

PROGRESS IN BIOMEDICAL OPTICS AND IMAGING

Vol. 10, No. 14

# ***Optical Tomography and Spectroscopy of Tissue VIII***

**Bruce J. Tromberg**  
**Arjun G. Yodh**  
**Mamoru Tamura**  
**Eva M. Sevick-Muraca**  
**Robert R. Alfano**  
*Editors*

**25–27 January 2009**  
**San Jose, California, United States**

*Sponsored and Published by*  
SPIE

**Volume 7174**

Proceedings of SPIE, 1605-7422, v. 7174

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

The papers included 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. The papers published in these proceedings 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 this book:

Author(s), "Title of Paper," in *Optical Tomography and Spectroscopy of Tissue VIII*, edited by Bruce J. Tromberg, Arjun G. Yodh, Mamoru Tamura, Eva M. Sevick-Muraca, Robert R. Alfano, Proceedings of SPIE Vol. 7174 (SPIE, Bellingham, WA, 2009) Article CID Number.

ISSN 1605-7422

ISBN 9780819474209

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 © 2009, 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](http://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 1605-7422/09/\$18.00.

Printed in the United States of America.

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



[SPIDigitalLibrary.org](http://SPIDigitalLibrary.org)

---

**Paper Numbering:** Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four 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. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

# Contents

xi Conference Committee

## SESSION 1 THEORY, ALGORITHMS, AND MODELING I

---

- 7174 02 **Fourth order perturbation theory for the diffusion equation: continuous wave results for absorbing defects** [7174-11]  
A. Sassaroli, Tufts Univ. (United States); F. Martelli, Univ. degli Studi di Firenze (Italy); S. Fantini, Tufts Univ. (United States)
- 7174 03 **Simplified spherical harmonics approximation of the time-dependent equation of radiative transfer for the forward problem in time-domain diffuse optical tomography** [7174-12]  
Y. Bérubé-Lauzière, V. Issa, J. Bouza Dominguez, Univ. de Sherbrooke (Canada)
- 7174 04 **Forward modeling of axial trans-luminal diffuse optical imaging with a cylindrical applicator using continuous-wave photon-illumination** [7174-13]  
A. Zhang, D. Piao, Oklahoma State Univ. (United States); G. Yao, Univ. of Missouri, Columbia (United States); C. F. Bunting, J. S. Krasinski, Oklahoma State Univ. (United States); B. W. Pogue, Dartmouth College (United States)
- 7174 05 **Applications of delta-P1 and delta-P3 approximations to optical tomography in small imaging volumes** [7174-14]  
B. Yuan, The Catholic Univ. of America (United States)
- 7174 06 **A parallel reduced-space sequential-quadratic programming algorithm for frequency-domain small animal optical tomography** [7174-15]  
X. Gu, H. K. Kim, J. Masciotti, A. H. Hielscher, Columbia Univ. (United States)

## SESSION 2 INSTRUMENTATION AND ALGORITHMS

---

- 7174 07 **Double layer estimation of flow changes using diffuse correlation spectroscopy** [7174-16]  
L. Gagnon, Massachusetts General Hospital (United States), École Polytechnique de Montréal (Canada), and Univ. de Gériatrie de Montréal (Canada); M. Desjardins, École Polytechnique de Montréal (Canada) and Univ. de Gériatrie de Montréal (Canada); L. Bherer, Univ. du Québec à Montréal (Canada); F. Lesage, École Polytechnique de Montréal (Canada) and Univ. de Gériatrie de Montréal (Canada)
- 7174 08 **Non-invasive skin oxygenation imaging using a multi-spectral camera system: effectiveness of various concentration algorithms applied on human skin** [7174-17]  
J. H. G. M. Klaessens, H. J. Noordmans, R. de Roode, R. M. Verdaasdonk, Univ. Medical Ctr. Utrecht (Netherlands)

- 7174 09 **Spectroscopic technique with wide range of wavelength information improves near-infrared spectroscopy** [7174-18]  
H. Eda, The Graduate School for the Creation of New Photonics Industries (Japan) and Photonics Innovations Co., Ltd. (Japan); H. Aoki, S. Eura, The Graduate School for the Creation of New Photonics Industries (Japan); K. Ebe, Toyota Central Research and Development Labs., Inc. (Japan)
- 7174 0A **Multi-wavelength measurement of cytochrome oxidase and water in biomedical tissues using optical topography system** [7174-19]  
T. Funane, H. Atsumori, H. Sato, M. Kiguchi, A. Maki, Hitachi, Ltd. (Japan)
- 7174 0B **Relative capacities of time-gated versus CW imaging to localize tissue embedded vessels with increasing depth** [7174-20]  
G. Alexandrakis, N. L. Patel, Z.-J. Lin, Univ. of Texas at Arlington (United States); E. H. Livingston, Univ. of Texas Southwestern Medical Ctr. at Dallas (United States); H. Liu, Univ. of Texas at Arlington (United States)

---

### SESSION 3 ADVANCES IN INSTRUMENTATION AND TECHNOLOGY

---

- 7174 0D **Angular domain optical projection tomography in turbid media** [7174-22]  
F. Vasefi, Simon Fraser Univ. (Canada) and Lawson Health Research Institute (Canada); B. Kaminska, Simon Fraser Univ. (Canada); K. Jordan, Univ. of Western Ontario (Canada) and London Health Sciences Ctr. (Canada); G. H. Chapman, Simon Fraser Univ. (Canada); J. J. L. Carson, Lawson Health Research Institute (Canada) and Univ. of Western Ontario (Canada)
- 7174 0E **Imaging of highly scattering media by spatially modulated pulsed light** [7174-23]  
A. Bassi, C. D'Andrea, G. Valentini, R. Cubeddu, IIT, ULTRAS-CNR-INFM, and IFN-CNR, Politecnico di Milano (Italy); S. Arridge, Univ. College London (United Kingdom)
- 7174 0F **Three-dimensional diffuse optical tomography of the whole finger: a step toward full hand imaging** [7174-24]  
Q. Zhang, Y. Tan, Z. Yuan, E. Sobel, H. Jiang, Univ. of Florida (United States)
- 7174 0G **3D optical contrast-recovery in MR guided diffuse optical spectroscopy** [7174-25]  
C. Carpenter, S. Srinivasan, B. Pogue, K. D. Paulsen, Dartmouth College (United States)
- 7174 0H **Wavelength optimization of the spectral derivative method improves quantification of chromophore values in NIR reconstruction** [7174-26]  
J. Wang, B. W. Pogue, S. Jiang, K. D. Paulsen, Dartmouth College (United States)

---

### SESSION 4 PRECLINICAL/CLINICAL APPLICATIONS

---

- 7174 0I **Combined hyperspectral and spectral domain optical coherence tomography microscope for non-invasive hemodynamic imaging** [7174-54]  
M. C. Skala, H. Hendargo, A. Fontanella, M. W. Dewhirst, J. A. Izatt, Duke Univ. (United States)
- 7174 0K **Image-guided optical spectroscopy in diagnosis of osteoarthritis by combining spectral and spatial a priori information** [7174-56]  
Z. Yuan, Q. Zhang, H. Jiang, E. S. Sobel, H. Jiang, Univ. of Florida (United States)

- 7174 0L **Absolute near-infrared oximetry for urology: a quantitative study of the tissue hemoglobin saturation before and after testicular torsion in a rabbit model** [7174-57]  
B. Hallacoglu, R. S. Matulewicz, Tufts Univ. (United States); H. J. Paltiel, H. Padua, P. Gargollo, G. Cannon, A. Alomari, Children's Hospital Boston (United States); A. Sassaroli, S. Fantini, Tufts Univ. (United States)

---

**SESSION 5 BREAST CANCER DIAGNOSIS I: INSTRUMENTATION**

---

- 7174 0M **Spectral imaging of the human breast for quantitative oximetry** [7174-27]  
Y. Yu, N. Liu, A. Sassaroli, S. Fantini, Tufts Univ. (United States)
- 7174 0N **Development of a dynamic optical tomographic breast imaging system with digital detection techniques** [7174-29]  
M. L. Flexman, J. M. Masciotti, M. Khalil, A. Ling, Columbia Univ. (United States); R. Al Abdi, R. L. Barbour, Downstate Medical Ctr., SUNY (United States); A. H. Hielscher, Columbia Univ. (United States)

---

**SESSION 6 BREAST CANCER DIAGNOSIS II: CLINICAL STUDIES**

---

- 7174 0S **Pressure-enhanced near-infrared breast imaging: toward cancer patient imaging** [7174-34]  
S. Jiang, B. W. Pogue, A. M. Laughney, K. D. Paulsen, Dartmouth College (United States)

---

**SESSION 7 BREAST CANCER DIAGNOSIS III: CLINICAL STUDIES**

---

- 7174 0U **An optical tomography method that accounts for a tilted chest-wall in breast imaging** [7174-36]  
Y. Ardeshirpour, M. Huang, Q. Zhu, Univ. of Connecticut (United States)
- 7174 0V **Optical mammography: improved sensitivity by combined absorption and fluorescence analysis** [7174-37]  
A. Leproux, M. van der Voort, R. Harbers, W. Verhaegh, L. Bakker, Philips Research (Netherlands); T. Nielsen, B. Brendel, Philips Research (Germany); M. van der Mark, Philips Research (Netherlands)
- 7174 0X **In vivo studies of 144 breast masses by phase contrast diffuse optical tomography** [7174-39]  
R. Jiang, X. Liang, Q. Zhang, S. R. Grobmyer, Univ. of Florida (United States); L. L. Fajardo, The Univ. of Iowa (United States); H. Jiang, Univ. of Florida (United States)

---

**SESSION 8 FLUORESCENCE IMAGING/SPECTROSCOPY I: ALGORITHM/TOMOGRAPHY**

---

- 7174 0Z **Numerical comparison of different penalty modified barrier functions for optical tomography problems** [7174-41]  
R. Roy, The Univ. of Texas-Pan American (United States)
- 7174 10 **Implementation of the radiative transfer equation on block-structured grids for modeling fluorescence light propagation in tissue with arbitrary shape** [7174-42]  
L. D. Montejo, A. D. Klose, A. H. Hielscher, Columbia Univ. (United States)

- 7174 13 **An information-theoretic treatment of fluorescent molecular tomography** [7174-45]  
P. Mohajerani, A. Behrooz, A. Adibi, Georgia Institute of Technology (United States)

---

**SESSION 9 FLUORESCENCE IMAGING/SPECTROSCOPY II: SMALL ANIMAL IMAGING**

---

- 7174 15 **A high sensitivity multi-spectral three-dimensional fluorescence optical tomography system for small animal imaging** [7174-47]  
C. Li, G. S. Mitchell, Univ. of California, Davis (United States); J. Dutta, S. Ahn, R. M. Leahy, Univ. of Southern California (United States); S. R. Cherry, Univ. of California, Davis (United States)
- 7174 16 **Near infrared fluorescence imaging of small animals with simultaneously estimated structural information** [7174-48]  
N. C. Biswal, J. Gamelin, Univ. of Connecticut (United States); B. Yuan, The Catholic Univ. of America (United States); J. M. Backer, SibTech, Inc. (United States); Q. Zhu, Univ. of Connecticut (United States)

---

**SESSION 10 FLUORESCENCE IMAGING/SPECTROSCOPY III: INSTRUMENTATION**

---

- 7174 19 **Sensor optimization for fluorescence optical tomography by experimental design methods** [7174-51]  
M. Freiburger, H. Scharfetter, Graz Univ. of Technology (Austria)
- 7174 1A **Three-dimensional localization of discrete fluorescent inclusions from multiple tomographic projections in the time-domain** [7174-52]  
J. Pichette, É. Lapointe, Y. Bérubé-Lauzière, Univ. de Sherbrooke (Canada)
- 7174 1B **Multi-projection based fluorescence optical tomography using a hand-held probe based optical imager** [7174-53]  
J. Ge, S. J. Erickson, A. Godavarty, Florida International Univ. (United States)

---

**SESSION 11 BRAIN, NEURO, AND FUNCTIONAL IMAGING I**

---

- 7174 1C **Near-infrared signals associated with electrical stimulation of peripheral nerves (Invited Paper)** [7174-01]  
S. Fantini, D. K. Chen, Tufts Univ. (United States); J. M. Martin, Tufts Univ. (United States) and Boston Univ. (United States); A. Sassaroli, Tufts Univ. (United States); P. R. Bergethon, Boston Univ. (United States)
- 7174 1H **Application of near-infrared spectroscopy for discrimination of mental workloads** [7174-06]  
A. Sassaroli, F. Zheng, M. Coutts, L. H. Hirshfield, A. Girouard, E. T. Solovey, R. J. K. Jacob, Tufts Univ. (United States); Y. Tong, B. deB. Frederick, McLean Hospital (United States); S. Fantini, Tufts Univ. (United States)

---

**SESSION 12      BRAIN, NEURO, AND FUNCTIONAL IMAGING II**

---

- 7174 1J      **Depth sensitivity analysis of high-density imaging arrays for mapping brain function with diffuse optical tomography** [7174-08]  
H. Dehghani, Univ. of Exeter (United Kingdom); B. R. White, Washington Univ. in St. Louis School of Medicine (United States) and Washington Univ. in St. Louis (United States); B. W. Zeff, Washington Univ. in St. Louis School of Medicine (United States); A. Tizzard, Middlesex Univ. (United Kingdom); J. P. Culver, Washington Univ. in St. Louis School of Medicine (United States) and Washington Univ. in St. Louis (United States)
- 7174 1L      **Functional brain tomography using a time-gated ICCD camera** [7174-10]  
A. Pifferi, IIT, ULTRAS-INFM-CNR, and IFN-CNR, Politecnico di Milano (Italy); Q. Zhao, Istituto Italiano di Tecnologia (Italy); L. Spinelli, A. Bassi, G. Valentini, D. Contini, R. Cubeddu, A. Torricelli, IIT, ULTRAS-INFM-CNR, and IFN-CNR, Politecnico di Milano (Italy)

---

**POSTER SESSION**

---

- 7174 1M      **Measurement of brain activation difference during different mathematical tasks by near infrared spectroscopy** [7174-05]  
N. Okamoto, Osaka Univ. (Japan) and Japan Society for the Promotion of Science (Japan); Y. Kuroda, Bukkyo Univ. (Japan); B. Chance, S. Nioka, Univ. of Pennsylvania (United States); H. Eda, The Graduate School for the Creation of New Photonics Industries (Japan); T. Maesako, Osaka Univ. (Japan)
- 7174 1N      **Multicolor frequency-domain diffuse optical tomography for detection of breast cancer** [7174-28]  
A. G. Orlova, V. A. Kamensky, G. Yu. Golubiatnikov, Institute of Applied Physics (Russian Federation); A. V. Maslennikova, Institute of Applied Physics (Russian Federation) and Nizhny Novgorod State Medical Academy (Russian Federation); V. I. Plehanov, N. M. Shakhova, M. S. Kleshnin, I. V. Turchin, Institute of Applied Physics (Russian Federation)
- 7174 1O      **Time-domain fluorescence molecular tomography based on experimental data** [7174-58]  
L. Zhang, J. Li, F. Gao, H. He, H. Zhao, Tianjin Univ. (China)
- 7174 1P      **Fast inverse Monte Carlo simulation for extracting the optical properties of cylindrical tissue** [7174-59]  
H. Zhao, X. Zhou, H. Li, J. Ma, K. Xu, Tianjin Univ. (China)
- 7174 1R      **Enhancing time-domain optical mammography by relocating optodes** [7174-61]  
Y. Ma, J. Wang, F. Gao, F. Yang, H. Zhao, Tianjin Univ. (China); Y. Tanikawa, National Institute of Advanced Industrial Science and Technology (Japan)
- 7174 1S      **A continuous-wave mode elliptic-region-based DOT methodology based on BEM-diffusion modeling** [7174-62]  
P. Ruan, Y. Liu, F. Gao, H. Zhao, M. Jin, Tianjin Univ. (China)
- 7174 1T      **Optical tomographic imaging of breast with time-domain detection: methodology and phantom validation** [7174-63]  
F. Yang, M. Jin, F. Gao, H. Zhao, Tianjin Univ. (China); Y. Tanikawa, National Institute of Advanced Industrial Science and Technology (Japan)

- 7174 1U **In vivo trans-rectal ultrasound coupled trans-rectal near-infrared optical tomography of canine prostate bearing transmissible venereal tumor** [7174-64]  
Z. Jiang, G. R. Holyoak, K. E. Bartels, J. W. Ritchey, G. Xu, C. F. Bunting, Oklahoma State Univ. (United States); G. Slobodov, Univ. of Oklahoma Health Sciences Ctr. (United States); J. S. Krasinski, D. Piao, Oklahoma State Univ. (United States)
- 7174 1W **Time-resolved polarization-dependent native near infrared spectral wing emission of human cancerous and normal prostate tissues** [7174-66]  
Y. Pu, W. B. Wang, B. B. Das, R. R. Alfano, City College, CUNY (United States)
- 7174 1X **Time-resolved fluorescence tomography in cancer research: backward versus toward geometry** [7174-67]  
L. Guyon, L. Hervé, J. Boutet, M. Debourdeau, N. Djaker, A. da Silva, P. Peltié, J.-M. Dinten, P. Rizo, Commissariat à l'Energie Atomique (France)
- 7174 1Y **Biophysical interpretation and ex vivo characterization of scattered light from tumor-associated breast stroma** [7174-68]  
A. Laughney, V. Krishnaswamy, Dartmouth College (United States); M. Schwab, W. A. Wells, Dartmouth Hitchcock Medical Ctr. (United States); K. D. Paulsen, B. W. Pogue, Dartmouth College (United States)
- 7174 1Z **Visualization of children's mathematics solving process using near infrared spectroscopic approach** [7174-69]  
Y. Kuroda, Bukkyo Univ. (Japan); N. Okamoto, Osaka Univ. (Japan) and Japan Society for the Promotion of Science (Japan); B. Chance, S. Nioka, Univ. of Pennsylvania (United States); H. Eda, The Graduate School for the Creation of New Photonics Industries (Japan); T. Maesako, Osaka Univ. (Japan)
- 7174 20 **Multidistance probe arrangement to eliminate motion artifacts in fNIRS** [7174-70]  
T. Yamada, S. Umeyama, K. Matsuda, National Institute of Advanced Industrial Science and Technology (Japan)
- 7174 22 **Frequency domain 3D simplified spherical harmonics approximation: development, validation, and implication in bioluminescence imaging** [7174-72]  
M. Chu, The Univ. of Exeter (United Kingdom); A. D. Klose, Columbia Univ. (United States); I. B. Styles, Univ. of Birmingham (United Kingdom); K. Vishwanath, Duke Univ. (United States); H. Dehghani, The Univ. of Exeter (United Kingdom)
- 7174 24 **Accuracy of the nonlinear fitting procedure for time-resolved measurements on diffusive phantoms at NIR wavelengths** [7174-74]  
L. Spinelli, IIT, ULTRAS-INFM-CNR and IFN-CNR, Politecnico di Milano (Italy); F. Martelli, Univ. degli Studi di Firenze (Italy); A. Farina, A. Pifferi, A. Torricelli, R. Cubeddu, IIT, ULTRAS-INFM-CNR and IFN-CNR, Politecnico di Milano (Italy); G. Zaccanti, Univ. degli Studi di Firenze (Italy)
- 7174 29 **An all-at-once reduced Hessian SQP algorithm for frequency domain optical tomography** [7174-79]  
H. K. Kim, X. Gu, A. H. Hielscher, Columbia Univ. (United States)



- 7174 2B **Optimal modulation frequencies for small-tissue imaging based on the equation of radiative transfer** [7174-81]  
H. K. Kim, Columbia Univ. (United States); U. J. Netz, J. Beuthan, Charité Universitätsmedizin Berlin (Germany); A. H. Hielscher, Columbia Univ. (United States)
- 7174 2C **Multispectral and phase-contrast diffuse optical tomography of breast cancer during neoadjuvant chemotherapy: a case study** [7174-82]  
X. Liang, Q. Zhang, S. Staal, S. Grobmyer, H. Jiang, Univ. of Florida (United States)
- 7174 2D **Three-dimensional diffuse optical imaging of finger joints based on simplified spherical harmonics approximated-radiative transport model** [7174-83]  
Z. Yuan, Q. Zhang, E. Sobel, H. Jiang, Univ. of Florida (United States)
- 7174 2F **Calibration of redox scanning for tissue samples** [7174-85]  
H. N. Xu, B. Wu, S. Nioka, B. Chance, L. Z. Li, The Univ. of Pennsylvania (United States)
- 7174 2G **Video-rate near infrared tomography for imaging thick tissue with dynamically varying absorption properties** [7174-86]  
Z. Li, V. Krishnaswamy, K. D. Paulsen, B. W. Pogue, Dartmouth College (United States)
- 7174 2H **Histologic models for optical tomography and spectroscopy of tissues** [7174-87]  
R. Bhargava, B. J. Davis, Univ. of Illinois at Urbana-Champaign (United States)
- 7174 2L **Brcal/p53 deficient mouse breast tumor hemodynamics during hyperoxic respiratory challenge monitored by a novel wide-field functional imaging (WiFi) system** [7174-97]  
A. Moy, Beckman Laser Institute and Medical Clinic (United States) and Univ. of California, Irvine (United States); J. G. Kim, Beckman Laser Institute and Medical Clinic (United States); E. Y. H. P. Lee, Univ. of California, Irvine (United States); B. Tromberg, Beckman Laser Institute and Medical Clinic (United States) and Univ. of California, Irvine (United States); A. Cerussi, Beckman Laser Institute and Medical Clinic (United States); B. Choi, Beckman Laser Institute and Medical Clinic (United States) and Univ. of California, Irvine (United States)

*Author Index*



# 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 School of Medicine (United States)

## *Program Track Chairs*

**Tuan Vo-Dinh**, Duke University (United States)  
**Anita Mahadevan-Jansen**, Vanderbilt University (United States)

## *Conference Chairs*

**Bruce J. Tromberg**, Beckman Laser Institute and Medical Clinic (United States)  
**Arjun G. Yodh**, University of Pennsylvania (United States)  
**Mamoru Tamura**, Hokkaido University (Japan)  
**Eva M. Sevick-Muraca**, Baylor College of Medicine (United States)  
**Robert R. Alfano**, City College, CUNY (United States)

## *Program Committee*

**Samuel Achilefu**, Washington University in St. Louis (United States)  
**David A. Boas**, Massachusetts General Hospital (United States)  
**Sergio Fantini**, Tufts University (United States)  
**Marco Ferrari**, Università degli Studi dell'Aquila (Italy)  
**Amir H. Gandjbakhche**, National Institutes of Health (United States)  
**Jeremy C. Hebden**, University College London (United Kingdom)  
**Andreas H. Hielscher**, Columbia University (United States)  
**Brian W. Pogue**, Dartmouth College (United States)  
**Quing Zhu**, University of Connecticut (United States)

## *Session Chairs*

- 1 Theory, Algorithms, and Modeling I  
**Andreas H. Hielscher**, Columbia University (United States)  
**Hamid Dehghani**, The University of Exeter (United Kingdom)
- 2 Instrumentation and Algorithms  
**Amir H. Gandjbakhche**, National Institutes of Health (United States)  
**Andreas H. Hielscher**, Columbia University (United States)

- 3 Advances in Instrumentation and Technology  
**Brian W. Pogue**, Dartmouth College (United States)
- 4 Preclinical/Clinical Applications  
**Hanli Liu**, The University of Texas at Arlington (United States)  
**Regine Choe**, University of Pennsylvania (United States)
- 5 Breast Cancer Diagnosis I: Instrumentation  
**Sergio Fantini**, Tufts University (United States)
- 6 Breast Cancer Diagnosis II: Clinical Studies  
**Quing Zhu**, University of Connecticut (United States)
- 7 Breast Cancer Diagnosis III: Clinical Studies  
**Mamoru Tamura**, Hokkaido University (Japan)
- 8 Fluorescence Imaging/Spectroscopy I: Algorithm/Tomography  
**Vasilis Ntziachristos**, Massachusetts General Hospital (United States)
- 9 Fluorescence Imaging/Spectroscopy II: Small Animal Imaging  
**Eva M. Sevick-Muraca**, Baylor College of Medicine (United States)
- 10 Fluorescence Imaging/Spectroscopy III: Instrumentation  
**Robert R. Alfano**, City College, CUNY (United States)
- 11 Brain, Neuro, and Functional Imaging I  
**David A. Boas**, Massachusetts General Hospital (United States)
- 12 Brain, Neuro, and Functional Imaging II  
**David A. Boas**, Massachusetts General Hospital (United States)