

Program

Advances in Optics for Biotechnology, Medicine and Surgery XIII

June 2 - 5, 2013

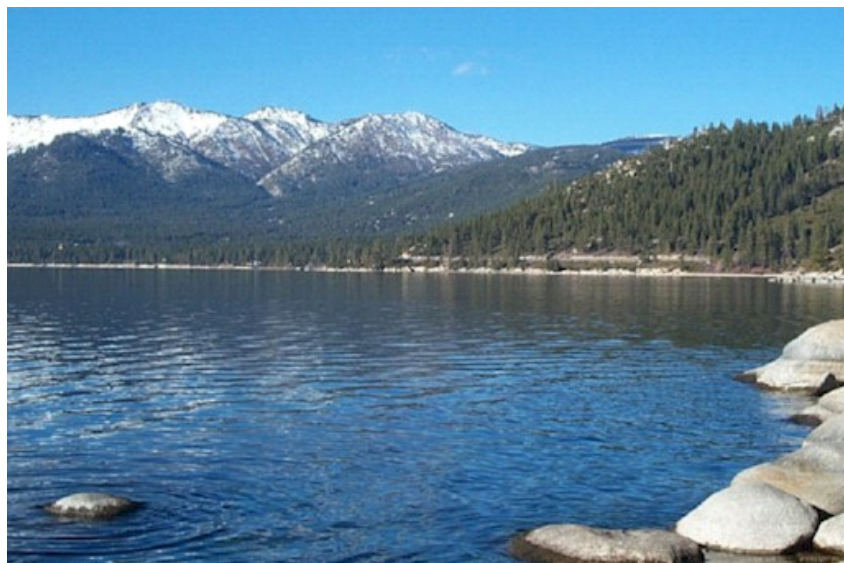
Granlibakken Conference Center and Lodge, Lake Tahoe, CA

Conference Co-Chairs:

**James W. Tunnell
University of Texas at Austin, USA**

**Maryann Fitzmaurice
Case Western Reserve University, USA**

**A. Claude Boccara
ESPCI-ParisTech, France**



Engineering Conferences International

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Conference Chairs

James W. Tunnell, University of Texas at Austin

James W. Tunnell is an Associate Professor in the Department of Biomedical Engineering at the University of Texas at Austin. He earned a BS in electrical engineering from the University of Texas at Austin in 1998 and a Ph.D. in bioengineering from Rice University in 2003. He was awarded a National Research Service Award from the NIH to fund his postdoctoral fellowship in the Spectroscopy Laboratory at the Massachusetts Institute of Technology from 2003-2005. He joined the faculty of the University of Texas in the fall of 2005.

Dr. Tunnell's research focuses in the broad field of biomedical optics with a specific focus on using optical spectroscopy and imaging for disease diagnosis and treatment, particularly that of cancer. Dr. Tunnell has received the following awards/honors: Outstand BME Graduate Alumnus from Rice University (2010), Coulter Fellow (2010), Ralph E. Powe Junior Faculty Enhancement Award from the Oak Ridge Associated Universities (2007), Early Career Award from the Wallace H. Coulter Foundation (2008, 2006), National Research Service Award from the NIH (2004), and Best Basic Science Paper from the American Society for Laser Medicine and Surgery (2000). He has published over 60 referred journal articles, proceedings and book chapters, presented papers at more than 100 international and national conferences, and edited one book. He is an Associate Editor for the Annals of Biomedical Engineering. He has served on the program committees for CLEO, OSA, and IEEE-LEOS and as the General Chair of 2012 CLEO annual meeting. He is a member of OSA, ASLMS, IEEE-EMBS, and BMES.



Maryann Fitzmaurice, Case Western Reserve University

Maryann Fitzmaurice is Senior Research Associate and Adjunct Associate Professor of Pathology in the School of Medicine at Case Western Reserve University (CWRU), Cleveland, OH. She is an alumnus of the Medical Scientist Training Program at CWRU, where she awarded a PhD in Experimental Pathology in 1982 and MD in 1983. She is director of the Diagnostic Optical Spectroscopy and Imaging Laboratory in the Institute of Pathology at CWRU. She is a long time collaborator with and Chief Medical Advisor to the Laser Biomedical Research Center, Massachusetts Institute of Technology, Cambridge, MA. Dr. Fitzmaurice has 25 years of experience in the clinical practice of diagnostic surgical pathology. Her research focuses on the development of instrumentation and data analysis techniques for real time, in vivo, disease diagnosis and imaging using optical spectroscopy, most recently on applications of Raman, fluorescence and diffuses reflectance to the diagnosis of breast cancer and vulnerable atherosclerotic plaque.



A. Claude Boccara, ESPCI-ParisTech

Professor A. Claude Boccara was Dean of Research at ESPCI-ParisTech up to January 2009 with Pierre-Gilles de Gennes and Jacques Prost. He has been involved in light-condensed matter interactions for both basic and applied purposes. He introduced new instruments and methods mostly limited in their performances by physical laws. Spectroscopic polarization based approaches for condensed materials have been developed and the associated instrumentation (dichrometers and polarimeters) is still produced by industrial partners. Then, both for spectroscopic application in "exotic" cases (strongly or very weakly absorbing samples) and local thermal characterization of materials (down to the micron scale) he developed a full range of photothermal approaches ("Mirage", Photothermal Microscope, Interferometers, IR Microscope...). This technique has been successfully applied to pollution monitoring as well as to ceramics characterization. Among these methods new kind of microscopies have been developed to increase depth and lateral resolution much below subwavelength limits (picometers in depth and nanometers in lateral) so, understanding the physics of small objects has been one of his goals. Recently, optical approaches to ultimate measurements have found new fields of application going from optical detection of gravitational waves (VIRGO project) to 3-D imaging through scattering media (like biological tissues). A.C. Boccara has published more than 300 scientific contributions (*ISI/ Boccara A* or Boccara C*) in international journals, 11 national or international awards and an H index of 44. He is one of the founders of the imaging company LLTech.



Program Committee

- **Bernard Choi**, Beckman Laser Institute and Medical Clinic, University of California, Irvine, USA
- **Amir Gandjbakhche**, National Institute of Child Health and Human Development, National Institutes of Health, USA
- **Vasilis Ntziachristos**, Institute for Biological and Medical Imaging, Technical University of Munich, Germany
- **Brian Pogue**, Thayer School of Engineering, Dartmouth College, USA
- **Gabriel Popescu**, Beckman Institute for Advanced Science and Technology, University of Illinois, Urbana-Champaign, USA
- **Nimmi Ramanujam**, Biomedical Engineering, Duke University, USA
- **Guillermo Tearney**, Massachusetts General Hospital, Harvard Medical School, USA
- **Bruce Tromberg**, Beckman Laser Institute and Medical Clinic, University of California, Irvine, USA
- **Thomas Wang**, Department of Internal Medicine and Biomedical Engineering, University of Michigan, USA
- **Brian Wilson**, Department of Medical Physics, Ontario Cancer Institute, University of Toronto, Canada
- **Changhuei Yang**, Department of Electrical and Bioengineering, California Institute of Technology, USA

June 2, 2013

12:15 - 14:15 Conference Registration (Foyer of Mountain Lake Room)

14:15 – 14:30 Opening remarks
Conference Chairs and ECI Liaison

Session 1: Optical Therapeutics

Session Chair: Bernard Choi (Beckman Laser Institute, University of California, Irvine)

14:30 – 14:45 Introduction and Questions

14:45 – 15:20 Gold nanoparticle mediated photothermal therapy and cancer immunotherapy in vivo
Adam Lin, Rice University

15:20 – 15:55 Image-guided ultrafast laser scalpel for precise, selective, & minimally invasive surgery
Adela Ben Yakar, University of Texas at Austin

16:30 – 17:05 Photochemotherapy of vascular birthmarks in human skin
Stuart Nelson, Beckman Laser Institute, University of California, Irvine

17:05 – 17:35 Welcome Reception (Garden Deck, weather permitting)

17:35 – 18:45 Dinner

Session 2: Endoscopic Microscopy in the Clinic

Session Chair: Guillermo Tearney (Wellman Center for Photomedicine-MGH)

18:45 – 19:00 Introduction and Questions

19:00 – 19:35 Tethered capsule endomicroscopy - a new paradigm for clinical GI imaging
Guillermo Tearney, Harvard University

19:35 – 20:10 Clinical applications of lower GI endomicroscopy
Jenny Sauk, Massachusetts General Hospital

20:10 – 20:45 Medical applications of confocal laser endomicroscopy in gastroenterology: Where do we stand?
Emmanuel Coron, University of Nantes

20:45 – 22:00 **Poster Session / Social Hour**
(sponsored by Hamamatsu Corporation)

NOTES

- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Please do not smoke at any conference functions.
- Turn your mobile phones to vibrate or off during technical sessions.
- Technical Sessions will be in the Mountain Lake Room.
- Poster sessions will be in the Bay Room
- Meals will be in the Granhall. If weather permits, meals will be outside on the Garden Deck.
- Be sure to check your contact information on the Participant List in this program and make any corrections to your name/contact information online. A corrected copy will be sent to all participants after the conference.
- Speakers – Please leave at least 5 minutes for questions and discussion. Be available for discussion during meals and social periods

June 3, 2013

07:00 – 08:30 Breakfast

Session 3: Clinical imaging and spectroscopy I

Session Chair: Brian Pogue (Dartmouth College)

08:30 – 08:45 Introduction and Questions

08:45 – 09:20 Detecting precancerous epithelial tissues with a/LCI
Adam Wax, Duke University

09:20 – 09:55 Spectroscopic imaging for the detection and discrimination of surgical breast pathologies
Ashley Laughney, Harvard University

09:55 – 10:30 Twenty years of functional near infrared spectroscopy of human brain activity
David Boas, Martinos Center for Biomedical Imaging, Harvard University

10:30 – 11:00 Coffee Break

Hot Topics Session

(Podium presentations of selected poster abstracts)

Session chair: Brian Wilson (University of Toronto, Toronto, Canada)

11:00 – 11:10 Scalable gigapixel microscopy imaging
Guoan Zheng, California Institute of Technology

11:10 – 11:20 Robust fluence correction in photoacoustics by adding acousto-optics
Wiendelt Steenbergen, University of Twente

11:20 – 11:30 Label-free in vivo imaging of leukocytes and their interaction with bacteria
Jianan Y. Qu, Hong Kong University of Science and Technology

11:30 – 11:40 Detection of colitis-associated cancer using a dual modal fluorescence and polarization endoscope
Tauseef Charanya, Washington University in St. Louis

11:40 – 11:50 Point of care biomedical optics 250 miles from earth
Ozzy Mermut, INO

11:50 – 12:00 Miniature, tunable endoscope for in-vivo investigation of middle ear
Michal Pawlowski, Rice University

12:30 – 13:45 Lunch

13:45 – 15:30 **Poster Session with coffee**

15:30 – 18:00 Free time (organized sport/ social networking events)

18:00 – 19:30 Dinner

Session 4: Commercializing optical technologies

Session Chair: Bruce Tromberg (Beckman Laser Institute, University of California, Irvine)

19:30 – 19:45 Introduction and Questions

19:45 – 20:20 Embracing open innovation: how engaging in collaborative development can result in new sources of funding and accelerate commercialization
Jason Eichenholtz, Open Photonics Inc.

June 3, 2013 (continued)

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|---------------|---|
| 20:20 – 20:55 | Realizing the promises of biomedical optics in the new millennium
<i>Tom Milner, University of Texas at Austin</i> |
| 20:55 – 21:30 | Commercializing noninvasive diabetes screening: lessons learned on the journey from lab to the end-user
<i>Woody Ediger, Veralight</i> |
| 21:30 – 22:30 | Poster Session / Social Hour |

June 4, 2013

07:00 – 08:30 Breakfast

Session 5: Novel microscopy technologies

Session Chair: Gabriel Popescu (University of Illinois)

08:30 – 08:45 Introduction and Questions

08:45 – 09:20 Adaptive optics from microscopy to nanoscopy
Martin Booth, University of Oxford

09:20 – 09:55 Ultrafast automated image cytometry for cancer detection
Keisuke Goda, University of Tokyo

09:55 – 10:30 Optical coherence microscopy from tissue to molecule
Theo Lasser, Ecole Polytechnique Federale de Lausanne

10:30 – 11:00 Coffee Break

Session 6: Spectroscopic assessment of functional and molecular changes in disease

Session chair: Brian Wilson (University of Toronto, Toronto, Canada)

11:00 – 11:15 Introduction and Questions

11:15 – 11:50 Shining Light on Pancreatic Disease
Mary Ann Mycek, University of Michigan

11:50 – 12:25 Peering through soft tissue to study mouse tibiae: detecting changes in bone quality with Raman spectroscopy
Andrew Berger, University of Rochester

12:25 – 13:00 Characterization of tumor physiology and vascular restructuring in response to therapy using optical spectroscopy and intravital microscopy
Greg Palmer, Duke University

13:00 – 16:00 Free time / Boxed lunches provided

Session 7: Multimodality imaging (optoacoustics & beyond)

Session Chair: Vasilis Ntziachristos (Technical University of Munich, Germany)

16:00 – 16:15 Introduction and Questions

16:15 – 16:50 Breast imaging using photoacoustics: Early experience in Twente
Srirang Manohar, University of Twente

16:50 – 17:25 Advances in optoacoustic imaging: The interferometry viewpoint.
Amir Rosenthal, Helmholtz Zentrum & Technische Universität München

17:25 – 18:00 Faster than the speed of light - Cerenkov imaging
Jan Grimm, Memorial Sloan-Kettering Cancer Center

June 4, 2013 (continued)

18:00 – 19:30 **Session 8: Biophotonics and Federal Funding (Panel Discussion)**
Session Chair: Amir Gandjbakhche (NIH/NICHD)

Panelists: *Richard Conroy, National Institutes of Health (NIBIB)*
Sohi Rastegar, National Science Foundation
Ilko Ilev, US Food and Drug Administration
Yantian Zhang, National Institutes of Health (NCI)

19:30 – 20:00 Reception (Garden Deck, weather permitting)

20:00 – 22:00 Conference Banquet (Granhall)

22:00 – 23:00 **Poster Session / Social Hour**

June 5, 2013

07:00 – 08:30 Breakfast

Session 9: Emerging Optical Technologies

Session Chair: Changhui Yang (California Institute of Technology)

08:30 – 08:45 Introduction and Questions

08:45 – 09:20 Acoustic tweezers: manipulating particles, cells, and organisms using standing surface acoustic waves (SSAW)
Tony Jun Huang, Pennsylvania State University

09:20 – 09:55 Disorder-enhanced imaging
Elbert van Putten, University of Twente

09:55 – 10:30 Plasmonics assisted super resolution imaging
Zhaowei Liu, University of California San Diego

10:30 – 11:00 Coffee Break

Session 10: Clinical Imaging and spectroscopy II

Session Chair: Lihong Wang, Washington University, St. Louis

11:00 – 11:40 Multi-spectral scanning fiber endoscopy in Barrett's esophagus
Eric Seibel, University of Washington

11:40 – 12:20 Photoacoustic tomography: Ultrasonically breaking through the optical diffusion and diffraction limits
Lihong Wang, Washington University, St. Louis

12:20 – 13:00 Diagnostic nodal staging of cancer with nuclear and NIR fluorescence molecular imaging
Eva Sevick, University of Texas Health Science Center at Houston

13:00 – 13:15 Closing Remarks

13:15 – 14:15 Lunch

14:15 Conference Close and Departures

Advances in Optics for Biotechnology, Medicine and Surgery XIII

Poster List

1. **Label-free spectroscopic monitoring of glycemic control**
Ishan Barman, Massachusetts Institute of Technology
2. **Laser speckle contrast imaging of resting-state functional connectivity in mice**
Karla M. Bergonzi, Washington University in St. Louis
3. **Expanded range of optical property measurement using dynamically filtered dmd diffuse optical spectroscopy**
Sheldon F. Bish, The University of Texas at Austin
4. **Influence of the training scheme on the soft tissue classification by near infrared pressure induced spectral response**
Maksimilijan Bregar, University of Ljubljana
5. **Experimental methods for recording stable NIRS measurements from upright alert infants**
Ashley Cannaday, The Institute of Optics
6. **Dual modal fluorescence-polarization endoscope for an in-vivo evaluation of colitis-associated cancer**
Tauseef Charanya, Washington University in St. Louis
7. **Characterizing and optimizing the tissue-imaging performance of confocal microscope architectures via monte-carlo scattering simulations**
Ye Chen, SUNY Stony Brook University
8. **Effect of speckle-to-pixel size ratio on relative flow-speed measurement with laser speckle imaging**
Bernard Choi, University of California, Irvine
9. **Transparent calvarium prosthesis for enhanced optical therapy and imaging of brain tumor**
Yasaman Damestani, University of California, Riverside
10. **Three dimensional simulation of photon propagation in laser speckle contrast imaging**
Mitchell Davis, The University of Texas at Austin
11. **Ultrasound-guided fluorescence tomography for subsurface protoporphyrin IX quantification**
Alisha V. D'Souza, Dartmouth College
12. **Hemodynamic monitoring of spinal cord with diffuse correlation and optical spectroscopies**
Angela D'Souza, Stony Brook University
13. **Near-infrared spectral absorption techniques and oct as an in situ rangefinder probe to locate a neurovascular bundle in dental implant surgeries**
Pascal Gallant, INO -National Optics Institute

14. **Targeted imaging of her-2 over-expressing ovarian cancer cell lineages using viral nanoconstructs doped with indocyanine green**
Yadir A. Guerrero, University of California, Riverside
15. **An inverse model for determining optical properties of multilayered tissues using diffuse reflectance spectroscopy at two source detector distances**
Ricky Hennessy, The University of Texas At Austin
16. **A clinical system for quantitative multi-diameter single fiber reflectance and single fiber fluorescence spectroscopy**
Christopher L. Hoy, Erasmus Medical Center
17. **Optical characterization of hydroxyapatite growth on silk films using simulated body fluid**
Martin Hunter, Tufts University
18. **Dynamic diffuse optical tomography imaging of peripheral arterial disease in the lower extremities**
Michael A. Khalil, Columbia University
19. **White light diffraction tomography of unlabeled live cells**
Taewoo Kim, University of Illinois at Urbana-Champaign
20. **Halo-free phase contrast microscopy**
Taewoo Kim, University of Illinois at Urbana-Champaign
21. **Enhanced imaging speed in swept-source optical coherence tomography with a multi-band demultiplexer**
Hee Yoon Lee, Stanford University
22. **Multi-directional viewing scheme for optical tomography imaging system and multimodality systems using camera-based optical imaging**
Jong Hwan Lee, Columbia university
23. **Modulated alignment dual-axis (MAD) confocal microscopy for deep optical sectioning in tissues**
Steven Y. Leigh, Stony Brook University
24. **Standardization technique of in vivo reflectance and fluorescence spectroscopy measurements of skin**
Liang Lim, The University of Texas At Austin
25. **Raman spectroscopy-based measurement of macroscopic chemical heterogeneity of bone extracted from a mouse model of osteogenesis imperfecta**
Jason R. Maher, University of Rochester
26. **Multimodal optical imaging of patients with oral lesions in a community dental setting**
Sharon M. Mondrik, Rice University
27. **Optical histology: High-resolution visualization of tissue microvasculature**
Austin Moy, University of California, Irvine
28. **Preclinical in-vivo evaluation of combined photodynamic and photothermal therapies on normal microvasculature**
Wesley Moy, University of California, Irvine

29. **Development and validation of a fast single photon avalanche photodiode based time resolved small animal diffuse tomographic imaging system**
Ying Mu, Northeastern University
30. **Pressure optimized high resolution diffuse reflectance spectral imaging for intra-operative margin assessment of breast tissue**
Brandon S. Nichols, Duke University
31. **Quantitative phase microscopy study reveals cellular mechanism of bone development**
Seungeun Oh, Harvard Medical School
32. **Frequency domain photon migration with vertical cavity surface emitting laser sources**
Thomas O'Sullivan, University of California, Irvine
33. **Cell death mechanisms involved in gold nanoparticle-mediated photothermal therapy**
Varun P. Pattani, The University of Texas at Austin
34. **Miniature, tunable endoscope for in-vivo investigation of inner ear**
Michal Pawlowski, Rice University
35. **Optical imaging of vascular remodeling and blood oxygenation after growth factor treatment in the mouse hind limb ischemia model**
Kristin M. Poole, Vanderbilt University
36. **Label-free in vivo imaging of leukocytes and their interaction with bacteria**
Jianan Y. Qu, Hong Kong University of Science and Technology
37. **Evaluation of microbicide film dissolution dynamics by real-time quantitative imaging refractometry**
Matthew T. Rinehart, Duke University
38. **Microflow: From concept to development of novel optofluidic flow cell technology for remotely deployable cytometry**
Ozzy Mermut, INO - National Optics Institute
39. **A new algorithm using diffuse correlation spectroscopy at early decay to separate blood flow changes in brain and scalp of stroke mouse**
Yu Shang, University of Kentucky
40. **Integration of diffuse optical spectroscopies with muscular stimulator for noninvasive evaluation of electrical stimulation impacts on muscle hemodynamics**
Yu Shang, University of Kentucky
41. **Size- and position-dependent angular scattering interferometry**
Dustin W. Shipp, University of Rochester
42. **Anatomically guided dynamic fluorescence molecular tomography for small animal imaging**
Metasebya solomon, Washington University School of Medicine
43. **Sers-coded nano-particles for multiplexed molecular endoscopy of the rat esophagus**
Madhura Som, Stony Brook University
44. **First quantitative phase image of an entire organism**
Shamira Sridharan, University of Illinois at Urbana-Champaign

45. **Label-free detection of the field effect in prostate adenocarcinoma**
Shamira Sridharan, University of Illinois at Urbana-Champaign
46. **Label-free prostate cancer recurrence prediction from pathology slides**
Shamira Sridharan, University of Illinois at Urbana-Champaign
47. **Quantitative, label-free gleason grading of grade 3 and 4 prostate adenocarcinoma**
Shamira Sridharan, University of Illinois at Urbana-Champaign
48. **Study of nuclear changes in prostate tissue during cancer progression**
Shamira Sridharan, University of Illinois at Urbana-Champaign
49. **Towards quantitative absorption imaging of biological tissues by the combined use of photoacoustics and acousto-optics**
Wiendelt Steenbergen, University of Twente / Institute MIRA
50. **Simulating digitally manipulated light delivery through turbid media**
Snow H. Tseng, National Taiwan University
51. **Developing a line-scanning dual-axis confocal microscope for video-rate diagnostic imaging**
Danni Wang, Stony Brook University
52. **Fiber-based combined oct and two-photon luminescence imaging system for detection of thin-cap fibroatheroma**
Tianyi Wang, The University of Texas at Austin
53. **Spontaneous FAD dynamics reveal functional connectivity patterns in mice**
Patrick W. Wright, Washington University in Saint Louis
54. **Biomechanical properties extraction on a thin sample with highly ordered structure using polarized spatial frequency domain imaging**
Bin Yang, The University of Texas at Austin
55. **Automated fiber-probe instrument for measurement of multiple fluorophore and absorber molecular concentrations with online blood flow monitoring**
Yan Zhao, Dartmouth College
56. **Multimodal portable optical neural imaging with VCSELS**
Ofer Levi, University of Toronto
57. **Droplet microfluidics microscopy for cell analysis and artificial bilayers**
Gregory Faris, SRI International
58. **Scan-less hyperspectral raman imaging (HSRI) by active-illumination for sers-based multiplexed molecular imaging**
Ji Qi, University of Houston
59. **Microfluidic label-free monitoring of DNA hybridization**
Ji Qi, University of Houston