Optics in Health Care and Biomedical Optics VI

Qingming Luo
Xingde Li
Ying Gu
Yuguo Tang
Editors

9–11 October 2014
Beijing, China

Sponsored by
SPIE
COS—Chinese Optical Society

Cooperating Organizations
Tsinghua University (China) • Peking University (China) • University of Science and Technology of China (China) • Zhejiang University (China) • Tianjin University (China) • Beijing Institute of Technology (China) • Beijing University of Posts and Telecommunications (China) • Nankai University (China) • Changchun University of Science and Technology (China) • University of Shanghai for Science and Technology (China) • Capital Normal University (China) • Huazhong University of Science and Technology (China) • Beijing Jiaotong University (China) • Shanghai Institute of Optics and Fine Mechanics (China) • Changchun Institute of Optics and Fine Mechanics (China) • Institute of Semiconductors (China) • Institute of Optics and Electronics (China) • Institute of Physics (China) • Shanghai Institute of Technical Physics (China) • China Instrument and Control Society (China) • Optoelectronics Technology Committee, COS (China) • SPIE National Committee in China (China) • Optical Society of Japan (Japan) • Optical Society of Korea (Korea, Republic of) • The Australian Optical Society (Australia) • Optics and Photonics Society of Singapore (Singapore) • European Optical Society

Supporting Organizations
CAST—China Association for Science and Technology (China)
NSFC—National Nature Science Foundation (China)

Published by
SPIE

Volume 9268

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.
## Contents

vii  Authors  

xi  Symposium Committees  

xiii  Conference Committee  

### SESSION 1  ADVANCED OPTICAL TECHNIQUES FOR MEDICINE I

| 9268 06 | The evaluation and planning of light dose in photodynamic therapy for port wine stains [9268-4] |
| 9268 07 | Optical coherence tomography: a potential tool for prediction of treatment response for port wine stain after photodynamic therapy (Best Student Paper) [9268-5] |

### SESSION 2  MICROSCOPY AND IMAGING I

| 9268 0A | Solutions on high-resolution multiple configuration system sensors [9268-8] |
| 9268 0C | A photoelastic modulator-based birefringence imaging microscope for measuring biological specimens [9268-10] |
| 9268 0E | Size-dependent amplitude and phase distribution under a high NA objective [9268-12] |

### SESSION 3  PHOTONICS THERAPY

| 9268 0H | Photophysical properties and photo-induced intermolecular electron transfer of a novel aryl benzyl ester dendritic axially substituted silicon (IV) phthalocyanine [9268-15] |
| 9268 0I | Role of laser fluence in protein synthesis of cultured DRG neurons following low-level laser irradiation [9268-16] |
| 9268 0K | The simulation of light distribution in photodynamic therapy for port wine stains [9268-18] |
| 9268 0L | In vitro sensitivity of Candida spp. to hematoporphyrin monomethyl ether-mediated photodynamic inactivation [9268-19] |

### SESSION 4  NANO BIOPHOTONICS

| 9268 0O | Synthesis of folate receptor-targeted photosensitizers for photodynamic therapy [9268-22] |

---

Proc. of SPIE Vol. 9268  926801-3
<table>
<thead>
<tr>
<th>SESSION 5</th>
<th>ADVANCED OPTICAL TECHNIQUES FOR MEDICINE II</th>
</tr>
</thead>
<tbody>
<tr>
<td>9268 0T</td>
<td>Vessel constriction correlated with local singlet oxygen generation during vascular targeted photodynamic therapy (Invited Paper) [9268-27]</td>
</tr>
<tr>
<td>9268 0U</td>
<td>Hybrid-modality high-resolution imaging: for diagnostic biomedical imaging and sensing for disease diagnosis [9268-28]</td>
</tr>
<tr>
<td>9268 0V</td>
<td>Mapping the microvascular and the associated absolute values of oxy-hemoglobin concentration through turbid media via local off-set diffuse optical imaging [9268-29]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 6</th>
<th>MICROSCOPY AND IMAGING II</th>
</tr>
</thead>
<tbody>
<tr>
<td>9268 11</td>
<td>Wide field-of-view microscopy using compressive sensing [9268-37]</td>
</tr>
<tr>
<td>9268 13</td>
<td>Measurement of refractive index distribution of biotissues by scanning focused refractive index microscopy [9268-39]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 7</th>
<th>MULTIMODAL BIOMEDICAL IMAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>9268 16</td>
<td>Optical coherence tomography imaging of microfluidic pattern with different refractive index contrast [9268-42]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSTER SESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9268 18</td>
</tr>
<tr>
<td>9268 1A</td>
</tr>
<tr>
<td>9268 1B</td>
</tr>
<tr>
<td>9268 1C</td>
</tr>
<tr>
<td>9268 1D</td>
</tr>
<tr>
<td>9268 1E</td>
</tr>
<tr>
<td>9268 1F</td>
</tr>
<tr>
<td>9268 1G</td>
</tr>
</tbody>
</table>
Novel optimization method for multi-dimensional breast photoacoustic tomography [9268-55]

Experimental demonstration of a Fresnel-reflection based optical fiber biosensor coated with polyelectrolyte multilayers [9268-56]

Comparison of 1470nm laser and 1470nm laser heat head for ex-vivo kidney tissue cutting: a preliminary study [9268-59]

Research of the types of applicable people and the statistical characteristics of hand vein image [9268-60]

The simulation of the recharging method of active medical implant based on Monte Carlo method [9268-61]

Precise $^{13}\text{CO}_2/^{12}\text{CO}_2$ isotopic ratio measurements for breath diagnosis with a 2-µm diode laser [9268-62]

Homing peptide guiding optical molecular imaging for the diagnosis of bladder cancer [9268-63]

Detection of protein kinases P38 based on reflectance spectroscopy with n-type porous silicon microcavities for diagnosing hydatidosis hydatid disease [9268-64]

An active timing controlled-gate fluorescence lifetime imaging microscopy using an ultrast short picosecond diode laser [9268-66]

An improved non-local means filter for denoising in brain magnetic resonance imaging based on fuzzy cluster [9268-68]

Measurement of the mid-infrared Fourier spectroscopic imaging of whole human face by portable apparatus (size: 50*50 mm, weight: 200 g) [9268-69]

Miniaturized endoscopic probe for optical coherence tomography with a tiny magnet driving device [9268-70]

Mueller matrix characterization on anisotropy in tissue optical models [9268-71]

Laser Doppler line scanner for monitoring skin perfusion changes of port wine stains during vascular-targeted photodynamic therapy [9268-72]

In-vivo monitoring rat skin wound healing using nonlinear optical microscopy [9268-74]

Multiphoton microscopic imaging of fibrotic focus in invasive ductal carcinoma of the breast [9268-78]

Initiation efficiency and cytotoxicity of a series of water-soluble benzylidene cyclopentanone for two-photon polymerization [9268-79]

Time-resolved multicolor two-photon excitation fluorescence microscopy of cells and tissues [9268-80]
| 26 | Detection and analysis of multi-dimensional pulse wave based on optical coherence tomography [9268-81] |
| 27 | Quantitative changes of collagen in human normal breast tissue and invasive ductal carcinoma using nonlinear optical microscopy [9268-82] |
| 28 | Simulation of stimulated emission depletion intensity distribution by scalar integral [9268-83] |
| 29 | Microfluidics-integrated cascaded double-microring resonators for label-free biosensing [9268-84] |
| 2A | Spectroscopic studies of the interaction between tetra-substituted aluminum phthalocyanines and bovine serum albumin [9268-85] |
| 2C | Influence of static pressure on dynamic characteristics of laser-induced cavitation and hard-tissue ablation under liquid environment [9268-88] |
| 2D | Influence of liquid medium with different absorption and its layer thickness on bovine bone tibia ablation induced by CO\textsubscript{2} laser [9268-89] |
| 2E | Monitoring the effect of low-level laser therapy in healing process of skin with second harmonic generation imaging techniques [9268-90] |
| 2G | In-vivo differentiation of photo-aged epidermis skin by texture-based classification [9268-92] |
| 2M | Characterization of secreted proteins in HepG2 and LO2 cells by Raman spectroscopy [9268-98] |
| 2N | Optical functional imaging of retina using stimulus-evoked intrinsic optical signals [9268-99] |
| 2O | Dual illumination OCT at 1050nm and 840nm for whole eye segment imaging [9268-100] |
| 2P | A denoising module based on the wavelet and empirical mode decomposition for photoacoustic microscopy [9268-101] |
| 2Q | OCT imaging enhancement of ovarian cancer using gold and gold/silver nanorods [9268-102] |
| 2R | Photoacoustic signal simulation and detection optimization based on laser-scanning optical-resolution photoacoustic microscopy [9268-103] |
Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abeygunawardhana, Pradeep Kumara, 1V
Bai, Liping, 1E
Cao, Jie, 1N
Cao, Meng, 1H
Cao, Zhen-song, 1O
Carson, Paul L., 1H
Chai, Xinyu, 2P, 2R
Chen, Chen, 0V
Chen, Chuang-uo, 1C, 2C, 2D
Chen, Defu, 07, 0T, 1Y
Chen, Hai-yu, 26
Chen, Jian-ling, 0H, 28
Chen, Jian-xin, 1A, 20, 23, 27
Chen, Jing, 20
Chen, Rong, 1B, 1D, 2M
Chen, Shu-hui, 2Q
Chen, Si-jia, 23
Chen, Weiiwei, 1B
Chen, Xiao-gang, 28
Chen, Xiu-qin, 0H
Chen, Yang-qing, 29
Cui, Da-xiang, 2Q
Dai, Cuixia, 2O
Dai, Pan-tao, 1N
Deng, Tong-xin, 1A
Deng, Zhi-Chao, 13
Di, Si, 1E
Ding, Quan-xin, 0A
Du, Si-dan, 1H
Du, Yi, 2P, 2R
Fan, Shan-hui, 2Q, 2Q
Fan, Zhen-wei, 1P
Fang, Yan-yan, 00, 24
Feng, Shang-yuan, 1B
Feng, Ting, 1H
Freudenthal, John, 0C
Fu, Fang-meng, 1A, 23, 27
Fujii-wara, Masaru, 1V
Gao, Xiao-ming, 1O
Gu, Ying, 07, 1Y
Gu, Ying, 0L, 0T
Guo, Chun-gen, 20
Guo, Chun-jie, 0A
Guo, Xue-qian, 2N
Guo, Yi-hong, 1X
Hao, Bingtao, 16
Hao, Qun, 1N
He, Jian-Jun, 29
He, Yipeng, 2A
Hong, Baoyu, 16
Hong, Xin, 0E
Hu, Xiao-ming, 06, 0K
Hu, Zhi-xiong, 16
Huang, Hao, 1B
Huang, Yide, 2A
Huang, Zufang, 1D, 2M
Ishimaru, Ichiro, 1V
Jia, Xing-you, 1P
Jia, Zhen-hong, 1Q
Jiang, Xia, 2Q
Jin, Jia, 1E
Jin, Ying, 1G
Klämpfe, Florian, 0V
Kong, Xian-yue, 1N
Lang, Ting-feng, 1I
Leadbetter, Andy, 0C
Li, Buhong, 0T
Li, Hui, 26, 28, 2E, 2G
Li, Jun, 1P
Li, Lin, 2P, 2R
Li, Ling, 1D
Li, Ming-yu, 29
Li, Qian, 2R
Li, Wansong, 1N
Li, Wei-qiang, 27
Li, Wenzhi, 1L
Li, Xuwei, 1C, 2C, 2D
Li, Yirong, 0T
Li, Zhenhui, 1G
Li, Zhifang, 26
Lian, Yuane, 1A, 23, 27
Liang, Zhiyuan, 1L
Liao, Fadian, 1D, 2M
Lim, Hoong-Ta, 0U
Lin, Duo, 1B
Lin, Jia, 1B
Lin, Jinyong, 2M
Lin, Jui-qiang, 1D, 2M
Lin, Lisheng, 0T
Lin, Ping-ping, 2A
Liu, Bin, 1U
Liu, Celong, 1X
Liu, Fei, 18, 1F, 1G
Liu, Hua, 0A
Liu, Huan, 0E
Liu, Jia-feng, 1L
Liu, Jie-hao, 1P
Liu, Kun, 1O
Zhang, Xiaoyu, 1N
Zhang, Yanding, 0I
Zhang, Zi-qiang, 1P
Zhao, Qingliang, 2Q, 2R
Zhao, Yang, 1P
Zhao, Yuxia, 0O, 24
Zhen, Jie, 07
Zheng, Liqin, 0I, 2A
Zheng, Wei, 25
Zhou, Chuanqing, 2O, 2P, 2Q, 2R
Zhou, Liwei, 0A
Zhou, Wen-Yuan, 13
Zhou, Ya, 0K
Zhou, Yan, 1S
Zhou, Zhentian, 1L
Zhu, Xiaoqin, 20
Zhuo, Shuangmu, 1A, 23, 27
Zou, Qianli, 0O, 24
Symposium Committees

General Chairs

H. Philip Stahl, NASA Marshall Space Flight Center (USA)
Bingkun Zhou, Tsinghua University (China)

General Co-chairs

Arthur Chiou, National Yang-Ming University (Taiwan, China)
Jianlin Cao, China Ministry of Science and Technology (China)
Junhao Chu, Shanghai Institute of Technical Physics (China)

Technical Program Chairs

Songlin Zhuang, Shanghai University of Science and Technology (China)
Xingde Li, Johns Hopkins University (United States)

Technical Program Co-chairs

Qiming Wang, Institute of Semiconductors (China)
Xu Liu, Zhejiang University (China)
Daoyin Yu, Tianjin University (China)
Qihuang Gong, Peking University (China)
Tianchu Li, National Institute of Metrology (China)
Wei Huang, Nanjing University of Posts and Telecommunications (China)

Local Organizing Committee Chair

Guangcan Guo, University of Science and Technology of China (China)
Local Organizing Committee Co-chairs

Guoqiang Ni, Beijing Institute of Technology (China)
Shusen Xie, Fujian Normal University (China)
Xiaomin Ren, Beijing University of Posts and Telecommunications (China)
Ying Gu, People’s Liberation Army General Hospital (China)
Huilin Jiang, Changchun University of Science and Technology (China)

General Secretary

Qihuang Gong, Peking University (China)

Local Organizing Committee

Yan Li, Chinese Optical Society/Peking University (China)
Zhiping Zhou, Peking University (China)
Changhe Zhou, Shanghai Institute of Optics and Fine Mechanics (China)
Qingming Luo, Huazhong University of Science and Technology (China)
Chongxiu Yu, Beijing University of Posts and Telecommunications (China)
Hongda Chen, Institute of Semiconductors (China)
Yongtian Wang, Beijing Institute of Technology (China)
Yiping Cui, Southeast University (China)
Xuping Zhang, Nanjing University (China)
Feijun Song, Daheng Corporation (China)
Cunlin Zhang, Capital Normal University (China)
Yanling Lu, Nanjing University (China)
Yuejin Zhao, Beijing Institute of Technology (China)
Chunqing Gao, Beijing Institute of Technology (China)
Tiegen Liu, Tianjin University (China)
Xiaocong Yuan, Nankai University (China)
Weimin Chen, Chongqing University (China)
Zhongwei Fan, Academy of Optoelectronics (China)
Hanyi Zhang, Tsinghua University (China)
Lan Wu, Zhejiang University (China)
Yongsheng Zhang, University of Science and Technology of China (China)
Hong Yang, Peking University (China)
Xiaoying Li, Tianjin University (China)
Wei Xiong, Chinese Optical Society (China)
Conference Committee

Conference Chairs

Qingming Luo, Huazhong University of Science and Technology (China)
Xingde Li, Johns Hopkins University (United States)
Ying Gu, Chinese PLA General Hospital (China)
Yuguo Tang, Suzhou Institute of Biomedical Engineering and Technology (China)

Conference Co-Chair

Dan Zhu, Huazhong University of Science and Technology (China)

Conference Program Committee

Jing Bai, Tsinghua University (China)
Stephen A. Boppart, University of Illinois at Urbana-Champaign (United States)
Wei R. Chen, University of Central Oklahoma (United States)
Yu Chen, University of Maryland, College Park (United States)
Linhong Deng, Chongqing University (China)
Zihua Ding, Zhejiang University (China)
Qiyong Gong, West China Hospital (China)
Hui Li, Fujian Normal University (China)
Hong Liu, The University of Oklahoma (United States)
Hui Ma, Tsinghua University (China)
Atsushi Maki, Hitachi, Ltd. (Japan)
Yingtian Pan, Stony Brook University (United States)
Paras N. Prasad, University at Buffalo (United States)
Yuwen Qin, National Natural Science Foundation (China)
Junle Qu, Shenzhen University (China)
Qiushi Ren, Shanghai Jiao Tong University (China)
Jie Tian, Institute of Automation (China)
Valery V. Tuchin, N.G. Chernyshevsky Saratov State University (Russian Federation)
Lihong V. Wang, Washington University in St. Louis (United States)
Ruikang K. Wang, University of Washington (United States)
Xunbin Wei, Shanghai Jiao Tong University (China)
Xujie Xia, Shanghai Jiao Tong University (China)
Da Xing, South China Normal University (China)
Kexin Xu, Tianjin University (China)
Yudong Zhang, Institute of Optics and Electronics (China)
Zhenxi Zhang, Xi'an Jiaotong University (China)
Session Chairs

1. Advanced Optical Techniques for Medicine I  
   Qingming Luo, Huazhong University of Science and Technology (China)  
   Ruikang K. Wang, University of Washington (United States)

2. Microscopy and Imaging I  
   Ruikang K. Wang, University of Washington (United States)  
   Shaoqun Zeng, Huazhong University of Science and Technology (China)

3. Photonics Therapy  
   Ying Gu, Chinese PLA General Hospital (China)  
   Buhong Li, Fujian Normal University (China)

4. Nano Biophotonics  
   Daxiang Cui, Shanghai Jiao Tong University (China)  
   Peng Xi, Peking University (China)

5. Advanced Optical Techniques for Medicine II  
   Hui Ma, Tsinghua University (China)  
   Xunbin Wei, Shanghai Jiao Tong University (China)

6. Microscopy and Imaging II  
   Junle Qu, Shenzhen University (China)  
   Dan Zhu, Huazhong University of Science and Technology (China)

7. Multimodal Biomedical Imaging  
   Liang Song, Shenzhen Institute of Advanced Technology (China)  
   Changhui Li, Peking University (China)