



Optical Methods for Inspection, Characterization, and Imaging of Biomaterials VI (OM105)

Conference Chairs: **Pietro Ferraro**, Institute of Applied Sciences and Intelligent Systems (ISASI-CNR) (Italy); **Demetri Psaltis**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Simonetta Grilli**, Institute of Applied Sciences and Intelligent Systems (ISASI-CNR) (Italy)

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BIOCOMPATIBLE MATERIALS (OR “BIOMATERIALS”) are substances that are intended to mimic and interact with biological systems. For the safe and reliable function of implants, composition and materials are as important as form. Surfaces may require appropriate coatings or functionalization. Therefore the last two decades have seen strong advancements in biomaterials and related science, with capital investments and research efforts into the development of new products in several fields of applications. Biomaterials science embraces several disciplines such as materials science, tissue engineering, chemistry, biology, and medicine.

When a new material is designed and created or optimized and adopted, application specific characterization is of paramount importance. The need of imaging and metrological tools is very important in defining and measuring properties of the materials from different points of view: morphological properties and their spatio-temporal changes, mechanical properties (stress and strain analysis), surface characterization, reaction to stimulus, degradation, assembling, and many more.

INNOVATIVE ASPECTS

Optical techniques have some advantageous features: they are largely non-invasive, non-contact, possibly have a large field of view and high spatial resolution and very high sensitivity for measuring and evaluating most of physical and material parameters. This gives them a prominent role among diagnostic tools. The requirements depend on the situation, varying substantially from single cell and tissue engineering to complex biological systems or components. In analogy to what occurred in „Photo-mechanics“ which furnished many decisive answers in the past 40 years, in a variety of engineering problems (in materials engineering, testing and characterization of components and structures for aerospace, automobile industry, optics and micromechanics industries), optical metrology can provide answers for emerging problems and key issues in biomaterials research.

INTENTION

The intention of this conference is to bring together researchers working in the emerging fields of biomaterials, either at microscopic or at macroscopic scale. The conference will provide a rare platform for detailed exchange between groups working on the development of “biomaterials” and experts in “optical metrology”, in order to promote and stimulate stronger interaction between these topics. We invite experts from very different areas, who are usually not attending the same conferences, and we expect new collaborations to come into being from these encounters. The emphasis of the conference lies on the development of new and smart diagnostic metrological tools of biomaterials, to furnish quantitative data to optimize engineering design, fabrication and characterization of biomaterials.

EXPECTED TOPICS AMONG CONTRIBUTIONS INCLUDE:

- characterization of implantable devices and materials
- visualization and evaluation of self-assembly processes at the nanoscale/microscale of biological/polymeric matter
- biodegradable and/or biocompatible polymers and their characterization
- mechanical strength, viscoelastic, optical and other properties of bone, cartilage, and other soft tissues
- measurements polymer scaffold characterization for tissue engineering
- single cell mechanics, cell motility, cell adhesion and morphological evolution and correlation to biomechanisms and cell fate
- collagen and other tissue investigation
- optics of the eye and vision correction (i.e. characterization of intraocular lenses)
- diagnostic systems on innovative phase-contrast imaging and optical tomography
- innovative approaches for biomarker sensing

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- optical micromanipulation for materials characterization
- study of liquid-solid interfaces by optical/imaging methods
- bioinspired biomimetic and nanobiomaterials
- investigation and characterization of biological nano-diffractive materials/surfaces
- characterization of soft-like biomaterials
- optical method for study fluids at micro and nanoscale
- soft matter.

CONTRIBUTIONS ARE EXPECTED BUT NOT LIMITED TO THE FOLLOWING APPROACHES AND MULTIMODAL METHODS:

- quantitative phase contrast imaging
- digital differential image contrast imaging
- interference microscopy
- holographic interferometry
- deep learning in microscopy
- SLM-based microscopy
- flow cytometry
- lensless imaging
- photoacoustic imaging
- ultrasound imaging
- spectroscopy, microscopy, and endoscope optics
- optical absorption, reflection, transmission and scattering techniques
- 3D modeling and profiling
- speckle interferometry and imaging
- optical methods for biomechanics of materials and evaluation of its functionalities
- fluorescence microscopy techniques
- optical coherence tomography and microscopy
- wavefront sensing
- fringe projection accurate shape measurement
- topography and 3D shape measurements
- optical elastography methods
- optical and electrical tweezers of biomaterials.

SPECIAL SESSION

Single Cell Flow Cytometry: Recent Advances and Future Perspectives

The conference will feature a special session devoted to emerging methods about flow cytometry for single cell analysis especially those in label-free modality. The session will be chaired by Pietro Ferraro, ISASI-CNR (Italy) and Demetri Psaltis (EPFL, Switzerland).

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Present your research at SPIE Optical Metrology

Below are abstract submission instructions, the accompanying submission agreement, conference presentation guidelines, and guidelines for publishing in the Proceedings of SPIE on the SPIE Digital Library. Submissions subject to chair approval.

Important dates

Abstracts due	8 February 2023
Registration opens	28 March 2023
Authors notified and program posts online	24 April 2023
Submission system opens for manuscripts and poster PDFs	3 April 2023
Registration opens	April 2023
Poster PDFs due (for spie.org preview and publication)	30 May 2023
Manuscripts due	7 June 2023

What you will need to submit

- Title
- Author(s) information
- 250-word abstract for technical review
- 100-word summary for the program
- Keywords used in search for your paper (optional)
- Your decision on publishing your presentation recording to the SPIE Digital Library
- Some conferences may indicate additional requirements in the call for papers

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/om105
- 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
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- 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

Submission agreement

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

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- 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
- Ensure that all clearances, including government and company clearance, have been obtained to present and publish. If you are a DoD contractor in the USA, allow at least 60 days for clearance
- 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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