Optical Biopsy XXII: Toward Real-Time Spectroscopic Imaging and Diagnosis (BO306)

The goal of this conference is to present novel, state-of-the-art work in non-invasive spectroscopic and imaging methods to detect the onset and progression of disease, including pre-malignancy and malignancy, and intra-operatively, and tissue and cells’ response to external conditions, including therapeutic intervention, unintended injury, and laser energy deposition. The conference will focus on work investigating the differences in single and multiphoton excitation optical signatures of normal and diseased tissues, and on understanding the underlying biochemical and structural changes of tissues and cells responsible for the observed spectroscopic signatures. There will also be a fast spectral data processing focus, with a view to real-time diagnostics through spectra, and including reservoir computing, biomimetic approaches, machine learning, and kernel methods, like SVMs (support-vector-machines). It is worth noting that this conference has hosted in recent years a number of contributions on the detection of disease using optical spectroscopy signatures of body fluids such as urine or blood plasma. As the field of metabolomics continues to grow, it is possible that “optical metabolomics” maybe a new frontier in the field of Optical Biopsy. Complex light, quantum effects and entanglement biomedical analysis of tissue, cells and structural components is a new thrust in Optical Biopsy.

This conference covers a wide array of well-established optical techniques and novel approaches to diagnose tissue changes, including in vivo and ex vivo fluorescence spectroscopy, Stokes shift spectroscopy, spectral imaging, Raman spectroscopy, Stimulated Raman, resonance Raman, multiphoton and photonic methods to modify the tissue and body fluid properties or functions implemented in vivo or ex-vivo covering the technology development steps from bench-to-bedside, at the point of need. Compact pill smart spectral explorers, multi-spectral imagers, coherence effects, and hyper-spectral imaging will be highlighted and covered, in part, by speakers.

Abstract due date extended to 1 September 2023.

Topics include:
- origin of tissue optical properties
- optical methods for tissue diagnosis and treatment
- methods for in vivo assessment of physiological state of tissue
- excitation, absorption, fluorescence spectroscopy and imaging
- mid-infrared (MIR) absorption spectroscopy and hyperspectral imaging
- Raman spectroscopy and imaging
- Resonance Raman spectroscopy
- inelastic light scattering spectroscopy and imaging
- Stimulated Raman gain spectroscopy and imaging
- polarization and diffusive reflectance spectral imaging
- THz spectroscopy and imaging
- photoluminescence spectroscopy and imaging
- multi-photon spectroscopy and imaging
- time resolved spectroscopy and imaging
- speckle and spatial Fourier frequency spectroscopy for diagnoses
- ultraviolet diagnostic methods
- near-infrared (NIR) diagnostic methods
- nano-particle tagging and contrast agents
- chemo- and molecular targeting agents
- instrumentation of in vivo optical biopsy
- in vivo spectroscopy and imaging
- optical processes at the single cell level
- endoscopes and micro-endoscopes for optical biopsy: visible to THz
- novel methods for optical biopsy
- optical biopsy mapping with linear excitation methods
- nonlinear optical biopsy mapping
- novel coherence methods
- instrumentation for in-vivo optical biopsy
- video spectral imaging and mapping of tissue
- STED nano-scale imaging
- non-invasive detection and imaging of cancer
- diabetes non-invasive detection
- assessment of tissue injury
- photonic applications in neuro-science

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CALL FOR PAPERS

Submit abstracts by 19 July 2023

27 January–1 February 2024
The Moscone Center
San Francisco, California, USA

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- optical methods for brain diseases, Autism, Alzheimer
- optical metabolomics
- supercontinuum for medical and biological applications
- Stokes shift spectroscopy
- upper excite states for deeper penetration in tissue and brain
- NIR optical windows in 700 nm to 2500nm
- MIR optical window 3 µm to 25 µm
- coherent and non-contact photo-acoustic imaging
- tissue modification with light pulses
- laser tissue welding and real time monitoring
- Complex Vector Vortex light propagation and imaging
- dynamics of laser-tissue interactions
- integration of optical detection and therapy systems
- high resolution imaging methods for in vivo pathology
- rapid tissue microstructure imaging with intrinsic or extrinsic mechanisms
- lipidomics
- fluorescence lifetime imaging (FLIM)
- phosphorescence lifetime imaging (PLIM)
- FLIM of fast metabolic effects
- NADH / FAD fluorescence
- Clinical FLIM applications
- advanced multiphoton imaging
- in-vivo multiphoton tomography of human skin and others
- in-vivo FLIM of the human retina
- protein interaction
- time-resolved spectroscopy
- NEW event thrust on fast spectral data processing focus, with a view to real-time diagnostics through spectra, and including reservoir computing, biomimetic approaches, machine learning, and kernel methods, like SVMs (support-vector-machines) and AI.
- NEW optical metabolomics detection
- NEW complex light on tissues, cells and structures: quantum effects and entanglement

BEST PAPER AWARDS
1st, 2nd, and 3rd place winners will receive a cash prize award along with their award certificate for best paper and oral presentations.

BEST POSTER AWARD
One award winner will receive a cash prize award along with their award certificate for best poster presentation.

Award Sponsors: To be determined.
Follow the instructions below to develop a successful abstract for submission to a conference and review policies for publication in the Proceedings of SPIE in the SPIE Digital Library. Submissions subject to chair approval.

### Important dates

<table>
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<tr>
<th>Event</th>
<th>Date</th>
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<tr>
<td>Abstracts due</td>
<td>19 July 2023</td>
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<tr>
<td>Registration opens</td>
<td>October 2023</td>
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<tr>
<td>Authors notified and program posts online</td>
<td>9 October 2023</td>
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<tr>
<td>Submission system opens for manuscripts and poster PDFs*</td>
<td>27 November 2023</td>
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<tr>
<td>Poster PDFs due for spie.org preview and publication</td>
<td>3 January 2024</td>
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<td>Manuscripts due</td>
<td>10 January 2024</td>
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<td>Advance upload deadline for oral presentation slides**</td>
<td>25 January 2024</td>
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*Contact author or speaker must register prior to uploading
**After this date slides must be uploaded onsite at Speaker Check-in

### What you will need to submit

- Presentation title
- Author(s) information
- Speaker biography
- 250-word abstract for technical review
- 100-word summary of abstract for display in the program
- Keywords used in search for your paper (optional)
- Check the individual conference call for papers for additional requirements (for example, some conferences require 2- to 3-page extended summary for technical review, or have instructions for award competitions)

Note: Only original material should be submitted. Commercial papers, papers with no new research/development content, and papers with proprietary restrictions will not be accepted for presentation.

### How to submit your abstract

- Visit the conference page: www.spie.org/BO306call
- You may submit more than one abstract, but submit each abstract only once
- Submit by clicking the “Submit an Abstract” button on the conference page
- Sign in to your SPIE account, or create an account if you do not already have one
- Follow the steps in the submission wizard until the submission process is completed
- If your submission is related to an application track below, indicate the appropriate track when prompted during the submission process

### Application track

Listed below are the application tracks available for this meeting. Application tracks aggregate presentations and focus on emerging technical and societal needs that require a multidisciplinary approach.

- **AI/ML**: Papers that highlight the use of artificial intelligence, machine learning, and deep learning to create and implement intelligent systems across multiple sectors, technologies, and applications
- **Sustainability**: Papers that highlight the use of optics and photonics for renewable energy, natural resource management, sustainable manufacturing, and greenhouse gas mitigation in support of the UN Sustainable Development Goals
- **Brain function**: Papers that highlight the development of innovative optics and photonics technologies that increase our understanding of brain physiology and function
- **Translational research**: Papers that highlight the transition from bench to bedside using the latest photonics technologies, tools, and techniques for healthcare
- **3D printing**: Papers that highlight the innovative use of optics and photonics in multidisciplinary applications for multidimensional manufacturing

### Submission agreement

All presenting authors, including keynote, invited, oral, and poster presenters, agree to the following conditions by submitting an abstract:

- Register and pay the author registration fee.
- Oral presenters: recording and publication of your onsite presentation (slides synched with voice) for publication in the Proceedings of SPIE in the SPIE Digital Library.
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- Final placement in an oral or poster session is subject to chair discretion

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