is presented. Numerical simulation results of probes with optimized structure parameters are displaced.

W3A.69
A Quantitative Assessment of Hepatocellular Carcinoma Grading using Multiphoton Microscopy, Hongxin Lin\textsuperscript{1}, Ning Zuo\textsuperscript{1}, Shuangmu Zhuo\textsuperscript{1};\textsuperscript{1}Fujian Normal Univ., China. We use collagen signals of hepatocellular carcinoma to distinguish the tumor grading through multiphoton microscopy. It successfully shows the expression of collagen, and the boxplots of collagen-related changes using the T-test.

W3A.70
Real-Time Data Acquisition System for Radiation-induced Acoustic Imaging, Zhong Ji\textsuperscript{1}, yongsheng cui\textsuperscript{1};\textsuperscript{1}South China Normal Univ., China. We established a data acquisition system, which composed of multielement detector, switch, multielement acquisition cards, field programmable gate arrays (FPGAs), and computer, for real-time capturing the raw photoacoustic and thermoacoustic data and reconstructing the image.

W3A.71
Graphene Oxide Nanoprobe for Rapid DNA Detection, Wan Xiaofang\textsuperscript{1};\textsuperscript{1}Shenzhen Univ., China. Here we have developed a graphene oxide based approach for rapid and sensitive detection of DNA. The biosensor displays a sigmoiadal response to DNA ranging from 5nM to 1000nM. And the total analysis time is less than 20min.

W3A.72
A assessment method of early gastric tumor excision based second harmonic generation signal, Ning Zuo\textsuperscript{1}, Hongxin Lin\textsuperscript{1}, Xiaoling Zheng\textsuperscript{2}, Shuangmu Zhuo\textsuperscript{1};\textsuperscript{1}Fujian Normal Univ., China;\textsuperscript{2}Fujian Provincial Hospital, China. Combining qualitation and quantitation to analyze the collagen fibers of ESD excision specimens using multiphoton microscopy, we successfully differentiate early gastric cancer with the submucosal invasion from the normal tissues.

W3A.73
CNN-based Automatic Region Identification for Accelerating Whole Mouse Brain Imaging, Zhiguang Wang\textsuperscript{1,2}, Shangbin Chen\textsuperscript{1,2}, Hui Gong\textsuperscript{1,2}, Qingming Luo\textsuperscript{1,2}, Anan Li\textsuperscript{1,2};\textsuperscript{1}Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory
To reduce the time required for imaging during whole-brain data acquisition, we proposed a machine learning based method to segment the contour of propidium iodide-stained mouse brain images of tomography and achieved effective results.

**W3A.74**

**Fast Quantifying Discrepancies Between Brain-wide Neuron Reconstructions**, Hang Zhou\(^1\), Shiwei Li\(^1\), Tingwei Quan\(^1\), Shaoqun Zeng\(^1\); \(^1\)Huazhong Univ of Science & Technology, China. Digital Reconstruction of brain-wide neuron contribute to the understanding of how brain works. Without heuristic knowledge, we quantifying discrepancies between neuron reconstructions to get golden standards. Here we report a fast method introducing hashing and binary search strategy to accelerate the quantifying work.

**W3A.75**

**Combination Optimization of PLS Regression and SG Smoothing in NIR Analysis of Hemoglobin**, Tao Pan\(^1\), Bingren Yan\(^1\), Yi Tang\(^1\), Jiemei Chen\(^1\), Lijun Yao\(^1\); \(^1\)Jinan Univ., China. The combination optimization method of partial least squares regression combined with Savitzky-Golay smoothing was proposed, and successfully applied to near-infrared spectroscopic analysis of hemoglobin in the human peripheral blood samples.

**W3A.76**

**A lysosome-targetable and two-photon fluorescent probe for imaging endogenous β-galactosidase in living ovarian cancer cells**, Yueqing Gu\(^1\), Jinxin Huang\(^1\); \(^1\)China Pharmaceutical Univ., China. We have rationally designed and synthesized a novel two-photon fluorescence probe FC-βgal for monitoring endogenous β-gal in lysosome.

**W3A.77**

**White Light Quantitative Phase Imaging Unit**, YoonSeok Baek\(^1\), KyeoReh Lee\(^1\), Jonghee Yoon\(^1\), YongKeun Park\(^1\); \(^1\)KAIST, Korea. We present white light quantitative phase imaging unit (WQIU) as a practical realization of quantitative phase imaging. WQIU which consists of a liquid crystal retarder, birefringent crystals and polarizers, enables phase imaging at conventional microscopes.

**W3A.78**

**Optical topography guided diffuse optical tomography for imaging brain function**, Bingyuan
Wang1, Jie He1, Xue Ding1, Yao Zhang1, Jiao Li1, Wenjuan Ma3, Limin Zhang1, Zhongxing Zhou1, Feng Gao1,2, Huijuan Zhao1,2; 1College of Precision Instrument and Optoelectronics Engineering, Tianjin Univ., China; 2Tianjin Key Laboratory of Biomedical Detecting Techniques and Instruments, Tianjin, China; 3Cancer Inst. and Hospital, Tianjin Medical Univ., Tianjin, China. Optical topography guided diffuse optical tomography is developed to regularize the ill-posed inverse problems involved in brain imaging. Simulation experiments demonstrate that stronger robustness and higher quantitativeness are obtained without adding any other modality measurements.

W3A.79
Nonlinear Photoacoustic Imaging by Pump-Probe Excitation, Fei Cao1, Zhihai Qiu1, Rui Zhang1, Puxiang Lai1, Lei Sun1; 1The Hong Kong Polytechnic Univ., Hong Kong. Nonlinear photoacoustic imaging is demonstrated by a pump-probe photoacoustic excitation scheme by using PPIX. The system has potentials to greatly facilitate deep-tissue photoacoustic theranostics as well as high resolution dynamic photoacoustic molecular imaging.

W3A.80
Ultra-thin Lens-less Holographic Microscopy Using a Scattering Layer, YoonSeok Baek1, YongKeun Park1; 1KAIST, Korea. A digital holographic microscopy using a scattering objective is presented. The proposed method measures a complex amplitude of light without a conventional objective lens or an external reference arm. The principle and the performance of the method have been validated through experiments.

W3A.81
Label-free, Optical Measurements of Brain Morphologies in Alzheimer’s Disease Using Quantitative Phase Imaging, Moosung Lee1, Eeksung Lee1, JaeHwang Jung1, Hyeonseung Yu1, Kyohyun Kim1, Jonghee Yoon1, Shinhwa Lee1, Yong Jeong1, YongKeun Park1; 1KAIST, Korea. We employ quantitative phase microscopy technique to investigate structural alterations in brains due to Alzheimer’s disease. Quantifying optical scattering parameters, we show that Alzheimer’s disease is associated with the morphological inhomogeneity of brains.

W3A.82
Optical coherence photoacoustic microscopy for retinal disease imaging, Cuixia Dai1; 1Shanghai Inst. of Technology, China. We performed the dual-modality Optical coherence photoacoustic microscopy on Age related macular degeneration (AMD) model in rat to investigate the morphology and variability of the AMD diseases and to validate the therapeutic approaches.
W3A.83
Monitoring the Breath Signal of Small Animals for Gated Photoacoustic Microscopy of Mice, Jianshuang Wei¹, Qun Wang¹, Xiaoquan Yang¹, Zhihong Zhang¹, Qingming Luo¹; ¹Wuhan National Lab for Optoelectronics, China. In photoacoustic microscopy (PAM), the imaging quality is limited by the motion artifacts of living animals. We introduce prospective respiratory gating for PAM to address this issue. This method captures the mouse’s respiratory signal to trigger system imaging.

W3A.84
A Feature Point Based Registration of Brain Microscopic Images to the Reference Brain Atlas, Hong Ni¹,², Shangbin Chen¹,², Hui Gong¹,², Qingming Luo¹,², Anan Li¹,²; ¹Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory for Optoelectronics-Huazhong Univ. of Science and Technology, China; ²Britton Chance Center and MOE Key Laboratory for Biomedical Photonics, School of Engineering Sciences, Huazhong Univ. of Science and Technology, China. Recently, we have developed a Micro-Optical Sectioning Tomography system which enables single neuron resolution. By using a flexible strategy, we have aligned our MOST dataset to a reference brain atlas from Allen from Allen Inst..

W3A.85
3D visualization of the ascending pathway of motor nucleus with viral infection and fluorescent imaging, Ben Long¹, Tao Jiang¹, Jing Yuan¹, Xiangning Li¹, Hui Gong¹; ¹Wuhan National Lab for Optoelectronics, China. To explore the network of the central motor system, we combined the fMOST technology with the recombinant Rabies virus. Rabies virus densely infected limbic system, brain stem and motor-related cortex, which included in motor system.

W3A.86
Automatic Collection of Paraffin-embedded Tissue Sections, Lu Tan¹, Ouyang Zhanmu¹, Ben Long¹, Jing Yuan¹, Xiaoquan Yang¹, Xiangning Li¹, Hui Gong¹, Qingming Luo¹; ¹Wuhan National Lab for Optoelectronics, China. We developed an automatic collection system that use sticky tape to achieve the collection of paraffin-embedded slices. We demonstrated that the collected brain slices can be used for immunohistochemistry studies.

W3A.87
Intravital simultaneous autofluorescence-multiharmonic imaging, Haohua Tu¹; ¹Univ of Illinois at Urbana-Champaign, USA. We empower multiphoton microscopy to visualize vital unlabeled cells and tissues of animals or human, achieve slide-free imaging in vivo and in real-time, and
enable simple translational research from live cells and animals to human.

W3A.88
Two photon Imaging Unveils Stress-Induced Remodeling of Structural Plasticity in Mouse Frontal Association Cortex, Zhao Li¹; ¹Huazhong Univ. of Science and Techn, China. Chronic social defeat stress induces re-modelling of neural circuit in mouse frontal association cortex no matter whether there is any depression behavior after exposure of stress.

W3A.89
Study Piezo1 Localization and Transportation Dynamics by Light-sheet Microscopy, Rui Zhang¹, Zhihai Qiu¹, Fei Cao¹, Jinhui Guo¹, Lei Sun¹; ¹The Hong Kong Polytechnic Univ., Hong Kong. The mechanosensitive ion channel piezo1 plays an important role in mediating varied cellular signaling. It is hypothesized that diverse functions of piezo1 could depend on its subcellular localizations. Here we demonstrated that activation of piezo1 can change its subcellular localization as a feedback by using light-sheet microscope.

W3A.90
Performance Comparisons of Two Treatment Planning Methods for Laser Ablation Therapeutic Approach, Jingyi Hu¹, Yuhaao Li¹, Yi Gong², Jie Tang³, Changcun Pan³, Xinru Xiao³, Yigang Qiu⁴, Shaolong Kuang², Yue Wu¹, Baiquan Su¹; ¹Beijing Univ. of Post and Telecommu, China; ²Soochow Univ., China; ³Beijing Tiantan Hospital, Capital Medical Univ., China; ⁴NAVY General Hospital, China. Treatment planning of laser spot on tissue dominates ablation performance. We investigate the comparative performance of difference velocities with a same trajectory for a laser spot on lesion tissue surface surrounding by normal tissue.

W3A.91
Titania conjugated phthalocyanine for two-photon photodynamic therapy on cancer cells, Xinyue Liang¹, Xiaobo Pan¹, Xinyi Wang¹, Yueyue Jing¹, Longfang Yao¹, Jiong Ma¹, Lan Mi¹; ¹Fudan Univ., China. This paper presents a novel photosensitizer TiO₂-Pc with strong two-photon absorption and enhanced fluorescence compared with Pc. The photokilling efficiency of TiO₂-Pc excited by two-photon was found significant on cancer cells for the first time.

W3A.92
Tunable Acoustic Gradient Index Lens for Fast Axial Scanning Photoacoustic Microscopy, Xiaoquan Yang¹, Bowen Jiang¹, Xianlin Song¹, Qingming Luo¹; ¹Wuhan National Lab for Optoelectronics, China. The diffraction limits of optical focus restrict the field of view along
the depth direction of OR-PAM. In this paper, the fabrication of the tunable acoustic gradient index lens (TAG) lens was demonstrated. And the performance of the TAG lens was also shown.

W3A.93
Development of a plastic embedding method for preservation of red fluorescent protein, Miao Ren¹, Jiaojiao Tian¹, Yang Yang¹, Hui Gong¹, Xiangning Li¹; ¹Wuhan National Lab for Optoelectronics, China. To improve the preservation of red fluorescent proteins (RFP) during resin embedding procedure, we developed the plastic embedding methods that can preserve RFP and decrease the auto-fluorescence simultaneously.

W3A.94
Withdrawn

W3A.95
A preliminary method to align fluorescence images of resin embedded mouse brains, Xiao Hu¹,², Xiaojun Wang¹,², Lei Su¹,², Yurong Liu¹,², Huimin Zhang¹,², Xiuli Liu¹,², Shaoqun Zeng¹,²; ¹Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory for Optoelectronics-Huazhong Univ. of Science and Technology, China; ²Britton Chance Center and MOE Key Laboratory for Biomedical Photonics, School of Engineering Sciences, Huazhong Univ. of Science and Technology, China. The mouse brain atlas of fluorescence Micro-Optical Sectioning Tomography was linearly globally registered based on the rigid transformation and the affine transformation, then it was nonlinearly locally registered based on the Demons symmetric diffeomorphisms algorithm.

W3A.96
Study on the Influence of Optical Clearing on Polarization Imaging Contrast, Nan Zeng¹, Hui Ma¹, Yu Huang¹, Dongsheng Chen¹, Qiaolin Xie¹, Valery V. Tuchin²; ¹Tsinghua Univ., China; ²Saratov National Research State Univ., Russian Federation. We simulated the tissue clearing process focusing on two type tissue anisotropy: the interstitial birefringence and the fibrous scatterers. By comparing experiments and simulations, we examine how the polarization contrast changes with the clearing.

W3A.97
A label-free visualize Characterization Method for Dynamic Feature of a Neuron Based on Optical Phase Imaging, Wenbo Tang¹, Ying Ji¹, Zhiya Chen¹, Mingming Zhang², Yawei Wang¹,²; ¹Faculty of science, Jiangsu Univ., China; ²School of mechanical engineering, Jiangsu Univ., China. A new method to characterize the dynamic firing activity feature of a neuron is
presented based on optical phase imaging. The method has the advantages both of label-free operation and simple calculation.

W3A.98
Microstructural imaging of human esophagus using multiphoton microscopy, Yaping Zeng, Jian Xu, Deyong Kang, Shuangmu Zhuo, Xiaoxin Zhu, Jiangbo Lin, Jianxin Chen; Fujian Normal Univ., China; The Affiliated Hospital of Fujian Medical Univ., China. Esophageal tissues contain abundant endogenous signals. In this work, we attempt to present microstructures of the four-layer structures of the human esophagus wall by multiphoton microscopy.

W3A.99
Selective Photo-activation and Resolution increasing in Structured Illumination Microscope, Dong Wen, Pengcheng Li, Huazhong Univ. of Science & Technology, China. We use a DMD to generate structured light illumination to increasing resolution in fluorescence microscope, and a SLM is used to generate pattern photo-activation image to select the area we need.

W3A.100
Scalable embedding method with hydrogel for optical imaging of fluorescent samples, Can Zhou, Ting Luo, Hui Gong, Xiangning Li; Wuhan National Lab for Optoelectronics, China. To acquire high SNR biological image in vitro, we developed a scalable embedding method of small deformation with modified hydrogel, which is compatible for large samples with kinds of fluorescent proteins and fluorescein.

W3A.101
3D Affine Registration of Large Image Stack for High-Resolution Brain Imaging Techniques, Chaozhen Tan, Zhao Feng, Hong Ni, Yuxin Li, Hui Gong, Qingming Luo, Anan Li; Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory for Optoelectronics-Huazhong Univ. of Science and Technology, China; Britton Chance Center and MOE Key Laboratory for Biomedical Photonics, School of Engineering Sciences, Huazhong Univ. of Science and Technology, China. To solve the stereotaxic deviation and sample deformation in Micro-Optical brain images at high resolution, we develop a high performance 3D affine registration method for large image stack to correct the stereotaxic space and morphology.

W3A.102
Study on Multi-parameter Evaluation Method of VDT Visual Fatigue Based on EEG and
NIRS, Meng Ji, Pengcheng Li; HUST, China. The visual fatigue experiment was designed to establish a visual fatigue monitoring system for simultaneous monitoring of ERP, SSVERP, EEG and blood oxygen signals. The purpose is to form multi-parameter objective evaluation of visual fatigue.

**W3A.103**
New approach to fast analyze spontaneous cortical activity alternation between motifs, Wen M. Li; HUST, China. Using large size images for function connection analysis encounter large time consumption and insufficient computer memory. A new approach based on spatial analysis could rapidly extract different cortical activity motifs alternate over the time series.

**W3A.104**
Circulating tumor cells occur nonuniformly monitored by in vivo flow cytometry, Xi Zhu, Yuanzhen Suo, Nan Ding, Hao He, Xunbin Wei; Med-X Research Inst., Shanghai Jiao Tong Univ., China. Understanding the distribution of CTCs may improve the detectable rate of it. By using in vivo flow cytometry, we found that intervals between neighboring CTCs at late stages of liver cancer were exponential distribution.

**W3A.105**
Insight into the photo dynamic reaction of SNP and interaction of SNP with DNA/HSA upon photo irradiation, Lifang Liu, LeiLei Xie, Wenming Wang, Hongfei Wang; Inst. of Molecular Science, Shanxi Univ., China. Sodium Nitroprusside (SNP) has been widely applied clinically as a vasodilator. The photo dynamic reaction of SNP, photo induced cleavage of supercoiled pBR322 DNA by SNP and the binding modes of SNP with human serum albumin (HSA) were investigated.

**W3A.106**
Fast Fluorescence Lifetime Imaging Basis on Compressive Sensing, Bingling B. Chen, Wei Yan, Dnaying Lin; College of Optoelectronic Engineering, Shenzhen Univ., China. We propose a fast fluorescence lifetime imaging method based on compression sensing (CS) sampling. By using this method, the imaging speed of the fluorescence lifetime is greatly improved while ensuring the accuracy of reconstruction.

**W3A.107**
Combining optical imaging and pharmacological methods to localize N-methyl-D-aspartate glutamate receptors in a stomach wall, Iuliia Golovynska, Tatiana Beregoa, Tatiana Falalyeyeva, Sergii Golovynskyi, Junle Qu, Tymish Y.Ohulchanskyy; Shenzhen Univ,
China; \textsuperscript{2}Inst. of Biology and Medicine, Taras Shevchenko National Univ. of Kyiv, Ukraine. The glutamate receptors of N-methyl-D-aspartate type were directly detected by fluorescence imaging in rat stomach tissue and also studied by combination of pharmacology methods, aiming on detailed localization of the receptors in a stomach wall.

W3A.108

Polymeric Nanoparticles Loaded with Organic Dye for Optical Bioimaging in Near-Infrared Range, Artem Yakovlev\textsuperscript{1}, Lyudmyla O. Vretik\textsuperscript{2}, Roman Ziniuk\textsuperscript{1}, Julia L. Briks\textsuperscript{3}, Yurii L. Slominskii\textsuperscript{3}, Junle Qu\textsuperscript{1}, Tymish Y.Ohulchansky\textsuperscript{1}; \textsuperscript{1}College of Optoelectronic Engineering, Shenzhen Univ., China; \textsuperscript{2}Taras Shevchenko National Univ. of Kyiv, Ukraine; \textsuperscript{3}Inst. of Organic Chemistry NASU, Ukraine. Poly-N-isopropylacrylamide (PNIPAM) based nanoparticles are formulated, postloaded with near-infrared dyes and charachterized. Obtained nanoparticles was tested as the near-infrared imaging contrast agents.

W3A.109

Parallel Implementation of 2D Structure Tensor for High Resolution Brain Imaging, Shangbin Chen\textsuperscript{1,2}, Anan Li\textsuperscript{1,2}, Chaozhen Tan\textsuperscript{1}, Jie Peng\textsuperscript{1}, Hui Gong\textsuperscript{1,2}, Qingming Luo\textsuperscript{1,2}; \textsuperscript{1}Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory for Optoelectronics-Huazhong Univ. of Science and Technology, China; \textsuperscript{2}Britton Chance Center and MOE Key Laboratory for Biomedical Photonics, School of Engineering Sciences, Huazhong Univ. of Science and Technology, China. We have developed a parallel algorithm of 2D structure tensor for high resolution brain imaging. It allows us to quantify the orientation of neural fibers and blood vessels efficiently.

W3A.110

Label-free and Rapid Quantification of the Lipid Contents in Individual Microalgae Using Optical Diffraction Tomography, Jae-hwang Jung\textsuperscript{1}, Han-Byeol Kim\textsuperscript{2}, Seong-Joo Hong\textsuperscript{2}, Geon Kim\textsuperscript{1}, Seungwoo Shin\textsuperscript{1}, SangYun Lee\textsuperscript{1}, Dong-Jin Kim\textsuperscript{3}, Choul-Gyun Lee\textsuperscript{2}, YongKeun Park\textsuperscript{1}; \textsuperscript{1}KAIST, Korea; \textsuperscript{2}Department of Biological Engineering, Inha Univ., Korea; \textsuperscript{3}Nelson Mandela African Institution of Science and Technology, Tanzania, United Republic of. We demonstrate label-free and non-invasive quantification of the lipid inside individual microalgae, \textit{Nannochloropsis oculata}, from the three-dimensional refractive index distribution measured using optical diffraction tomography.

W3A.111

Interfacing Global Fiber Tracking for Optical Microscopy Imaging, Zhengyu Pan\textsuperscript{1,2}, Zhengchao Xu\textsuperscript{1,2}, Hui Gong\textsuperscript{1,2}, Qingming Luo\textsuperscript{1,2}, Anan Li\textsuperscript{1,2}, Shangbin Chen\textsuperscript{1,2}; \textsuperscript{1}Collaborative Innovation
Tracing of neuron morphology is an essential technique in neuroscience. Many conventional methods are local algorithms that may accumulate error step by step. Thus, we apply a global tracking algorithm to reconstruction neuron morphology.

W3A.112

**A Czerny-turner Spectrometer for Ultrahigh Resolution SD-OCT**, Zhangkai Peng\(^1\), Wenchao Liao\(^1\), Shengnan Ai\(^1\), Chengming Wang\(^1\), Wenxin Zhang\(^1\), Xiao Zhang\(^1\), Ping Xue\(^1\); \(^1\)Tsinghua Univ., China. A Czerny-turner spectrometer is specially designed to eliminate coma and other aberrations with high spectral resolution over a bandwidth of >200nm centered at 830nm and enable SD-OCT imaging with high resolution of \(~1.6\)μm.

W3A.113

**Measurements of Polarization-dependent Angular Light Scattering from Individual Microscopic Samples Using Polarization Fourier Transform Light Scattering**, Jae-hwang Jung\(^3\), Jinhyung Kim\(^1\), Min-Kyo Seo\(^1\), YongKeun Park\(^1\); \(^1\)KAIST, Korea. We demonstrate polarization-sensitive measurements of the angle-resolved light scattering from a liquid crystal droplet and silver nano wire utilizing quantitative phase imaging and Fourier transform light scattering.

W3A.114

**A novel probe for endoscopic OCT imaging**, Wenchao Liao\(^1\), Tianyuan Chen\(^1\), Chengming Wang\(^1\), Wenxin Zhang\(^1\), Zhangkai Peng\(^1\), Xiao Zhang\(^1\), Shengnan Ai\(^1\), Deyong Fu\(^1\), Tieying Zhou\(^1\), PING XUE\(^1\); \(^1\)Tsinghua Univ., China. A probe is made to overcome depth of focus limitations for endoscopic OCT imaging, achieving an effective depth of focus of >1mm with lateral resolution of \(~4\)μm. C-mode OCT imaging of biological tissue is demonstrated.

W3A.115

**Characterizations of Erythrocytes from Individuals with Sickle Cell Diseases and Malaria Infection in Tanzania Using a Portable Quantitative Phase Imaging Unit**, Jae-hwang Jung\(^1\), Lucas E. Matemba\(^2\), KyeoReh Lee\(^1\), Paul Kazyoba\(^3\), Jonghee Yoon\(^1\), Julius J. Massaga\(^2\), Kyohyun Kim\(^1\), Dong-Jin Kim\(^3\), YongKeun Park\(^1\); \(^1\)KAIST, Korea; \(^2\)National Inst. for Medical Research, Tanzania, United Republic of; \(^3\)Nelson Mandela African Institution of Science and Technology, Tanzania, United Republic of. We demonstrate characterization of the red blood cells obtained from individuals with sickle cell disease and with malaria infection using quantitative phase
imaging. Morphological, biochemical, and biophysical properties of individual red blood cells are investigated.

**W3A.116**

**Multiscale photoacoustic visualization of the cardio-cerebrovascular development in the embryonic zebrafish**, Qian Chen¹, Lei Xi¹; ¹UESTC, China. In this study, we applied multiscale optical resolution photoacoustic microscopy (ORPAM) to image the whole-body vasculature of the embryonic zebrafish with a special focus on the development of the cardio-cerebrovascular system.

**W3A.117**

**Photoacoustic Elasticity Imaging for Soft Tissue-mimicking Phantom**, Naizhang Feng¹, Ying Fu¹, Tong Wang¹, Mingjian Sun¹; ¹Harbin Inst. of Technology at Weihai, China. Photoacoustic elasticity imaging for soft tissue-mimicking phantom is proposed, based on laser-generated shear wave. It generates high frequency shear wave for high-resolution imaging and has potential to achieve non-contact testing by integrating with optical detection.

**W3A.118**

**A Fast Sparse Sampling Photoacoustic Microscopy System**, Mingjian Sun¹, Guanji Leng¹, Ying Fu¹, Yang Liu¹, Keke Yang¹, Xiangwei Lin¹, Naizhang Feng¹; ¹Harbin Inst. of Technology at Weihai, China. Traditional full-sampling mode cannot meet the experimental requirements since long time-consuming. Based on the sparseness of photoacoustic images, present study establish a fast sparse sampling photoacoustic microscope system for saving time and rebuilding good images.

**W3A.119**

**New Technique to Compensate Dispersion of OCT Imaging**, Wenxin Zhang¹, Xiao Zhang¹, Chengming Wang¹, Wenchao Liao¹, Shengnan Ai¹, Zhangkai Peng¹, Ping Xue¹; ¹Tsinghua Univ., China. A novel transformation for dispersion compensation utilizing the conjugate function of the signal itself is proposed. Its ability to compensate dispersion in biological sample and obtain the sample’s group-velocity and third order dispersion is also demonstrated.

**W3A.120**

**Hybrid photoacoustic and ultrasound imaging of tongue cancer**, Heng Guo¹, Lei Xi¹; ¹U. of Electr. Sci. and Tech. of China, China. Tongue cancer is an increasingly common disease. We proposed a dual-modality photoacoustic and ultrasound imaging technique to simultaneously map the functional and structural information for early-stage tongue cancer detection.
W3A.121
Measuring Structural, Chemical, and Biomechanical Properties of Live Amphibian Erythrocytes Using Optical Diffraction Tomography, SeongYeon Youn$^2$, EuiTae Lee$^2$, Daeheon Kwon$^2$, Jonghun Shin$^2$, Yoonsil Lee$^2$, Geon Kim$^1$, Moosung Lee$^1$, YongKeun Park$^1$; $^1$KAIST, Korea; $^2$Daejeon Science High School for the Gifted, Korea. We present optical characterizations of live amphibian erythrocytes by utilizing quantitative phase imaging. Without any labeling or preparation procedures, 3-D refractive index tomogram and 2-D phase delay of amphibian erythrocyte were measured using Mach-Zehnder interferometry.

W3A.122
Optical transparency windows for head tissues in near and short-wave infrared regions, Sergii Golovynskyi$^1$, Iuliiia Golovynska$^1$, Ludmila Stepanova$^2$, Oleksandr Datsenko$^2$, Junle Qu$^1$, Tymish Y.Ohulchanskyy$^1$; $^1$Shenzhen Univ., China; $^2$Taras Shevchenko National Univ. of Kyiv, Ukraine. The optical permeability of rat head tissues, such as brain cortex, cranial bone and skin has been determined in the visible, near-infrared and short-wave infrared regions, aiming towards the trough-skull brain imaging.

W3A.123
Visualize the morphology of tissue blocks with hematoxylin and eosin staining, Yawu Li$^1$; $^1$Huazhong Univ. of Science and Techn, China. In this work, we use hematoxylin and eosin method to stain whole mount tissues and then to acquire the morphological information with 3D imaging system; this would be helpful to study tumor growth and metastasis.

W3A.124
Label-free Structural Characterizations of Pinus Pollen Grains Using Optical Diffraction Tomography, Geon Kim$^1$, YongKeun Park$^1$; $^1$KAIST, Korea. We present a label-free structural characterization of individual pollen grains from trees of genus Pinus using quantitative phase imaging. 3-D refractive index distribution in single pollen grain was measured using optical diffraction tomography.

W3A.125
Fast transversal flow vector resolving with high spatial resolution reachable using speckle decorrelation optical coherence tomography, Lei Fu$^1$, Wenping Li$^1$, Ya Su$^1$, Yimin Wang$^1$, Lei Chen$^3$, Hongjie Wang$^3$, X. Steve Yao$^{1,2}$; $^1$Photonics Information Innovation Center, China; $^2$General Photonics Corporation, USA; $^3$Affiliated Hospital, Hebei Univ., China. We present a tri-scan method which can resolve the transversal flow vector by speckledecorrelation OCT.
High spatial resolution can be reached by using the data set within a specific portion of the scan range.

W3A.126

Two-photon Small Molecular Enzymatic Probes, Lin Li¹; Nanjing TECH Univ., China. Two-photon Small Molecular Enzymatic Probes (TSMEPs) have helped to uncover new biological roles and functions of a series of enzymes, therefore we hope to encourage more TSMEPs to be developed for diverse enzymes.

W3A.127

High-resolution imaging immunofluorescence-labeled large-volume brain tissues, Yadong Gang¹, Xiaojun Wang¹, Ruixi Chen¹, Fangfang Yin¹, Xiuli Liu¹, Zheng-bo Wang², Xin-tian Hu², Shaqun Zeng¹; Wuhan National Laboratory for Optoelectronics, China; Key Laboratory of Animal Models and Human Disease Mechanisms of Chinese Academy of Sciences and Yunnan Province, China. We combined large sample resin embedding with immunofluorescence staining to acquire biomolecules profiles with high spatial-resolution. After evaluating the compatibility of this method and filtering embedding resin, we achieved to high-resolution image immunolabeled large-volume tissues.

W3A.128

Cell-permeable organic fluorescent probes for live-cell long-term super-resolution imaging reveal lysosome-mitochondrion interactions, Yubing Han³², Meihua Li¹², Fengwu Qiu¹², Meng Zhang¹², Yuhui Zhang¹²; Britton Chance Center for Biomedical Photonics, Huazhong Univ. of Science and Technology-Wuhan National Laboratory for Optoelectronics, China; MoE Key Laboratory for Biomedical Photonics, Department of Biomedical Engineering, Huazhong Univ. of Science and Technology, China. Two kinds of cell-permeable organic fluorescent probes with high photostability were developed for lysosomes and mitochondria. With these probes, we first observed dynamic physical lysosome-mitochondrion interactions for over 13 min in live-cell dual-color super-resolution imaging.

W3A.129

A reduced graphene oxide-based fluorescence resonance energy transfer sensor for highly sensitive detection of trypsin, Jianshu Xu¹, Yating Lin¹, Ya Hu¹, Shusen Xie¹, Juqiang Lin¹; Fujian Normal Univ., China. Reduced graphene oxide is utilized as a FRET probe acceptor to quench the fluorescent donor emission. Compared with control group, the fluorescence intensity increased 6.59 times, indicating the probe is promising for detecting trypsin activity.
W3A.130
Quenching effects of (-)-epigallocatechin-3-gallate for triplet photosensitizer and singlet oxygen during photosensitization, Xianglian Liao¹, Huiyun Lin¹, Buhong Li¹; ¹Fujian Normal Univ., China. Time and spectral resolved singlet oxygen (¹O₂) luminescence was detected to elucidate quenching effects of (-)-epigallocatechin-3-gallate (EGCG) for triplet photosensitizer and ¹O₂ during photosensitization. The data indicate that EGCG could efficiently quench triplet photosensitizer and ¹O₂.

W3A.131
Delivery of Peptide Antigen with Lipid-based Fluorescent-trackable Nanoparticles in Vivo for Cancer Immunotherapy, Sha Qiao¹, Yuan Qian¹, Zhihong Zhang¹; ¹Huazhong Univ. of Science & Technology, China. Dendritic cells (DCs) play important roles in cancer immunotherapy. Recently, we developed a lipid-based fluorescent-trackable nanoparticle which could target and deliver antigen peptides and adjuvants to DCs simultaneously and achieved promising effects of cancer immunotherapy.

W3A.132
CT/FMT dual-model imaging of breast cancer based on peptide-lipid nanoparticles, Guoqiang Xu¹², Qiaoya Lin¹², Zhihong Zhang¹²; ¹²Collaborative Innovation Center for Biomedical Engineering, Wuhan National Laboratory for Optoelectronics-Huazhong Univ. of Science and Technology, China; ²Britton Chance Center and MOE Key Laboratory for Biomedical Photonics, School of Engineering Sciences, Huazhong Univ. of Science and Technology, China. Here, we developed a breast cancer-targeting nanoparticle for dual-modality imaging based on incorporation of CT contrast agents (iodinated oil) and far-infrared fluorescent dyes (DiR-BOA) into core of nanoparticles, and obtained FMT and CT signals simultaneously.

W3A.133
Edge Recognition on Terahertz Pulse Images of Cutaneous Malignant Melanoma, Sun Ping¹; ¹Beijing Normal Univ., China. Terahertz pulse imaging of cutaneous malignant melanoma was carried out across a frequency range of 0.2–1.4 THz. The areas of normal and cancerous tissues were determined using multi-scale, multi-azimuth and multi-structural element mathematical morphology.

W3A.134
Hybrid EEG-fNIRS Based BCI for Rehabilitation, Yuan L. Zhu¹, Pengcheng Li¹; ¹HUST, China. We aim at design a motor-magyery based brain-computer interface (BCI) using functional near-infrared spectroscopy (fNIRS) and electroencephalography (EEG) for rehabilitation. We use
the common spatial pattern (CSP) to extract features which are then classified with the support vector machine (SVM).

**W3A.135**

**Graphene Based Optical Differential Detection for Photoacoustic Imaging**, Chonglei Zhang, Fan Yang, Wei Song, Hui Fang, Changjun Min, Xiaocong Yuan*. *Shenzhen Univ., China*. Photoacoustic signals cause a slight change in the refractive index of the medium, which can be detected based on the absorption difference of the multilayer graphene film exerting on p and s polarized light beams.

**A101-102**

15:40 -- 17:30

**W4A • Neurophotonics**

*Presider: Chris Xu; Cornell Univ., USA and Shaoqun Zeng; Huazhong Univ. of Science & Technology, China*

**W4A.1 • 15:40 (Keynote)**

*Photonics for the study of neurons: from synaptic plasticity to network dynamics*, Guoqiang Bi1; 1Univ. of Science and Technology of China, China. Fluorescence imaging and other photonic methods are used to reveal how mitochondrial activity underlies the conversion from short-term to long-term synaptic plasticity and how reverberatory activity emerges in neuronal networks through synaptic plasticity.

**W4A.2 • 16:10 (Invited)**

*DMD-based two-photon random-access imaging and optical stimulation for neuroimaging applications*, Shih-Chi Chen1; 1The Chinese Univ. of Hong Kong, Hong Kong. I will present our recent work on femtosecond laser manipulation based on digital micromirror devices (DMD) and binary holography; and its applications in developing the next-generation two-photon excitation (TPE) microscopes.

**W4A.3 • 16:30 (Invited)**

*Fast High-resolution Miniature Two-photon Microscopy for Brain Imaging in Freely-behaving Mice at the Single-spine Level*, Liangyi Chen1; 1Inst of Molecular Medicine, Peking Univ., China. We have designed a fast, high-resolution, miniaturized two-photon microscope. Weighting 2.15 g, it is capable of imaging at high spatiotemporal resolution (0.64 μm laterally and 3.35 μm axially, 40 Hz at 256 × 256 pixels).
Fast Volumetric Imaging Methods for Whole Brain Imaging in Larval Zebrafish, Lin Cong\textsuperscript{1}, Zeguan Wang\textsuperscript{3}, Wei Hang\textsuperscript{1}, Zhenkun Zhang\textsuperscript{1}, Chunfeng Shang\textsuperscript{1}, Lu Bai\textsuperscript{1}, Jiulin Du\textsuperscript{1,3}, Kai Wang\textsuperscript{1,2}; \textsuperscript{1}Inst. of Neuroscience, State Key Laboratory of Neuroscience, CAS Center for Excellence in Brain Science and Intelligence Technology, Chinese Academy of Sciences, China; \textsuperscript{2}Univ. of Chinese Academy of Sciences, China; \textsuperscript{3}Univ. of Science and Technology of China, China. We developed a new type of light field microscope with extended field-of-view. We achieved whole larval zebrafish brain imaging at near single cell resolution and at 90 Hz volume rate. We demonstrated its applications in functional imaging of neural dynamics and fast imaging of circulating blood cells in larval zebrafish brain.

Multi-modal Optical Imaging of Cortical Spreading Depression, Pengcheng Li\textsuperscript{1}; \textsuperscript{1}Huazhong Univ of Science and Technology, China. Cortical spreading depression (CSD) is related to brain diseases such as cerebral ischemia, migraine and brain injury. Multi-modal optical imaging methods were employed to investigate the physiology of CSD to help understanding its underlying mechanism for brain disfunction.

Integrating Intelligent Materials into Organ on a Chip System, Zhongze Gu\textsuperscript{1}; \textsuperscript{1}Southeast Univ., China. We have developed several kinds of organ-on-chips, organ-on-liquid-phase barcodes chips, liver on a chip, three-dimensional vascularized tissue on a chip, tumor on a chip, neuromuscular junction on a chip, kidney on a chip, heart on a chip, etc.

Optical Trapping of Nanoparticles: New Opportunities in Nanoscale Sensors, Peter Reece\textsuperscript{1}; \textsuperscript{1}Univ. of NewSouth Wales, Australia. Combining nanotechnology with optical trapping offers new possibilities for developing photonic force probes and nanoscale sensors with engineered functionality that target specific types of physical, biological and chemical interactions. In addition, nanoparticles provide interaction volumes that are many times smaller than their microscopic counterparts, thereby potentially creating much higher resolutions for
sensing in a variety of confined complex environments.

**W4B.3 • 16:40 (Invited)**

**Monitoring Circulating Tumor Cells by In-vivo Photoacoustic Flow Cytometry**, Xunbin Wei; Med-X Res. Inst, Shanghai Jiao Tong Univ, China. An in vivo photoacoustic flow cytometer (PAFC) is used to monitor circulating tumor cells. The counting of circulating tumor cells provides insights in cancer metastasis. It is useful to understand the molecular mechanisms of tumor metastasis.

**W4B.4 • 17:00 (Invited)**

**Laser-induced generation of singlet oxygen: new strategies in the treatment of brain tumor**, Oxana Semyakhkina-Glushkovskaya, Ekaterina Borisova, Sergei Sokolovski, Alexander Shirokov, Nikita Navolokin, Natalia Shushunova, Alexander Khorovodov, Maria Ulanova, Madina Sagatova, Ilana Agranivich, Anastasiya Bodrova, Maria Dvoryatkina, Edik Rafailov, Valery V. Tuchin, Interdisciplinary Center of Critical Technologies in Medicine, Saratov State Univ., Russian Federation; Inst. of Electronics, Bulgarian Academy of Sciences, Bulgaria; Optoelectronics and Biomedical Photonics Group, Aston Univ., UK; Inst. of Bioorganic Chemistry, Russian Academy of Sciences, Russian Federation; Saratov State Medical Univ., Russian Federation; Interdisciplinary Center of Critical Technologies in Medicine, Saratov State Univ., Russian Federation; Interdisciplinary Laboratory of Biophotonics, National Research Tomsk State Univ., Russian Federation. Here we show the photodynamics (PD)-induced opening of the blood-brain barrier in dependence on different light doses and concentrations of photosensitizer that is important for correction of PD-related fluorescence guided resection of brain tumor

**W4B.5 • 17:20 (Invited)**

**Deep Tissue Two-photon Microscopy with Local structure illumination**, Ke Si; Zhenjiang Univ., China. A high-resolution two-photon microscopy deep into the scattering medium is reported, by structure illuminating the sample in the focal volume and demodulating the fluorescent signal thereafter.
Thursday, 28 September

A101-102

08:30 -- 09:50

T1A • Novel Techniques for Bioimaging I

*Presider: Tongsheng Chen; South China Normal Univ., China and Pengcheng Li; Huazhong Univ. of Science & Technology, China*

T1A.1 • 08:30 (Invited)

Fluorescence lifetime imaging and its applications in cellular microenvironment measurement and auxiliary diagnosis, Junle Qu\(^1\); \(^1\)Shenzhen Univ., China. FLIM can be used to measure intracellular viscosity, analyze cellular differentiation and apoptosis, and monitor macromolecule dynamic changes in the nucleus as well as aid diagnosis of H&E-stained pathological sections.

T1A.2 • 08:50 (Invited)

FRET Based Probe for the Detection of NO in Tumor Environment, Yueqing Gu\(^1\), Han Wang\(^1\); \(^1\)China Pharmaceutical Univ., China. The nanosystem consists of the amphiphilic polymer PAAO, UCNPs and RhBs. The RhBs can absorb the 540nm light of UCNPs emission with the existence of NO could realize real-time monitoring of the treatment process.

T1A.3 • 09:10 (Invited)

Quantitative Image Analysis of Multiphoton Microscopy in the Application to Brain Imaging, Shu Wang\(^1\), Xiuxiang Chen\(^2\), Weilin Wu\(^1\), Zhida Chen\(^1\), Huiping Du\(^1\), Xingfu Wang\(^3\), Yu V. Fu\(^2\), Liwen Hu\(^3\), Jianxin Chen\(^1\); \(^1\)Fujian Normal Univ., China; \(^2\)Chinese Academy of Sciences, China; \(^3\)Fujian Medical Univ., China. Quantitative image analysis methods were developed. A combination of multiphoton microscopy and image analysis methods established a visualized approach for identification of brain structure and boundary between normal and cancerous tissues.

T1A.4 • 09:30 (Invited)

GRIN Lens Based High Speed Confocal System for Deep Brain Calcium Imaging, Ling Fu\(^1\); \(^1\)Huazhong Univ. of Science and Technology, China. We developed a gradient index lens (GRIN lens) based high speed confocal system to detect the calcium signal efficiently with single cell resolution for deep brain.
T1B • Immunophotonics and Analytical Biophotonics

Presider: Sune R. Svanberg; South China Normal Univ., China and Buhong Li; Fujian Normal Univ., China

T1B.1 • 08:30 (Invited)
Immunophotonics-based therapy for Metastatic Cancers, Wei R. Chen¹; ¹Univ Central Oklahoma, USA. An immunophotonics-based novel therapy was developed for the treatment of metastatic cancers. It uses the combination of local laser irradiation and immunological stimulation through administration of immunoadjuvants.

T1B.2 • 08:50 (Invited)
Actin Cytoskeletal Remodeling in the Regulation of Glucose Homeostasis, Man Shrestha¹, Chun-Yan Lim¹, Weiping Han¹; ¹Singapore Bioimaging Consortium, Singapore. Glucose transporter 4 (GLUT4) is a key regulator of systemic glucose homeostasis. We recently showed that GLUT4 translocation is regulated by actin remodeling triggered by insulin signaling. Here we present that AMPK-mediated phosphorylation of an actin-capping protein is required for GLUT4 exocytosis and glucose uptake in muscle cells.

T1B.3 • 09:10 (Invited)
In vivo optical imaging of anti-tumor immune response, Zhihong Zhang¹, Shuhong Qi¹, Fei Yang¹; ¹Huazhong Univ. of Science & Technol, China. In vivo optical spatio-temporal imaging of the tumor microenvironment is useful to explain how tumor immunotherapies work. Here, we try to use this technology to answer two important questions about tumor immune response in vivo.

T1B.4 • 09:30 (Invited)
Smart Nanomaterials for Synergistically Enhancing Photodynamic Therapy Efficiency, Xiaolong Liu¹; ¹Mengchao Hepatobiliary Hospital, Fujian Medical Univ., China. Taken together, here described nanoplatform with tumor cell specific responsive properties and programmable PDT/PTT/chemotherapy functions, might be an interesting synergistic strategy for HCC treatment.
**T1C.1 • 08:30**  
**Multiplex and ultrasensitive bioassays based nanophotonic materials**, Xiangwei Zhao\(^1\); \(^1\)Southeast Univ., China. We proposed to use plasmonic nanotags and photonic crystal materials for multiplex detection of proteins in a wide concentration range from fg mL\(^{-1}\) to sub mg mL\(^{-1}\), which has wide applications in precision medicine.

**T1C.2 • 08:50**  
**High-power Homogeneous Illumination for Super-resolution Localization Microscopy with Large Field-of-view**, Zhen-Li Huang\(^1\); \(^1\)Wuhan National Lab for Optoelectronics, China. Super-resolution localization microscopy with large field-of-view has not been achieved due to the lack of high-power homogeneous illumination. Here we report our efforts to achieve the largest reported field-of-view with homogeneous spatial resolution.

**T1C.3 • 09:10 Postdeadline Submission**  
**Imaging subcellular structures for biomedical applications**, Fu-Gen Wu\(^1\); \(^1\)Southeast Univ., China. In this talk, I will introduce our very recent advancements of using a variety of molecular- or nanoparticle-based fluorescent probes for visualizing subcellular structures such as plasma membrane, mitochondria, lysosome, and nucleus.

**T1C.4 • 09:30**  
**Cell-permeable Organic Fluorescent Probes for Live-cell super-resolution Imaging**, Yubing Han\(^1\), Meihua Li\(^1\), Meng Zhang\(^1\), Yuhui Zhang\(^1\); \(^1\)Britton Chance Center for Biomedical Photonics, Huazhong Univ. of Science and Technology-Wuhan National Laboratory for Optoelectronics, China. We anticipate that these fluorescent probes and our delivery strategies will be helpful tools for live-cell super-resolution imaging and substantially benefit characterizations of dynamic physical interactions between intracellular organelles in living cells.
Nonlinear Vibrational Spectroscopy for Probing Biological Interfaces, Xiaolin Lu\textsuperscript{1}; \textsuperscript{1}Southeast Univ., China. Background of a nonlinear optical technique – sum frequency generation (SFG) spectroscopy was introduced first. Examples were presented to demonstrate study of biological interfaces using SFG.

T2C.2 • 10:25
Quantifying the Brain-wide and Regional Distributions of Type-specific Neurons Using Whole-brain Optical Imaging and Stereoscopic Cell Counting, Jing Yuan\textsuperscript{1}; \textsuperscript{1}Wuhan National Lab for Optoelectronics, Huazhong Univ of Science & Technology, China. We propose a stereological analysis platform for quantifying the brain-wide and regional distributions of type-specific neurons in a whole mouse brain using the Brian-wide Position System and NeuroGPS.

T2C.3 • 10:45 Postdeadline
Evaluation of Barcodes Reveals Ligation Biases between the Terminal Bases, Jing Tu\textsuperscript{1}, Na Lu\textsuperscript{1}, Qinyu Ge\textsuperscript{1}, Zuhong Lu\textsuperscript{1}; \textsuperscript{1}Southeast Univ., China. Barcode-independent biases accompany with the application of barcodes in high throughput sequencing. We evaluate two types of barcodes on a sequencing-by-ligation platform. The results suggest that terminal bases of barcodes tend to influence ligation.

T2C.4 • 11:05
Advanced NeuroGPS-Tree achieves brain-wide reconstruction of neuronal population, Tingwei Quan\textsuperscript{1}; \textsuperscript{1}Wuhan National Laboratory for Optoelect, China. Here, we reported a software tool for brain-wide reconstruction of neuronal population. The reconstructions indicated that without loss of the reconstruction accuracy, our tool has about 10 folds speed gain over the commercial software that provides the manual reconstruction.

T2C.5 • 11:25 Postdeadline
Precise measurement of two-photon absorption coefficient of microscale biophotonics materials by femtosecond laser pump-probe, Qiannan Cui\textsuperscript{1}, Chunxiang Xu\textsuperscript{1}, Hui Zhao\textsuperscript{2}; \textsuperscript{1}Southeast Univ., China; \textsuperscript{2}The Univ. of Kansas, USA. We present a new method to spatiotemporally measure two-photon absorption coefficient of microscale biophotonics materials by femtosecond laser pump-probe. Our method is more accurate than Z-scan technique.

T2C.6 • 11:45
Rapid optical clearing method for mouse brain tissues, Tingting Yu\textsuperscript{1}, Yisong Qi\textsuperscript{1}, Jianyi Xu\textsuperscript{1}, Jingtan Zhu\textsuperscript{1}, Yusha Li\textsuperscript{1}, Dan Zhu\textsuperscript{1}; \textsuperscript{1}Wuhan National Lab for Optoelectronics, China. Various
tissue optical clearing techniques have emerged for large-volume imaging. Most of them suffer from long processing time. Here, we introduced rapid clearing methods for thin and thick brain blocks, respectively.

**A101-102**
10:20 -- 12:00
T2A • Novel Techniques for Bioimaging II
*Presider: Junle Qu; Shenzhen Univ., China and Zhihong Zhang; Huazhong Univ. of Science and Technology, China*

**T2A.1 • 10:20**
*Early Diagnosis of Traumatic Intracranial Hematomas*, Baruch Ben Dor¹; ²*Drexel University, USA and InfraScan, Inc., USA*. Timing of the intervention for intracranial hematomas is critical for good outcomes, specifically coupled with suboptimal pre-hospital care. Near Infrared Spectroscopy technology, developed by Britton Chance, offers the first FDA approved pre-hospital diagnosis solution.

**T2A.2 • 10:40 (Invited)**
*Structural and Functional Fourier Domain Optical Coherence Tomography, Technology and Applications*, Zhihua Ding¹; ²*Zhejiang Univ., China*. Optical coherence tomography (OCT) systems with ultralong depth range, ultrawide lateral field, ultrahigh axial resolution, and enhanced contrasts are introduced. Quasi-needle-like focus in OCT and lens-free all-fiber OCT probe are presented. New applications are feasible with these developed OCT systems.

**T2A.3 • 11:00 (Invited)**
*Biological Microlasers Inside Cells and Tissues*, Matjaz Humar¹,²; ¹*J. Stefan Inst., Slovenia; ²Faculty of Mathematics and Physics, Univ. of Ljubljana, Slovenia*. Lasers made out of biological and biocompatible materials have been produced and inserted into cells and tissues. Biological lasers enable tagging of thousands of cells, intracellular sensing, diagnostics and novel imaging methods.

**T2A.4 • 11:20 (Invited)**
*Characterizing Microstructural Features of Breast Carcinoma Tissues in Different Progression Stages by Transformed Mueller Matrix Parameters*, Honghui He¹, Yang Dong¹, Wei Sheng¹, Hui Ma¹; ²*Tsinghua Univ., China*. In this work, we demonstrate that the transformed Mueller matrix parameters and Mueller matrix microscope can be used as tools for quantitative diagnosis of breast ductal carcinoma tissues at different progression stages.
T2A.5 • 11:40 (Invited)
Time-domain Diffuse Optical Tomography of Thyroid Gland, Yoko Hoshi\textsuperscript{1}; \textsuperscript{2}Hamamatsu Univ., Japan. NIRS was originally designed for clinical monitoring, and it has also become a useful tool for neuroimaging studies with the so called functional NIRS (fNIRS). In parallel to these developments, diffuse optical tomography (DOT) using near-infrared (NIR) light has been being developed.

A103
10:20 -- 12:00
T2B • Translational Biophotonics I

Presider: Hui Ma; Tsinghua Univ., China and Sihua Yang; MOE Key Laboratory of Laser Life Science, China

T2B.1 • 10:20 (Invited)
Laser Spectroscopy to Meet some Challenges in Medicine, Katarina Svanberg\textsuperscript{2,1}, Wansha Li\textsuperscript{2}, Ying Li\textsuperscript{2}, Huiying Liu\textsuperscript{2}, Hao Zhang\textsuperscript{2}, Sune R. Svanberg\textsuperscript{2,1}; \textsuperscript{1}Lund Laser Centre, Sweden; \textsuperscript{2}Center for Optical and Electromagnetic Research, South China Academy of Advanced Optoelectronics, South China Normal Univ., China. Laser based spectroscopic techniques can be used in the detection and therapy of many human diseases. Examples will be given from a variety of clinical areas, such as oncology, orthopedics and pediatrics, and also from the field of food safety and antibiotic control.

T2B.2 • 10:40 (Invited)
Laser Spectroscopy applied to Environmental, Ecological, Agricultural and Food Safety Research, Sune R. Svanberg\textsuperscript{2,1}, Zheng Duan\textsuperscript{1}, Wei Fu\textsuperscript{1}, Wansha Li\textsuperscript{2}, Ying Li\textsuperscript{2}, Yiyun Li\textsuperscript{2}, Ming Lian\textsuperscript{2}, Huiying Liu\textsuperscript{1}, Xun Wang\textsuperscript{1}, Hao Zhang\textsuperscript{1}, Guangyu Zhao\textsuperscript{1}, Shiming Zhu\textsuperscript{1}, Katarina Svanberg\textsuperscript{2,1}; \textsuperscript{1}South China Normal Univ., Sweden; \textsuperscript{2}Lund Univ., Sweden. Laser spectroscopy has a multitude of applications of importance to human and eco-system well-being, such as in the environmental, ecological, agricultural and food safety areas. Recent work, mostly from SCNU, will be reviewed.

T2B.3 • 11:00 (Invited)
Towards Optical Bioimaging in Near and Short-wave Infrared Regions: Contrast Agents and Tissue Optical Properties, Tymish Y. Ohulchanskyy\textsuperscript{1,2}; \textsuperscript{1}College of Optoelectronic Engineering, Shenzhen Univ., China; \textsuperscript{2}Institute for Lasers, Photonics and Biophotonics, State Univ. of New York, Univ. at Buffalo, USA. Optical bioimaging probes are developed in conjunction with study of
spectral properties of biological tissues in near infrared (NIR) and short-wave infrared (SWIR) regions (~800-1700 nm). An applicability of some endogenous and exogenous contrast agents for imaging in NIR and SWIR optical transparency windows are assessed.

**T2B.4 • 11:20 (Invited)**

**Spatiotemporal Detection of Singlet Oxygen Luminescence for Photodynamic Therapy**, Buhong Li¹, ²Key Laboratory of OptoElectronic Science and Technology for Medicine of Ministry of Education, Fujian Normal Univ., China. Singlet oxygen is recognized to be the main cytotoxic species generated during photodynamic therapy. In this talk, the emerging strategies for enhanced photosensitized singlet oxygen generation are introduced, and the recent advances in spatiotemporal detection of singlet oxygen luminescence at around 1270 nm are presented.

**T2B.5 • 11:40 (Invited)**

**Ag₂S Quantum Dots for Advanced In Vivo Imaging: Seeing is Believing**, Qiangbin Wang¹; ¹Chinese Academy of Science, China. We have successfully developed a new kind of Ag₂S QDs in the second near-infrared window (900-1700 nm) for in vivo imaging with much deeper tissue penetration and higher spatiotemporal resolution.

**A101-102**

**13:30 -- 14:30**

**T3A • Student Competition**

Presiders: Wei Chen; Univ. of Central Oklahoma, USA and Dan Zhu; Wuhan National Lab for Optoelectronics, China

**A101-102**

**14:30 -- 16:10**

**T4A • Analytical Biophotonics**

Presider: Ling Fu; Huazhong Univ of Science and Technology, China and Tymish Y. Ohulchanskyy; SUNY Buffalo, USA

**T4A.1 • 14:30 (Invited)**

**Focused and controllable optical delivery in complex media using wavefront shaping**, Puxiang Lai¹; ¹Hong Kong Polytechnic Univ., Hong Kong. Achieving noninvasive focused or controlled optical delivery at depths in tissue is challenging due to strong scattering of light. Recent progress on wavefront engineering has opened up new opportunities for this long sought goal.
T4A.2 • 14:50 (Invited)
Towards High Spatial Resolution Imaging Based on Optical Field Engineering, Kebin Shi1; 2Peking Univ., China. In this talk, I will present our recent progresses on deep tissue fluorescence super-resolution and non-labeling chiral sum frequency generation imaging by utilizing optical field engineering mechanism.

T4A.3 • 15:10 (Invited)
Organic Nanodots for Superresolution Optical Imaging, Changfeng Wu1, Zhihe Liu1, Xiaofeng Fang1; 1Southern Univiersity of Science and Technology, China. Organic nanodots exhibit superior brightness and tunable optical properties. This presentation describes the development of small organic nanodots for biological imaging. Stimulated emission depletion (STED) imaging and Superresolution optical fluctuation imaging (SOFI) were demonstrated.

T4A.4 • 15:30 (Invited)
SPEED Microscopy: Fast Single-molecular Tracking and 3D Deconvolution Process, Jiong Ma1; 2Fudan Univ., China. For studying the Nucleocytoplamic transport mechanism, we developed a new methods named single-point edge-excitation sub-diffraction (SPEED) microscopy. SPEED microscopy allows 3D spatial density maps of molecular pathway of the NPC with a spatiotemporal resolution of 9 nm and 400 μs.

T4A.5 • 15:50 (Invited)
Structured Illumination Microscopy for Super-resolution Live Cell Imaging, Dong Li1; 1Inst. of Biophysics, CAS, China. Structured illumination microscopy excels at live cell super-resolution imaging, since many fewer raw images and much lower light levels are required. We will report the latest advances in its spatiotemporal resolution, imaging duration, and hyper-spectrum.
technology development pursued in our lab towards clinical translations.

T4B.2 • 14:50 (Invited)
All-optical photoacoustic microscopy for biomedical applications, Sihua Yang\textsuperscript{1}; \textsuperscript{1}MOE Key Laboratory of Laser Life Science, China. All-optical photoacoustic microscopy for biomedical applications

T4B.3 • 15:10 (Invited)
Photoacoustic Imaging Guide Efficiently Tumor Therapy by Microbubble Explosion Induced by Ultrasonication, Liming Nie\textsuperscript{1}, Honghui Li\textsuperscript{1}, Zhiyou Wu\textsuperscript{1}; \textsuperscript{1}Xiamen Univ., China. We encapsulated photosensitizers in the microbubble, allowing synergistic physical burst therapy and photodynamic therapy. The results showed that the bubble explosion could bring mechanical impacts by its transient burst wave and improve the treatment.

T4B.4 • 15:30 (Invited)
Dual-phase Stimulated Raman Scattering Microscopy for Rapid, Label-free Histology, Minbiao Ji\textsuperscript{1}, Lili Zhang\textsuperscript{1}; \textsuperscript{1}Fudan Univ., China. We developed dual-phase SRS.

T4B.5 • 15:50 (Invited)
Modeling Methods Applied in Micro Lens System, Hua Liu\textsuperscript{1}; \textsuperscript{1}AVIC, China. Micro lens are developing the methodology in advanced multiple configuration systems. The effect of system evaluated criterion that MTF, REA, and RMS can support our issue qualitatively. Results showed that can not only change systems weight, size and structural stability, but also increase freedom in design.

A101-102
16:20 -- 17:20
T5A • Plenary Session III
Presider: Qingming Luo; Huazhong Univ. of Science and Technology, China

T5A.1 • 16:20 (Plenary)
Photoacoustic Tomography: Omniscale Imaging from Organelles to Patient, Lihong V. Wang\textsuperscript{1}; \textsuperscript{1}California Inst. of Technology, USA. Photoacoustic tomography provides in vivo multiscale functional, metabolic, molecular, and histologic imaging across the scales of organelles through organisms with consistent contrast. Penetration and resolution have reached 7 cm and 90 nm with trade-offs, respectively.
Plenary Speech
(In alphabetical order by first name)

Irene Georgakoudi
Tufts University, USA
Email: Irene.Georgakoudi@tufts.edu

Biography: Irene Georgakoudi studied physics at Dartmouth College, and received her PhD in Biophysics at the University of Rochester. Following postdoctoral work at the MIT Spectroscopy Laboratory and the Wellman Laboratories for Photomedicine at Massachusetts General Hospital, she joined the Department of Biomedical Engineering at Tufts University, where she is currently a full professor. She teaches and performs research focused on the use of optical, non-invasive methods to characterize the morphology and function of biological specimens, from the subcellular to the human tissue level. Her aim is to develop such methods to improve the detection and treatment of a number of conditions, including cancer, diabetes, obesity, cardiovascular and neurodegenerative diseases. Her research has been supported by NIH, NSF and the American Cancer Society. She has over one hundred peer reviewed publications and patents in the area of biomedical optics. She currently serves on the editorial board of Optica and she has been involved in the organization of numerous national and international conferences. She is a senior member of SPIE, and a fellow of the American Institute for Medical and Biological Engineering and of the Optical Society of America.
Biography: Dr. Qingming Luo is the Vice-President of Huazhong University of Science and Technology and Executive Deputy Director of Wuhan National Laboratory for Optoelectronics. He is an elected Fellow of The American Institute for Medical and Biological Engineering (AIMBE), The International Society for Optics and Photonics (SPIE), The Institution of Engineering and Technology (IET) and The Optical Society (OSA). His research interests focus primarily on multi-scale optical bioimaging and cross-level information integration. Since 1996, he has been devoted to new techniques and novel applications in life sciences, including laser speckle imaging (LSI) and combination with optical intrinsic signal imaging (ISI), small animal imaging of fluorescence diffusion optical tomography (fDOT) coregistered with micro-CT, micro-optical sectioning tomography (MOST), and functional near infrared (NIR) imaging. He is currently leading the project Visible Brainwide Networks at single-neuron resolution and the Chief Scientist of National Major Scientific Instruments & Equipment’s Development Project “Instrument Development and Application Demonstration of the Micro-Optical Sectioning Tomography System”. He created “the most detailed three-dimensional map of all the connections between the neurons in a complete mouse brain” and “demonstrated the first long-range tracing of individual axons in the mouse brain”. He is also the chief scientist of the project Novel Technologies and Methods of Optical Molecular Imaging for Protein Function in vivo supported by National Basic Research Program of China, which aims to develop a series of novel technologies and methods of optical molecular imaging, such as the high-resolution fast microscopy for simultaneously monitoring the molecular events of multiple proteins, multi-scale optical imaging for protein function, cross-level integration and visualization of the related information of the protein function. Dr. Luo holds 60 patents and has co-authored more than 200 papers in peer-reviewed journal, including Science, Nature Cell Biology, Nature Communications, PNAS, Optics Letters, Optics Express and Journal of Biomedical Optics, with an h-index of 45 according to Google Scholars. He won the Cheung Kong Professorship of Ministry of Education of China in 1999, the National Science Fund for Distinguished Young Scholars in 2000, the second place prize in State Natural Sciences Award in 2010, China’s Top Ten Major Scientific Progress, and the second-place prize in State Technological Invention Award in 2014.
Brian Pogue
Dartmouth College, USA
Email: brian.w.pogue@Dartmouth.edu

Biography: Brian Pogue is Professor of Engineering, Physics and Surgery at Dartmouth College, having a PhD in Nuclear/Medical Physics from McMaster University, Canada, and completing a post-doctoral fellowship at the Harvard Medical School in 1995. At Dartmouth since 1996, he served as Dean of Graduate Studies at Dartmouth 2008-2012, and currently is Director of MS & PhD Programs at the Engineering School, and leads the Center for Imaging Medicine at the Dartmouth-Hitchcock Medical Center. His work is focused on optical imaging systems for surgery and radiation therapy guidance, in which he has published 300+ peer-reviewed and 400+ conference papers. This work is funded by the National Institutes of Health (NCI & NIBIB) as well as the Department of Defense Breast Cancer Research Program. Dr Pogue is on editorial boards for Physics in Medicine & Biology, Medical Physics, Journal of Biomedical Optics, and Breast Cancer Research, and is an elected Fellow of the Optical Society of America (OSA) and the American Institute of Medical and Biological Engineers (AIMBE).
Biography: Lihong Wang is Bren Professor of Medical and Electrical Engineering at California Institute of Technology. His book entitled “Biomedical Optics: Principles and Imaging” won the Goodman Book Writing Award. He has published 470 peer-reviewed journal articles and delivered 460 invited talks. His Google Scholar h-index and citations have reached 114 and 53,000, respectively. His laboratory was the first to report functional photoacoustic tomography, 3D photoacoustic microscopy, photoacoustic endoscopy, photoacoustic reporter gene imaging, the photoacoustic Doppler effect, the universal photoacoustic reconstruction algorithm, and CUP. He is the Editor-in-Chief of the Journal of Biomedical Optics. He received NIH Director’s Pioneer and NIH Director’s Transformative Research awards. He also received the OSA C.E.K. Mees Medal, IEEE Technical Achievement Award, IEEE Biomedical Engineering Award, SPIE Britton Chance Biomedical Optics Award, and Senior Prize of the International Photoacoustic and Photothermal Association. An honorary doctorate was conferred on him by Lund University, Sweden.
Biography: Chris Xu is Professor of Applied and Engineering Physics, Cornell University, the Mong Family Foundation director, Cornell Neurotech, and the director of Cornell NeuroNex Hub. Prior to Cornell, he was a member of technical staff at Bell Laboratories. He received his Ph.D. in Applied Physics from Cornell University. His current research areas are biomedical imaging and fiber optics. His research is supported by major grants from NIH, NSF, DARPA, and IARPA. Dr. Xu has chaired or served on numerous conference organization committees and NSF/NIH review panels. He has published more than 110 journal papers (including 7 invited review articles) and 8 book chapters. He has 32 patents granted or pending. He has won the NSF CAREER award, Bell Labs team research award, and the Tau Beta Pi and two other teaching awards from Cornell Engineering College. He is a fellow of the Optical Society of America, and a fellow of the National Academy of Inventors.
**Biography:** Arjun Yodh is the James M. Skinner Professor of Science in the Department of Physics and Astronomy at the University of Pennsylvania. At Penn, he is also Director of The Laboratory for Research on the Structure of Matter (LRSM) and its NSF-supported Materials Science and Engineering Center (MRSEC). Yodh has published over 300 papers (h-index, 94) about research that spans the fields of Biomedical Optics, Condensed Matter Physics, and Atomic, Molecular & Optical Sciences. His biomedical research is oriented towards diffuse optical imaging and monitoring of brain, breast, and muscle, and for monitoring hemodynamic biomarkers during therapy.
Keynote Speech
(In alphabetical order by first name)

Guoqiang Bi
University of Science and Technology of China, China
Email: gqbi@ustc.edu.cn

Biography: Guo-Qiang Bi received his B.S. in physics from Peking University (1989) and Ph.D. in biophysics from UC Berkeley (1996). After postdoctoral research at UCSD (1996-2000), he was Assistant Professor and promoted to Associate Professor with tenure at the Department of Neurobiology, University of Pittsburgh (2000-2008). In 2007, he established the Laboratory of Neurophysics at USTC, where he is Xinchuang Professor and Changjiang Scholar, Chair of the Department of Neurobiology and Biophysics, and founding co-Director of the Center for Integrative Imaging. His research focuses on understanding the structure and function of neuronal synapses and circuits, with new imaging tools.
Biography: Zhongze Gu graduated from Southeast University (China) in 1989 and got his M.S. in 1992 there. He went to The University of Tokyo (Japan) in 1994 and obtained his Ph.D. in 1998. Since then, he had been working as a researcher at the Kanagawa Academy of Science and Technology. He then began a project to study the opal photonic crystals and made a lot of excellent work in this field. Since 2003, he began to work at Southeast University as a professor Cheung Kong Scholars of Biomedical Science and Medical Engineering. Now he is the dean of School of Biological Science and Medical Engineering, the director of Institute of Biomaterials and Medical Devices of Jiangsu Industrial Technology Research Institute. His researches related to bio-inspired intelligent materials, photonic crystal, biosensor and bioelectronics. He has published more than two hundred research papers in international journals and applied more than 70 related patents.
Biography: Dr. Peter Reece is a senior lecturer in the School of Physics at the University of New South Wales, Sydney Australia. He completed his PhD in 2005, working in the area of Silicon Photonics followed by a three-year postdoctoral position working in the field of Optical Trapping and Micromanipulation at the University of St Andrews in the group of Kishan Dholakia. He returned to Australia in 2008 as a UNSW Vice Chancellor’s Postdoctoral Fellow. He currently runs the Photonics and Optoelectronics Group and has research activities in a broad range of fields from photovoltaics to biosensing. In the area of Optical Tweezers he has worked mainly on optical trapping of nanoscale objects and associated instrumentation development. He has been the co-Chair of the OSA Conference on Optical Trapping Applications since 2015-2017.
**Invited Speech**

(In alphabetical order by first name)

Jianxin Chen  
Fujian Normal University, China  
Email: chenjianxin@fjnu.edu.cn

**Biography:** Jianxin Chen received her Ph. D in 2002 from Harbin Institute of Technology (China) and completed postdoctoral studies from Peking University (China). She is Professor of College of Photonic and Electronic Engineering, Fujian Normal University and director of Fujian Provincial Key Laboratory for Photonics Technology. She was a Visiting Professor at Cornell University from 2014 to 2015. She also worked as a Visiting Professor at Yale University from 2010 to 2011. In 2008, she was a Visiting Scholar at BC Cancer Research Centre of Canada for half of year. She has authored or coauthored more than 100 papers in the international journals. Her research interests focus on application of multiphoton microscopy in diagnosis and therapy of early cancer.
Biography: Liangyi Chen, Ph.D., Tenured Investigator, Institute of Molecular Medicine, Peking University. Dr. Chen received his Bachelor degree in Xi’an JiaoTong University (1995), and Ph.D. degree in Huazhong University of Science and Technology (2001). After finishing his postdoc training in Department of Physiology and Biophysics in University of Washington (2001-2003), Dr. Chen went back to join Institute of Biophysics, Chinese Academy of Sciences as an associated investigator. In 2010, Dr. Chen moved to Institute of Molecular Medicine, Peking University and is now a tenured principal investigator here. His current research interests are focused on development of novel high spatiotemporal fluorescence imaging techniques for in vivo studies, such as high-resolution miniature two-photon microscopy, two-photon lightsheet microscopy and live cell super-resolution microscopy. His lab also use these new technologies to study the exocytosis-endocytosis coupling in pancreatic β-cells and its correlation with blood glucose regulation and diabetes, using cell lines, Zebrafish and mouse models. All these works have been published on journals like Nature Methods, Dev Cell, Cell Res, Proc Natl Acad Sci USA, Biophys J, Biomed Opt Express, Diabetes and Diabetologia, etc. He has also been served as a senior faculty member in the Neuronal Signaling Mechanisms Section in Faculty of 1000 Biology since 2012, and has been invited to give talks in international conferences hosted by academic societies such as OSA, SPIE and Biophysical Society, etc.
Biography: Prof. Shih-Chi Chen received his B.S. degree in Mechanical Engineering from the National Tsing Hua University, Taiwan, in 1999. He received his S.M. and Ph.D. degrees in Mechanical Engineering from the Massachusetts Institute of Technology, Cambridge, in 2003 and 2007, respectively. Following his graduate work, he entered a post-doctoral fellowship in the Wellman Center for Photomedicine, Harvard Medical School, where his research focused on biomedical optics and endomicroscopy. From 2009 to 2011, he was a Senior Scientist at Nano Terra, Inc., a start-up company founded by Prof. George Whitesides at Harvard University, to develop precision instruments for novel nanofabrication processes. Joining since 2011, he is presently an Associate Professor in the Department of Mechanical and Automation Engineering and Assistant Dean in the Faculty of Engineering at the Chinese University of Hong Kong. His current research interests include ultrafast laser applications, biomedical optics, precision engineering, and nanomanufacturing. Prof. Chen is a member of the American Society for Precision Engineering (ASPE), American Society of Mechanical Engineers (ASME), SPIE, The Optical Society (OSA), and Institute of Electrical and Electronics Engineers (IEEE). He is the recipient of a 2003 R&D 100 Award for the design of a microscale six-axis nanopositioner.
Wei R. Chen
University of Central Oklahoma, USA
Email: wchen@uco.edu

Biography: Wei R. Chen received his BS in physics from Shandong University in China in 1982, and Ph.D. degree in theoretical high-energy physics from the University of Oregon in 1988. Currently he is Professor of Biomedical Engineering, Director of the Center for Interdisciplinary Biomedical Education and Research, and Dean of the College of Mathematics and Science, at the University of Central Oklahoma, Edmond, Oklahoma, United States. Dr. Chen’s research focuses on cancer treatment. He is the co-inventor (awarded 5 US patents) of the novel treatment method for metastatic cancers – laser immunotherapy (LIT). LIT uses the combination of local laser irradiation and local administration of an immunological stimulant to treat tumors in order to induce systemic anti-tumor immunological responses. LIT could not only destroy treated local tumors but also eliminate untreated distant metastases, as demonstrated in the pre-clinical studies and preliminary clinical trials. With the efforts of Dr. Chen and his collaborators, LIT has been developed from a simple bench-top concept to a potential bedside clinical tool, with extremely promising outcomes in their preliminary clinical trials for melanoma and breast cancer patients. Dr. Chen is also the inventor of immunologically modified carbon nanotubes (awarded 2 US patents) for nanotechnology-based photoimmunotherapy for cancer treatment. Dr. Chen had published more than 130 peer-reviewed articles and more than 160 conference proceeding papers. He has been awarded eight US patents with several pending. As Principal Investigator, Dr. Chen has received more than $6.5 million funding for research and education from federal and state agencies, foundations, as well as from industrial sponsors. Dr. Chen established in 2006 and since then has served as the Chair of the International Conference “Biophotonics and Immune Responses” in Photonics West of SPIE (International Society of Optics and Photonics). He was elected as a SPIE Fellow in 2007. From 2011 to 2015, Dr. Chen served as the Editor-in-Chief of the SCI indexed Journal of X-Ray Science and Technology. Dr. Chen has an outstanding teaching career for more than 30 years. He received the 2008 US Professor of the Year award, the highest national award for excellence in teaching in the United States. He was the recipient of the 2011-2012 US Fulbright Lecturing / Research Award. He was the winner of the Medal for Excellence in Teaching from the Oklahoma Foundation for Excellence, the highest teaching award in the State of Oklahoma. In 2012, Dr. Chen received the international recognition as the recipient of the SPIE Educator Award.
**Biography:** Zhihua Ding is a professor of Optical Engineering and the director of institute of laser biomedicine at Zhejiang University, Hangzhou, China. He received his PhD degree in Optical Engineering from Shanghai institute of optics and fine mechanics (Chinese academy of sciences) in 1996. He was a temporary lecturer at Venture Business Laboratory, Shizuoka University, Japan from November 1998 to April 2000, and a senior postdoctoral fellow at Beckman laser institute, University of California, Irvine, USA from June 2000 to September 2002. He was selected as the New Century Excellent Talent of the Ministry of Education of China in 2004. His research focuses on optical coherence tomography and biomedical applications. He has authored more than 100 journal papers and over 30 patents. He is an editorial member of Journal of Innovative Optical Health Sciences, Frontiers of Optoelectronics, Chinese Journal of Lasers, Journal of Lasers, Optics & Photonics, and an associated editor of Acta Laser Biology.
Ling Fu
Huazhong University of Science and Technology, China
Email: lfu@mail.hust.edu.cn

Biography: Dr. Ling Fu is a professor in Britton Chance Center for Biomedical Photonics in Wuhan National Laboratory for Optoelectronics (WNLO), and the deputy dean for School of Engineering Sciences in Huazhong University of Science and Technology (HUST) in China. Her research aims to develop real-time optical imaging approaches to monitor how molecules work and cells interact in their natural environment. Dr. Ling Fu serves as an assistant editor in Journal of Innovative Optical Health Sciences. Dr. Ling Fu received funding as the New Century Excellent Talents in University in 2008, the Outstanding Young Scholars of National Science Fundation in 2015.
Biography: Dr. Yueqing Gu is currently the professor of biomedical engineering in China Pharmaceutical University. She received her Master and Ph.D degree from Nanjing University of Aeronautics and Astronautics. From 1999 to 2001, she served as a postdoctoral fellow in the Medical School, University of Pennsylvania. After that, she was promoted as research assistant professor in the joint BME program in the University of Texas at Arlington/UT Southwestern Medical Center. Since 2005, she has been working in China Pharmaceutical University. Her research focus is in the molecular imaging and targeted drug delivery system for tumor diagnosis and therapy. She received many research grants from national and provincial funding agents. She has more than 80 publications in different prestigious journals.
Weiping Han
Singapore Bioimaging Consortium, Singapore
Email: weiping_han@sbic.a-star.edu.sg

Biography: Weiping Han obtained his Ph.D. in Physiology from Cornell University in 1996. He did his postdoctoral work at the University of Pittsburgh and HHMI/UT Southwestern Medical Center in Dallas. In 2003, he was promoted to Research Assistant Professor in the Center for Basic Neuroscience at UT Southwestern Medical Center, where he studied molecular mechanisms of hormone secretion and signaling. In 2005, he moved to Singapore to set up a research program in the Laboratory of Metabolic Medicine (LMM) at Singapore Bioimaging Consortium (SBIC). Currently he is Deputy Director of SBIC with concurrent appointment as Head of LMM. He is also Research Director at Institute of Molecular and Cell Biology and Professor in the Program of Cardiovascular and Metabolic Disorders at Duke-NUS Graduate Medical School.
Biography: Honghui He received his PhD in physics from Tsinghua University. He is an assistant professor at the Institute of Optical Imaging and Sensing, Graduate School at Shenzhen, Tsinghua University. He is an author of over 50 scientific articles in optics and biomedical optics journals. His area of expertise includes Mueller matrix polarimetric techniques and their applications in biomedical diagnosis, especially early cancerous tissues detection.
Yoko Hoshi
Hamamatsu University School of Medicine, Japan
Email: yhoshi@hama-med.ac.jp

Biography: Yoko Hoshi, Professor, Department of Biomedical Optics, Institute for Medical Photonics Research, Preeminent Medical Photonics Education & Research Center, Hamamatsu University School of Medicine

Education & Professional Positions
May 1981: M., Akita University School of Medicine
Pediatrician, Department of Pediatrics, Hokkaido University School of Medicine
April 1988: Research Student, Research Institute of Electronic Science, Hokkaido University
March 1990: Ph. D., Hokkaido University School of Medicine
April 1996: Research Fellow, Research Institute of Electronic Science, Hokkaido University
April 2000: Department Head, Department of Psychophysiology, Tokyo Institute of Psychiatry
April 2003: Research Director, Integrated Neuroscience Research Team, Tokyo Institute of Psychiatry
April 2011: Project Leader, Integrated Neuroscience Research Project, Tokyo Metropolitan Institute of Medical Science
April 2015: Professor, Department of Biomedical Optics, Medical Photonics Research Center, Hamamatsu University School of Medicine
January 2016: Professor, Department of Biomedical Optics, Institute for Medical Photonics Research, Preeminent Medical Photonics Education & Research Center, Hamamatsu University School of Medicine

Fields of study
Biomedical Optics, Cognitive Neuroscience, Child Neurology
Matjaz Humar
J. Stefan Institute, University of Ljubljana
Email: Matjaz.humar@ijs.si

Biography: Dr. Matjaž Humar is a researcher at J. Stefan Institute and leader of Laboratory for Bio-integrated photonics. He has been working for three years as a Marie-Curie fellow at Harvard Medical School and Massachusetts General Hospital in Boston, USA. Humar is the co-inventor of world’s first 3D laser and first laser inside a live human cell.
Minbiao Ji
Fudan University, Shanghai, China
Email: minbiaoj@fudan.edu.cn

Biography: Dr. Minbiao Ji received B.S. degree in Physics from the Peking University, Beijing, in 2001. He received his Ph.D degree in Physics at Stanford University, in 2011. His research was focused on using ultrafast laser spectroscopy to study various chemical dynamics, including hydrogen-bond dynamics in water, and transient dynamics of carriers and enzyme molecules. Afterwards, he joined the research group of Prof. Sunney Xie at Harvard University as a postdoctoral research fellow, where he learnt the technique of coherent Raman scattering microscopy and applied it to various biomedical researches. Minbiao Ji is currently a Professor in the Department of Physics in Fudan University, Shanghai, where he won the “Thousand Youth Talent Plan” in 2015. His current research is focused on developing novel nonlinear optical spectroscopy and microscopy tools to study biomedical and material sciences.
Biography: Dr. Puxiang Lai received his Bachelor’s degree from Tsinghua University in 2002, Master from Chinese Academy of Sciences in 2005, and PhD from Boston University in 2011. After that, he joined Dr Lihong Wang’s Lab in Washington University in St. Louis as a Postdoc. Since September 2015, Dr. Lai has been an Assistant Professor of Biomedical Engineering in Hong Kong Polytechnic University. Dr Lai’s research has been focusing on the development of novel biomedical imaging, therapy, and manipulation modalities by using sound and light, such as acousto-optic imaging, photoacoustic imaging, and guidestar-assisted optical focusing at depths in tissue.
Biography: Buhong Li is a professor of Biomedical Photonics and the Executive Vice-Dean of Graduate School, Fujian Normal University. He received his PhD degree in Optical Engineering from Zhejiang University in 2003. He was the New Century Excellent Talents in Ministry of Education of China. His research interests focus primarily on optical methods and apparatus for monitoring photodynamic therapy dosimetry, in particular for the spatiotemporal detection of singlet oxygen luminescence. He has authored more than 90 publications. He is the Associate Editor of Nano Biomedicine and Engineering and the editorial members of Journal of Innovative Optical Health Sciences.
Dong Li
Institute of Biophysics, Chinese Academy of Sciences, China
Email: lidong@ibp.ac.cn

Biography: My research focus on developing novel optical imaging methods, which enable us to measure and study the biological processes with unprecedented precision, such as structures and dynamics of molecular assemblies in living biological systems, interactions between molecules, and behavior of individual molecules, etc. We are greatly enjoying working at the interface of several disciplines, where light, biology and chemistry catalyze each other.
Pengcheng Li
Huazhong University of Science and Technology, China
Email: pengchengli@hust.edu.cn

Biography: Pengcheng Li PhD Professor, Britton Chance Center for Biomedical Optics, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (HUST). He received his B.S. degree in Optoelectronics, M.S. degree in Optical Engineering and Ph.D in Biomedical Engineering from HUST. Research field: functional optical imaging techniques of biological tissue, such as laser speckle imaging and spectroscopic imaging.
Hua Liu
Science and Technology on Electro-optic Control Laboratory, China
Email: Melody.h.liu@vip.163.com

Biography: Prof. LIU, her current research interests are systems engineering, the core optical system on global optimization, adaptive system configuration and product in research and development. For our contributions to these areas, has achieved a series of honors, e.g. the national science and technology progress awards, and holds more than 20 international and national invention patents, and published more than 90 papers in journal, and international conferences. Be editors and reviewers for 6 scientific journals, and chairs of 12 international technical conferences. Products which we have developed are certified by Food and Drug Administration (FDA) and so on.
Xiaolong Liu  
Mengchao Hepatobiliary Hospital of Fujian Medical University, China  
Email: xiaoloong.liu@gmail.com

**Biography:** Xiaolong Liu has received his Ph.D. degree in biophysics from Xi’an Jiaotong University in 2008. He worked then as a Research Associate (staff scientist) at University of Basel. Since 2013, he moved to Mengchao Hepatobiliary Hospital of Fujian Medical University, and has been appointed as Professor and Director of the of Liver Disease Research Institute. His research interests include Biomedical Photonics, Nanomedicine, Photodynamic/Photothermal Therapy. He has authored more than 50 publications in scientific journals, and received the “Alexander von Humboldt fellowship” in 2008 and the “Young Scientist Award” of Japanese Cancer Association in 2015.
Biography: Prof. Jiong Ma studied in the Physics Department of Fudan University in 1999-2008 and received the PhD degree in 2008. During his Ph.D. process, he visited as a research fellow at the Department of Chemistry at Rhodes University, South Africa at 2007 and the Department of Physiology at University of Oslo, Norway at 2007-2008. Then he worked as the post-doctor in the Department of Biology at Bowling Green State University, USA in 2008-2012, as the Research Assistant Professor in the Department of Biology at Temple University, USA in 2012-2015. He returned to in Fudan University in 2015, and worked as Young Research Professor of the physics department and the dean of school of information science and engineering. He received the Thousand Youth Talents Plan of Introduction Plan of Overseas Chinese High-levelled Talents and “Shanghai star talent program” in 2016. He works in the field to study the biophotonics, including innovation of the advanced optical microscopy in application. He has more than 20 scientific publications.
Liming Nie
Xiamen University, China
Email: nielm@xmu.edu.cn

Biography: Dr. Liming Nie earned his BS degree in 2005 and PhD degree in 2010, both in optics. He received postdoctoral training in the Optical Imaging Lab at Washington University in St. Louis from 2010 to 2012. He worked as visiting fellow in National Institutes of Health from 2012-2014 and then joined as a faculty member in Xiamen University. His research interests are the development of novel biomedical imaging method including photoacoustic imaging and other modalities such as MRI, PET. One of his aims is to provide effective and low-cost imaging methods and instruments for early-stage disease diagnosis and treatment monitoring.
Tymish Y. Ohulchanskyy  
Shenzhen University, China / State University of New York, University at Buffalo  
Email: tyo@szu.edu.cn, tyo2@buffalo.edu

Biography: Tymish Y. Ohulchanskyy holds his Ph.D. in Optics and Laser Physics from the National University of Kyiv (Ukraine). In 2001 he joined the Institute for Lasers, Photonics and Biophotonics (ILPB) at the University at Buffalo, Buffalo, NY, USA, where later advanced to ILPB Deputy Director. He has published 110 articles in peer-reviewed journals (>9500 citations, h-index of 44) and has number of patents and patent applications. His research interests lie in biophotonics and includes formulations for bioimaging and phototherapy. In 2016, Dr. Ohulchanskyy accepted a Distinguished Professor position in the College of Optoelectronic Engineering, Shenzhen University, Shenzhen, Guangdong, China.
Oxana
Saratov State University, Russia
Email: glushkovskaya@mail.ru

**Biography:** OxanaSemyachkina-Glushkovskaya (PhD, Dr. Biol. Sci., Professor) - the head of Interdisciplinary Center of Critical Technologies in Medicine and head of Chair of Physiology of Human and Animals in Saratov State University, Russia. Her research interests are focused on the development of new strategies in the drug brain delivery using non-invasive methods such as sound and lasers. She also works in the field of lymphatic and glymphatic systems of the brain.
Junle Qu
Shenzhen University, China
Email: jlqu@szu.edu.cn

Biography: Junle Qu received his PhD degree in Physical Electronics from Xi’an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences in 1998. He is currently a professor of Optical Engineering at Shenzhen University. He is also the Dean of College of Optoelectronic Engineering of Shenzhen University and Director of Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province. Prof. Junle Qu’s research interests include nonlinear optical microscopy, fluorescence lifetime imaging, superresolution optical imaging and their applications in biomedicine. He has published over 100 scientific papers in peer-reviewed journals such as Nature Photonics, Journal of American Chemical Society, Theranostics, Optics Letters etc., and holds 20 issued patents, including 2 US and 1 international patents. He is a senior member of SPIE and Chinese Optical Society. He is also the director of Biomedical Photonics Committee of Chinese Optical Society. Prof. Junle Qu serves on the editorial board of several journals including Medical Photonics, Journal of Innovative Optical Health Sciences and Acta Laser Biology Sinica. He has delivered more than 40 invited talks at various conferences and research institutions.
Biography: Dr. Shi received his Bachelor’s and Master’s degree from Nankai University in 1998 and 2001 respectively. He received his Ph.D degree at the Pennsylvania State University in 2007. Dr. Shi joined Peking University under the “Young Talent (BaiRen) Recruitment Program” as a professor in the Institute of Modern Optics in May 2011. Dr. Shi’s research focuses on developing novel photonic systems and devices based on ultrafast/nonlinear optical principles for spectroscopy, imaging and applications. He currently serves as a co-chair of conference committee for Ultrafast Imaging and Spectroscopy Conference at SPIE Optics + Photonics meeting. In 2013, Dr. Shi was awarded “National Natural Science Funds for Excellent Young Scholar” by National Natural Science Foundation of China (NNSFC). His research publication includes over 60 technical papers and 2 patents.
Ke Si
Zhejiang University, China
Email: kesi@zju.edu.cn

Biography: Dr. Ke Si is a professor at the College of Optical Science and Engineering in Zhejiang University. He is also a joined professor in the Institute of Neuroscience Zhejiang University. Before he joined Zhejiang University, he was a research associate at Janelia Farm Research Campus Howard Hughes Medical Institute (HHMI) and Singapore-MIT Alliance for Research and Technology, respectively. He received his Ph.D. degree in NUS Graduate School for Integrative Sciences and Engineering from NUS (with Professor Colin J.R. Sheppard). His research interests include Biophotonics, Deep Tissue Imaging, Nonlinear Optics, Adaptive Optics, Fluorescence Microscopy and Biomedical Imaging.
Liang Song
Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China
Email: liang.song@siat.ac.cn

Biography: Liang Song, Ph.D., is Professor at SIAT, CAS and founding director of the Shenzhen Key Lab for Molecular Imaging. Prior to joining SIAT, he studied at Washington University, St. Louis and received his Ph.D. in Biomedical Engineering. He has authored >40 peer-reviewed journal articles in *Advanced Functional Materials*, *Optics Letters*, *Biomaterials* etc., which have been cited by prestigious journals such as *Science* and *Nature Medicine* (Google scholar citations: 1190; h-index: 22). He serves on the editorial board of *Photoacoustics* (Elsevier CiteScore 2016: 5.7) and is a regular reviewer for >20 SCI-indexed journals such as *Biomaterials*, *IEEE TMI* etc. He has invented and developed multiple novel photoacoustic imaging technologies and been awarded >10 US and Chinese invention patents, for example: (1) optical-resolution intravascular photoacoustic endomicroscopy aiming for the identification of vulnerable plaques; (2) fully integrated photoacoustic/two-photon microscopy that can potentially open up new avenues for multi-contrast sub-cellular biomedical imaging; (3) handheld, real-time photoacoustic imaging system for cancer theranostics. His research on photoacoustics has been supported by the NSFC (including the National Key Instrumentation R&D Grant and National Excellent Young Scholar Award), the MOST of China, the local governments, and the industry.
Katarina Svanberg
Lund University, Sweden
Email: Katarina.Svanberg@fysik.lth.se

Biography: Katarina Svanberg obtained her PhD from Lund University in 1989, and is affiliated with the Department of Oncology, Lund University Hospital, where she has been active as chief consultant and professor of oncology since more than 25 years. Since 2011 she is also a distinguished professor at the South China Normal University, Guangzhou. Her research interests concern applications of laser spectroscopy to the biomedical and biophotonics fields.
**Biography:** Sune Svanberg obtained his PhD from University of Gothenburg in 1972, and is since 1980 professor of physics at Lund University, Lund, Sweden. During 30 years he was head of the Atomic Physics Division, and during 20 years director of the Lund Laser Centre. Since 2011 he is also a distinguished professor at the South China Normal University, Guangzhou. His research interests include laser spectroscopic applications to the environmental, food safety and biomedical fields.
Kai Wang  
Institute of Neuroscience, Chinese Academy of Sciences, China  
Email: wangkai@ion.ac.cn

Biography: Kai Wang, PhD is principle investigator and head of the laboratory of Optical neuroimaging. He got his BS and MS degrees in the Department of Electronic Engineering at Tsinghua University. He received Ph.D. degree in Harvard University and did postdoctoral research in Dr. Eric Betzig's Lab at Janelia Research Campus, HHMI. His general interests lies in developing new optical imaging methods for biological researches. Particularly, he is interested in developing novel optical physiology techniques and applying them on various animal models in neurosciences.
Qiangbin Wang  
Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, China  
Email: qbwang2008@sinano.ac.cn

**Biography:** Dr. Wang is a Professor in Suzhou Institute of Nano-Tech and Nano-Bionics (SINANO), Chinese Academy of Sciences. He developed Ag2S quantum dots with fluorescence emission in the second near-infrared window (NIR-II, 900-1700 nm) and commercialized the NIR-II in vivo imaging technology, which greatly improves the tissue penetration depth, spatio resolution and temporal resolution of in vivo fluorescence imaging. Dr. Wang has been awarded “National Outstanding Young Scientist” by NSFC and “Distinguished Lectureship Award” by Japanese Chemical Society. He is now the Director of Key Laboratory of Nano-Bio Interface of Chinese Academy of Sciences.
Xunbin Wei
Shanghai Jiao Tong University, China
Email: Xwei01@sjtu.edu.cn

Biography: Dr. Wei’s research interests include optical detection of cancer and disease treatment by light. He received his BS in physics from University of Science and Technology of China. He received his PhD from Department of Physiology and Biophysics, UC, Irvine. Dr. Wei completed his post-doc training at Children’s Hospital, Harvard Medical School. From 2006-2010, he is a professor in Fudan University, China. Currently he is a professor in School of Biomedical Engineering, Shanghai Jiao Tong University, China. Dr. Wei is an SPIE Fellow. He has published more than 80 peer-reviewed papers, including in Nature and PNAS.
Changfeng Wu
Southern University of Science and Technology, China
Email: wucf@sustc.edu.cn

Biography: Changfeng Wu completed his Physics PhD in 2004 at Institute of Optics, Fine Mechanics, and Physics, Chinese Academy of Sciences. He earned his PhD in Chemistry at the group of Prof. Jason McNeill from Clemson University in 2008. He then carried out postdoctoral research with Prof. Daniel T. Chiu at University of Washington. He started his independent research at Jilin University in 2012. He is currently a Professor of Biomedical Engineering at Southern University of Science and Technology. His research is focused on the development of fluorescent probes, biosensors, spectroscopic and imaging techniques for biomedical applications.
Biography: Sihua Yang received his doctoral degree in Optics in 2009 at South China Normal University. Now he is Professor, the Vice Dean of College of Biophotonics, Institute of Life Science, South China Normal University; The Distinguished Young Teacher in Higher Education of Guangdong. He has published more than 60 peer-reviewed journal papers, including Journal of the American College of Cardiology, Small, Biomaterials, Theranostics, Optics Letter, Optics Express, Appl Phys Lett and so on. He got the "Sylvia Sorkin Greenfield Award" of American Association of Physicists in Medicine (AAPM) in 2008, and the Natural Science Award of Guangdong Province in 2008 and 2013. His main interests in research include Photoacoustic microscopy imaging and clinical applications, multi-modality imaging of photoacoustics, ultrasound and fluorescence, ultrashort microwave-induced thermoacoustic imaging.
Biography: Professor Zhihong Zhang is the director of Division of Biomedical Photonics, Wuhan National Lab for Optoelectronics, Huazhong University of Science and Technology (HUST) in China. She is the awardee of National Science Fund for Distinguished Young Scholars of China. Aiming at significant demand for the visualization research of tumor immunotherapy, she devoted in developing novel optical imaging methods for multi-level, multi-molecular parallel detection and targeted labeling in vivo. Her research is also focused on intravital optical molecular imaging for tumor immune, multi-functional lipid nanoparticle for tumor imaging and therapeutics, and fluorescent protein probes and multi-event synchronization imaging in living cells.
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<thead>
<tr>
<th>Date</th>
<th>Time</th>
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<th>Location</th>
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<tbody>
<tr>
<td>9月26日</td>
<td>09:00-16:30</td>
<td>第二届中国（苏州）创新医疗与大健康产业国际博览会暨生物医学光学与健康产业国际展览会</td>
<td>B1 馆 Hall B1</td>
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<tr>
<td>9月26日</td>
<td>08:30-12:30</td>
<td>智能创新推动未来健康——第二届中国（苏州）创新医疗与大健康产业产业发展高峰论</td>
<td>会议室 A101-102</td>
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<tr>
<td>9月26日</td>
<td>14:30-17:00</td>
<td>首届苏州脑联接图谱与类脑智能发展论坛</td>
<td>会议室 A104</td>
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<td></td>
<td>09:00-17:00</td>
<td>医学光学影像应用与转化论坛</td>
<td>会议室 A105</td>
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<td></td>
<td>09:00-17:10</td>
<td>纳米生物光子学创新发展论坛</td>
<td>会议室 A108</td>
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<td>09:00-15:00</td>
<td>Doctor Clinic on Spot</td>
<td>B1 馆展览区</td>
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<td>09:00-16:30</td>
<td>第二届中国（苏州）创新医疗与大健康产业国际博览会暨生物医学光学与健康产业国际展览会</td>
<td>B1 馆</td>
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<tr>
<td>08:00-17:40</td>
<td>第十四届生物医学光子学与成像技术国际学术研讨会</td>
<td>会议室 A101-103</td>
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<tr>
<td>08:50-16:50</td>
<td>分子影像与精准医疗技术与产业发展论坛</td>
<td>会议室 A105</td>
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<td>27th, Sep.</td>
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<tr>
<td>13:30-15:30</td>
<td>资本助力——生物医疗创新技术及产品融资洽谈会</td>
<td>B1 馆发布区</td>
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<td></td>
<td>Innovation Achievements and Technology Finance Matchmaking Meeting</td>
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<td>13:30-15:00</td>
<td>国际项目融资对接会（澳大利亚、美国等国家专场）</td>
<td>B1 馆</td>
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<td>Biomedical Care and Biophotonics Matchmaking Meeting</td>
<td>Hall B1</td>
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<td>13:30-16:40</td>
<td>红外医学与智能诊疗产业发展高峰论坛</td>
<td>会议室 A106</td>
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<td>Infrared Medicine and Smart Clinic Industry Forum</td>
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<td>08:00-16:50</td>
<td>分子影像与精准医疗技术与产业发展论坛</td>
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<td>Molecular Imaging and Precision Medical Technology and Industry</td>
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| 09:30-16:10 | 激光先进技术在医疗领域的应用发展论坛  
Laser Medicine Application and Development Forum    | 会议室 A106  
Meeting Room A106 |
| 09:00-17:00 | 眼科光学创新发展论坛暨医用光学和仪器检验标准解读会  
Ophthalmic Optical Innovation Development Forum | 会议室 A107  
Meeting Room A107 |
| 13:30-15:30 | 医疗器械注册讲座:医疗器械注册路径规划、创新申报及临床试验的解析  
Medical Device Registration Lecture    | B1 馆发布区  
Road Show, Hall B1 |
| 09:30-11:00 | 新技术、新产品发布会  
New Technology and New Product Promotion Meeting | B1 馆发布区  
Road Show, Hall B1 |
| 09:00-16:00 | 第二届中国（苏州）创新医疗与大健康产业国际博览会暨生物医学光学与健康产业国际展览会  
2017 China(Beijing) International Technology Exchange Fair and 9th Photonics China Expo | B1 馆  
Hall B |
| 08:30-17:20 | 第十四届生物医学光子学与成像技术国际学术研讨会  
The 14th International Conference on Photonics and Imaging in Biology and Medicine, PIBM 2017 | 会议室 A101-103  
Meeting Room A101-103 |
Service Facilities Map