



SPIE. PHOTONICS WEST BIOS 25 - 30 January 2025
The Moscone Center
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CALL FOR PAPERS

Submit abstracts by
17 July 2024

Photonic Diagnosis, Monitoring, Prevention, and Treatment of Infections and Inflammatory Diseases 2025 (BO106)

Conference Chairs: **Tianhong Dai**, Wellman Ctr. for Photomedicine (United States), Massachusetts General Hospital (United States), Harvard Medical School (United States); **Jürgen Popp**, Leibniz-Institut für Photonische Technologien e.V. (Germany); **Mei X. Wu M.D.**, Harvard Medical School (United States)

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Infectious diseases remain a major contributor to global mortality rates. For example, the Coronavirus disease 2019 (COVID-19), the recent global pandemic, causing Severe Acute Respiratory Syndrome Corona virus -2 (SARS CoV-2), has devastated the world resulting in several million infections and close to five million deaths till late October 2021. Shockingly, more than 95% of deaths caused by infections are due to the lack of proper diagnosis and treatment. A definite diagnosis of infections can only be obtained by culture and/or molecular detection, which often requires tissue biopsy. This invasive diagnostic procedure takes many hours or even several days to yield an answer, and sometimes, it is not even possible to obtain a representative biopsy. The inability of physicians to characterize infections at the point of care has led to the wide overuse of broad-spectrum antibiotics and, subsequently, the development of antibiotic resistance by pathogens. The rise of antibiotic resistance has furthermore exponentially complicated the choice of treatment. Many physicians are concerned that several infections may soon be untreatable. In 2020, the United States government announced the National Action for Combating Antibiotic-Resistant Bacteria, 2020-2025, in which it is noted that new diagnostics and therapeutics are urgently needed to combat emerging and reemerging antibiotic-resistant pathogens. On the global level, the G20 heads of state and government decided in 2017 to create a joint collaboration platform - the Global Antimicrobial Resistance Research and Development Hub, or Global AMR R&D Hub.

In the area of innovative and antibiotic diagnostic and non-antibiotic therapeutic approaches, photonic (optics and light-based) technologies are prominent. Rapid, accurate, and noninvasive infection diagnosis using photonic strategies such as Raman and infrared spectroscopy, fluorescence spectroscopy, and plasmonics augmented with molecular technologies can play critical roles by influencing treatment during the critical initial window (< 3 hours) and saving many lives.

Once diagnosed, photonic antimicrobial therapies such as antimicrobial photodynamic therapy, antimicrobial blue light, ultraviolet C radiation, photocatalytic antimicrobial therapy, and light-based vaccines offer significant benefits. Their ability to eliminate pathogens independent of antibiotic resistance and the low likelihood that pathogens will develop resistance due to the nature of relatively nonspecific targets make them particularly attractive. Monitoring the response to antimicrobial therapy allows therapeutic approaches to be tailored based on individual patient responses, ultimately leading to personalized medicine.

The conference emphasizes photonic diagnostic and therapeutic techniques for infections and inflammatory diseases. The conference aims to solicit technical and scientific papers that present advanced photonic diagnostic, monitoring, prevention, and therapeutic technologies that push beyond the current state-of-the-art in basic science and clinical practice. These include, but are not limited to:

PHOTONIC DIAGNOSIS AND MONITORING OF INFECTIONS AND INFLAMMATORY DISEASES

- Novel optical biosensors for rapid point-of-care identification of infections and Inflammatory diseases
- Pathogen-targeted optical imaging
- Optical microscopy for bacterial morphology and spectral fingerprint analysis for detecting infectious diseases

- Automated image analysis of bacterial morphology and spectral fingerprint analysis for characterizing antimicrobial susceptibility
- Rapid detection of drug resistance via enzyme-activated fluorescence detection
- Multiphoton microscopy for detecting dynamics of immune cell responses to infections
- Confocal microscopy for detecting pathogen-host interactions
- Molecular imaging of infections and inflammatory diseases
- Photoacoustic imaging of infections and inflammatory diseases
- Magnetic resonance imaging of infections and inflammatory diseases
- Positron emission tomography scanning for infections and inflammatory diseases
- Hyperspectral Imaging for mapping infectious diseases
- Multimodal approaches for visualizing infections and inflammation
- Preclinical bioluminescence imaging of infectious diseases in animal models
- Photonic detection of the systemic response to infections
- Photonic monitoring of response to antimicrobial therapy
- Artificial intelligence in diagnostic imaging of infections and inflammatory diseases
- Photonic methods and technologies for the diagnosis of infections and inflammatory diseases in low-resource settings
- AI supported systems for imaging diagnosis of infections and inflammatory diseases

PHOTONIC PREVENTION AND TREATMENT OF INFECTIONS AND INFLAMMATORY DISEASES

- Inactivation of pathogens (bacteria, mycobacteria, viruses, fungi and parasites) using photonic approaches (antimicrobial photodynamic inactivation, antimicrobial blue light, ultraviolet irradiation, photocatalytic antimicrobial therapy, etc.)
- Photonic-based antimicrobial therapy
- Antimicrobial effectiveness of photocatalysts
- Combined antimicrobial therapies using photonic approaches and other antimicrobials.
- Photonic vaccination for the control of infections and inflammatory diseases
- Optogenetics in bacteria
- Disinfection using light-based approaches
- Inactivation of virulence factors of pathogens using photonic approaches
- Mechanism of action of photonic-based antimicrobial approaches
- Development of novel photosensitizers in antimicrobial photodynamic therapy
- Light delivery in antimicrobial light-based therapy
- Drug delivery in antimicrobial photodynamic therapy
- Light-triggered antimicrobial drug delivery
- Potential development of light-resistance by pathogenic microbes
- Nanotechnology and photonic-based antimicrobial therapy
- Toxicity of photonic-based antimicrobial therapy (e.g., cytotoxicity, genotoxicity) to the host cells and tissues.

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#PhotonicsWest

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Present your research at SPIE Photonics West

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

Abstracts due	17 July 2024
Registration opens	October 2024
Authors notified and program posts online	7 October 2024
Submission system opens for manuscripts and poster PDFs*	25 November 2024
Poster PDFs due for spie.org preview and publication	2 January 2025
Manuscripts due	8 January 2025
Advance upload deadline for oral presentation slides**	23 January 2025

*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 (1000-character max including spaces)
- Abstract for technical review (200-300 words; text only)
- Summary of abstract for display in the program (50-150 words; text only)
- Keywords used in search for your paper (optional)
- Check the individual conference call for papers for additional requirements (i.e., special abstract requirements or 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/bo106call
- Choose one conference that most closely matches the topics of your abstract. You may submit more than one abstract, but submit each abstract only once
- Click the title of the conference to view the full description and submit by clicking the "Submit an Abstract" button on that 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
- **Photonic chips:** Papers that highlight advances in materials, design, fabrication, integration, testing and packaging of photonic components at the chip level

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 conference registration fee
- Agree to receive email messaging for the conference series
- 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
- Poster presenters: one person may not present more than two posters in a poster session; poster presenters may submit an optional poster PDF available for preview in the online program (web and app) and for publication in the Proceedings of SPIE in the SPIE Digital Library
- Submit a manuscript by the advertised due date for publication in the Proceedings of SPIE in the SPIE Digital Library
- Obtain funding for registration fees, travel, and accommodations
- Attend the meeting
- Present at the scheduled time

Review and program placement

- To ensure a high-quality conference, all submissions will be assessed by the conference chair/editor for technical merit and suitability of content
- Conference chairs/editors reserve the right to reject for presentation any paper that does not meet content or presentation expectations
- Final placement in an oral or poster session is subject to chair discretion

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