

PROGRESS IN BIOMEDICAL OPTICS AND IMAGING

Vol. 19 No. 20

Design and Quality for Biomedical Technologies XI

Ramesh Raghavachari

Rongguang Liang

Editors

27–28 January 2018

San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 10486

Proceedings of SPIE 1605-7422, V. 10486

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

Design and Quality for Biomedical Technologies XI, edited by Ramesh Raghavachari, Rongguang Liang, Proc. of SPIE Vol. 10486, 1048601 · © 2018 SPIE · CCC code: 1605-7422/18/\$18 · doi: 10.1117/12.2323032

Proc. of SPIE Vol. 10486 1048601-1

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Design and Quality for Biomedical Technologies XI*, edited by Ramesh Raghavachari, Rongguang Liang, Proceedings of SPIE Vol. 10486 (SPIE, Bellingham, WA, 2018)
Seven-digit Article CID Number.

ISSN: 1605-7422
ISSN: 1996-756X (electronic)

ISBN: 9781510614574
ISBN: 9781510614581 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2018, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/18/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

- v *Authors*
- vii *Conference Committee*

PHANTOM-BASED TESTING IN PHOTOACOUSTICS

- 10486 04 **Motorized photoacoustic tomography probe for label-free improvement in image quality**
[10486-3]

PHANTOMS AND TEST METHODS

- 10486 06 **Identifying viscoelastic parameters of tissue specimens using Hertz contact mechanics**
[10486-5]
- 10486 08 **Comparison of calibration and standardization approaches for fluorescence guided imaging systems to benchtop fluorometers** [10486-7]
- 10486 09 **Evaluation of blood flow in human exercising muscle by diffuse correlation spectroscopy: a phantom model study** [10486-8]
- 10486 0A **Influence of low temperature aging on optical and mechanical properties of transparent yttria stabilized-zirconia cranial prosthesis** [10486-9]

INNOVATIVE OPTICAL MODALITIES

- 10486 0E **Getting more early photons with less background: detection rate and signal-to-background improvements in enhanced early photon imaging** [10486-13]

HYPERSPECTRAL IMAGING

- 10486 0G **Hyperspectral characterization of tissue simulating phantoms using a supercontinuum laser in a spatial frequency domain imaging instrument** [10486-16]
- 10486 0K **Design considerations for highly effective fluorescence excitation and detection optical systems for molecular diagnostics** [10486-44]

OCT IMAGING SYSTEMS

- 10486 0N **Ultra-low noise supercontinuum source for ultra-high resolution optical coherence tomography at 1300nm** [10486-22]

- 10486 OP **Image-guided intraocular injection using multimodality optical coherence tomography and fluorescence confocal scanning laser ophthalmoscopy in rodent ophthalmological models** [10486-24]

NIRS OXIMETRY PERFORMANCE STANDARDIZATION

- 10486 OR **Saturation measurement accuracy in clinical near-infrared cerebral oximeters with a 3D-printed channel array phantom** [10486-26]
- 10486 OS **An applicable approach for extracting human heart rate and oxygen saturation during physical movements using a multi-wavelength illumination optoelectronic sensor system** [10486-27]
- 10486 OT **Hemoglobin spectra affect measurement of tissue oxygen saturation (Invited Paper)** [10486-28]

SMART PHONE IMAGING TECHNOLOGIES I

- 10486 OV **Development of a dual-modality, dual-view smartphone-based imaging system for oral cancer detection** [10486-30]

SMART PHONE IMAGING TECHNOLOGIES II

- 10486 OX **Ultra low-cost, portable smartphone optosensors for mobile point-of-care diagnostics (Invited Paper)** [10486-32]
- 10486 OY **Optical tests for using smartphones inside medical devices** [10486-33]

POSTER SESSION

- 10486 13 **A dynamic system with digital lock-in-photon-counting for pharmacokinetic diffuse fluorescence tomography** [10486-38]
- 10486 14 **A novel multi-wavelength procedure for systolic blood pressure estimation using opto-physiological sensor at peripheral arteries and capillaries** [10486-39]
- 10486 15 **Extracting broadband optical properties from uniform optical phantoms using an integrating sphere and inverse adding-doubling** [10486-40]
- 10486 16 **Charactering baseline shift with 4th polynomial function for portable biomedical near-infrared spectroscopy device** [10486-41]
- 10486 17 **A commercialized photoacoustic microscopy system with switchable optical and acoustic resolutions** [10486-42]
- 10486 18 **Portable measurement system for real-time acquisition and analysis of in-vivo spatially resolved reflectance in the subdiffusive regime** [10486-43]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Acobas, Jennifer K., 0Y
Afshari, Ali, 0R
Aguilar, Guillermo, 0A
Alharbi, Samah, 0S
Anbarani, Afarin, 0V
Badran, Karam W., 06
Bajwa, Neha, 06
Bang, O., 0N
Barrett, Laura, 14
Bartels, Randy A., 0G
Benavides, Oscar R., 0P
Bernat, Amir S., 0Y
Bi, Renzhe, 17
Birur, Praveen, 0V
Blanos, Panagiotis, 0S, 14
Bolton, Frank J., 0Y
Brankov, Jovan G., 0E
Bürmen, Miran, 18
Chang, Yu-Chung, 0X
D'Acquisto, Leonardo, 14
Davoodzadeh, Nami, 0A
DeRose, Paul, 08
Du, Wenwen, 13
Durkin, Anthony J., 0G
Engelholm, R. D., 0N
Feuchter, T., 0N
Gandjbakhche, Amir H., 0R
Gao, Feng, 13
Garay, Javier E., 0A
Ghassemi, Pejman, 0R
Goergen, Craig J., 04
Gonzalo, I. B., 0N
Grundfest, Warren S., 06
Halaney, David, 0A
Hale, Nick H., 04
Halprin, Molly, 0R
Hassan, David, 0Y
Hu, Sijung, 0S, 14
Ichinose, Masashi, 09
Isler, Helene, 0T
Ivančič, Matic, 18
Ji, Yaoyao, 16
Karen, Tanja, 0T
Kasper, Axel, 0K
Kennedy, Gordon T., 0G
Kleiser, Stefan, 0T
Kuk, Sola, 0K
Kuriakose, Moni Abraham, 0V
Leeburg, Kelsey C., 0P
Leick, L., 0N
Levine, Edward M., 0P
Levitz, David, 0Y
Li, Lei, 0X
Li, Ting, 16
Liang, Rongguang, 0V
Likar, Boštjan, 18
Lin, Jonathan, 0R
Litorja, Maritoni, 08
Liu, Han, 13
Ma, Wenjuan, 13
Maccabi, Ashkan, 06
Maria, M., 0N
Mehanathan, Sankarathi B., 0P
Moselund, P. M., 0N
Mulvaney, David, 0S
Naglič, Peter, 18
Nakabayashi, Mikie, 09
Namiri, Nikan K., 06
Nasseri, Nassim, 0T
Olivo, Malini, 17
Ono, Yumie, 09
Ostojic, Daniel, 0T
Pan, Boan, 16
Pasta, Salvatore, 14
Patrick, Sanjana, 0V
Pernuš, Franjo, 18
Pfefer, Joshua, 0R
Phang, Ye Shang, 0Y
Podoleanu, A., 0N
Pu, Yang, 17
Saager, Rolf B., 0G
Saddik, George N., 06
Sangha, Gurmeet S., 04
Scardulla, Francesco, 14
Scholkmann, Felix, 0T
Sinha, Lagnojita, 0E
Song, Bofan, 0V
Spires, Oliver, 0V
St. John, Maie A., 06
Stockton, Patrick, 0G
Sun, Rongrong, 0X
Sunny, Sumsum, 0V
Suresh, Amritha, 0V
Tao, Yuankai K., 0P
Taylor, Zachary D., 06
Terrones, Benjamin D., 0P
Tichauer, Kenneth M., 0E
Torabzadeh, Mohammad, 0G

Tromberg, Bruce J., 0G
Uahengo, Gottlieb, 0A
Uthoff, Ross D., 0V
Van Hille, Herbert, 0K
Vincely, Vinois, 15
Vishwanath, Karthik, 15
Wang, Jianting, 0R
Wang, Li-Ju, 0X
Weininger, Sandy, 0R
Wilder-Smith, Petra, 0V
Wolf, Martin, 0T
Yan, Liangwen, 14
Yin, Guoyan, 13
Zhang, Limin, 13
Zhang, Yanqi, 13
Zhao, Huijuan, 13
Zhao, Ke, 16
Zhao, Xiaojie, 17

Conference Committee

Symposium Chairs

James G. Fujimoto, Massachusetts Institute of Technology
(United States)

R. Rox Anderson, Wellman Center for Photomedicine, Massachusetts
General Hospital (United States) and Harvard Medical School
(United States)

Program Track Chairs

Tuan Vo Dinh, Fitzpatrick Institute for Photonics, Duke University
(United States)

Anita Mahadevan-Jansen, Vanderbilt University (United States)

Conference Chairs

Ramesh Raghavachari, U.S. Food and Drug Administration
(United States)

Rongguang Liang, College of Optical Sciences, The University of
Arizona (United States)

Conference Co-Chair

T. Joshua Pfefer, U.S. Food and Drug Administration (United States)

Conference Program Committee

David W. Allen, National Institute of Standards and Technology
(United States)

Anthony J. Durkin, Beckman Laser Institute and Medical Clinic
(United States)

Jeeseong Hwang, National Institute of Standards and Technology
(United States)

Robert J. Nordstrom, National Institutes of Health (United States)

Eric J. Seibel, University of Washington (United States)

Behrouz Shabestari, National Institutes of Health (United States)

Gracie Vargas, The University of Texas Medical Branch (United States)

Rudolf M. Verdaasdonk, Vrije University Medical Center (Netherlands)

Session Chairs

- 1 Phantom-Based Testing in Photoacoustics
William C. Vogt, U.S. Food and Drug Administration (United States)
- 2 Phantoms and Test Methods
Jeeseong Hwang, National Institute of Standards and Technology (United States)
- 3 Innovative Optical Modalities
Gracie Vargas, The University of Texas Medical Branch (United States)
Rongguang Liang, College of Optical Sciences, The University of Arizona (United States)
- 4 Hyperspectral Imaging
Gracie Vargas, The University of Texas Medical Branch (United States)
- 5 OCT Imaging Systems
Eric J. Seibel, University of Washington (United States)
- 6 NIRS Oximetry Performance Standardization
Maritoni Litorja, National Institute of Standards and Technology (United States)
- 7 NIH Special Session: NIBIB and NCI Funding Opportunities
Behrouz Shabestari, National Institutes of Health (United States)
Robert J. Nordstrom, National Cancer Institute (United States)
- 8 Smart Phone Imaging Technologies I
Behrouz Shabestari, National Institutes of Health (United States)
- 9 Smart Phone Imaging Technologies II
Ramesh Raghavachari, U.S. Food and Drug Administration (United States)