# Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>vii</td>
<td>Conference Committee</td>
</tr>
<tr>
<td>ix</td>
<td>Introduction</td>
</tr>
</tbody>
</table>

## SESSION 1  ADVANCES IN SPECTROSCOPIC IMAGING AND MICROSCOPY

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>7171 03</td>
<td>Image-guided near infrared spectroscopy using boundary element method: phantom validation [7171-02]</td>
<td>S. Srinivasan, C. Carpenter, B. W. Pogue, K. D. Paulsen, Dartmouth College (United States)</td>
</tr>
<tr>
<td>7171 04</td>
<td>Bioluminescence tomography using spectral techniques [7171-03]</td>
<td>H. Dehghani, Univ. of Exeter (United Kingdom); S. C. Davis, B. W. Pogue, Dartmouth College (United States)</td>
</tr>
<tr>
<td>7171 05</td>
<td>Incorporation of magnetic resonance water-fat separation into MR-guided near-infrared spectroscopy in the breast [7171-04]</td>
<td>C. M. Carpenter, B. W. Pogue, K. D. Paulsen, Dartmouth College (United States)</td>
</tr>
<tr>
<td>7171 06</td>
<td>Imaging protoporphyrin IX fluorescence with a time-domain FMT/microCT system [7171-05]</td>
<td>F. Leblond, D. Kepshire, J. A. O'Hara, Dartmouth College (United States); H. Dehghani, Univ. of Exeter (United Kingdom); S. Srinivasan, Dartmouth College (United States); N. Mincu, M. Hutchins, M. Khayat, ART Advanced Research Technologies, Inc. (Canada); B. W. Pogue, Dartmouth College (United States)</td>
</tr>
</tbody>
</table>

## SESSION 2  ANALYSIS AND RECONSTRUCTION TECHNIQUES

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>7171 07</td>
<td>Wavelength optimization in spectral near-infrared optical tomography [7171-06]</td>
<td>M. E. Eames, Univ. of Exeter (United Kingdom); J. Wang, B. W. Pogue, Dartmouth College (United States); H. Dehghani, Univ. of Exeter (United Kingdom)</td>
</tr>
<tr>
<td>7171 08</td>
<td>An extensible imaging platform for optical imaging applications (Invited Paper) [7171-07]</td>
<td>G. Paladini, F. S. Azar, Siemens Corporate Research (United States)</td>
</tr>
<tr>
<td>7171 09</td>
<td>Application of a multicompartment dynamical model to multimodal optical imaging for investigating individual cerebrovascular properties [7171-08]</td>
<td>M. Desjardins, L. Gagnon, Ecole Polytechnique de Montréal (Canada) and Ctr. de recherche de l’Institut Univ. de gériatrie de Montréal (Canada); C. Gauthier, R. D. Hoge, Ctr. de recherche de l’Institut Univ. de gériatrie de Montréal (Canada); M. Dehaes, Ecole Polytechnique de Montréal (Canada) and Ctr. de recherche de l’Institut Univ. de gériatrie de Montréal (Canada); L. Desjardins-Crépeau, L. Bherer, Ctr. de recherche de l’Institut Univ. de gériatrie de Montréal (Canada) and Univ. du Québec à Montréal (Canada); F. Lesage, Ecole Polytechnique de Montréal (Canada) and Ctr. de recherche de l’Institut Univ. de gériatrie de Montréal (Canada)</td>
</tr>
</tbody>
</table>
A coupled radiative transfer and diffusion approximation model for the solution of the forward problem and the a-priori fluorophore distribution estimation in fluorescence imaging [7171-09]
D. Gorpas, D. Yova, K. Politopoulos, National Technical Univ. of Athens (Greece)

Optical tomographic detection of rheumatoid arthritis with computer-aided classification schemes [7171-11]
C. D. Klose, A. D. Klose, Columbia Univ. (United States); U. Netz, J. Beuthan, Charité - Universitätsmedizin Berlin (Germany); A. H. Hielscher, Columbia Univ. (United States)

SESSION 3 MULTIMODALITY IMAGING

Advances in bi-modal optical and ultrasound detection of prostate cancer diagnosis [7171-13]
J. Boutet, L. Guyon, M. Debourdeau, J-M. Dinten, CEA, LETI, MINATEC (France); D. Vray, CREATIS, INSA (France); P. Rizo, CEA, LETI, MINATEC (France)

Development of a continuous-wave dual-band trans-rectal optical tomography system for concurrent sagittal imaging with trans-rectal ultrasound [7171-15]
Z. Jiang, H. Xie, D. Piao, J. S. Krasinski, Oklahoma State Univ. (United States)

SESSION 4 BREAST IMAGING

Breast cancer targeting novel microRNA-nanoparticles for imaging [7171-22]
A. Natarajan, S. K. Venugopal, S. J. DeNardo, M. A. Zern, Univ. of California Davis Medical Ctr. (United States)

POSTER SESSION

Optical coherence tomography and Raman spectroscopy of the retina [7171-23]
J. W. Evans, Lawrence Livermore National Lab. (United States), Vision Science and Advanced Retinal Imaging Lab., Univ. of California, Davis (United States), and NSF Ctr. for Biophotonics Science and Technology, Univ. of California, Davis (United States); R. J. Zawadzki, Vision Science and Advanced Retinal Imaging Lab., Univ. of California, Davis (United States); R. Liu, NSF Ctr. for Biophotonics Science and Technology, Univ. of California, Davis (United States); J. W. Chan, Lawrence Livermore National Lab. (United States) and NSF Ctr. for Biophotonics Science and Technology, Univ. of California, Davis (United States); S. M. Lane, NSF Ctr. for Biophotonics Science and Technology, Univ. of California, Davis (United States); J. S. Werner, Vision Science and Advanced Retinal Imaging Lab., Univ. of California, Davis (United States)
Comparison of hemodynamic response non-linearity using simultaneous near infrared spectroscopy and magnetic resonance imaging modalities [7171-24]
R. Parlapalli, V. Sharma, Univ. of Texas, Arlington (United States); K. S. Gopinath, R. W. Briggs, Univ. of Texas, Southwestern Medical Ctr. (United States); H. Liu, Univ. of Texas, Arlington (United States)

Instrumentation for simultaneous magnetic resonance and optical tomographic imaging of the rodent brain [7171-25]
J. M. Masciotti, J. Lee, Columbia Univ. (United States); M. Stewart, SUNY Downstate Medical Ctr. (United States); A. H. Hielscher, Columbia Univ. (United States)

A hierarchical spatial prior approach for prostate image reconstruction in trans-rectal optical tomography [7171-27]
G. Xu, C. F. Bunting, Oklahoma State Univ. (United States); H. Dehghani, Univ. of Exeter (United Kingdom); D. Piao, Oklahoma State Univ. (United States)

Simultaneous measurements of optical coherence tomography and fluorescence spectroscopy based on double clad fiber [7171-28]
S. Y. Ryu, H. Y. Choi, J. Na, Gwangju Institute of Science and Technology (Korea, Republic of); E. S. Choi, Chosun Univ. (Korea, Republic of); B. H. Lee, Gwangju Institute of Science and Technology (Korea, Republic of)

An approach to parameter estimation for breast tumor by finite element method [7171-29]
A. Xu, H. Yang, Fujian Normal Univ. (China); Z. Ye, Y. Su, Fujian Medical Univ. (China); S. Xie, Fujian Normal Univ. (China)

Refractive index mapping of layered samples using optical coherence refractometry [7171-30]
M. Tedaldi, P. Woolliams, C. Hart, A. Beaumont, P. Tomlins, National Physical Lab. (United Kingdom)

Spatial-temperature high resolution map for early cancer diagnosis [7171-31]
G. V. Gavriloaia, Univ. of Pitesti (Romania); A. Hurduc, Oncologic Institute of Bucharest (Romania); A.-M. Ghimigean, Endocrinologic Institute of Bucharest (Romania); R. Fumarel, Oncologic Institute of Bucharest (Romania)

Quality assessment for spectral domain optical coherence tomography (OCT) images [7171-32]

Statistical pattern recognition algorithms for autofluorescence imaging [7171-33]
Z. Kulas, E. Bereś-Pawlik, Wroclaw Univ. of Technology (Poland); J. Wierzbicki, Wroclaw Medical Univ. (Poland)

Imaging retinal degeneration in mice by combining Fourier domain optical coherence tomography and fluorescent scanning laser ophthalmoscopy [7171-34]
N. Hossein-Javaheri, Simon Fraser Univ. (Canada); L. L. Molday, Univ. of British Columbia (Canada); J. Xu, Simon Fraser Univ. (Canada); R. S. Molday, Univ. of British Columbia (Canada); M. V. Sarunic, Simon Fraser Univ. (Canada)
Unmixing multiple markers with spectral lifetime measurements [7171-37]
K. Tasimi, X. Intes, B. Roysam, Rensselaer Polytechnic Institute (United States)

Diffuse optical tomography with time-gated perturbation Monte Carlo method [7171-38]
J. Chen, V. Venugopal, X. Intes, Rensselaer Polytechnic Institute (United States)

Quantifying optical properties in small animals using MR-guided multispectral time-resolved imaging [7171-39]
V. Venugopal, J. Chen, X. Intes, Rensselaer Polytechnic Institute (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

Fred S. Azar, Siemens Corporate Research (United States)
Xavier Intes, Rensselaer Polytechnic Institute (United States)

Program Committee

Nicholas Ayache, INRIA Sophia Antipolis (France)
David A. Boas, Massachusetts General Hospital (United States)
Britton Chance, University of Pennsylvania (United States)
Sergio Fantini, Tufts University (United States)
Keyvan Farahani, National Institutes of Health (United States)
Gultekin Gulsen, University of California, Irvine (United States)
Mario Khayat, ART Advanced Research Technologies Inc. (Canada)
Dimitris N. Metaxas, Rutgers University (United States)
Nassir Navab, Technische Universität München (Germany)
Tim Nielsen, Philips Research (Germany)
Vasilis Ntziachristos, Helmholtz Zentrum München, GmbH (Germany)
Brian W. Pogue, Dartmouth College (United States)
Birsen Yazıcı, Rensselaer Polytechnic Institute (United States)
Arjun G. Yodh, University of Pennsylvania (United States)

Session Chairs

1 Advances in Spectroscopic Imaging and Microscopy
Xavier Intes, Rensselaer Polytechnic Institute (United States)
Hamid Dehghani, The University of Birmingham (United Kingdom)
2 Analysis and Reconstruction Techniques
Xavier Intes, Rensselaer Polytechnic Institute (United States)
Qianqian Fang, Massachusetts General Hospital (United States)

3 Multimodality Imaging
Fred S. Azar, Siemens Corporate Research (United States)
Regine Choe, University of Pennsylvania (United States)

4 Breast Imaging
Fred S. Azar, Siemens Corporate Research (United States)
Albert E. Cerussi, Beckman Laser Institute and Medical Clinic (United States)
Introduction

Data generated by novel imaging technologies such as optical tomography are complex to analyze, due to the inherent scattering of light through anatomical systems. Cross validation and direct comparison with established methods in other imaging modalities are especially challenging. There is critical need for new computational techniques to provide rapid, accurate and cost-effective means for quantification and characterization of such data, either independently or integrated with other modalities. These computational methods will enable faster acceptance of novel imaging modalities into viable clinical and/or pre-clinical systems. The applications are diverse and range from imaging at the cellular level to the whole body while incorporating molecular, functional and anatomical information. The conference objectives are to provide a forum (1) to review and share recent developments in novel multimodal imaging techniques, (2) to report development of novel computational methods, and (3) to bring together the optical imaging and image analysis communities. Topics include, but are not limited to:

- multimodal imaging integrating structural, molecular and functional information
- 2D, 3D, 4D, tomographic and/or multi-spectral imaging
- imaging analysis and/or image processing techniques applied to optical imaging (e.g. visualization, segmentation, registration)
- detection and diagnostic analysis techniques which may provide better quantitative and/or diagnostic insight into clinical and pre-clinical imaging (e.g. methods for quantitative measurements, computer-assisted diagnosis…)
- imaging analysis and/or image processing techniques used to combine optical imaging with other imaging modalities (e.g. MR, X-Ray, PET…)
- image analysis, computational methods and reconstruction approaches which may help bring optical imaging into the clinic (visual rendering of complex data set, novel algorithms for assisted optical reconstruction, …)
- Clinical evaluation of these new technologies (Physiological and functional interpretation of image data, visual perception and observer performances, validation of quantitative assessment of optical signatures in-vivo…).

Fred S. Azar
Xavier Intes