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SPIE. OPTICS+ PHOTONICS
NANOSCIENCE + ENGINEERING

18 - 22 August 2024
San Diego Convention Center
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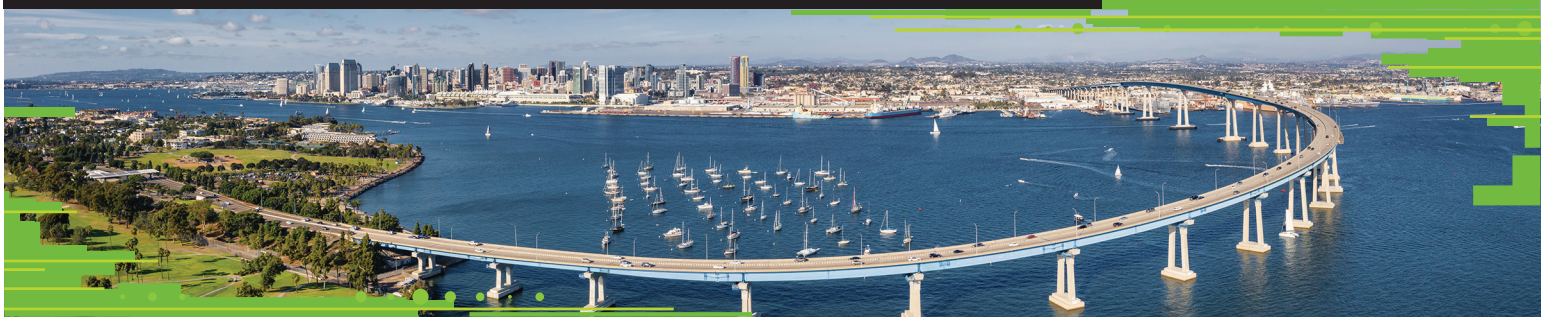

Nanoengineering: Fabrication, Properties, Optics, Thin Films, and Devices XXI (OP108)

Conference Chairs: **Balaji Panchapakesan,** Vellore Institute of Technology (India); **André-Jean Attias,** Yonsei Univ. (Republic of Korea), Sorbonne Univ. (France); **Wounjhang Park,** Univ. of Colorado Boulder (United States)

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Nanoengineering is an essential bridge that utilizes nanoscience and nanotechnology to enable a broad spectrum of totally new materials, functionalities, applications, devices, and products. Conventional photonic manufacturing technologies have extended well into the nanometer regime. Over-extended technologies are pushing sizes and densities into ranges that challenge reliability and basic physics. Nanoengineering also allows for manipulating matter at the nanoscale. Newly engineered materials, processes, ultrahigh precision and metrologies are emerging. Novel synthesized nanomaterials, based on 1D, 2D, and 3D architectures, nanocomposites and hierarchical assemblies based on such materials offer exciting opportunities. Nanostructured thin films display unique phenomena, thus enabling the improvement of traditional applications or the development of novel applications. Newly attainable design and fabrication of miniature optical elements have enabled the development of micro/nano/quantum-scale optical, near field optics, and optoelectronic elements in ever more diverse application areas. New low power logic and memory devices, expanded functionality, systems on a chip, solar cells, energy storage devices, biotechnology, photonics, photovoltaics, molecular electronics and optics are emerging. Application areas are highly diversified and include telecommunications, data communications, consumer electronics, microwave photonics, optical computing, neural networks, optical storage, non-volatile data storage, information display, optical imaging, printing, optical sensing, optical scanning, renewable energy harvest and storage, medical diagnosis, chemical/biological/environmental sensing, new nanomechanic applications, and new medical devices and prosthetic methods.

Critical to this realization of robust nanomanufacturing is the development of appropriate instrumentation, metrology, and standards. As novel applications emerge, the demand for highly sensitive and efficient measurement tools with the capability of rapid, automated, and thorough coverage of large functional areas at high precision is emerging.

The newly upcoming nanotechnologies present new opportunities and challenges in materials processing, device design, and integration. Drivers for commercial deployment include increased functionality, small form factor, performance, reliability, cost, as well as renewable energy and climate change mitigation.

Papers are solicited in the areas of:

LIGHT-MATTER INTERACTIONS IN 1D AND 2D NANOMATERIALS

- 1D and 2D photo-physics
- photoconductivity and photocurrents in 1D and 2D nanomaterials and composites
- novel architectures based on 1D and 2D nanomaterials for enhanced light-matter interactions
- photo-thermal phenomenon in nanoscale materials and their composites
- novel devices based on 1D and 2D nanomaterials for photonics.

PHOTON UPCONVERSION

- exploration of new photon upconversion materials, nanomaterials, and nanostructures
- synthesis and surface modification techniques for photon upconversion materials
- nanophotonic approach for photon upconversion enhancement, including but, not limited to, plasmonic nanostructures, metamaterials, photonic crystals, and nanocavities
- applications of photon upconversion materials, including, but not limited to, solar energy conversion, imaging, sensing, and therapeutics
- theory and modeling of photon upconversion processes
- advanced spectroscopy and other characterizations of photon upconversion materials.

NANOSTRUCTURED THIN FILMS

- fabrication techniques
- characterization
- homogenization studies and modeling
- hybrid nanostructures
- multifunctionality at the nanoscale
- plasmonics
- organic and inorganic nanostructured thin films
- sculptured thin films
- nanostructured porous thin films

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- two-dimensional materials
- carbon-based nanostructures
- topological insulators and photonic topological insulators
- functionalization of nanostructures
- thin-film sensors
- superhydrophobicity
- biomedical applications
- bioinspired and biomimetic thin films
- structural evolution.

INNOVATIVE PATTERNING, MATERIALS ENGINEERING, NANOFABRICATION, AND NANOLITHOGRAPHY FOR PHOTONICS APPLICATIONS

- electrospinning, imprinting, and embossing techniques
- fabrication, processing, and replication techniques
- directed self-assembly techniques
- engineered nano- and micro-structured materials
- synthesis of nanotubes, nanowires, and two-dimensional materials such as graphene
- stacked 2D atomic crystals
- molecular patterning and ordering.

HIGH PRECISION NANOPOSITIONING AND FEEDBACK, NEW METROLOGIES FOR PHOTONICS

- proximal probe manipulation techniques
- nanomotors and actuators
- nano-alignment techniques, tolerance
- tribology nanotechnologies
- new metrology instrumentation, methods, and standards for measuring nanodevices
- metrology for placement precision
- novel measurement and inspection methodologies
- high resolution optics, including full-field, near-field and scanning probe microscopy, scatterometry, and interferometric techniques
- x-ray techniques
- synchrotron techniques
- optical detectors for state of the art instrumentation
- particle beam (electron, ion) microscopy and elemental analysis
- atomic force microscopy.

NANOMANUFACTURING OF 1D AND 2D NANOMATERIALS FOR PHOTONICS APPLICATIONS

- liquid phase exfoliation of 1D and 2D nanomaterials
- new developments in liquid phase exfoliation for low cost nanomanufacturing
- chemical vapor deposition of 1D and 2D nanomaterials for manufacturing
- new green synthesis methods for low cost manufacturing of 1D and 2D nanomaterials
- scalable manufacturing of nanocomposites based on 1D and 2D nanomaterials
- properties of scalable nanomanufactured products
- scalable nanomanufacturing: innovative device architectures
- scalable nanomanufacturing: what is the road map?

DEVICES AND PROPERTIES OF NANOSTRUCTURES FOR PHOTONICS (EXPERIMENT AND/OR THEORY)

- nanoelectronic and nanomagnetic devices and structures
- waveguiding nanodevices and nanostructures
- nano-MEMS devices and structures
- near field optics based devices
- NOMS: Nano-Opto-Mechanical Systems
- photovoltaic cells and structures
- biological devices and structures
- molecular devices and structures
- atomic devices and structures
- quantum devices and structures
- nanosensors
- smart mechanical actuators
- 1D nanotubes
- stacked 2D atomic crystals.

NANO- AND MICRO-OPTICS

- physics, theory, design, modeling, and numerical simulation of optical nano- and micro-structures
- diffractive and refractive micro-structures for beam shaping and manipulation
- photonic microcircuits in silica, polymer, silicon, compound semiconductors, ferroelectrics, magnetics, metals, and biomaterials
- 1D, 2D, and 3D photonic crystals
- quantum dots, wells, and wires
- guided-wave and free-space optical interconnects
- optical alignment, tolerance, and coupling
- characterization (optical, electrical, structural, etc.)
- integration with guided-wave systems
- integration with photonic devices including VCSELs, modulators, and detectors
- nano- and micro-optic-based optical components, modules, subsystems, and systems for communications, information processing, computing, storage, photovoltaic power generation, information display, imaging, printing, scanning, and sensing
- graphene-and transition metal dichalcogenides based devices
- molecular devices.

ENERGY HARVESTING AND STORAGE NANOTECHNOLOGIES

- nanostructured materials for efficient light trapping, photon absorption, charge generation, charge transport, and current collection in photovoltaic cells and modules
- nanostructured solar cells
- polymer solar cells based on 1D and 2D nanomaterials
- solar thermal phenomenon based on 1D and 2D nanomaterials
- photoelectrochemical cells based on 1D and 2D nanomaterials
- nanocomposites, nanocoatings, and nanolubricants for power-generating wind turbines
- nanocomposites for smart behavior: reciprocity in electroactuation
- nanotechnologies for batteries and ultracapacitors, including powder-based, carbon-nanotube-based, silicon-nanowire-based and graphene-based electrodes.

COMMERCIALIZATION OF NANO- AND MICRO-STRUCTURE PHOTONIC AND OTHER DEVICES, MODULES, AND SYSTEMS

- nanomanufacturing methodology
- in-situ and in-operando inspection
- 3D critical dimension metrology
- characterization of nanostructured functional surfaces
- characterization of nano-objects used in novel devices or products
- assembly and packaging
- reliability
- novel concepts.

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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

Abstracts due	7 February 2024
Registration opens	April 2024
Authors notified and program posts online	29 April 2024
Submission system opens for manuscripts and poster PDFs*	17 June 2024
Poster PDFs due for spie.org preview and publication	24 July 2024
Manuscripts due	31 July 2024
Advance upload deadline for oral presentation slides**	16 August 2024

**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

- 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. extended abstract PDF upload for review 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/op108call**
- You may submit more than one abstract but submit each abstract only once
- Click 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

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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- Poster presenters: submit a poster PDF by the advertised due dates for publication in the Proceedings of SPIE in the SPIE Digital Library; poster PDFs may also be published and viewable in the spie.org program during and immediately after the event. Each poster must have a unique presenter; one person may not present more than one poster per session
- Email messaging for the conference series
- 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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