

Program

**Advances in Optics for Biotechnology,
Medicine and Surgery XVI**

June 2-5, 2019

Fairmont Tremblant
Mont Tremblant, Quebec, Canada

Conference Co-Chairs

Erin Buckley

Emory University/Georgia Institute of Technology, USA

Christophe Moser

Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Brian Pogue

Dartmouth College, USA

David Sampson

University of Surrey, United Kingdom



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Previous conferences in this series:

Future Directions for Lasers in Medicine and Surgery

February 26-March 3, 1989

Palm Coast, Florida

Conference Chairs:

Ronald W. Waynant, FDA, USA

Ashley J. Welch, University of Texas-Austin, USA

Future Directions for Lasers in Medicine and Surgery II

February 24-March 1, 1991

Palm Coast, Florida

Conference Chairs:

Thomas F. Deutsch, Wellman Labs, MA General, USA

Ronald W. Waynant, FDA/CDRH, USA

Future Directions for Lasers in Medicine and Surgery III

February 27-March 4, 1993

Palm Coast, Florida

Conference Chair:

Joseph T. Walsh, Jr., Northwestern University, USA

Lasers in Medicine and Surgery IV

July 9-14, 1995

Snowbird, Utah

Conference Chairs:

Sharon Thompsen, University of Texas, USA

George Pettit, USDA

Advances in Optical Technology for Medicine and Surgery V

July 13-18, 1997

Snowbird, Utah

Conference Chairs:

Irving J. Bigio, Los Alamos National Laboratory, USA

Kenton W. Gregory, Oregon Medical Laser Center, USA

Bruce J. Tromberg, Beckman Laser Institute, UC Irvine, USA

Advances in Optics for Biotechnology, Medicine and Surgery VI

Aug. 1-6, 1999

Kailua-Kona, Hawaii

Conference Chairs:

David Benaron, Stanford University, USA

Eva M. Sevick-Muraca, Purdue University, USA

Arjun G. Yodh, University of Pennsylvania, USA

Advances in Optics for Biotechnology, Medicine and Surgery VII

July 22-27, 2001

Banff, Alberta, Canada

Conference Chairs:

Daniel Farkas, University of Pittsburgh, USA

Michele Follen, University of Texas, Anderson Cancer Center, USA

Michael Patterson, Hamilton Regional Cancer Center/McMaster University, Canada

Previous conferences in this series:

Advances in Optics for Biotechnology, Medicine and Surgery VIII

August 3-7, 2003

Banff, Alberta, Canada

Conference Chairs:

Molly Brewer, University of Arizona, USA

Thomas Foster, University of Rochester, USA

James Fujimoto, Massachusetts Institute of Technology, USA

Advances in Optics for Biotechnology, Medicine and Surgery IX

July 24-28, 2005

Copper Mountain, Colorado

Conference Chairs:

Stephen M. Hahn, University of Pennsylvania, USA

Vasilis Ntziachristos, Harvard University, USA

Brian Wilson, University of Toronto, Canada

Advances in Optics for Biotechnology, Medicine and Surgery X

June 10-14, 2007

Naples, Florida, USA

Conference Chairs:

Guillermo Tearney, Harvard University, USA

Samuel Achilefu, Washington University, USA

Paul M.W. French, Imperial College, London, UK

Advances in Optics for Biotechnology, Medicine and Surgery XI

June 28-July 2, 2009

Burlington, Vermont, USA

Conference Chairs:

Stephen A. Boppart, University of Illinois at Urbana-Champaign, USA

Jeremy C. Hebden, University College London, UK

Laura Marcu, University of California, Davis, USA

Advances in Optics for Biotechnology, Medicine and Surgery XII

June 5-8, 2011

Naples, Florida, USA

Conference Chairs:

Elizabeth Hillman, Columbia University, USA

Daniel Elson, Imperial College London, UK

R.C. Thomson, Vanderbilt University, USA

Advances in Optics for Biotechnology, Medicine and Surgery XIII

June 2-5, 2013

Lake Tahoe, California, USA

Conference Chairs:

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

Maryann Fitzmaurice, Case Western University, USA

A.C. Boccara, ESPCI-Paris Tech., France

Previous conferences in this series:

Advances in Optics for Biotechnology, Medicine and Surgery XIV

June 14-17, 2015

Vail, Colorado, USA

Conference Chairs:

Rainer Leitgeb, Medical University of Vienna, Austria
Richard Levenson, University of California – Davis, USA
Laura Waller, University of California, Berkeley, USA

Advances in Optics for Biotechnology, Medicine and Surgery XV

July 23-26, 2017

Snowmass Village, Colorado, USA

Conference Chairs:

Peter So, Massachusetts Institute of Technology, USA
Kate Bechtel, Triple Ring Technologies, USA
Ivo Vellekoop, University of Twente, The Netherlands
Michael Choma, Yale University, USA

Conference Sponsor

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Sunday, June 2, 2019

16:00 – 18:00	Conference Check-in (Mali Foyer)
18:00 – 19:30	Dinner
19:30 – 21:00	<u>Session I: Hot Topics</u> Session Chairs: Brian Pogue, Dartmouth College, USA Christophe Moser, EPFL, Switzerland
19:30 – 20:15	Imaging multiple molecular markers under surgical light illumination Viktor Gruev, University of Illinois at Urbana-Champaign, USA
20:15 – 21:00	Molecular guided surgery advances Eben Rosenthal, Stanford University, USA
21:00 – 22:00	Poster Session / Social Hour

Room locations and notes

- General Sessions will be held in Mali I-II.
- Poster Sessions will be in Mali III.
- Meals will be in Soutana I-II. The conference banquet location will be announced on site.
- The ECI office is the Meeting Planner Office.
- Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.
- Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).
- Speakers – Please leave discussion time as previously directed by your session chair.
- Please do not smoke at any conference functions.
- Turn your mobile telephones to vibrate or off during technical sessions.
- Please write your name on your program so that it can be returned to you if lost or misplaced.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
- Emergency Contact Information: Because of privacy concerns, ECI does not collect or maintain emergency contact information for conference participants. If you would like to have this information available in case of emergency, please use the reverse side of your name badge.

Monday, June 3, 2019

07:00 – 08:30 Breakfast and Discussion Time

Session II: Engineering Optical and Fiber Systems

Session Chair: Rongguang Liang, University of Arizona, USA

08:30 – 09:00 **Advances in SCAPE microscopy for high-speed volumetric imaging**
Elizabeth Hillman, Columbia University

09:00 – 09:30 **Development of compact ultrafast fiber laser sources for nonlinear optical microscopy**
Khanh Kieu, University of Arizona, USA

10:00 – 10:30 **OCT for image-guided therapy and surgery**
Thomas Milner, Texas A&M University, USA

10:30 – 11:00 Coffee break and discussion time

Session III: Optical-Radiation Interactions

Session Chair: Brian Wilson, University of Toronto, Canada

11:00 – 11:15 **Radiation-optical interactions**
Brian Wilson, University of Toronto, Canada

11:15 – 11:45 **Liposomal optical activation delivery of agents**
Jonathan Lovell, University of Buffalo, USA

11:45 – 12:15 **Combining ionising radiation with nanoconstructs: towards new options in cancer therapy**
Ewa M. Goldys, The University of New South Wales, Australia

12:15 – 12:30 **Shedding light on the effect of radiation therapy on circulating tumor cells**
Mark Niedre, Northeastern University, USA

12:30 – 14:00 Lunch

14:00 – 18:00 Networking/Discussion

18:00 – 19:30 Dinner

Session IV: Neurophotonics

Session Chair: Chair Erin Buckley, Emory University/Georgia Tech, USA

19:30 – 20:00 **Increasing depth sensitivity and brain specificity of diffuse correlation spectroscopy blood flow measures**
Maria Angela Franceschini, Massachusetts General Hospital, USA

20:00 – 20:30 **What does laser speckle contrast imaging really measure?**
Andrew Dunn, University of Texas at Austin, USA

20:30 – 21:00 **Non-invasive optical measurement of cerebral critical closing pressure in pediatric hydrocephalus**
Wesley Baker, Children's Hospital of Philadelphia, USA

21:00 – 22:00 Poster Session / Social Hour

Tuesday, June 4, 2019

07:00 – 08:30 Breakfast and Discussion Time

Session V: Optics and Biomechanics

Chair: David Sampson, University of Surrey, United Kingdom

08:30 – 09:00 **Biomechanics of cells and tissues: What can we learn when we combine mechanical stimuli with microscopy?**

Davide Iannuzzi, Vrije University, Netherlands

09:00 – 09:30 **Translational shear-wave optical coherence elastography**

Kirill Larin, University of Houston, USA

10:00 – 10:30 **Diagnosis of intestinal fibrosis by spectroscopic and strain photoacoustic imaging**

Guan (Gary) Xu, University of Michigan, USA

10:30 – 11:00 Coffee Break and Discussion Time

Session VI: Molecular Guided Surgery

Chair: Sylvain Gioux, University of Strasbourg, France

11:00 – 11:30 **The state of fluorescence imaging in robotic surgery**

Jonathan Sorger, Intuitive Surgical, USA

11:30 – 12:00 **Artificial intelligence (AI)-enabled multimodal macroscopic optical spectroscopy imaging platform for surgical oncology applications**

Frederic Leblond, University of Montreal, Canada

12:00 – 12:30 **Making sense in surgery using Near-Infrared Optical Imaging**

Sylvain Gioux, University of Strasbourg, France

12:30 – 14:00 Lunch

Session VII: Imaging Through Turbid Media

Chairs: Christophe Moser, Polytechnique Fédérale de Lausanne (EPFL), Switzerland

14:00 – 14:30 **Scalable and reliable deep learning for computational microscopy in complex media**

Lei Tian, Boston University, USA

14:30 – 15:00 **Photoacoustic microendoscopy through multimode fibers**

Emmanuel Bossy, University of Grenoble, France

Session VIII: Commercialization Case Studies

Chairs: Kate Bechtel, Triple Ring Technology, USA

15:30 – 16:00 **Development of the MediBeacon transdermal GFR measurement system**

Martin Debreczeny, Medibeacon Inc., USA

16:00 – 16:30 **Commercialization of Photodisinfection Technologies**

Nicolas Loebel, Ondine Biomedical, Inc., Canada

16:30 – 17:00 **Commercialization of Modulated Imaging**

Amaan Mazhar, Modulated Imaging, Inc., USA

Tuesday, June 4, 2019 (continued)

17:00 – 19:00	Networking/Discussion
19:00 – 19:30	Reception
19:30 – 21:00	Conference Banquet

Wednesday, June 5, 2019

07:00 – 08:30 Breakfast and Discussion Time

Session IX: Microscopy Advances

Chairs: Christoph Moser

08:30 – 09:00 **Advances in computational wide field imaging**
Peter So, Massachusetts Institute of Technology, USA

09:00 – 09:30 **Design, fabrication, and test of micro-optics for biomedical applications**
Rongguang Liang, University of Arizona, USA

10:00 – 10:30 **Spectroscopic single-molecule localization microscopy (sSMLM)**
Hao Zhang, Northwestern University, USA

10:30 – 11:00 Coffee Break and Discussion Time

Session X: Learning in Optical Systems

Session Chair: Aydogan Ozcan, University of California Los Angeles, USA

11:00 – 11:30 **Too far, too small, too dark, too foggy: On the use of machine learning for computational imaging problems**
George Barbastathis, Massachusetts Institute of Technology, USA

11:30 – 12:00 **Can we control highly complex and nonlinear optical systems?**
Rafael Piestun, University of Colorado at Boulder, USA

12:00 – 12:30 **Toward a thinking microscope: Deep learning-enabled computational microscopy and sensing**
Aydogan Ozcan (introduced by C. Moser), University of California Los Angeles, USA

12:30 Lunch and Departures

Posters

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Poster Presentations

1. **Simulation analysis of manipulating light propagation through turbid Media**
Snow H. Tseng, National Taiwan University, Taiwan
2. **Speckleplethysmographic (SPG) estimation of heart rate variability**
Cody E. Dunn, Beckman Laser Institute, UCI, USA
3. **Model eye imaging by closed-loop accumulation of single scattering (CLASS) microscopy**
Yookyung Jung, Center for Molecular Spectroscopy and Dynamics/Institute for Basic Science (IBS), South Korea
4. **Interferometric speckle visibility spectroscopy for improved measurement of blood flow dynamics**
Joshua H. Brake, California Institute of Technology, USA
5. **Generative adversarial network prediction of optical properties from single images with structured- or homogenous-illumination**
Nicholas Durr, Johns Hopkins University, USA
6. **De-scattering with excitation patterning in temporally-focused microscopy (DEEP-TFM)**
Jong Kang Park, MIT, USA
7. **Utilizing ectopic Hsp90 expression to diagnose breast cancer at the point-of-care using fluorescence microscopy**
Roujia Wang, Duke University, USA
8. **Matrix approach of Full-Field OCT for volumetric imaging of an opaque human cornea**
Paul Balontrade, Institut Langevin, France
9. **Image-guided fluorescence tomography in head & neck surgical models**
Michael J. Daly, University Health Network, Canada
10. **A fast three-dimensional dynamic light scattering computational model for imaging through turbid media**
Chakameh Zahed Jafari, University of Texas at Austin, USA
11. **Cortex-wide, cellular-resolution two-photon microscopy**
Hunter B. Banks, Washington University in St. Louis, USA
12. **Using a multimodal platform to investigate the role of spreading depolarization and hemodynamics in neurological recovery**
Christian Crouzet, Beckman Laser Institute, USA
13. **Methodology to rapidly map and quantify whole-brain microvasculature in 3d**
Katiana M. Khouri, University of California, Irvine, USA
14. **Microvascular cerebral hemodynamics in pediatric sickle cell disease with Diffuse Correlation Spectroscopy**
Erin M. Buckley, Emory University, USA

15. **SPAD based imaging of Cherenkov light in radiation therapy**
Arthur Petusseau, Dartmouth College, USA
16. **Cherenkov-excited luminescence imaging of microdose injections for novel tumor response assay**
Jennifer Soter, Dartmouth College, USA
17. **Using dynamic vascular optical spectroscopy to monitor patients with peripheral arterial disease - three exemplary cases**
Alessandro Marone, Columbia University, USA
18. **Imaging of stiffness heterogeneity in pancreatic cancer to assess elastography as a surrogate for drug distribution in orthotopic xenograft models**
Phuong Vincent, Dartmouth College, USA
19. **Total hemoglobin reduction in the tumor volume correlates with response to breast cancer neoadjuvant chemotherapy within two weeks of treatment**
Mirella Altoe, Columbia University, USA
20. **Wearable toe band system for monitoring of peripheral artery disease**
Youngwan Kim, Columbia University, USA
21. **Workflow for real-time in-vivo Cherenkov-excited luminescence imaging during radiotherapy**
Ethan LaRochelle, Dartmouth College, USA
22. **Towards label-free imaging of breast cancer-induced pre-metastatic niche using spontaneous Raman spectroscopy**
Santosh Kumar Paidi, Johns Hopkins University, USA