Photonic and Phononic Properties of Engineered Nanostructures XII

(OE302)

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Engineered nanostructures (e.g., photonic crystals, metamaterials) offer the possibility of controlling and manipulating the propagation of electromagnetic (or acoustic) waves within a given frequency range. The existence of photonic (and phononic) bandgaps in such nanostructures makes it possible to fabricate ultrasmalt optical (and acoustic) devices like lasers and cavities. These cavities find applications in several novel fields including cavity quantum electrodynamics (QED) and quantum computations.

Optical and acoustic metamaterials offer unique material platform in which the geometrical engineering of the nanostucture allows for novel properties (e.g., negative refraction) that cannot be found in conventional bulk materials.

Plasmonic structures are another set of structures that have recently demonstrated unique capabilities to control the propagation of light. Such structures are formed by engineering the metallic structures either separately or when combined with dielectric materials. Plasmonic structures provide unique capabilities that cannot be matched by conventional bulk materials.

The ability to control the propagation of electromagnetic (or acoustic) waves using engineered nanostructures (e.g. metamaterial and metasurfaces) makes them very attractive for the development of new set of devices that take advantage of the novel optical (or acoustic) properties of these structures. The ability for custom designing the electromagnetic mode patterns, frequencies and numbers opens up the possibility of novel devices (imaging systems, miniature lasers and detectors at different frequencies, switches, filters, interconnects, etc.) and interesting physics. The outstanding potentials of such meta-devices to revolutionize communications, sensing, information, and energy technologies along with the existence of several challenges in design, optimization, fabrication, and characterization of such structures have inspired extensive research activities in the field of engineered nanostructure materials and devices.

The number of design parameters in engineered nanostructures like metasurfaces have necessitated new inverse design techniques to take maximum advantage of their unique capabilities. While mathematically rigorous approaches have been developed in the last two decades, new approaches based on machine learning and deep learning algorithms for both knowledge discovery and design of engineered nanostructures have emerged in the last few days. These techniques can potentially result in new classes of structures for practical application.

It is the aim of this conference to bring together scientists and engineers worldwide to review and discuss state-of-the-art developments and future trends of engineered nanostructure materials and devices. Among such structures, photonic and phononic crystals, metamaterials, and plasmonic structures will be extensively covered.

We encourage authors to submit abstracts and manuscripts demonstrating their research achievements concerning, but not limited to, the following topical areas:

- fabrication of 2D and 3D structures (photonic and phononic crystals, plasmonic structures, metasurfaces, and metamaterials)
- numerical methods for the analysis of engineered nanostructure materials and devices
- deep-learning and machine-learning techniques for inverse design and knowledge discovery in engineered nanostructures
- photonic and phononic crystal waveguides, cavities, and active devices
- novel plasmonic devices and their characterization
- new metasurface-based structures for imaging and computing applications
- novel photonic and optoelectronics materials (e.g., 2D materials, phase-change materials, graphene, diamond)
- hybrid CMOS-compatible material platforms through integration/bonding of active, nonlinear, or other materials with CMOS-compatible substrates
- active and reconfigurable nanostructures and metamaterials
- non-linear effects in plasmonic structures, photonic crystals, and metamaterials
- novel phenomena in engineered nanostructures
- new photonic, phononic, plasmonic, and electronic functionalities on a single substrate.

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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

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<td>Abstract submission deadline</td>
<td>11 August 2021</td>
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<td>Author notification</td>
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<td>Manuscript due date</td>
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*Authors must register prior to uploading.

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)
- 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.

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- Visit the conference page: www.spie.org/oe302call
- You may submit more than one abstract but submit each abstract only once.
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- Follow the steps in the submission wizard until the submission process is complete.
- If your submission is related to an application track below, indicate the appropriate track when prompted during the submission process.

Application track

- Brain: Papers that describe the development of innovative technologies that will increase our understanding of brain function.
- Translational Research: Papers that showcase the latest photonics technologies, tools, and techniques with high potential to impact healthcare.
- 3D Printing: Papers that showcase innovative ways to apply this multidimensional/multidisciplinary technology.
- COVID-19 Research: Papers that illustrate the creativity and breadth of the optics and photonics community’s response to the COVID-19 pandemic.

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.
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- 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

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