

Program

Advances in Optics for Biotechnology, Medicine and Surgery XVIII

May 18 - 22, 2025

**Maryborough Hotel
Cork, Ireland**

Conference Co-Chairs:

Stefan Andersson-Engels, Tyndall National Institute, Ireland

Summer Gibbs, Oregon Health and Science University, USA

Melissa Skala, Morgridge Institute for Research, USA



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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

Advances in Optics for Biotechnology, Medicine and Surgery XVI

June 2-6, 2019

Quebec, Canada

Conference 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

Advances in Optics for Biotechnology, Medicine and Surgery XVII

October 15-19, 2023

Tomar, Portugal

Conference Chairs:

Frederic Leblond, Polytechnique Montreal, Canada
Mark Niedre, Northeastern University, USA

Conference Sponsor



Sunday May 18, 2025

17:30 – 18:30	Conference check-in (Sherrard Foyer)
18:30 – 19:30	Welcome reception (Orangery)
19:30 – 21:00	Dinner (Bellini's Restaurant)

NOTES

- *Technical sessions will be in Sherrard Suite B. Poster sessions will be in Sherrard Suite A.*
- *Meals will be in Bellini's Restaurant except for the conference banquet on Wednesday which will be in the Orangery.*
- *Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, watches) is **strictly prohibited** during the technical sessions, unless the author and ECI have granted prior permission.*
- *This is a conference of invited speakers only with the goal to guide the field. Discussions are strongly encouraged throughout the week.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before). **Material shown at the meeting cannot be cited and photos of slides and posters are not allowed without the presenter's permission**, so that unpublished data can be shown. Speakers are encouraged to present novel results and ideas in an opinionated and possibly controversial way.*
- *Speakers – Please leave at least **7 minutes** for questions.*
- *Please do not smoke at any conference functions.*
- *Turn your cellular telephones to vibrate or off during technical sessions.*
- *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.*

Monday, May 19, 2025

- 07:00 – 09:00 Breakfast and Discussion Time
- 09:00 – 09:10 Conference Welcome – Conference Liaison and Chairs
- Session 1: Light Sheet Microscopy**
Session Chair: Kishan Dholakia, University of Adelaide
- 09:10 – 09:40 **Revolutionising IVF with advanced photonics**
Kylie Dunning, University of Adelaide, Australia
- 09:40 – 10:10 **Illumination and detection in light sheet microscopy: The case for structured light**
Kishan Dholakia, University of Adelaide, Australia
- 10:10 – 10:45 Coffee Break and Networking
- Session 2: Translational Biophotonics**
Session Chair: Kevin Tsia, University of Hong Kong
- 10:45 – 11:15 **Spatial frequency fluorescence for surgical tumor depth: Assessment in heterogeneous models of oral cancer**
Michael Daly, Princess Margaret Cancer Centre, Canada
- 11:15 – 11:45 **Making sensing of label-free bioimaging - from data generation to AI analytics**
Kevin Tsia, University of Hong Kong
- 11:45 – 12:15 **Holotomography and virtual staining: interference of 3D fluorescence and H&E images from unlabeled live cells and tissues**
YongKeun (Paul) Park, Korea Advanced Institute of Science & Technology, Korea
- 12:15 – 12:45 **Quick-fire session**
Poster presenters, Two minutes and one slide each
- 12:45 – 14:30 Lunch and Networking
- Session 3: Optics in Women's Health**
Session Chair: Jessica Ramella-Roman, Florida International University, USA
- 14:30 – 15:00 **Imaging cilia function in the fallopian tubes in vivo**
Irina Larina, Baylor College of Medicine, USA
- 15:00 – 15:30 **Imaging Mueller polarimetry: A new lens on women health**
Tatiana Novikova, Ecole Polytechnique, France
- 15:30 – 16:00 **Polarization-sensitive imaging of Uterine Cervical Structures**
Jessica Ramella-Roman, Florida International University, USA
- 16 :00 – 16 :30 **Digital twins of human pregnancy: engineering innovation in understanding preterm birth risk**
Kristin Myers, Columbia University, USA
- 16:30 – 17:00 Coffee Break in Poster Area

Monday, May 19, 2025 (continued)

Session 4: Photodynamic Therapy

Session Chair: Lothar Lilge, Princess Margaret Cancer Centre, Canada

- 17:00 – 17:30 **Photodynamic Therapy: beyond local response (remote presentation)**
Layla Pires, Texas A&M University, USA
- 17:30 – 18:00 **Overcoming Optical Penetration Barriers in Tissues: Nanoscintillators for Deep Photodynamic Therapy**
Anne-Laure Bulin, Inserm, France
- 18:00 – 18:30 **Dosimetry and Optical Monitoring in EGFR-Targeted Photodynamic Therapy**
Dominic Robinson, Erasmus University Medical Center, the Netherlands
- 18:30 – 20:30 Dinner and Networking
- 20:30 – 21:30 Social Hour / Poster Session 1

Tuesday, May 20, 2025

- 07:00 – 08:30 Breakfast and Networking
- Session 5: Surgical guidance**
Session Chair: Lei Wang, Oregon Health and Science University, USA
- 08:30 – 09:00 **Clinical implementation of optical spectroscopy**
Theo Ruers, The Netherlands Cancer Institute
- 09:00 – 09:30 **Clinical translation trifecta: Phantoms, quality management & software tools**
Ethan LaRochelle, QUEL Imaging, USA
- 09:30 – 10:00 **Improving surgical outcomes with NIR nerve-specific contrast agents**
Lei Wang, Oregon Health and Science University
- 10:00 – 10:30 **Mechanical Imaging of Embryos with Reverberant Optical Coherence Elastography and Brillouin Spectroscopy**
Kirill Larin, University of Houston, USA
- 10:30 – 11:00 Coffee Break and Networking
- Session 6: Early disease diagnostics I**
Session Chair: Mark Niedre, Northeastern University, USA
- 11:00 – 11:30 **Advances in Clinical Multiphoton Microscopy for Early Melanoma Diagnosis**
Mihaela Balu, University of California, Irvine, USA
- 11:30 – 12:00 **Hemodynamic-based early detection of treatment efficacy in brain and breast with diffuse optics**
Regine Choe, University of Rochester, USA
- 12:00 – 12:30 **Speckle Contrast Optical Spectroscopy for Cuffless Ambulatory Blood Pressure Estimation**
Ariane Garrett, Boston University, USA
- 12:30 – 14:00 Lunch and Networking
- Session 7: Early disease diagnostics II**
Session Chair: Martin Leahy, University of Galway, Ireland
- 14:00 – 14:30 **Tethered Instrument for Continuous Fluorescence Detection and Counting of Circulating Cancer Cells in Awake, Freely Moving Mice**
Mark Niedre, Northeastern University, USA
- 14:30 – 15:00 **Advancing early diagnostics from bedside to operating room with non-invasive spectroscopic imaging**
Aboma Merdasa, Lund University, Sweden
- 15:00 – 15:30 **Translating Surgical AI Research into Medical Devices**
Danail Stoyanov, University College London, UK
- 15:45 Bus departs for Kinsale

Tuesday, May 20, 2025 (continued)

15:45 – 20:30	<u>Excursion to Kinsale</u>
16:20 – 20:00	Free time to explore Kinsale including dinner on your own
20:00 – 20:40	Bus back to hotel (leaving Kinsale 20:00)
20:40 – 22:00	Social Hour / Poster discussions

Wednesday, May 21, 2025

- 07:00 – 08:30 Breakfast and Networking
- Session 8: Neurophotonics**
Session Chair: Turgut Durduran, Institute of Photonic Sciences
- 08:30 – 09:00 **TBA**
Tiffany Ko, University of Pennsylvania, USA
- 09:00 – 09:30 **Brain Haemodynamic and Metabolic in-vivo optical sensing with NIRS: MetaboLight**
Ilias Tachtsidis, University College London, UK
- 09:30 – 09:45 **A high-density hybrid diffuse optical tomography device with integrated electroencephalography**
Georgina Tresanchez, ICFO- Institut de Ciències Fotòniques, Spain
- 09:45 – 10:30 Coffee Break and Networking
- Session 9: Machine learning**
Session Chair: Randy Bartels, Morgridge Institute for Research, USA
- 10:30 – 11:00 **Feature-Driven Multiscale Microscopy**
Kevin Dean, University of Texas Southwestern Medical Center, USA
- 11:00 – 11:30 **Towards robust channel-adaptive models for multi-channel imaging**
Bryan Plummer, Boston University, USA
- Session 10: Photoacoustics I**
Session Chair: Mallidi Srivalleesha, Tufts University
- 11:30 – 12:00 **Engineering ultrasound and photoacoustic imaging approaches for next-generation cellular theranostics**
Kelsey Kubelick, University of Virginia, USA
- 12:00 – 12:30 **Near Infrared II Imaging of Tissue Ischemia during Preeclampsia**
Carolyn Bayer, Tulane University, USA
- 12:30 – 14:00 **Lunch and Discussion Time**
- Session 11: Photoacoustics II**
Session Chair: Mallidi Srivalleesha, Tufts University
- 14:00 – 14:30 **TBA (remote presentation)**
Rui Cao, Case Western Reserve University
- 14:30 – 15:00 **Photoacoustic stem cell and vesicle tracking in small and large animals using optimized gold nanostars**
Martin Leahy, University of Galway, Ireland
- 15:00 – 15:30 **Multi-modality, nanoparticle imaging**
Yung Shen Chen, Illinois University, USA
- 15:30 – 17:00 Coffee Break and **Poster Session II**

Wednesday, May 21, 2025 (continued)

Session 12: Nonlinear microscopy

Session Chair: Melissa Skala, Morgridge Institute for Research, USA

- 17:00 – 17:30 **Label-free multiphoton imaging of metabolic changes during immunotherapy in vivo**
Alexa Heaton, Morgridge Institute for Research, USA
- 17:30 – 18:00 **Optical Metabolic Nanoscopy for Studying Aging and Diseases (remote presentation)**
Lingyan Shi, University of California San Diego, USA
- 18:00 – 18:30 **Computational adaptive optics nonlinear holographic microscopy for tissue imaging**
Randy Bartels, Morgridge Institute for Research, USA
- 18:45 – 19:45 **Reception with Irish music (Orangery)**
- 19:45 – 21:45 **Conference Banquet**

Thursday, May 22, 2025

- 07:00 – 09:00 Breakfast and Networking
- 09:00 – 09:30 **Characterizing and Mitigating the Effects of Skin Tone on Visual Diagnosis and Medical Devices**
Leo Shmuylovich, Washington University in St. Louis, USA
- 09:30 – 10:00 **Development and validation of a low-cost wearable laser speckle imaging device for early detection of postpartum hemorrhage**
Christine O'Brien, Washington University in St. Louis, USA
- 10:00 – 10:30 **Smart endoscopy with structured light and AI**
Nicholas Durr, Johns Hopkins University, USA
- 10:30 Coffee break and boxed lunches available
- Check-out (by 12 Noon) and Departures
- 11:30 – 14:00 Optional Lab tour at Tyndall National Institute for those interested

Poster Presentations

- 1. *In vivo* label-free multiphoton imaging reveals distinct CD8 T cell metabolic changes and collagen reorganization during immunotherapy in murine melanoma versus colon carcinoma**
Alexa Heaton, Morgridge Institute for Research, University of Wisconsin, USA
- 2. Fiber-array diffuse reflectance spectroscopy for resection margin assessment during soft tissue sarcoma surgery**
Freija Geldof, Netherlands Cancer Institute, the Netherlands
- 3. Continuous Diffuse Reflectance Spectroscopy with weakly labeled data for positive resection margin prediction during colorectal cancer surgery**
Joris Hepkema, Netherlands Cancer Institute, the Netherlands
- 4. Defining an Ideal Offset Metric for Assessing Subsurface Bone Quality through Raman Spectroscopy**
Rekha Gautam, Tyndall National Institute, Ireland
- 5. Hypoxia monitoring in nascent life using long wavelength near infrared spectroscopy**
Shree Krishnamoorthy, Tyndall National Institute, Ireland
- 6. Monte Carlo validation of fluorescent optical phantoms: Towards digital twins**
Mayna Nguyen, QUEL Imaging, USA
- 7. Field-Deployable, Non-Contact Vital Sign Monitoring Using Speckleplethysmography (SPG)**
Christian Crouzet, University of California, Irvine, USA
- 8. Diffuse optical spectroscopy and magnetic resonance imaging with gadolinium-incorporated porphyrins for multimodal theranostic guidance of oral cancer resection**
Theo Husby, University of Toronto, Canada
- 9. Synergy of hyperthermia and photodynamic therapy in an in-vitro lung cancer model**
Andrew Effat, University Health Network, Canada