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• Semiconductor Lasers and LEDs
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• Optical Communications: Devices to Systems
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SPIE OPTO 2019 addresses the most current developments and research in a broad range of optoelectronic technologies and their integration into a variety of industrial and non-industrial applications. Topics to be covered include optoelectronic materials and devices, photonic integration, nanotechnologies, MEMS/MOEMS, advanced quantum and optoelectronic applications, semiconductor lasers, light-emitting devices, packaging, displays, holography, optical networks, and communications.

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Xiang Zhou, Google (USA)
Physics and Simulation of Optoelectronic Devices XXVII (OE101)

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This conference targets existing and new physical and mathematical methods as applied to optoelectronics, as well as recent advances in new materials and devices. Its objective is to bring together experimentalists, theorists, computational specialists, and development engineers to provide an interdisciplinary forum to discuss physical understanding and state-of-the-art computational analysis of active and passive optoelectronic materials and devices. Theoretical and experimental papers are solicited on the following and related topics:

- **optoelectronic device modeling**: lasers, light-emitting diodes, photodetectors, modulators, solar cells
- **materials for optoelectronic devices**: wide bandgap materials; band structure, band offsets, gain and recombination in II-VI and III-nitride structures, materials for mid-infrared optoelectronic devices, photonics synthetic matter
- **plasmonic materials and structures**: theory and application in optoelectronic devices
- **2D materials and their application in photonics**: electronic band structure, luminescent properties, device strategies
- **photovoltaics modeling**: simulation models and modeling results for solar cells
- **physics of nanostructures**: quantum well, quantum wire, and quantum dot lasers and surface plasmon devices; hybrid nano structures, lattice mismatch and strain effects; Coulomb effects and macroscopic theories; carrier and quantum transport, capture, and dynamics; hole burning, gain suppression and non-equilibrium effects; coherent effects; polarization phenomena
- **micro- or nanocavity effects and photonic crystals**: applications for LEDs and lasers; thresholdless laser; novel VCSEL structures; polariton lasers
- **quantum communications**: semiconductor quantum bits; single-photon devices; entangled states; quantum cryptography; optically-probed spin dynamics; cavity quantum electrodynamics, superconducting optoelectronics
- **dynamics and noise in diode lasers and systems**: gain switching; passive and actively mode-locked diode lasers; self-pulsations; chaos and instabilities in diode lasers and laser arrays; bistability and multistability, effects of injected light and optical feedback; coherence of lasers and laser arrays
- **numerical simulation methods**: heterolayer transport simulation; ab-initio and multi-scale simulation of materials for optoelectronics; computational electromagnetics; multi-scale and multi-physics methods; photonic circuit simulation, code parallelization techniques
- **modeling techniques for fiber and integrated optical devices**: eigenvalue techniques, finite difference, finite element and Fourier transform methods, high-order propagation methods, wide-angle and vector wave equations, models of guided-wave reflection
- **advances in waveguides and waveguide devices**: pulse propagation in active waveguides, waveguide structures for routing, switching and high brightness devices; tapered waveguides; waveguide-fiber coupling; nonlinear and high-power effects in waveguides and fibers; gratings; soliton propagation.

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This conference attempts to capture basic research and breakthroughs in the application of photonic/ novel device architectures and the development of advanced modeling and simulation techniques to feed the innovation pipeline leading to revolutionary and practically viable high-efficiency photovoltaic (PV) technologies. The conference also aims at providing an interdisciplinary forum to enhance interactions between physicists, photonic engineers, and photovoltaic device specialists at both the experimental and theoretical levels.

Theoretical or experimental papers are sought that address recent advances in basic material/device physics, simulation, demonstration, and optimization of:

- advanced light management concepts and architectures, including new approaches to spectral engineering (i.e. luminescent concentrators, up-down converters), light concentration, surface texturing and light trapping (i.e. plasmonic cavities, micro/nano-engineered ARs), as well as synergistic hybrid/multifunctional designs
- non-conventional PV converters, in particular application of advanced photonics to enable unique conversion mechanisms. Examples include application of photonics to enable the demonstration of advanced quantum confined or nanostructured concepts, intermediate band concepts, multiple exciton generation, thermophotonics or hot-carrier effects
- advanced single and multi-junction devices leveraging on innovative materials or/and photonic architectures. In particular the simulation or/demonstration of the application of cross-cutting photonic engineering approaches for enhancing the performance, reliability and functionality of these devices
- quantum- and nano-structured devices with a particular focus on deciphering the science at play in photogeneration, recombination, and carrier transport in quantum well/quantum dot and wire devices
- defect-tolerant PV designs and application of photonics to enhance defect tolerance (dislocations, radiation defects, grain-boundaries, points defects) of solar cells
- contributions dealing with the characterization of the above mentioned devices/concepts as well as related advanced scalable micro/nano-fabrication technique are also of relevance.

Finally the conference also welcomes new and emerging methods in simulation of PV and hybrid photonic/PV devices, including but not limited to 3D-drift diffusion and RCWA models, integrated ab-initio and multi-scale simulation techniques.

Save the date

**ABSTRACTS DUE:** 25 July 2018

**AUTHOR NOTIFICATION:** 1 October 2018

The contact author will be notified of acceptance by email.

**OPTO POST-MEETING MANUSCRIPT DUE DATE:**

(All conferences except OE115 and OE131-OE133)

9 January 2019

**OPTO ON-SITE MANUSCRIPT DUE DATE**: (*Conferences OE115 and OE131-OE133. Manuscripts will be published on first day of conference): 12 December 2018

**PLEASE NOTE:** Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a manuscript for publication in the conference proceedings.
CALL FOR PAPERS

Optical Components and Materials XVI (OE103)

Conference Chairs: Shibin Jiang, AdValue Photonics, Inc. (USA); Michel J. F. Digonnet, Stanford Univ. (USA)

Program Committee: Jean-Luc Adam, Univ. de Rennes 1 (France); Joel Bagwell, Edmund Optics Inc. (USA); Rolindes Balda, Univ. del País Vasco (Spain); Robert P. Dahlgren, NASA Ames Research Ctr. (USA); Angel Flores, Air Force Research Lab. (USA); Jesse A. Frantz, U.S. Naval Research Lab. (USA); Leonid B. Glebov, CReOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Seppo K. Honkanen, Univ. of Eastern Finland (Finland); Jacques Lucas, Univ. de Rennes 1 (France); Yasutake Ohishi, Toyota Technological Institute (Japan); Aydogan Ozcan, Univ. of California, Los Angeles (USA); Giancarlo C. Righini, Istituto di Fisica Applicata “Nello Carrara” (Italy); Setsuhisa Tanabe, Kyoto Univ. (Japan); John M. Zavada, Polytechnic Institute of New York Univ. (USA); Jun Zhang, U.S. Army Research Lab. (USA)

Active and passive optical components are playing key roles in current optical communication networks, optical sensors, and medical optical devices. Extensive research continues to be carried out to improve their performance and functionality, and to reduce their size and cost. Areas of research that are particularly active include high-power fiber lasers, switches, filters, ultra-short-pulse fiber lasers, as well as material research in rare-earth-doped glasses, semiconductors, and nano-particles for enabling innovative photonic devices. There is also significant activity in developing components in lightwave circuits, which will ultimately reduce manufacturing cost while integrating multiple active and passive functions on a single chip.

The purpose of this conference is to bring together researchers and engineers from academia and industry to discuss recent developments in these rapidly advancing fields. Suggested topics include:

- rare-earth-doped devices and materials
- rare-earth-doped or metal-doped glasses, crystals, polymers, semiconductors, hybrid materials, and fibers
- spectroscopy of rare-earth ions and other laser species
- graphene and carbon nanotubes
- new materials for mode-locking
- nanoparticles
- quantum dots
- fiber amplifiers design and fabrication
- waveguide lasers and amplifiers
- UV to far-infrared fiber lasers
- cladding-pumped lasers and amplifiers
- Raman laser and amplifiers
- Brillouin lasers
- broadband fiber sources
- semiconductor-based lasers and amplifiers
- optical switches, modulators, and other devices
- optical nonlinearities in fibers and waveguides
- lithium niobate bulk-optic and waveguide devices
- thermal and UV poiling of silica and other glasses
- electro-optic poled sol-gels
- progress in lithium niobate electro-optic modulators
- nonlinear frequency converters
- photonic-bandgap fibers and devices
- plasmonic devices and technologies
- sub-wavelength optical elements
- photosensitivity in fibers and planar waveguides
- photosensitivity in glasses and polymers
- filters, reflectors, and other grating-based devices
- fiber and waveguide Bragg gratings
- long-period fiber gratings
- modeling glass structure and defects arising from UV irradiation
- novel passive and active components for dense WDM
- tunable filters and add-drop filters
- device packaging, testing, and reliability
- devices for optical interconnect
- detectors
- SWIR photodetectors
- single-photon detectors
- silicon-based photodetectors
- low-noise detection architectures
- unique detector materials and special spectral regions
- progress in MEMS-based detectors
- detectors with gain.

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Organic Photonic Materials and Devices XXI (OE104)

Conference Chairs: Christopher E. Tabor, Air Force Research Lab. (USA); François Kajzar, Univ. Politehnica of Bucharest (Romania); Toshikuni Kaino, Tohoku Univ. (Japan)

Conference Co-Chair: Okihiro Sugihara, Utsunomiya Univ. (Japan)

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For energy-saving and economic reasons, there is a growing interest in organic/polymeric photonic and electronic materials and devices that is generating a revolution in optical communication, data transmission, storage, displays, and many other photonic applications. Recent advances in optical interconnection and electro-optic devices as well as planar light-wave circuits, light-emitting and photovoltaic devices suggest that organic and polymeric materials will play a significant role in these areas. Organic-inorganic hybrid materials and biophotonic materials are of special concern for novel photonic device development. The ability to solution process various organic and organic-inorganic hybrid materials opens them up to next-generation advanced processing techniques, such as additive manufacturing and roll-to-roll printing, which are usually not feasible with all inorganic photonic materials. Applications that require flexible and stretchable photonic devices are also more viable with organic materials compared to most inorganic alternatives. Organic Photonic Materials and Devices XXI will serve as a forum for the dissemination and discussion of state-of-the-art results pertaining to organic/polymeric opto-electronic, nanophotonic, and biophotonic materials and devices, their manufacturability, and their applications. The objective of this conference is to bring together researchers and engineers from academia, industry, and government laboratories who share a common interest in organic/polymeric photonic materials and devices.

This conference will provide a forum for an update on progress in the highly-connected and multidisciplinary subject of photonic technologies based on organic/polymeric materials. Papers are solicited in the following areas:

• nonlinear optical polymer materials and devices
• organic light-emitting materials and devices
• photorefractive materials and processes
• photochromic materials
• polymer optical waveguides and fibers
• multiphoton processes
• charge transport in organic materials
• single-molecule spectroscopy
• organic field effect transistors
• polymer lasers and amplifiers
• optical limiting materials
• polymer solar cells and photodetectors
• nanophotonics and organic metamaterials
• biophotonics
• electro-optic materials for silicon photonics
• biopolymers
• organic-inorganic hybrid materials and devices
• flexible semiconductors
• plasmonic NLO effects
• polymeric photonic crystals
• hybrid organic-inorganic materials
• multiphoton processes
• theoretical description of NLO processes
• printed optical materials and processes
• Rf organic materials properties.
CALL FOR PAPERS

Ultrafast Phenomena and Nanophotonics XXIII (OE105)

Conference Chairs: Markus Betz, Technische Univ. Dortmund (Germany); Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada)

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This conference covers ultrafast phenomena in bulk semiconductors, semiconducting and metallic nanostructures and devices with emphasis on ultrafast optical and/or coherent phenomena. Manuscripts are solicited in the following topics but not restricted to:

ULTRAFAST DYNAMICS IN SEMICONDUCTORS AND HETEROSTRUCTURES
• carrier-carrier, carrier-phonon interactions
• polariton dynamics in microcavities
• ultrafast acoustic phenomena.

COHERENT DYNAMICS OF OPTICAL EXCITATIONS
• excitonic coherences
• quantum interference effects
• four-wave mixing, two-dimensional spectroscopy.

NON-LINEAR OPTICAL EFFECTS
• optical frequency conversion
• multi-photon processes, high-field physics
• high harmonic generation, attosecond physics
• nonlinear and ultrafast processes at surfaces and interfaces.

NON-EQUILIBRIUM CARRIER TRANSPORT
• ballistic carrier transport
• tunneling phenomena
• Bloch oscillations.

ULTRAFAST PHENOMENA CARBON NANOMATERIALS
• dynamics in graphene and carbon nanotubes
• graphene plasmonics
• carbon-based quantum dots.

ULTRAFAST PHENOMENA IN MONOLAYER SEMICONDUCTORS
• nonlinear and dynamical processes in transition metal dichalcogenides (TMDs)
• optics in silicene, germanene and black phosphorus
• novel emerging 2D materials.

SPIN DYNAMICS AND SPIN MANIPULATION
• ultrafast optical spin manipulation
• spin coherence and relaxation
• ultrafast magnetism
• spin injection and transport.

ULTRAFAST PLASMONICS
• active plasmonics
• THz plasmonics
• ultrafast dynamics in metallic nanostructures.

THz SPECTROSCOPY
• THz wave generation
• field-resolved techniques
• THz time-domain spectroscopy
• strong-field THz physics.

ULTRAFAST PROCESSES IN DEVICES AND LASERS
• ultrafast optical switching
• wavelength conversions
• gain dynamics in lasers and amplifiers.

ULTRAFAST NANO-OPTICS
• nanoemitters, nanoantennae
• nanolocalization of optical fields
• coherent control in nanostructures
• semiconductor quantum dots and wires
• single-photon sources
• applications for quantum information processing.

ULTRAFAST OPTICAL PROPERTIES OF METAMATERIALS
• photonic and phononic crystals
• metal-semiconductor hybrid structures
• negative-index materials
• epsilon-near-zero materials
• metatronics.

BEST STUDENT PAPER AWARDS

All contributed papers of conference OE105 given by a young scientist (PhD student or postdoc within the first two years after graduation) are eligible for the award. Note that this award is for contributed papers only. Invited papers and contributions to other symposia do not qualify. To facilitate handing out the award during the meeting, applications will be collected prior to the meeting. To be considered for the award, applicants must:
• be a young scientist (PhD student or postdoc within the first two years after graduation)
• be listed as a contributing author (not invited) on an accepted paper within conference OE105
• have conducted the majority of the work to be presented
• submit your manuscript online by 9 January 2019
• present your paper as scheduled
• be present at the Awards Ceremony.

Nominations
Details about how to apply for this Best Student Paper Award will be sent to all accepted authors shortly after the Author Acceptance Notifications are sent on 1 October 2018.
This conference brings together researchers and engineers from academia, industry, and government laboratories to explore and present work in the frequency range covering approximately less than 1 GHz (300 mm) to greater than 3 THz (100 nm) as well as infra-red including near, mid and far infrared. Papers on RF and millimeter and infrared technology including advances in wireless communications, radar, lidar, microwave and mm-wave photonics, metamaterials, antennas, phased array radar, modulation, security, monitoring, detection, imaging are encouraged. Papers on photonic-related fields including, but not limited to, radio over fiber (RoF) RF photonics including photonic generation of microwave signals, photonic processing of microwave signals, and photonic distribution of microwave signals and semiconductor (including Si, SiC, SOI, GaAs, GaN, InP, SiGe, diamond, graphene and other materials) RF, mm-wave and terahertz devices and related applications are also encouraged, as well as the hybrid photonic systems and applications. Terahertz (THz) technology deals with the generation and utilization of electromagnetic energy covering what is also known as the sub-millimeter wave region of the spectrum. In this region, which lies between the millimeter wave and far infrared spectral regions, materials exhibit properties that can be exploited to advantage for use over a broad range of important technologies and applications. Papers on terahertz photonics including photonic generation and detection of terahertz waves to/or infrared, THz to/or infrared lasers are also encouraged.

This conference also includes hybrid technologies including, for example, microwave to THz wearable devices of any type and form as well as microwave to THz communications and data links, Artificial intelligence in microwave to THz imaging, etc.

Disciplines utilizing terahertz technology include physical chemistry (certain molecules or molecular segments exhibit strong resonances in the 10 cm⁻¹ to 100 cm⁻¹ spectral region), military, and homeland security (terahertz radiation can penetrate clothing and packing materials but is reflected by metals and other materials), biomedical technology (tissue exhibits reflection and absorption properties that change dramatically with tissue characteristics), medical and dental, secure short-distance wireless communications (atmospheric water content prevents terahertz radiation from traveling very far), astronomy (the cold background of the universe exhibits a peak in this spectral region), space communications (where the terahertz region is wide open for use) and other disciplines where new, yet-to-be-discovered applications will undoubtedly come forth. Since the low energy associated with terahertz radiation is expected to be no more harmful than infrared or microwave radiation, safety issues are not expected to limit the use of terahertz radiation at low-power levels.

Papers on power supplies and electronic power conditioning technologies and associated power protection systems including energy-efficient power supplies are also encouraged.

Papers are solicited in the following and related areas:

**TERAHERTZ SOURCES**
- solid-state sources, electron-beam sources, vacuum electronics sources, frequency mixers, frequency multipliers, parametric oscillators, hybrids, graphene, FET and HEMT sources, gas lasers, quantum cascade lasers and related sources, p-germanium sources, photoconductive switches, resonant tunneling diodes, backward wave oscillators
- novel stabilized photonic THz sources
- fabrication processes
- high bandwidth devices, structures, sources, detectors, sensors, etc.
- wearables
- systems and systems integration.
RF, SUB-MILLIMETER-WAVE AND MILLIMETER-WAVE SOURCES
- power sources of all types in the range of 1 GHz to 300 GHz and 300 GHz and higher (i.e. from S-band to the higher end of the millimeter-wave frequencies and all of the sub-millimeter-wave frequency region)
- novel stabilized photonic RF, millimeter-wave, sub-millimeter-wave sources.

DETECTORS
- bolometers and other thermal detectors,
- Schottky and other mixers, thermopiles, quantum devices, antenna integrated detectors, heterodyne detection techniques, hybrid detection, direct detection techniques
- transistor-based detectors including graphene, silicon, III-V, II-VI, nitride-based, etc.
- theoretical modeling
- novel detectors.

HIGH-POWER SOURCES, MODULES, AND SYSTEMS
- THz, RF, millimeter-wave and sub-millimeter-wave high power sources
- THz, RF, millimeter-wave and sub-millimeter-wave modules
- THz, RF, millimeter-wave and sub-millimeter-wave systems
- power supplies and support circuits, electronics, optoelectronics, systems.

TERAHERTZ, RF, MILLIMETER-WAVE, AND SUB-MILLIMETER-WAVE PASSIVE COMPONENTS
- optics, lenses, gratings, waveguides, photonic crystal structures and metamaterials, couplers, wire guides, other components.

MATERIALS FOR THZ AND GHZ DEVICES
- linear and nonlinear optical materials and devices
- organic and inorganic source and modulator materials and devices
- RF, millimeter-wave and sub-millimeter-wave materials, devices and fabrication processes
- THz and/or GHz material systems
- silicon (Si)-based
- silicon carbide (SiC)-based
- silicon-on-insulator (SOI)-based
- gallium arsenide (GaAs)-based
- gallium nitride (GaN)-based
- indium phosphide (InP)-based
- silicon germanium (SiGe)-based
- quantum dot (QD) based including for QDs for sensors, detectors and sources
- diamond-based
- graphene-based
- other-based.

ENHANCEMENTS, IMPROVEMENTS AND ADVANCES IN RF, MILLIMETER-WAVE AND SUB-MILLIMETER WAVE GENERATION, MODULATION AND DETECTION
- RF, millimeter-wave and sub-millimeter-wave integrated photonic devices
- RF, millimeter-wave and sub-millimeter-wave and photonic integration process development
- RF, millimeter-wave and sub-millimeter-wave performance characterization
- phased-array and single-element photonically-driven antennas
- phased-array and single-element antennas, systems, concepts, approaches
- low-Vp and wide-bandwidth modulators
- direct-driven millimeter-wave lasers and amplifiers
- millimeter-wave, sub-millimeter and THz photonic crystal devices and applications
- RF, millimeter-wave, sub-millimeter-wave and THz photonic up- and down-converters
- photonic phase locked loops
- RF, millimeter-wave, sub-millimeter-wave, and THz MMICs
- wearables
- RF, millimeter-wave, sub-millimeter-wave, high power solid-state and electronic vacuum devices.

SIMULATIONS AND MODELING
- simulations and/or modeling of RF devices, components, and/or systems
- simulations and/or modeling of millimeter-wave devices, components, and/or systems
- simulations and/or modeling of sub-millimeter-wave devices, components, and/or systems
- simulations and/or modeling of THz devices, components, and/or systems
- modeling of optical components, optical systems, imaging systems, wave propagation, models, Gaussian beam characteristics, couplers, antennas, performance limitations, software designs
- artificial intelligence, augmented reality, virtual reality.

SPECTROSCOPY
- terahertz and/or sub-millimeter spectroscopy, DNA segment identification, cell abnormalities, cancer identification and screening, imaging, medical and dental detection
- infrared spectroscopy
- identification of biological and chemical detection and fingerprinting
- identification of hazardous, explosive, and/or dangerous materials
- identification of chemical or biological threats
- scalar and vector network analysis at sub-millimeter and terahertz frequencies
- measurement techniques at sub-millimeter, millimeter, and terahertz frequencies
- identification of organic and inorganic compounds using terahertz and/or sub-millimeter wave spectroscopy
- high-speed and/or high-resolution spectroscopic techniques, methods, approaches
- artificial Intelligence, augmented reality, virtual reality, etc.
- novel approaches, systems, designs, techniques, reflection, sensitivity, applications.

BIOMEDICAL APPLICATIONS
- DNA identification, burn analysis, tissue abnormality identification, pharmaceutical, dentistry, medical, clinical, commercial applications
- cancer, water, and/or water content detection; high sensitivity, high contrast, etc.
- biological and/or physiological aspects and/or related effects of RF, millimeter-wave, sub-millimeter-wave and/or THz
OPTOELECTRONIC MATERIALS AND DEVICES

Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XII (OE106 continued)

- artificial Intelligence, augmented reality, virtual reality, etc.
- imaging techniques, methods, hardware design, strategies, technologies and techniques.

COMMUNICATION AND SENSING SYSTEMS
- terahertz, RF, millimeter-wave and sub-millimeter-wave communications, media characteristics, wireless communications, inspection systems, detection systems, screening systems
- RF, millimeter, sub-millimeter-wave and microwave links
- RF, millimeter-wave, sub-millimeter-wave photonic communication and sensing systems
- Internet of things (IOT) sensors, detectors and communication interfaces, protocols and implementations including but not limited to wireless sensors and wireless communications.

IMAGING AND SECURITY
- RF imaging devices, components, and/or systems
- millimeter-wave imaging devices, components, and/or systems
- sub-millimeter-wave imaging devices, components, and/or systems
- THz imaging devices, components, and/or systems
- RF, millimeter-wave and sub-millimeter-wave active and passive imaging systems
- artificial Intelligence, augmented reality, virtual reality, etc.
- x-ray imaging including components, systems, power supplies, applications, techniques, etc.

ASTRONOMY AND SPACE AND OTHER AREAS OF PHOTONICS, LIGHT, AND MATTER
- imaging techniques, ultra-sensitive detection, applications, programs
- artificial Intelligence, augmented reality, virtual reality, etc.
- satellite communications
- space based electronics and devices
- satellite components and systems
- space and satellite qualifications and testing
- radiation hard electronics
- high-energy physics and related topics
- fusion and related topics
- fission and related topics.

INNOVATIONS
- new or novel terahertz, RF, millimeter-wave and sub-millimeter, microwave concepts, systems, applications
- new or novel developments in THz or sub-millimeter waves including teaching, instruction, course offerings, simulations, conceptional and/or experimental procedures, implementations, concepts, etc.
- wearables, implantable, etc.

POWER SUPPLIES AND ELECTRONIC POWER CONDITIONERS
- high-power power supplies
- low- and ultra-low-power power supplies
- low-noise power supplies
- high- and ultra-efficient power supplies
- associated power protection systems
- energy-efficient power supplies
- novel designs and architectures
- specialized power electronics
- portable power supplies
- power supplies tailored for photonics and/or RF, mm-wave and/or THz applications
- power supplies for lighting applications including solid state lighting such as LEDs, OLEDs and quantum dots.

ORGANIC ELECTRONICS
- DC and low frequency
- high frequency
- novel designs and architectures
- passive and active addressable arrays
- low power
- modulated configurations
- sensing, detection and/or emitting
- organic light emitting diodes and associated electronics
- lighting therapy using solid state lighting including OLEDs.

INFRARED DEVICES, COMMUNICATIONS, SOURCES, SENSORS, DETECTORS
- infrared amplifiers
- infrared imaging devices, components, and/or systems
- infrared sources devices, components, and/or systems
- infrared sensors, detectors and/or associated devices, components, and/or systems
- infrared communications devices, components, and/or systems
- infrared active and passive components and/or systems
- infrared advances including components, systems, power supplies, applications, techniques, etc.
- infrared applications
- wearables
- artificial Intelligence, augmented reality, virtual reality.

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CALL FOR PAPERS

Gallium Nitride Materials and Devices XIV (OE107)

Conference Chairs: Hiroshi Fujoka, The Univ. of Tokyo (Japan); Hadis Morkoc, Virginia Commonwealth Univ. (USA); Ulrich T. Schwarz, Technische Univ. Chemnitz (Germany)

Conference Co-Chairs: Jen-Inn Chyi, National Central Univ. (Taiwan); Jung Han, Yale Univ. (USA); Motoaki Iwaya, Meijo Univ. (Japan)

Program Committee: Frank Bertram, Otto-von-Guericke-Universität Magdeburg (Germany); Michał Bockowski, Institute of High Pressure Physics (Poland); Raffaella Calarco, Paul-Drude-Institut für Festkörperforschung (Germany); Mitch M. C. Chou, National Sun Yat-Sen Univ. (Taiwan); Martin Feneberg, Otto-von-Guericke-Universität Magdeburg (Germany); Mitsuhiro Funato, Kyoto Univ. (Japan); Bernard Gil, Lab. Charles Coulomb (France); Nicolas Grandjean, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Hideki Hirayama, RIKEN (Japan); Ray-Hua Horng, National Chiao Tung Univ. (Taiwan); Chih-Fang Huang, National Tsing Hua Univ. (Taiwan); Michael Kneissl, Technische Univ. Berlin (Germany); Elison Matioli, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Koh Matsumoto, Nagoya Institute of Technology (Japan); Eva Monroy, Commissariat à l'Energie Atomique (France); Yong-Tae Moon, LG Electronics Inc. (Korea, Republic of); Yasaki Nanishi, Ritsumeikan Univ. (Japan); Ümit Özgür, Virginia Commonwealth Univ. (USA); Piotr Perlin, Institute of High Pressure Physics (Poland); Fan Ren, Univ. of Florida (USA); Tae-Yeon Seong, Korea Univ. (Korea, Republic of); Bo Shen, Peking Univ. (China); Jong-In Shim, Hanyang Univ. (Korea, Republic of); Maria Tchernycheva, Univ. Paris-Sud 11 (France); Akio Wakejima, Nagoya Institute of Technology (Japan); Chih-Chung Yang, National Taiwan Univ. (Taiwan); Euljoon Yoon, Seoul National Univ. (Korea, Republic of)

This conference will focus on recent advances and challenges in GaN and related materials and electronic, switching, and optical devices based on them, including potential applications. An important objective of this conference is to provide a forum for dissemination of the latest results on current and emerging topics in GaN and related materials and devices, as well as paving the way for in-depth discussions among participants. The topics of discussion will include, but not limited to, scientific and technological advances in all aspects of materials, including bulk GaN, ternaries and quaternaries, heterostructures, new substrates and new methodologies employed for alternative substrates such as Si, materials physics, devices (electronic and optical), device physics, novel devices such as microcavities, processing, and particularly devices with emphasis on light-emitters, novel growth techniques, and device reliability.

Topics for presentation and discussion will include but not be limited to:

BULK GROWTH
• solution growth methods both very high pressure and not so high pressure, HVPE growth, or by any other method, characterization (structural, electrical, and optical), high-resistivity bulk GaN.

EPITAXIAL GROWTH, BULK GROWTH, AND GROWTH OF NONSTRUCTURES
• MOVPE, MBE, HVPE, substrates (patterned and planar, alternative orientations), precursors for dopants and constituents, epitaxial lateral overgrowth, alloys, low-dimensional systems, growth and exploitation of non-polar and semi-polar surfaces.

DEFECTS AND DOPING
• defect structures at the structural and electronic energy levels, electronic states associated with group dopants (mainly involuntary kinds); techniques applied to illuminate the local nature of impurities; surface states; surface passivation; interface states; DLTS and its variants, low-frequency noise techniques, microscopy (TEM, electron holography, STM, AFM and its variants), x-ray analysis, novel dopants.

OPTICAL CHARACTERIZATION
• photoluminescence, cathodoluminescence, optical-emission imaging, non-linear optics, reflection spectroscopy, experimental measurement of energy band parameters and band structure, etc.

ELECTRICAL CHARACTERIZATION
• Hall effect, carrier transport, magneto-transport, photoconductivity, thermally stimulated currents, etc.

STRUCTURAL CHARACTERIZATION
• x-ray, TEM and its variants, local charge mapping, AFM detection of dislocations, stacking faults, etc.

III-NITRIDE NANOSTRUCTURES
• including self-assembled and ordered quantum dots, quantum wires and related low-dimensional structures.

FUNDAMENTAL PHYSICS
• band structure (including quantum well heterostructures), quantum size effects, strain effects, excitons (free and bound), polaritons, nanocavities, plasmonic effects, surface phenomena, polarization effects, piezoelectric effects, theoretical models.

DEVICES
• lighting by LEDs, LEDs for displays, LEDs for TVs, UV and visible LEDs (particularly radiative/nonradiative recombination processes and efficiency related topics), laser diodes (particularly extended wavelengths toward longer and shorter wavelengths), FETs and dielectric-gated FETs for high-power switching and RF as well as high-frequency applications inclusive of topics such as hold-voltage and on-current, hot-phonon and hot-electron effects, power dissipation, degradation/reliability, pathways for degradation and ways to improve reliability, UV and other optical detectors, chemical and biological sensors, field-emitters, integration with other technologies, novel devices, device theory and simulations.
Oxide-based Materials and Devices X (OE108)

Conference Chairs: David J. Rogers, Nanovation (France); David C. Look, Wright State Univ. (USA); Ferechteh H. Teherani, Nanovation (France)

Program Committee: Philippe Bove, Nanovation (France); Ekat erine Chikio de, Univ. de Versailles Saint-Quentin-en Yvelines (France); Jean-Jacques Delon, The Univ. of Tokyo (Japan); Aleksandra B. Djurisić, The Univ. of Hong Kong (Hong Kong, China); Michael D. Gerhold, U.S. Army Research Office (USA); Michael A. Harper, CIV USN ONR GLOBAL (USA); Adrián Hierro, Univ. Politecnica de Madrid (Spain); Axel Hoffmann, Technische Univ. Berlin (Germany); Norbert H. Nickel, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany); Tatsu Su Okada, OPERA Ctr. for Organic Photonics and Electronics Research (Japan); Seong-Ju Park, Gwangju Institute of Science and Technology (Korea, Republic of); Manjire Razezhi, Northwestern Univ. (USA); Vinod Eric Sandana, Nanovation (France); Michael L. Schuer, Air Force Research Lab. (USA); Chris G. Van de Walle, Univ. of California, Santa Barbara (USA); Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France); Markus R. Wagner, Technische Univ. Berlin (Germany); Magnus Willander, Linköping Univ. (Sweden); Hideki Yamamoto, NTT Basic Research Labs. (Japan)

Oxides are remarkable multifunctional materials with a huge range of emerging applications spanning domains as diverse as solid-state lighting, photovoltaics, nanotechnology, biotechnology, capacitors, transparent electronics, next-generation memories, sensors, and spintronics. A number of breakthroughs over the past few years have driven an exponential surge in research activity in the field. This interdisciplinary conference is intended to cover (but not be limited to) oxide materials for use as transparent conductors, opto-semiconductors, ferroelectrics, piezoelectrics, dielectrics, multiferroics, superconductors, magnetic oxides, metamaterials, and various electrical/optical components. We would like to encourage you to take part in this conference and submit an abstract. Presentations are solicited on the following topics:

- bulk growth and characterization
- thin films and multilayers (growth, interfaces, surfaces, and properties) of oxides, and oxides/non-oxide
- 2D materials
- nanostructured growth, properties and applications
- amorphous oxide semiconductors
- highly-correlated complex systems
- phase transitions
- modeling and theoretical studies
- structural, mechanical, electrical, chemical, thermal, magnetic, and optical properties
- degenerate conduction
- plasmonics
- doping and band gap engineering
- photon-induced phenomena in complex oxides
- optical studies
- processing, etching, annealing, and formation of ohmic and Schottky contacts
- applications including: LEDs, lasers, photovoltaics, TCOs, transparent electronics, FETs, TFTs, memories, spintronics, scintillators, sensors, actuators, SAW devices, MEMS, optical coatings plus devices for high temperature, RF, radiation hard, microwave, and radar applications
- integration with Si + beyond Si oxide electronics
- gate-controlled metal-insulator transitions in oxides
- multilayered oxide structures for optical materials
- graphene/graphene oxide/hybrids of graphene and oxides
- nanionics
- energy management: production, harvesting, and storage
- “green” processing of materials/devices (cost-competitive biocompatible materials and processes).

This year, building on last year’s excellent contributions, we are having two special focus sessions: one dedicated to Ga2O3 and the other to perovskite solar cells.

ABSTRACTS DUE: 25 July 2018

AUTHOR NOTIFICATION: 1 October 2018

The contact author will be notified of acceptance by email.

OPTO POST-MEETING MANUSCRIPT DUE DATE: (All conferences except OE115 and OE131-OE133)

9 January 2019

OPTO ON-SITE MANUSCRIPT DUE DATE*:

(*Conferences OE115 and OE131-OE133. Manuscripts will be published on first day of conference):

12 December 2018

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a manuscript for publication in the conference proceedings.
2D Photonic Materials and Devices II (OE109)

Conference Chairs: Arka Majumdar, Univ. of Washington (USA); Carlos M. Torres Jr., SPAWAR Systems Ctr. Pacific (USA); Hui Deng, Univ. of Michigan (USA)

Program Committee: Ritesh Agarwal, Univ. of Pennsylvania (USA); Joshua R. Hendrickson, Air Force Research Lab. (USA); Nathaniel P. Stern, Northwestern Univ. (USA); A. Nick Vamivakas, Univ. of Rochester (USA); Feng Wang, Univ. of California, Berkeley (USA); Fengnian Xia, Yale Univ. (USA); Xiaodong Xu, Univ. of Washington (USA)

Atomically thin 2D materials have recently emerged as attractive optoelectronic materials. These materials exist in metallic, dielectric, and semiconducting form, and exhibit unusual properties, such as high-mobility of carriers in graphene, strong light-matter interactions in transition metal di-chalcogenides, and anisotropic optoelectronic properties in black phosphorus. These materials can be transferred either on top of each other to form heterostructures, or on any substrate for integrated photonics, as the interaction is via Van-der Waals force and no explicit lattice matching is required. This unique property enables new device applications, especially in materials platform, where growing quantum wells will be very difficult. The field of 2D materials, and optoelectronics devices based on 2D materials, has seen rapid advances in exciting experimental demonstrations and theoretical results. This conference aims to provide an international forum for presenting the latest results and reviewing technologies relevant to new physics and devices using 2D materials. Prospective authors are invited to submit original experimental and theoretical papers dealing with enabling technology for 2D materials-based device integration in nanophotonics.

Topics of particular interests include:
• 2D material optoelectronics and integrated nanophotonics
• chalcogenides and boron nitride monolayer-based devices
• graphene optoelectronics
• atomically thin classical and quantum light sources
• 2D material nonlinear optical devices and cavity-enhanced nonlinear optics
• valleytronics with 2D materials
• 2D material exciton-polariton
• scalable growth of 2D material for large-scale integration
• emerging 2D materials, including ferroelectric and ferromagnetic materials.

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The scope of this conference is to highlight the continuous growth and advancement of the field of integrated optics, its applications, devices, materials, and technologies by soliciting papers that report progress in all branches of waveguide-based integrated optics (IO). Recent advances in fabrication technologies including high-resolution lithographic and replication techniques have made possible unprecedented control of properties and geometry of waveguide (WG) structures and IO elements down to the level of nanoscale. This has enabled a broad range of new functionalities in spectral filtering and to the level of nanoscale. This has enabled a broad range of new functionalities in spectral filtering and geometries and replication techniques have made possible unprecedented control of properties and geometry of waveguide (WG) structures and IO elements down to the level of nanoscale. This has enabled a broad range of new functionalities in spectral filtering and geometries. The topics include, but are not limited to:

- WG optics of conventional and novel materials, chalcogenides, and subwavelength-ferroelectrics, hybrid and photorefractive materials, chalcogenides, and subwavelength-engineered metamaterials
- nonlinear (NL) WG optics (parametric conversion in WG devices, periodically-poled materials and poling techniques, NL materials for waveguide optics, applications of three- and four-wave mixing, stimulated scattering, self- and cross-phase modulation in WG devices, supercontinuum generation and applications involving propagation instabilities, filamentation and optical solitons in WG devices)
- integrated planar waveguide circuits for fiber optics, signal processing, microwave photonics, optical interconnects, datacom and telecom applications
- complex photonics in WG, photonic crystals, waveguide arrays, integrated resonators, PT and other synthetic structures or devices
- integrated optical circuits based on hybrid/heterogenous integration approaches, including III-V silicon, wafer and chip bonding, and co-packaging
- light-sound integrated circuits (forward and backward Brillouin scattering, waveguide structures for light and sound, applications of acousto-optic integrated devices, acoustic bandgap devices, coupling of light and sound in silicon, chalcogenides and other material platforms, surface acoustic wave devices, analysis and simulations of acousto-optic integrated devices)
- integrated devices for quantum information processing and communications, for entanglement, squeezed states and other non-classical states of light, quantum metrology, integrated devices for quantum sources and single photons emitters and detectors
- integrated magneto-optics and integration of magneto-optical materials on platforms (non-reciprocal devices, modulators, sensors)
- biophotonics and waveguide sensors (evanescent-field based devices, grating and microring resonators, WG spectrometers, bio-applications, lab-on-a-chip)
- rare-earth-doped integrated devices (optical amplifiers, CW and pulsed lasers, use of nano crystals as rare-earth sensitizers) for telecom, sensing and other applications
- on-chip amplifiers and lasers (high gain, high efficiency, low threshold, narrow-linewidth, tunable, different wavelength ranges, short pulses, novel laser performance)
- optofluidics (co-integration of microfluidic and IO), light guiding into fluids, integrated optical tweezers and other applications
- integrated substrength grating metamaterial and diffractive photonics (advances in submicron and nanoscale fabrication technologies and WG/OI-applications based thereupon: active, passive, reconfigurable diffractive and holographic processing devices, arrayed-waveguide gratings, WG echelle gratings, resonant guided-mode gratings, grating couplers, Bragg gratings, integrated holographs)
• enabling photonics integration technologies (dense and large scale component integration; hybrid and monolithic integration of light sources, SOAs, modulators, (de)multiplexers, optical isolators, mode converters, feedback resistant lasers, etc.)
• IO circuits based on the physics and technologies of guided-wave nano-optics (gap and index guidance in photonic crystal structures, new guidance concepts, metamaterials, slowlight waveguides, photonic wires, nanopatterning and nanoreplication, nanostructural integration)
• low-power-consumption integrated photonics for data-center applications
• surface plasmon waveguides and devices (plasmonic transmission lines, nanoparticle waveguides, hybrid dielectric-plasmonic structures, plasmonic WG sensors)
• testing and metrology of IO devices: surface analysis and structural characterization, spectroscopic and optical testing methods, reliability and life-testing
• theory and modeling supporting the above-mentioned areas (numerical modeling methods and design tools, propagation phenomena in special WG structures, optical guided-wave circuit design, thermal and mechanical modeling of IO systems).
Smart Photonic and Optoelectronic Integrated Circuits XXI (OE11)

Conference Chairs: Sailing He, KTH Royal Institute of Technology (Sweden), Zhejiang Univ. (China); El-Hang Lee, Inha Univ. (Korea, Republic of)

Program Committee: Pavel Cheben, National Research Council Canada (Canada); Ray T. Chen, The Univ. of Texas at Austin (USA); Louay A. Eldada, Quanergy Systems, Inc. (USA); Shanhui Fan, Stanford Univ. (USA); Chattopadhyay Sundar, The Australian National Univ. (Australia); Stefan A. Maier, Imperial College London (United Kingdom); Joachim Piprek, NUSOD Institute LLC (USA); David V. Plant, McGill Univ. (Canada); Andrew W. Poon, Hong Kong Univ. of Science and Technology (Hong Kong, China); Ali Serpengüzel, Koç Univ. (Turkey); Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France); Alan X. Wang, Oregon State Univ. (USA); Jian Wang, Huazhong University of Science and Technology (China); Qian Wang, Huawei Technologies Co., Ltd. (China); Michael R. Watts, Massachusetts Institute of Technology (USA); Lin Yang, Institute of Semiconductors (China); Rui Q. Yang, The Univ. of Oklahoma (USA)

Papers are solicited in the area of optical or photonic integrated circuits (PICs) and optoelectronic integrated circuits (OEICs) for smart or intelligent systems. Optical, photonic, optoelectronic, electronic, and/or biological devices are integrated to address the issues of functional performance, reliability, space and cost in an increasingly complex and connected world with dynamic environments that can benefit from smart solutions comprising integrated micro- or nanoscale circuits with possible artificial intelligence.

Demands for greater bandwidths have driven the telecom and datacom research and development communities to realize complex optoelectronic integrated circuits such as transceivers, switching systems, low-chirp optical sources, and multichannel optical distribution systems. The integration of multi-wavelength laser arrays, monitoring photodiodes, and drivers is becoming a reality in the communications arena. Other emerging fields include 3D time of flight (TOF) sensing/scanning, real-time 3D imaging/mapping, 3D printing, holographic displays, smart pixel arrays, neural networks, optical computing, optical data storage, medical diagnostics, chemical/biological sensing, and object detection, tracking, identification, and classification.

The increased level of integration in recent years has resulted in an increased level of miniaturization. The scientific and technological issues and challenges concerning the micro/nano/quantum-scale integration of optoelectronic devices, circuits, and systems include the size effect, proximity effect, energy confinement effect, microcavity effect, single photon effect, optical interference effect, high field effect, noise effect, quantum optical effect, nonlinear effects, and chaotic noise effects. Optical alignment between miniature devices, minimizing interconnection losses, and maintaining optical modes between devices are important issues and require careful consideration. Scientists and engineers from academic institutions, research laboratories, and the industry are strongly encouraged to submit papers in the following areas:

- physics, theory, design, modeling, simulation, and scaling of optical integrated circuits (PICs) and optoelectronic integrated circuits (OEICs)
- PIC/OEIC materials (semiconductors, graphene, glasses, polymers, ferroelectrics, magnets, metals, biomaterials, DNA, molecules, etc.)
- integration, interconnection, fabrication, assembly, packaging, characterization, and roadmap of micro/nano silicon and compound semiconductor photonic and optoelectronic devices
- electronics and photonics convergence on a silicon CMOS platform
- integration of different photonic and optoelectronic structure types (dots, wires, wells, planar, free space, 1D/2D/3D photonic bandgap devices, plasmonic devices, etc.)
- integration of miniature (micro/nano/quantum-scale) photonic and optoelectronic devices, circuits, and systems; photonic/optoelectronic system on a chip; VLSI/ULSI photonics and optoelectronics
- integration of novel devices using micro-rings, micro-disks, micro-spheres, micro-cavities, nano-optic/nano-photonic devices, nano-lasers, nano-detectors, nano-wires, plasmonics, and metamaterials
- integration and assembly of micro- and nano-scale imaging systems
- integration and assembly of micro- and nano-scale smart sensor and detector systems
- miniaturization and integration of THz and microwave photonic devices, components, and systems
- integration and interconnection of different functions (lasers, amplifiers, detectors, sensors, modulators, isolators, circulators, switches, attenuators, couplers, phased arrays, multi/demultiplexers, filters, wavelength converters, polarization controllers, PMD/CD compensators, control electronics, etc.)
- integration of dynamic devices actuated through thermo-optic, electro-optic, acousto-optic, magneto-optic, and all-optical mechanisms
- monolithic and hybrid integration of optical, photonic, optoelectronic, electronic, and biological devices
- parallel and serial integration of optical, photonic, and optoelectronic devices
- fabrication and processing techniques (UV/Deep UV/X-ray/e-beam lithography, casting, melting, embossing, etching, passivation, etc.)
- alignment, tolerance, coupling, and interconnections; designs for alignment tolerance relaxation
- optical interconnection and integration on photonic PCBs
- integration on novel flexible and rigid substrates
- assembly and packaging approaches and processes
- characterization (optical, electrical, optoelectronic, thermal, structural, etc.)
- standards, quality, reliability, qualification, and certification

PHOTONIC INTEGRATION
CALL FOR PAPERS

- components, modules, subsystems, and systems
- smart PIC- and OEIC-based systems with artificial intelligence
- smart systems of special interest include nodes in self-healing optical communication networks, light detection and ranging (LiDAR) sensing systems with object detection, tracking, identification, and classification capability
- applications: communications, quantum information services, computing, data storage, sensing, scanning, imaging, mapping, displays, printing, industrial automation, robotization, autonomous vehicles, etc.
- subsystem-on-chip for bio-detection, sensing and communications.

Refinement of existing schemes as well as novel concepts are within the scope of this solicitation. Authors are also encouraged to emphasize design-for-manufacturing criteria and manufacturing methods that enable the commercial deployment of PIC- and OEIC-based smart systems.

Submit your abstract today: www.spie.org/opto19call

ABSTRACTS DUE: 25 July 2018

AUTHOR NOTIFICATION: 1 October 2018
The contact author will be notified of acceptance by email.

OPTO POST-MEETING MANUSCRIPT DUE DATE: (All conferences except OE115 and OE131-OE133)
9 January 2019

OPTO ON-SITE MANUSCRIPT DUE DATE*: (*Conferences OE115 and OE131-OE133. Manuscripts will be published on first day of conference)
12 December 2018

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a manuscript for publication in the conference proceedings.
PHOTONIC INTEGRATION

Silicon Photonics XIV (OE112)

Conference Chairs: Graham T. Reed, Optoelectronics Research Ctr. (United Kingdom); Andrew P. Knights, McMaster Univ. (Canada)

Program Committee: Martijn J. R. Heck, Aarhus Univ. (Denmark); Siegfried Janz, National Research Council Canada (Canada); Delphine Marris-Morini, Ctr. de Nanosciences et de Nanotechnologies (France); Goran Z. Mashanovich, Univ. of Southampton (United Kingdom); Jurgen Michel, Massachusetts Institute of Technology (USA); Liam O’Faolain, Tyndall National Institute (Ireland); Jason Ching Eng Png, A*STAR Institute of High Performance Computing (Singapore); Andrew W. Poon, Hong Kong Univ. of Science and Technology (Hong Kong, China); Haisheng Rong, Intel Corp. (USA); Dries Van Thourhout, Univ. Gent (Belgium); Laurent Vivien, Ctr. de Nanosciences et de Nanotechnologies (France); Jeremy Witzens, RWTH Aachen Univ. (Germany); Winnie H. Ye, Carleton Univ. (Canada); Shui–Qing Yu, Univ. of Arkansas (USA); Zhiping Zhou, Peking Univ. (China); Aaron J. Zilkie, Rockley Photonics (USA)

The field of Silicon Photonics continues to develop for an increasing number of application areas. Technology allowing the combination and miniaturization of optoelectronic and electronic devices in an integrated silicon platform is the key to providing affordable smart components for many different markets. Integration offers reduced component costs and size reduction in photonic networks, particularly for the emerging markets. Examples continue to appear of integrated systems and sub-systems, with the Data Center application leading the technology pull. Similarly, smart measurement and sensing systems using integrated optoelectronics could be miniaturized and made available at low cost, allowing wide deployment for medical, biological, and environmental screening applications. The need for optical interconnects on ULSI circuits is now an essential part of the roadmap for Si microelectronics.

As systems emerge, there is an increased focus on implementation, interfacing, and test. Consequently work is increasing on automated wafer scale testing systems, packaging, and passive alignment, all realized at low cost. Silicon is the ideal platform for integration of smart components. Large diameter, high quality silicon, and silicon-on-insulator (SOI) wafers are available at a relatively low cost and provide many chips per wafer, even for large area optoelectronic circuits. Furthermore, the move to 300mm wafers only exacerbates the need for high quality test and packaging in order to reach mass market applications. The maturity of Si process technology provides leverage for manufacture of optoelectronic components and provides many ways to integrate optoelectronic and electronic components on the same substrate. For optical interconnects, other important topics are the overall circuit architectures, the total power consumption, and the technology for optical wiring, couplers, modulators, emitters, and detectors, I/O, multiplexing and increasing levels of integration.

The emergence of the field of mid infra-red Silicon Photonics also opens many opportunities for this maturing technology to be applied into another buoyant application area, perhaps more naturally aligned with sensing applications. This conference aims to provide an international forum for presenting the latest results and reviewing technologies relevant to the evolution of active and passive optoelectronic devices on Si and SOI platforms for all applications. Prospective authors are invited to submit original experimental and theoretical papers dealing with enabling technology for optoelectronic device integration on Si-based platforms.
CALL FOR PAPERS

Optical Interconnects XIX (OE113)

Conference Chairs: Henning Schröder, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Ray T. Chen, The Univ. of Texas at Austin (USA)

Program Committee: Maggie Yihong Chen, Texas State Univ. (USA); Darrell Childers, US Conec Ltd. (USA); Hamed Dalir, Omega Optics, Inc. (USA); Alan F. Evans, Corning Incorporated (USA);

Ruth Houbertz, Multiphoton Optics GmbH (Germany); Marika P. Immonen, TTM Technologies, Inc. (Finland); Takaaki Ishigure, Keio Univ. (Japan); Mikko Karpinnen, VTT Technical Research Ctr. of Finland Ltd. (Finland); Christian Koos, Karlsruher Institut für Technologie (Germany); Tobias Lamprecht, vario-optics ag (Switzerland); Matthias Lorenz, AEMtec GmbH (Germany); Christopher T. Middlebrook, Michigan Technological Univ. (USA); Bert-Jan Offrein, IBM Research – Zürich (Switzerland);

Hyo-Hoon Park, ficonTEC Service GmbH (Germany); Ruth Houbertz, TTM Technologies, Inc. Corning Incorporated (USA); Maggie Yihong Chen, Texas State Univ. (USA); Darrell Childers, US Conec Ltd. (USA);

Optical Interconnect Technologies

• optical waveguide, substrate guided, lay-in fiber
• electronic/photonic printed circuit boards and OPTICAL INTERCONNECT TECHNOLOGIES

Papers are solicited in the following areas:

OPTICAL INTERCONNECT TECHNOLOGIES
• optical interconnect design and system architectures, end-to-end link modelling and simulation
• electronic/photonic printed circuit boards and optical backplanes, panel level integration of photonics
• optical waveguide, substrate guided, lay-in fiber and free space optical interconnects
• machine-to-machine, board-to-board, chip-to-chip, intra-chip optical interconnects
• glass made photonic interposer
• trends in ultra-short reach optical links
• high-speed and near-IR vertical-cavity surface-emitting lasers.

NANOPHOTONICS INTEGRATION AND OPTICAL COUPLING
• Si, Ge, SiGe, III-V device integration
• small size and low loss waveguide-based active and passive devices
• advances in chip-to-waveguide or chip-to-fiber coupling schemes including: grating coupler, adiabatic taper and butt-coupling approaches
• subwavelength gratings for on-chip interconnect applications
• 2D membrane-based devices
• photonic crystals and surface plasmonic waveguides for interconnection applications
• new regimes involving surface plasmons or optical polaritons
• implementation of optical interconnects in Si CMOS process compatible environment
• measurement and testing methods for hybrid electronic/photonic assemblies
• reliability assessment of optical interconnects, sub-systems and electronic/photonic assemblies.

PARALLEL OPTICAL LINK TECHNOLOGIES AND ACTIVE OPTICAL CABLES
• data communication systems with parallel optical links and active optical cables
• integration and packaging technologies for parallel on-board transceivers
• parallel optical engines for on-board data communication
• optical bus architectures for on-board interconnects
• ultra-low cost and ultra-low power optical links using novel laser and photodiode array components for interconnect applications
• assembly and alignment of arrayed components
• free-space parallel optical interconnect.

OPTICAL COMMUNICATION AND COMPUTING IN NEXT GENERATION DATA CENTERS
• optical interconnect solutions for rack- and enclosure scale disaggregation
• optically enabled hyperconverged infrastructures
• multi-tier optical connectivity
• optical packet and circuit switch technologies and architectures for data centers
• WDM and SDM switching technologies and architectures for intra-data center interconnections
• power-efficient optical computing for data centers
• photonic integration technologies for computercom applications
• future demands for parallel optics in data center: inter-rack, inter-board and inter-chip
• implementation timeline for integrated photonics, roadmapping.

MICRO-OPTIC ASSEMBLY AND PHOTONIC INTEGRATION TECHNOLOGIES
• micro-optic component assemblies and integrated micro-optics
• heterogeneous and monolithic device integration including silicon photonics
• 3D optical routing and assembly of coupling elements
• new connectors and novel light coupling approaches
• prototyping for advanced interconnect fabrication
• new fiber optical integration/coupling/connectorization techniques
• fiber handling
• reflective, refractive and diffractive micro-optic elements and micro-optical systems
• active optical alignment and assembly automation
• passive micro-optic alignment techniques
• solder reflow compatible connectivity
• interconnect reliability, qualification and test.

MATERIALS FOR PACKAGING AND INTERCONNECTS
• advanced photonics packaging materials
• thin glass for board, modules and panel-level-packaging
• polymers and organic/inorganic hybrid materials for optical interconnects
• novel nanostructures and nanotechnologies for optical interconnects
• AuSn bonding for flip-chip with highest precision
• structured fibers, multicore fibers and other novel optical fibers
• nanomaterials and applications
• novel bonding materials and processes.
This conference provides an interdisciplinary forum for engineers and scientists to present their ideas, designs, case studies, and success stories in photonic instrumentation development. It also offers attendees an invaluable insight into the latest developments and trends in the continuously-evolving field of photonic instrumentation engineering.

The significant expansion and proliferation of photonic instrumentation has been driven by continuing advancement in several key areas: the discovery of new physical phenomena, the commercial availability of a wide variety of sophisticated optoelectronic devices, and the development of powerful simulation and analysis techniques. These improvements have led to technology that can exploit photons or optical fields and their interactions with matter across a wide expanse of scientific and industrial application areas. Today’s instrumentation developers are able to take advantage of a broad range of commercially available components for the generation, propagation, control, and detection of photons and optical fields for achieving system level design and development goals.

Contributions at both the component, sub-system, and system levels in the multi-disciplinary area of photonic instrumentation engineering are desired. Consideration will be given to submissions showing system-level interactions between various components and subsystems of photonic instruments, rather than the development of individual photonic components. Paper submissions related to the integration of optical components with various types of electro-optical components with adjustable properties, photo-detectors, as well as with active and passive photonic modules for the conditioning, delivery, and control of the propagating radiation, are considered for this conference. Emerging photonics technologies and instrumentation schemes are certainly welcome.

Theoretical and experimental papers are solicited in the following and related areas:

**APPLICATIONS OF PHOTONIC INSTRUMENTS**

- Photonic instrumentation for astronomy and imaging
- Consumer applications: optical data storage, augmented and virtual reality devices, information and head-up displays, optical sensors
- Metamaterials, plasmonic and nanostructures in photonic instruments
- Hyperspectral imagery and laser spectroscopy
- Laser instrumentation in material processing and manufacturing: laser-matter interactions, micro-machining and multi-photon fabrication
- Instrumentation for optical lithography, alignment and proximity sensors
- Medical, pharmaceutical, and bio-photonics instrumentation
- Metrological instrumentation: interferometry, profilometry, polarimetry, reflectometry, scatterometry, polarimetry, super-resolved microscopy, optical tomography
- Nanofabrication and self-assembly, tracking and micromanipulation
- Remote sensing and probing techniques, Lidar and time-of-flight systems, multi-aperture and computational imagery systems

**DESIGN, DEVELOPMENT, AND FABRICATION OF PHOTONIC INSTRUMENTS**

- Novel photonic instrumentation architectures, design approaches and concepts, design techniques for super-resolution, wavefront and polarization control
- Design and integration of metamaterials, plasmonic, and nanostructures in photonic instruments
- Modeling, tolerance analysis and optimization of photonic instruments
- Innovative packaging and integration solutions
- Agile, reconfigurable and real-time-controlled photonic instruments
- Photonic instruments in extended spectral domains, including THz, EUV, and x-ray.

**LIGHT SOURCES IN PHOTONIC INSTRUMENTATION**

- Novel coherent and incoherent sources
- Photonic instrumentation employing unique properties of laser radiation
- Light control in spatial, spectral and temporal domains
- Laser beam shaping and structured light; ToF sources
- Interaction between emitters and other system’s components.

**METROLOGY, CHARACTERIZATION, AND FABRICATION OF PHOTONIC INSTRUMENTS**

- Photonic metrology instrumentation on the nano, micro, and macro levels
- Metrology systems based on super-resolution, wavefront control and polarization techniques
- System-level evaluation and performance verification
- Calibration schemes and reference measurement techniques
- Alignment and compensation techniques in photonic instrumentation.

**SENSORS AND RUGGEDIZED SYSTEMS**

- Innovative sensor architectures and their applications
- Multi-spectral and broadband sources, supercontinuum sources and SLEDs, sources based on optical excitation, rapidly tunable and spectrally adjustable sources
- High sensitivity, high dynamic range and broadband detectors and detection techniques
- Fiber sensors and sensor networks
- Sensor miniaturization and functional integration
- Photonics sensors for harsh and industrial environments
- Sensors for display, virtual and augmented reality, and interactive gaming and learning.
One of the objectives of science is to enhance our senses and better understand the universe around us; by harnessing quantum-size effects and/or nanophotonics it becomes possible to develop novel approaches to sensing.

Infrared detectors expand our vision into the realm of heat by allowing the remote sensing of an object’s temperature, and single-photon detectors let us detect light at levels far below what the eye is capable of. LEDs, lasers, and other nanophotonic devices can be added to create integrated sensing systems that allow us to see a wide array of phenomena beyond just photons, having a dramatic impact on how we perceive our environment. These newfound abilities have in turn spurred the further development of advanced sensing systems. Future advances in these areas are inspired by the use of quantum-sized effects to achieve higher efficiency and added functionality.

The purpose of this conference is to provide a broad overview of the current state-of-the-art and future prospects in quantum sensing and nano electronics and photonics. By bringing together experts in physics, materials science, fabrication technology, and applications, we will have a well-rounded view of how science has progressed towards developing integrated and versatile detection systems. The diversity of topics has been chosen to encourage the exchange of ideas between the different relevant disciplines.

Contributions for this conference are solicited in the following areas:

- Quantum devices, including solar cells, LED lasers, detectors, pin, avalanche photodiodes, QWIP, BIB, UV, visible, IR, FIR, etc.
- Applications (quantum spectroscopy, imaging, communications, cryptography)
- New quantum structures (quantum wells, wires, dots)
- Nonlinear and ultrafast optical phenomena
- Hyperbolic metamaterials
- Characterization (optical, electrical, structural, etc.)
- Micro- and nano-fabrication technologies (e-beam lithography, deep-UV, etching, passivation, contacts, etc.)
- Semiconductor quantum detectors, FPAs and ROICs for UV, visible, Type-II, MWIR, LWIR, VLWIR, THz, and applications
- Nanophotonics, metamaterials, graphene, active plasmonics
- THZ emitters and receivers (quantum-cascade lasers, narrow band-gap, III-nitride, etc.)
- Single-photon counting detectors, FPAs and their applications
- Biosensing
- Terahertz nanophotonics and nanoelectronics
- Graphene and other 2D materials
- Near-field optics and scanning probe microscopy, and flat optics
- Bio-electronics and bio-photonics
- Light-matter interaction at the nanoscale
- Nano-structured and functionalized surfaces
- Neuromorphic.

INNOVATION AWARD IN QUANTUM SENSING AND NANO ELECTRONICS AND PHOTONICS

SPIE announces the Innovation Award in Quantum Sensing and Nano Electronics and Photonics at SPIE Photonics West OPTO 2019. These awards will recognize the outstanding scientific contribution of students and early career professionals who present the most notable recent discoveries with broad impact in the areas of quantum sensing and nano electronics and photonics. These discoveries should be innovative in that they represent a new paradigm or way of thinking which will have a broad impact in their respective field. Participants will be required to give a 15-minute presentation in the Tuesday evening Innovative Technologies for Quantum Sensing and Nano Electronics and Photonics (7:30-9:00 pm) technical event, chaired by Prof. Manijeh Razeghi. The winners will be announced at the end of the Tuesday evening event. Winner will be awarded a commemorative plaque as well as a cash prize. To submit your work for consideration in this awards session, contact Prof. Manijeh Razeghi with a two-page abstract (containing working title, author(s)/affiliation(s), description, and references) by Monday 10 December 2018.

IMPORTANT: The Proceedings for this conference will be published on the SPIE Digital Library on the first day of the meeting. Manuscript submission (6-page minimum) is obligatory for participation in the conference. Note the earlier manuscript due date of 12 December 2018.
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 ultrasmall optical (and acoustic) devices like lasers and cavities. These cavities find applications in several novel fields including cavity quantum electrodynamics (QED) and quantum computing.

Optical and acoustic metamaterials offer unique material platforms in which the geometrical engineering of the nanostructure 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., by including appropriate defects to the photonic crystal structure) 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 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.

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, and metamaterials)
- numerical methods for the analysis of engineered nanostructure materials and devices
- photonic and phononic crystal waveguides, cavities, and active devices
- novel plasmonic devices and their characterization
- novel photonic and optoelectronics materials
- hybrid CMOS-compatible material platforms through integration/bonding of active, nonlinear, or other materials with CMOS-compatible substrates
- photonic crystal active devices
- nonlinear effects in plasmonic structures, photonic crystals, and metamaterials
- novel phenomena in engineered nanostructures
- acoustic metamaterials
- negative index properties
- super-dispersive photonic crystals for wavelength demultiplexing and spectroscopy
- dispersion engineering in photonic crystals
- novel applications of plasmonic, photonic crystal, and metamaterial devices (e.g., sensing, communications)
- applications of photonic crystal cavities in lasing, cavity QED, and quantum computation
- photonic crystal fibers; supercontinuum generation
- integration of photonic, phononic, plasmonic, fluidic, and/or electronic functionalities on a single substrate.
CALL FOR PAPERS

High Contrast Metastructures VIII (OE117)

Conference Chairs: Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA); Andrei Faraon, Caltech (USA); Weimin Zhou, U.S. Army Research Lab. (USA)

Program Committee: Markus-Christian Amann, Walter Schottky Institut (Germany); Il-Sug Chung, Technical Univ. of Denmark (Denmark); Mikhail A. Kats, Univ. of Wisconsin-Madison (USA); Fumio Koyama, Tokyo Institute of Technology (Japan); Arseniy I. Kuznetsov, A*STAR - Data Storage Institute (Singapore); Philippe Lalanne, Lab. Photonique, Numérique et Nanosciences (France); John R. Lawall, National Institute of Standards and Technology (USA); Tien-Chang Lu, National Chiao Tung Univ. (Taiwan); Rainer F. Mahrt, IBM Research – Zürich (Switzerland); Arka Majumdar, Univ. of Washington (USA); Bala Pesala, CSIR Madras Complex (India); Jon A. Schuller, Univ. of California, Santa Barbara (USA); Pierre Viktorovitch, Ecole Centrale de Lyon (France); Alan E. Willner, The Univ. of Southern California (USA); Ming C. Wu, Univ. of California, Berkeley (USA)

A completely new class of planar optics has emerged using subwavelength metastructures and metasurfaces with a large contrast in dielectric constants. “High-contrast metastructure” refers to this type of optical material which is formed by a planar array of coupled-resonance structures, which are defined by high refractive index contrast boundaries that have dimensions comparable to the wavelength of interest. Both 1D and 2D, uniform and chirped high-contrast gratings (HCGs), metastructures and metasurfaces are demonstrated to create mirrors, lenses, filters, polarizations, birefringent elements, 3D display and many traditional bulk optical components. This has enabled simple fabrication of long-wavelength vertical-cavity surface-emitting lasers (VCSELs), dynamically tunable all-pass filters (APF) for fast optical beam steering, high-Q resonators with surface-normal and arbitrary angle output, enabling massive wafer-scale semiconductor lasers and optical filters. They are used to form hollow core waveguide for chip-scale ultra-low loss photonic delays. Vertical to in-plane waveguide coupler can be made with high efficiency for easy integration with Si-photonic circuits. Chirped HCGs are shown as excellent focusing reflectors and lenses with very high numerical apertures. Finally, simple but rigorous theoretical studies lead to intuitive device designs. The field has seen rapid advances in exciting experimental demonstrations and theoretical results. This conference aims to provide an international forum for presenting the latest results and reviewing technologies relevant to new physics and devices using high contrast subwavelength metastructures. Prospective authors are invited to submit original experimental and theoretical papers dealing with enabling technology for optoelectronic device integration either on Si, or III-V-based platforms. Topics of particular interests include incorporation of high-contrast metastructures in the following:

• zero-index metamaterials and anisotropic metamaterials
• response to both the electric and magnetic fields of light
• support of large optical chirality and anisotropy
• dispersion engineering
• spectral tailoring and management for solar photovoltaic and solar thermal applications
• slow light, fast light and stop light devices
• optical switches and modulators
• metastructure waveguides
• nonlinear optics; coherent optical mixers
• optical amplifiers
• omni mirrors and spatial-mode filtering
• subwavelength plasmonics
• manipulation of polarization
• beam-steering devices
• novel fabrication techniques and materials
• photonic crystal devices and guided mode and leaky mode resonances.

Submit your abstract today: www.spie.org/opto19call
This conference seeks to highlight the most compelling work in nanostructures. We host a unique forum where materials scientists, semiconductor device designers, theorists and device experts can exchange recent results on this focused topic. Invited papers will represent international expertise in growth, characterization of quantum dots, nanowires, metallic nanostructures, and modeling of the optoelectronic properties of quantum nanostructures, metamaterials, and devices. Hot topics focus on nanomaterials (quantum dots, nanowires) to revolutionize optoelectronics through new device and integration possibilities. The geometry, i.e. size and shape, controls the properties of a quantum structures. However realization of their potential requires control of their geometry, location, composition, and surface interaction. This is often studied by development of unique models as well as development of methods to create the desired structure and of associated characterization techniques to measure the appropriate properties. Topics of metamaterials and plasmonics naturally combine with nanostructure technology and will be included in this conference.

Contributed papers are solicited concerning growth, characterization, and modeling of the following areas:
- nanowires, quantum dots, nanoparticles, metamaterials, plasmonics
- nanoscale properties such as energy transport, nonlinear processes, decoherence
- epitaxial growth, characterization, modeling
- nanofabrication and nanolithography
- characterization techniques and modeling
- optics of single quantum dots, ensembles, and exploratory devices
- single-photon emitters and detectors based on quantum dots
- devices based on nanomaterials, metamaterials, plasmonics.

Special Topic: Nanowires – one full-day symposium to focus on epitaxy, synthesis, modeling, devices, and integration.

Save the date

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<th>ABSTRACTS DUE:</th>
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<td>AUTHOR NOTIFICATION:</td>
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<td>OPTO POST-MEETING MANUSCRIPT DUE DATE:</td>
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PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a manuscript for publication in the conference proceedings.

Submit your abstract today: [www.spie.org/opto19call](http://www.spie.org/opto19call)
MOEMS–MEMS IN PHOTONICS

Advanced Fabrication Technologies for Micro/ Nano Optics and Photonics XII (OE201)

Conference Chairs: Georg von Freymann, Technische Univ. Kaiserslautern (Germany); Winston V. Schoenfeld, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Raymond C. Rumpf, The Univ. of Texas at El Paso (USA).

Program Committee: Cornelia Denz, Münster Univ. (Germany); Ruth Houbertz, Multiphoton Optics GmbH (Germany); Saulius Juodkazis, Swinburne Univ. of Technology (Australia); Stephen M. Kuebler, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Mangirdas Malinauskas, Vilnius Univ. (Lithuania); Robert R. McLeod, Univ. of Colorado at Boulder (USA); Hernán R. Míguez, Institute of Materials Science of Seville (Spain); Aaron J. Pung, Clemson Univ. (USA); John A. Rogers, Univ. of Illinois at Urbana–Champaign (USA); Thomas J. Suleski, The Univ. of North Carolina at Charlotte (USA); Michael Thiel, Nanoscribe GmbH (Germany); Sandra Wolff, Technische Univ. Kaiserslautern (Germany).

Technologies for fabrication of optics and photonics at the micro- and nano-scale continue to advance and diversify due to rising demands for miniaturization, cost reduction, functional integration, and increased performance in optical and photonic systems. Examples include three-dimensional microoptics, photonic crystals, photonic metamaterials, plasmonic devices, sub-wavelength optics, microrefractive optics, diffractive optics, optical waveguides, and heterogeneously integrated active and passive micro- and nano-optical devices. These devices are playing increasing roles in a wide range of applications, including sensors, communications, imaging, biomedical, data storage, photovoltaics and other areas.

Both conventional and unconventional micro- and nano-fabrication techniques serve as fundamental enablers for wide ranges of passive and active optical components and devices. To this end, this conference provides a forum for exchange of viewpoints and reports on new techniques and advances in fabrication methods for optics and photonics at the micro- and nano-scale. Applications enabled through these novel fabrication processes are also appropriate.

Topics of interest include, but are not limited to:

NON-CONVENTIONAL LITHOGRAPHY AND NOVEL APPROACHES
- DNA based plasmmonic self-assembly
- two-photon processes for two-dimensional and three-dimensional micro- and nanostructures
- STED inspired lithography
- plasmmonic lithography
- lithography with structured light
- nano-imprint lithography
- dip-pen lithography
- soft-lithography

LITHOGRAPHIC FABRICATION APPROACHES
- three-dimensional laser lithography, three-dimensional micro-printing
- fabrication methodologies based on binary, grayscale, and interferometric techniques
- additional techniques, such as additive lithography, and lift-off processes for sub-micron patterning.

ULTRAFAST LASER MICROMACHINING
- surface and bulk micromachining for micro- and nano-optics
- fabrication of 2D and 3D waveguides
- fabrication of novel optical elements.

ELECTRON AND ION BEAM FABRICATION OF MICRO- AND NANO-OPTICS
- three-dimensional structuring
- analog and multi-exposure methods
- unique patterning and beam controls.

DEPOSITION AND GROWTH TECHNOLOGIES
- self-assembly and nucleation site control (2D and 3D)
- lithographically defined selective growth
- pre-patterned and strain engineered templates.

MATERIALS ISSUES AND TECHNOLOGIES FOR POLYMERIC MICRO- AND NANO-OPTICS
- three-dimensional micro- and nano-optics and freeform surfaces
- replication in polymer and other materials
- novel photoresists.

PROCESSING OF NANOPHOTONIC DEVICES
- holographic lithography and multi-beam exposure methods
- nano-patterning for site selective growth
- texturing and patterning for enhanced light extraction
- fabrication of plasmmonic devices
- quantum device fabrication for micro and nano-devices.

MICRO- AND NANO-OPTICAL INTEGRATION AND MANUFACTURING
- passive and/or active integration
- quality and metrology issues
- volume fabrication techniques for micro- and nano-optics and photonics.

JOINT SESSION WITH OE201 AND OE203
Advanced Fabrication using a Digital Micromirror Device or MEMS Array
Active research in the fields of advanced fabrication and MEMS Arrays, such as the digital micromirror device, have shown application and promise for implementing lithography and other forms of high precision printing. The purpose of this joint session is to explore the relationships between MEMS technology and fabrication as they relate to:
- 3D printing
- additive manufacturing
- lithography
- structured light.

CONTINUED NEXT PAGE
The purpose of this joint session is to emphasize the growing field of laser printing/fabrication of micro/nano optics and photonics.

**BEST PAPER AWARDS**

We are pleased to announce that a cash prize, sponsored by Nanoscribe GmbH, will be awarded to the best paper and best student paper in this conference. Qualifying papers will be evaluated by the awards committee. Manuscripts will be judged based on scientific merit, impact, and clarity. The winners will be announced during the conference and the presenting authors will be awarded a cash prize.

**To be eligible for the Best Paper Award, you must:**
- be listed as an author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by 9 January 2019
- present your paper as scheduled.

**To be eligible for the Best Student Paper Award, you must:**
- be a student without a doctoral degree (undergraduate, graduate, or PhD student)
- submit your abstract online, and select “Yes” when asked if you are a full-time student, and select yourself as the speaker
- be the presenting author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online by 9 January 2019
- present your paper as scheduled.

**Nominations**

All submitted papers will be eligible for the awards if they meet the above criteria.

Submit your abstract today: [www.spie.org/opto19call](http://www.spie.org/opto19call)
MOEMS and Miniaturized Systems XVIII (OE202)

Conference Chairs: Wibool Piyawattanametha, King Mongkut's Institute of Technology Ladkrabang (Thailand); Yong-Hwa Park, KAIST (Korea, Republic of); Hans Zappe, Univ. of Freiburg (Germany)

Program Committee: Caglar Ataman, Univ. of Freiburg (Germany); Robert Brunner, Ernst-Abbe-Hochschule Jena (Germany); Andreas Brückner, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Wyatt O. Davis, MicroVision, Inc. (USA); David L. Dickensheets, Montana State Univ. (USA); Jan Grahmann, Fraunhofer-Institut für Photonic Mikrosysteme (Germany); Ulrich Hofmann, Fraunhofer-Institut für Siliziumtechnologie (Germany); Diaa Abdel Maguid Khalil, Si-Ware Systems (Egypt); David G. Lishan, Plasma-Therm LLC (USA); Veljko Milanovic, Mirrorcle Technologies, Inc. (USA); Zhen Qiu, Michigan State Univ. (USA); Niels Quack, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Harald Schenk, Northumbria Univ. (United Kingdom); Frédéric Zamkotsian, École Polytechnique Fédérale de Lausanne (Switzerland); Anna Rissanen, VTT Technical Research Ctr. of Finland Ltd. (Finland); Anna Rissanen, VTT Technical Research Ctr. of Finland Ltd. (Finland); Feinmechanik (Germany); Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Jan Grahmann, VTT Technical Research Ctr. of Finland Ltd. (Finland); Harald Schenk, Université de Genève (Switzerland); Anna Rissanen, VTT Technical Research Ctr. of Finland Ltd. (Finland); Anna Rissanen, VTT Technical Research Ctr. of Finland Ltd. (Finland); Jan Grahmann, VTT Technical Research Ctr. of Finland Ltd. (Finland); Harald Schenk, Universität Dortmund (Germany);

CALL FOR PAPERS

MOEMS (micro-opto-electro-mechanical systems) are highly miniaturized, highly functional MEMS-based optical systems. Typically fabricated using batch microfabrication technologies, MOEMS combine optical, electrical and mechanical functionality in complex yet robust standalone microsystems. MOEMS are found in myriad applications, ranging from displays and human interface devices to photonic communications systems and medical instrumentation. Combining a broad range of materials, from silicon to polymers, with a wide spectrum of manufacturing technologies, from nano-lithography to large-area printing, MOEMS represent one of the most interdisciplinary fields in photonics. “MOEMS and Miniaturized Systems” solicits contributions from all disciplines contributing to MOEMS, including new materials and fabrication techniques, novel devices and components, advanced system concepts and the latest applications.

MATERIALS
- silicon and other semiconductors
- polymers and liquids
- metals, dielectrics and ceramics
- glasses and glass-like materials.

FABRICATION
- surface and bulk micromachining
- hybrid assembly and integration techniques
- micro- and nano-contact printing
- roll-to-roll processes
- CMOS and packaging integration
- additive and subtractive micro-manufacturing.

COMPONENTS AND SYSTEMS
- beam shaping, steering, and wavefront modulators
- UV, IR and spectroscopic imagers
- tunable lenses, lasers, filters and DOEs
- optofluidic devices and systems
- optical shutters, modulators and switches.

APPLICATIONS
- biomedical, endoscopic and multi-modal imaging
- confocal, OCT, Raman and other microscopy systems
- telecommunications, autonomous vehicles and space exploration
- portable and wearable consumer products
- sensing, medical diagnostics, and health monitoring
- 2D, 3D and holographic displays and imaging
- nanotechnology, photonic crystals and plasmonics
- distributed sensing, environmental monitoring and quality control.

JOINT SESSION WITH OE202 AND OE203

Spatial Light Modulator
Various technologies including MEMS, LCD, lasers, LED, and OLED are under development to build high-performance projection and flat panel display systems. They are needed to provide large display sizes or high light efficiency in comparison to integrated displays for mobile phones, digital cameras, biomedical instruments, and personal digital assistants with ever decreasing size. This special session will give a comprehensive overview about recent development activities and results of the various light modulating technologies from modulating devices to module/system integration for novel applications.

JOINT SESSION WITH OE202 AND BIOS B0103

Microscopy
This special joint session is in conjunction with BIOS conference B0103: Endoscopic Microscopy. Papers are solicited that address the unique challenges to deliver high-fidelity microscopic imaging of tissue with a miniaturized instrument platform. Example topics include mechanisms for distal beam scanning, focus control and aberration correction using MOEMS devices, MEMS actuators or electrowetting optics; proximal scanning based on DMD or other SLM technologies; novel optical assembly and alignment techniques; highly corrected miniature optical systems.
Emerging Digital Micromirror Device Based Systems and Applications XI (OE203)

Conference Chairs: Michael R. Douglass, Texas Instruments Inc. (USA); John Ehmke, Texas Instruments Inc. (USA); Benjamin L. Lee, Texas Instruments Inc. (USA)

Program Committee: Roland Höffling, ViALUX GmbH (Germany); Alfred Jacobsen, Visitech Engineering GmbH (Germany); Yuval Kapeliner Rabinovitz, EKB Technologies Ltd. (Israel); Badia Koudsi, Optecks, LLC (USA); Jinyang Liang, Institut National de la Recherche Scientifique (Canada); Alex Lyubarsky, Texas Instruments Inc. (USA); Sanjeev Kumar M, Texas Instruments (India) Pvt. Ltd. (India); Jorge Moguel, Digital Light Innovations (USA); Michael W. O’Keefe, Greenlight Optics, LLC (USA); Hakki H. Refai, Optecks, LLC (USA); Bin Yang, UPMC Eye Ctr. (USA); Song Zhang, Purdue Univ. (USA); Karel J. Zuzak, Univ. of Texas Southwestern Medical Ctr. (USA). The Lab. of Biomedical Imaging and Engineering, LBI-51, LLC (USA)

Conference Cosponsor:

The Digital Micromirror Device (DMD) was conceived at Texas Instruments in 1987, following a decade of work on analog deformable-mirror and cantilever-mirror devices. This particular optical MEMS or MOEMS device has been applied most famously to digital cinema projection systems, enterprise projectors and highly portable personal displays, all of which were enabled by DLP® technology. The DMD has been commercially available since 1996 leading to hundreds of products and innovative research projects spanning consumer, industrial, medical and automotive markets. As was evident by this well-attended conference at Photonics West 2018, the DMD and associated evaluation modules are enabling many exciting new applications and equipment beyond traditional display systems. By bringing together scientists, technologists, and developers, the goal of this conference is to highlight new and interesting means of applying DLP technology to solve problems across various markets.

MOEMS and Miniaturized Systems XVIII (OE202 continued)

BEST PAPER AWARDS

We are pleased to announce that a cash prize, sponsored by Mirr coke Technologies, Inc., will be awarded to the best paper and best student paper in MOEMS and Miniaturized Systems. Qualifying papers will be evaluated by the awards committee. Manuscripts will be judged based on scientific merit, impact, and clarity. The winners will be announced during the conference and the presenting authors will be awarded a cash prize.

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• be listed as an author on an accepted paper within this conference
• have conducted the majority of the work to be presented
• submit your manuscript online by 9 January 2019
• present your paper as scheduled.

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• be a student without a doctoral degree (undergraduate, graduate, or PhD student)
• submit your abstract online, and select “Yes” when asked if you are a full-time student, and select yourself as the speaker
• be the presenting author on an accepted paper within this conference
• have conducted the majority of the work to be presented
• submit your manuscript online by 9 January 2019
• present your paper as scheduled.

Technical areas of particular interest include, but are not limited to:

PROGRAMMABLE PATTERNING AND ADVANCED IMAGING SOLUTIONS
• 3D metrology, machine vision, and factory automation
• compressive sensing
• computational imaging
• hyperspectral imaging
• security and surveillance
• spectroscopy (including mobile spectroscopy)
• volumetric scanning.

DISPLAY SOLUTIONS
• 3D displays (light-field, autostereoscopic, volumetric, multi-views, and holographic)
• augmented reality, virtual reality, and mixed reality
• automotive interior (head-up displays, interior displays, interior lighting)
• automotive exterior (headlight illumination, exterior lighting)
• intelligent lighting or displays.

MANUFACTURING SOLUTIONS
• additive manufacturing / 3D printing
• coding and marking
• direct imaging lithography
• industrial printers and exposure systems.
CALL FOR PAPERS

MEDICAL DEVICES
• biochemical visualization
• microscopy
• ophthalmology.

LIGHT MANIPULATION
• beam steering / wave-front shaping
• optical micromanipulation
• spectrally tunable light sources.

OTHER
• NIR applications
• optical telecommunications
• UV applications.

JOINT SESSION WITH BIOS BO500 AND OE203
Biomedical Imaging and Cell Manipulation using a Digital Micromirror Device or MEMS Array
This special joint session is in conjunction with BiOS conference BO500: Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues. The utilization of the DMD and other Optical MEMS arrays to manipulate light has numerous medical applications ranging from cancer detection to operating room aids to the manipulation of individual cells. Papers are solicited that address the uses of a DMD and other Optical MEMS arrays with:
• 3D medical visualization
• confocal microscopes
• cytometers
• hyperspectral imaging
• image-guided intervention
• microscopy
• optoelectronic tweezers
• ophthalmology
• organs on a chip
• oxygenation measurements
• phototherapy
• selectable wavelength light sources
• spectroscopy (including mobile spectroscopy)
• structured light or 3D imaging
• tissue illumination.

JOINT SESSION WITH OE202 AND OE203
Spatial Light Modulator
Various technologies including MEMS (such as the DMD), LCD, lasers, LED, and OLED are under development to build high-performance projection and sensing systems. They are needed to provide large display sizes or high light efficiency for mobile phones, digital cameras, biomedical instruments, and other applications with ever-decreasing size. This special session will give a comprehensive overview about recent development activities and results of the various light modulating technologies for novel applications.

JOINT SESSION WITH OE201 AND OE203
Advanced Fabrication using a Digital Micromirror Device or MEMS Array
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• 3D printing
• additive manufacturing
• lithography.

BEST PAPER AWARDS
We are pleased to announce that a cash prize, sponsored by Texas Instruments DLP Products, will be awarded to the best paper and best student paper in Emerging DMD-Based Systems and Applications. Qualifying papers will be evaluated by the awards committee. Manuscripts will be judged based on scientific merit, impact, and clarity. The winners will be announced during the conference and the presenting authors will be awarded a cash prize.

To be eligible for the Best Paper Award, you must:
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• Submit your abstract online and select “Yes” when asked if you are a full-time student and select yourself as the speaker
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• Submit your manuscript online by 9 January 2019
• Present your paper as scheduled.

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Microfluidics, BioMEMS, and Medical Microsystems XVII (BO308)

Conference Chairs: Bonnie L. Gray, Simon Fraser Univ. (Canada); Holger Becker, microfluidic ChipShop GmbH (Germany)

Program Committee: Brian W. Anthony, Massachusetts Institute of Technology (USA); Yolanda Fintschenko, LabSmith, Inc. (USA); Bruce K. Gale, The Univ. of Utah (USA); Albert K. Henning, Aquarian Microsystems (USA); Yu-Cheng Lin, National Cheng Kung Univ. (Taiwan); Yuehe Lin, Pacific Northwest National Lab (USA); Clara K. O’Sullivan, Univ. of Cincinnati (USA); Bastian E. Rapp, Karlsruher Institut für Technologie (Germany); Thomas Stieglitz, Albert-Ludwigs-Univ. Freiburg (Germany); Sindy Kam-Yan Tang, Stanford Univ. (USA); Albert van den Berg, MESA+ Institute for Nanotechnology (Netherlands); Wanjun Wang, Louisiana State Univ. (USA); Bernhard H. Weigl, PATH (USA)

The purpose of this conference is to provide an international technical forum to showcase recent advancements in microfluidics, BioMEMS, and medical Microsystems. Microfluidic devices and systems have created a tremendous interest in many application fields, including life sciences, point of care (POC) diagnostics, and environmental applications. They offer many advantages over the existing macroscale systems, including compact size, disposability, higher speed and parallelism of analyses, increased functionality and decreased sample/reagent volumes. In the life sciences, recent research efforts have focused on bio/chemical analyses, pharmaceutical high-throughput systems, and biomaterial surface modification. The interaction of microsystems with living cells or tissues opens a pathway to novel methods of medical diagnostics and therapeutics. Thus, the range of interests has expanded from the molecular scale over single cells to more complex biological systems, and finally, living organisms. Further, several conventional methods in medical engineering for diagnosis and therapy have also been shifting towards miniaturization and MEMS technologies, including minimally invasive surgery, in vivo and ex vivo monitoring, and smart implants. Last, but not least, environmental applications have focused on developing inexpensive sensors for in situ monitoring of contaminants in the environment for public safety or measuring a person’s exposure to environmental contamination.

For many of these applications, microfluidics and other MEMS technologies are essential, as they provide the functional basis of many research tools as well as commercial devices and applications. Thus, over the past several years, there has been a significant increase in the activities associated with understanding, development, and application of micro- mechanical and microfluidic devices and systems for BioMEMS and medical microsystems.

Papers are solicited on the following major topics and other related subjects:

**MICRO/NANO FLUIDIC COMPONENTS**
- fluid delivery, transport, and control
- micro -valves, -pumps, -mixers, and -reactors
- nanofluidic devices and systems
- microdroplet generation and manipulations
- micro-heating/cooling devices
- emerging microfluidic approaches (inertial microfluidics, electrofluidics, optofluidics)
- CAD, modeling, and analysis.

**MICROFABRICATION TECHNOLOGIES FOR MICROFLUIDICS AND BIOMEMS**
- polymer microfabrication methods
- emerging fabrication technologies (e.g., paper microfluidics)
- fluidic modules and interconnects
- fluidic packaging and assembly
- microstructuring of organic materials
- functional materials for microfluidics and BioMEMS
- surface texturing and modification.

**APPLICATIONS OF MICROFLUIDICS, BIOMEMS, AND MEDICAL MICROSYSTEMS**
- point-of-care (POC) medical monitoring and diagnostics
- nano bio/medical sensors
- optofluidics, on-chip waveguides and optical detection
- cell-based sensing devices and systems, flow cytometry
- implantable medical Microsystems
- sensors and systems for environmental monitoring
- sensors and systems for in vitro/in vivo monitoring and diagnosis
- microfluidic-based drug development and analysis.

**BEST STUDENT PAPER AWARD**
A cash prize sponsored by microfluidic ChipShop GmbH will be awarded to the best student paper.

**Judging and Requirements**
Presentations and manuscripts will be judged based on scientific merit, impact, and clarity. Candidates for the award need to be the presenting author, a full-time student, must have conducted the majority of the research presented in the paper, and must submit their manuscript by the deadline (January 2019).

**Nominations**
To be considered, submit your abstract online, select “Yes” when asked if you are a full-time student, and select yourself as the speaker.
Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVI (BO502)

Conference Chairs: Thomas G. Brown, Univ. of Rochester (USA); Tony Wilson, Univ. of Oxford (United Kingdom)

Program Committee: Martin Booth, Univ. of Oxford (United Kingdom); Charles A. DiMarzio, Northeastern Univ. (USA); Jonathan T.C. Liu, Univ. of Washington (USA); Raimund J. Ober, Texas A&M Univ. (USA); Chrysanthi Preza, Univ. of Memphis (USA); Monika Ritsch-Marte, Innsbruck Medical Univ. (Austria); Laura Waller, Univ. of California, Berkeley (USA)

Chair Emeritus: Carol J. Cogswell, Univ. of Colorado, Boulder (USA)

This conference of related interest is part of BIOS 2019 co-located at Photonics West

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This conference has been a venue to present exciting advances in multidimensional microscopy, including confocal- and coherence-based imaging systems, and microscopes based on fluorescence, polarization and nonlinear optics. While many of the instruments are oriented toward biomedical imaging, the papers usually include applications such as materials science, industrial inspection, and nanoscale metrology. Many microscopes are now fully integrated systems, including computer hardware and software. It is hoped that the broad range of relevant topics being presented at this conference will serve to encourage interaction among instrumentation engineers, computer image analysts, and researchers in the various fields of application.

We consider papers that cover overall system design, as well as more specialized areas: optical image formation, image recording, deconvolution and image restoration in two, three, or more dimensions, image classification, and digital methods of producing and displaying the resulting reconstruction. We especially encourage submission of articles on novel optical and digital techniques for imaging or detecting nanoscale object features, coherence-based imaging and image reconstruction, and full-field quantitative phase imaging. Many microscopes are now fully integrated systems, including computer hardware and software. It is hoped that the broad range of relevant topics being presented at this conference will serve to encourage interaction among instrumentation engineers, computer image analysts, and researchers in the various fields of application.

Papers are invited in the following and related areas:
• instrumentation and methods for microscopy in 2, 3, or more dimensions
• novel illumination, imaging, and computational methods for exceeding the far field diffraction limit
• innovations in optical modes for microscopy (such as interference, fluorescence, or polarizing) in reflection or transmission
• full-field quantitative phase imaging, including quantitative DIC and holographic imaging techniques
• innovations aimed toward nanostructure detection and imaging, including STED, PALM, STORM, etc.
• advances in confocal microscopy
• new modes of multiphoton fluorescence excitation microscopy
• probe microscopy (atomic force microscopy, near-field scanning optical microscopy)
• time-resolved image acquisition systems
• image processing and analysis
• image reconstruction in 2, 3, or more dimensions

• deconvolution and image estimation in 2, 3, or more dimensions
• computational models
• computational optical sensing and imaging (COSI) techniques for microscopy
• point spread function engineering for enhanced image information content
• wavefront manipulation techniques for correcting aberrations, extending depth of field, etc.
• spectral and hyperspectral imaging
• specimens and procedures for testing and evaluating new instruments and algorithms
• spatio-temporal reconstruction of living cells and tissues
• applications of multidimensional microscopy in materials science
• 3D image visualization techniques, including volume rendering, animation, stereoscopic and holographic displays
• holographic microscopy
• single-plane illumination and light sheet microscopy

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Advanced optical devices have the potential to satisfy the ever-increasing requirements of computing and communication systems. Applications can be envisioned in computational algorithms, in data transfer and routing, in memory and storage, and in clock stability. Increasingly these applications exploit the coherent and quantum characteristics of the interaction of optical fields with atomic and nanostructured materials. These are variously represented by optical and quantum interference and quantum entanglement phenomena; by spectral discrimination and dispersion of resonant transitions; and by incorporation of nonlinearity and feedback. The promises of quantum computing are well-recognized. They depend on the realization of material systems that exhibit slow decoherence as well as singular interactions with data and control signals from the programming environment. Development of these attributes is near fruition in optical materials with laser-born signal interactions. This capability is a continuing theme of this conference.

These principles connect naturally to those of quantum interconnects, dependent for bandwidth, power efficiency, timing and fidelity on the attributes of entanglement. Alternatively, manipulation of atomic or morphological dispersion can impact this requirement. Interfacing between different photonic and material systems is critical to the development of practical quantum information processing, as storage, processing nodes, and communication links will likely not all be directly compatible. Interfaces will include single-photon frequency and bandwidth conversions and conversions between photonic and material states as well as the development of hybrid photonic components. Possible systems include atoms, Rydberg atoms, spins, quantum dots, rare earth ions, photonic crystal molecules all of which may be in conventional and photonic crystal cavities. Another mechanism at the interface between quantum data processes and quantum communications, and amenable to implementation at sub-wavelength scale, is quantum plasmonics. The functionality of plasmons in connecting optical fields to charge oscillations comprises both electric and magnetic aspects, and can be manipulated by nano-scale morphologies and materials properties, both inherent and engineered. Surface plasmon connections to boundary condition characteristics and super-resolution capabilities represent emerging capabilities.

Signal switching using the features of optical resonance represents an emerging application area. Important goals include few- and single-photon control of the switch, along with low energy dissipation and high frequency operation. These same attributes can also provide the foundation for accurate high-repetition-rate low-dissipation clocks. Feedback mechanisms with minimal dispersion that exploit recently identified nonlinearities could revolutionize this application. In memory applications, optics contributes both to high capacity and high data transfer. Spectral hole-burning, photon echo, and slow light are at various stages of development. Their introduction depends upon development of efficient interfaces to conventional computer systems requiring novel optoelectronic interfaces, including source and signal routing architectures and smart photodetectors. Device operation must be compensated by data encoding and error control codes to ameliorate noise and crosstalk. The objective of this conference is to bring together researchers whose expertise covers the entire spectrum between materials/devices and computer systems thus providing a forum for the discussion of the capabilities and limitations of advanced optical data manipulation, transfer, and memory for computing and communications capabilities.

Nanometer-sized optical probes, fluorescence nano-markers, and narrowband ultra-sharp filters have opened a door to possibilities of probing biological and quantum biological systems in all their details. Single cell plasmonic and spectroscopic probes can be used to couple optical radiation to the cell or even to a single molecule in it. The conference invites papers on living and non-living biological systems using novel concepts in quantum photonics and plasmonics. Quantum operations and devices that exploit them often depend on external bias and control. Bias fields, coherent and incoherent, cavities and slits, for example, are often treated classically – without noise, or with Poisson statistics – as if they do not derive from quantum ensembles. These, of course, also exhibit quantum characteristics which influence the throughput of the intended quantum operation. And of interest for a number of important applications is pushing these controls to the single-photon and single-particle level. Understanding and capability are maturing so that either the quantum aspects of these bias processes can be addressed and controlled or they can be supplanted by quantum-scale effects and new quantum concepts.

A newly-emerging photonics application is the use of photonic circuits to simulate quantum systems that are otherwise hard to test experimentally, such as extreme magnetic fields and topological states. With tools to fabricate large scale waveguide chips becoming more available photonic simulations of exotic systems is becoming a reality. The fabrication and control of such photonic chips is also of much practical interest for components in optical process-
ing and communication systems. This conference invites papers on the full range of these topics. Diamond optical color centers, such as N-V centers, are recognized as the most interactive single-atom-like quantum mechanical systems. Such centers are addressable by single- and multiple-photon sources, can be entangled, and lately, can be produced with great control and precision on optical platforms. Thus, the so called “diamond photonics” has provided a new paradigm for nano-sensing and probing, quantum entanglement and computing, and, biophotonics with unprecedented precision and resolution. This conference will include special sessions on diamond and rare-earth photonics and biophotonics. The topics of interest will also include the quantum structures themselves; waveguides, dielectric resonators, metallic or plasmonic structures, and hybrid structures that combine bulk diamond or diamond nanoparticles with other materials.

Papers are solicited on the following and related topics:

- diamond waveguides and resonators
- hybrid structures combining diamond with other dielectrics or metals for quantum information sensing
- diamond bio-optics
- diamond optomechanics
- diamond-based quantum computing and magnetometry
- Raman lasers
- optical aspects of quantum computing, materials, methods, and algorithms
- rare-earth-based systems for quantum computing
- f-f and f-d rare earth systems for bio-sensing and quantum computing
- plasmonics for enhanced quantum entanglements
- room-temperature quantum computing and sub-shot noise sensing
- quantum optical entanglement and hyper-entanglement for computational and communication links
- quantum plasmonics
- nanophotonics materials, devices, information transfer
- advanced optical memory and storage concepts, materials, interfaces, and error compensation
- applications for advanced optical memory technologies
- quantum-enhanced solar cells
- quantum communication and quantum internet
- quantum metrology, entanglement-enhanced metrology and quantum electronic metrology and more generally, few-photon metrology
- quantum repeaters and quantum cryptography
- smart photodetectors
- plasmonic detectors
- optical enhancements to electronic microchips
- photonic interface to single spins in semiconductor impurities and quantum dots
- ultra-narrow band holeburning-based filters
- nonbleachable and ultrasmall fluorescent markers for monitoring biological processes in cells
- nanophotonics and plasmonics in quantum biology
- approaches to enhanced accuracy in quantum measurements using squeezed and entangled light
- quantum-scale bias fields in quantum optics
- bias fields from collective quantum effects
- quantum-enhanced sensors involving spin squeezing: clocks, magnetometers and interferometers
- squeezed light optical interferometry
- cascade and feed-back quantum processes
- simulation of experimentally difficult systems using photonic topological-based schemes
- simulated systems include synthetic gauges and topological order
- few-photon nonlinearities and hybrid quantum systems
- integrated photonics for nonclassical applications
- photonics for space-based nonclassical applications.

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Optical, Opto-Atomic, and Entanglement-Enhanced Precision Metrology (OE120)

Conference Chairs: Selim M. Shahrira, Northwestern Univ. (USA); Jacob Scheuer, Tel Aviv Univ. (Israel)

Program Committee: Robert W. Boyd, Univ. of Ottawa (Canada), Univ. of Rochester (USA); Danielle A. Braje, MIT Lincoln Lab. (USA); Brian D’Urso, Univ. of Pittsburgh (USA); Daniel J. Gauthier, The Ohio State Univ. (USA); Andrew Geraci, Northwestern Univ. (USA); Kohzo Hakuta, The Univ. of Electro-Communications (Japan); John C. Howell, The Hebrew Univ. of Jerusalem (Israel); Jacob B. Khurgin, Johns Hopkins Univ. (USA); John E. Kitching, National Institute of Standards and Technology (USA); Uriel Levy, The Hebrew Univ. of Jerusalem (Israel); Frank A. Narducci, Naval Postgraduate School (USA); Irina Novikova, The College of William & Mary (USA); Gour S. Pati, Aston Univ. (United Kingdom); Stefania Residori, Institut de Physique de Nice (France); John C. Howell, Stanford Univ. (USA); David D. Smith, NASA Marshall Space Flight Ctr. (USA); Misha Sumetsky, Delaware State Univ. (USA); Irina Novikova, The Hebrew Univ. of Jerusalem (Israel); Jacob Scheuer, Stanford Univ. (USA); Andrew Geraci, The Hebrew Univ. of Jerusalem (Israel); John E. Kitching, NASA Marshall Space Flight Ctr. (USA); Misha Sumetsky, Aston Univ. (United Kingdom); Sharon M. Weiss, Vanderbilt Univ. (USA); Yanhong Xiao, Fudan Univ. (China); Avinoam Zadok, Bar-Ilan Univ. (Israel).

Precision metrology (PM) deals with the ability to detect and quantify miniscule changes in the ambient parameters such as temperature and magnetic field, as well as stress, strain, position, time, rotation, force, acceleration, gravitation and so on. In addition to practical applications, precision metrology is an important tool for exploring the frontiers of fundamental physics, and seeking evidence of phenomena beyond the Standard Model. Examples include the search for permanent electric dipole moment of elementary particles, variations in fundamental constants, search for dark matter and dark energy, possible role of gravitation in the decoherence of macroscopic quantum superpositions with spatial separations, violation of the Newtonian law of gravitational attraction over very short distances, precision tests of General Relativity, and so on.

Interferometers (optical and atomic) are among the most suitable devices for PM as they provide the ability to detect extremely small changes (sub-wavelength) in the optical/quantum phase, which with a proper design can be associated with the variation of the desired parameter/quantity. Among the means for enhancing the sensitivity of interferometers is dispersion control and engineering, where particularly steep dispersion profiles are desired for this purpose. Many different systems are currently being investigated in order to achieve optimal performance for these applications. Numerous techniques and physical systems have been studied for controlling and engineering the dispersion properties of an effective medium. Steep positive dispersion has been demonstrated by conventional electromagnetically induced transparency (EIT) in a lambda system, population pulsations in a two level system, Raman and Brillouin gains, wave mixing in photorefractive media, photonic bandgap structures, coupled micro-resonators, and so on. Realizing steep negative dispersion, on the other hand, requires systems such as dual peak-ed Raman gain, dual pumped Brillouin gain in a fiber, coupled whispering gallery resonators, and photorefractive media, among others. Some important technological developments for advancing these systems include rubidium loaded hollow core fiber and Arrow waveguide, tapered fiber and SiN waveguides embedded in hot and cold rubidium vapor, dynamically adjustable photonic crystal structures, etc.

A specific example for enhanced PM using steep dispersion engineering is utilizing it for obtaining very slow and very fast group velocities. Slow light process can be employed to enhance the precision of relative rotation sensing and spectrally resolved interferometry. The fast light process, on the other hand, can be used to realize an absolute rotation sensor with a sensitivity that is orders of magnitude better than that of a conventional gyroscope. A fast light enhanced gyroscope may be sensitive enough to detect the gravitational frame-dragging effect retrogradially, via measuring the Lense-Thirring rotation. Furthermore, a WLC can be employed to enhance the sensitivity-bandwidth product of the next-generation interferometer being developed for detecting gravitational waves. Beyond the relatively simple case of group velocity control, more complex dispersion profiles enable controlling the shapes of optical pulses and facilitates various applications.

Traditionally, interferometry (including dispersion effect) has been investigated in passive systems. However, it is also important to investigate such effects in active media, particularly in a laser. One example is the superluminal laser, which can be realized by using a gain medium with a dip in the gain profile. In particular, it has been shown that such a laser may be the ideal system for fast-light enhanced sensitivity in measuring a broad range of effects, including rotation, acceleration, vibration, magnetic fields, temperature, and so on. It may also be possible to realize a gravitational wave detector using such a laser as well. It is also possible to realize a subluminal laser, with a steep peak in the gain spectrum. Such a laser is also likely to have important properties, such as extreme robustness to perturbations, and ultra-narrow quantum noise limited linewidth. In order to optimize the utilization of the superluminal and subluminal laser, it is also important to study, theoretically and experimentally, the quantum effect limited noise properties thereof.

As evident from the discussions above, PM can benefit dramatically by dispersion engineering which allow for tailored phase control. However, similar effects based on multilevel atomic, molecular or ionic (both atomic and molecular) resonances can also be used in general for PM, without necessarily making use of dispersion effects explicitly. Thus, the scope of this conference includes a sub-set of PM that makes use of optically induced transitions in atomic, molecular or ionic media. This sub-area of opto-atomic precision metrology includes, but is not limited to, coherent population trapping based clocks and magnetometers in vapors or cold atoms, optical
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Clocks using frequency combs, optically pumped microwave atomic clocks, optical ion clocks, ring laser gyroscopes using atomic gases, including those employing fast-light effects, laser induced atomic interferometry for rotation sensing, gravimetry, gravity gradiometry and magnetometry. Broadly speaking, any PM technology that employs atomic, molecular or ionic resonances excited by electromagnetic waves would be under the purview of this call, irrespective of the part of the spectrum occupied by the waves. As such, devices such as nuclear magnetic resonance (NMR) based gyroscopes would also be of interest. Also of interest are new ideas of gravitational wave detection using atomic interferometry, fast-light enhanced gravitational wave detection, and superluminal ring-laser based vibrometers and accelerometers.

Use of quantum entanglement, in various forms, can enable enhancement of sensitivity far beyond the standard quantum limit, for many devices, including optical interferometers, atomic interferometers, atomic clocks, ionic clock, and atomic magnetometers. Well-known examples of entanglement-enhanced PM technology includes optical squeezing for optical interferometers, including gravitational wave detectors, and imaging, and spin squeezing for atomic interferometers, atomic clocks, atomic magnetometers, and optical clocks. Non-linear effects are needed for generating both optical squeezing and spin squeezing. Any effort in this regard, requiring the use of electromagnetic waves in any part of the spectrum, would fall under the purview of this program.

The objective of this conference is to bring together researchers whose expertise covers the entire spectrum of technological advances and applications in the field of optical, opto-atomic, opto-molecular, opto-ionic and entanglement enhanced precision metrology.

List of Topics:
- Atomic clocks and atomic magnetometers using coherent population trapping in vapors or cold atoms or other optical techniques
- Optical clocks, atomic and ionic, using frequency combs
- Optically-pumped microwave atomic clocks
- Laser-induced atomic interferometry for rotation sensing, gravimetry, gravity gradiometry, and magnetometry
- Ring laser gyroscope using atomic gases
- NMR gyroscopes
- Spin squeezing for atomic clocks, atomic interferometers, and magnetometers any other precision metrology application
- Optical squeezing for interferometry, gravitational wave detection, imaging and any other precision metrology application
- Qubits bases quantum logic employing optical techniques for precision metrology
- Gravitational wave detection using dispersive or atomic interferometry
- Search of permanent electric dipole moment of elementary particles
- Search for variations in fundamental constants
- Search for dark matter and dark energy
- Search for violation of Newtonian law of gravitational attraction at short distances
- Gravitationally induced decoherence of macroscopic quantum superpositions with spatial separations
- Precisions tests of General Relativity
- Materials and systems for dispersion control and engineering for precision sensing
- Application of dispersion for interferometry, spectrum analysis and sensing
- Use of dispersive media for rotation and acceleration sensing
- Development and characterization of superluminal and subluminal cavities and lasers
- Quantum noise and linewidth of superluminal and subluminal lasers
- Quantum optics for precision sensing
- Nonlinear optics for precision sensing
- Structural dispersion and its applications for precision sensing
- Special and general relativity in dispersive medium
- Metamaterials, plasmonics and nano-antennas for precision sensing
- All sensors employing optical techniques
- Periodic and semi-periodic optical structure such as coupled cavities and resonators and photonic crystals, PT symmetric systems and symmetry breaking, for precision sensing
- Dispersion control in microwave or THz domain for precision sensing
- Integrated optics and nano-photonic for precision sensing
- Theoretical studies and novel concepts in dispersion control for precision sensing
- Dispersion-enhanced sensing of rotation, acceleration/vibration, magnetic field, temperature and other effects.

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Complex light – light with structured wavefronts, amplitudes, phase and polarization – is the common theme in a rapidly expanding number of areas in optics. Fundamental topics in this field include: classical and quantum aspects of the spin and orbital angular momentum of light? spin-orbit effects; optical beams with a structured wavefront? high-order modes and their generation methods; optical waves that have singularities? phase and non-uniform polarization? monochromatic and multimodal optical vortices? chiral interactions; vortex loops and knots? novel propagation dynamics? the interaction between singularities? new topological effects of multidimensional space modes? the interactions of complex light with rotating optical elements and within laser cavities; the encoding of spatial modes onto light waves; the encoding of orbital angular momentum quantum eigenstates for quantum computing, and new fundamental tests of quantum mechanics.

Together, these topics represent a highly active interdisciplinary field with a rich scope for new developments, notably spanning and linking fundamental and applied aspects. This conference provides a well-established annual forum for advancing the development and application of new forms and methods of generating complex optical structures. The world-wide interest in these topics brings together an international community to discuss new fundamentals, methods, techniques, and devices. Papers are solicited, focusing on any of the following or related topics:

- singular optics with phase or polarization discontinuities
- optical vortices, propagation, loops, knots and interactions
- optical angular momentum
- geometric phases
- spiral phase contrast and vortex filters
- structured optical modes
- Laguerre-Gauss, Hermite-Gauss, Bessel, Mathieu, Airy, helico-conical beams
- vector, Poincare’ and space-variant polarized beams
- pulsed- and time-structured beams, Bessel-X pulses
- optical tweezers and fiber tweezers
- holographic optical trapping and manipulation
- nanoscale and deep imaging and trapping
- optical binding
- optical manipulation using generalized phase contrast (GPC)
- imaging with structured light
- light robotics
- laser cooling, atom trapping and atom chips
- single-molecule and liquid-crystal-molecule interactions with light
- communication, encoding and cryptography with spatial modes
- quantum multimode and vector spaces
- quantum information processing and imaging with complex light
- entanglement and hyper-entanglement with spatial modes
- micro- and nanofabrication with structured light
- nano-optics and nanostructure devices
- optofluidics, optical sorting, optical fractionation
- chirality in optical fields
• chirality in particles and film nanophotonics
• near-field and evanescent wave interactions
• ultrahigh-resolution imaging
• electron vortices
• multimode propagation in fibers
• spin-orbit effects.

TRAVEL SUPPORT AWARD
We are pleased to announce an Early Career Professional Travel Award for this conference of $400 USD. To be eligible for the Travel Award, you must:
• be a junior scientist (Masters or PhD student, or post doc with less than three years experience)
• be listed as an author on an accepted paper within this conference
• have conducted the majority of the work to be presented
• submit your manuscript online before 9 January 2019
• present your paper as scheduled
• submit a 250-word statement of need
• submit a 1-page describing your research and bio (please include your SPIE Paper Number).

Applicants must email a short statement confirming eligibility, intent to apply, plus additional required materials, to Prof. Enrique Galvez at egalvez@colgate.edu by Monday 7 January 2019.

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The emerging field of photonics heat engines generally encompasses the science of manipulation of thermal characteristics of matter using or involving electromagnetic and optical radiation. In particular, the field of laser cooling of solids (optical refrigeration) and the related area of electroluminescence refrigeration and radiation-balanced lasers have been advancing on many fronts. Most recently, optical refrigeration in rare-earth-doped crystals has achieved sub-100K temperatures which has subsequently led to the demonstration of the world's first all-solid-state cryocooler. On the more fundamental side, optical refrigeration has been used to manipulate and investigate micro-mechanical systems and nanostructures approaching their quantum-mechanical ground state. Mitigating and/or balancing the heat generated from quantum defects in solid-state lasers by anti-Stokes fluorescence cooling has led to novel “athermal” or radiation-balanced lasers (RBLs), which promises to eliminate thermal instabilities in high power solid-state lasers. In parallel, fundamental research on optical refrigeration and electroluminescence cooling in semiconductor structures has advanced immensely in recent years. The related fields of thermophotonics (TPX) and thermophotovoltaics (TPV) exploit efficient electro- and photo-luminescence in semiconductors for converting waste or solar heat to electricity. We encourage the submission of papers dealing with experimental and theoretical studies as well as the applications of photonic heat engines including but not limited to the fields of optical and electroluminescence refrigeration, radiation balanced lasers, thermophotonics, and optomechanical cooling.
The exponential increase in the amount of data created every day has led to a new era in data exploration and utilization. Optical sensors and fibers have enabled capture and transfer of massive data across both short and long distances and have formed the backbone of the internet. The field of biological research healthcare has been influenced radically by the developments in photonics technologies ranging from imaging, tomography to spectroscopy. Optical sensors are able to collect a massive amount of data at high frame rates. These trends are fueling the need and the opportunity for artificial intelligence (AI) techniques that take advantage of the unique properties of optics or are customized for processing of optical data. Early examples include integration of artificial intelligence with various types of microscopy for classification of biological cells and tissue, AI enhancement of image resolution, improvement of optical sensors and receivers using machine learning, and optical implementations of the canonical neural networks. In the field of cybersecurity, optics can offer means to generate and distribute keys for encrypted communication.

The photonic applications have served as an important source of data ranging from the photographs taken by almost 5 billion cellphones all the way to the images and data created by optical measuring systems. Going forward, the convergence of AI with cutting-edge optics will have a transformative impact on communication, imaging and sensing systems.

The goal of this conference is to serve as a unique platform for bringing together artificial intelligence and photonics researchers from around the world to showcase the newest trends and best practices. Researchers from leading companies and universities present their high-impact research and products and exchange new ideas.

Topics of interest include but are not limited to:
- computational imaging
- augmented reality
- structured illumination
- neural imaging
- target recognition
- optical random number generation
- optical encryption and security
- digital pathology
- smart microscopy
- digital holography
- super resolution imaging
- optical data compression
- optical phase recovery
- optics inspired algorithms
- photonic hardware accelerators
- computational sensors
- optical information theory
- analog optical computing
- metaphoric computing
- nonlinear Fourier transform
- machine learning for optical sensing and metrology
- machine learning in optical receivers and networks
- optical classification and inference.

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Sustained research and development of vertical-cavity surface-emitting lasers (VCSELs) over the past thirty years has transformed VCSELs to viable components in the photonic marketplace for optical interconnect and many other applications. Currently, VCSELs are being developed for a wide variety of applications, as well as being designed to conform to standard system architectures. This conference seeks to provide a forum for interaction between VCSEL researchers, product developers, and system engineers, and VCSEL component users to disseminate information about new advances and applications. Subjects of interest for this conference include the design, novel fabrication, and physical characterization of VCSELs. Papers concerning commercial VCSEL activity and new VCSEL applications are particularly solicited. Topics of interest include:

- high-performance VCSELs (low-threshold current, high output power, high-speed modulation, etc.)
- VCSEL applications (position sensing, smart pixels, optical data links, print heads, display, scanning, sensors, etc.)
- VCSEL reliability (qualification, research)
- hybrid VCSEL integration with optics and/or microelectronics
- advances in fabrication technologies (selective oxidation, dry etching, wafer bonding, etc.)
- techniques and monitoring of VCSEL growth (uniformity, reproducibility)
- new materials for VCSELs
- 2D VCSEL arrays
- characterization and control of transverse optical modes and polarization
- new VCSEL devices including tunable VCSEL structures
- commercial VCSEL production techniques
- VCSEL packaging.
Novel In-Plane Semiconductor Lasers XVIII (OE125)

Conference Chairs: Alexey A. Belyanin, Texas A&M Univ. (USA); Peter M. Smowton, Cardiff Univ. (United Kingdom)

Program Committee: Yasuhiro Arakawa, The Univ. of Tokyo (Japan); Mikhail A. Belkin, The Univ. of Texas at Austin (USA); Dan Botez, Univ. of Wisconsin-Madison (USA); Federico Capasso, Harvard John A. Paulson School of Engineering and Applied Sciences (USA); Gary A. Evans, Southern Methodist Univ. (USA); Mariangela Gioannini, Politecnico di Torino (Italy); Michael Kneissl, Technische Univ. Berlin (Germany); Sophie G. Lange, Microsoft Research Cambridge (United Kingdom); Kei-May Lau, Hong Kong Univ. of Science and Technology (Hong Kong, China); Luke F. Lester, Virginia Polytechnic Institute and State Univ. (USA); Shinji Matsuo, NTT Device Technology Labs. (Japan); Luke J. Mawst, Univ. of Wisconsin-Madison (USA); Jerry R. Meyer, U.S. Naval Research Lab. (USA); Roberto Paiella, Boston Univ. (USA); Katrin Paschke, Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany); Richard V. Penty, Univ. of Cambridge (United Kingdom); Johann Peter Reithmaier, Univ. Kassel (Germany); Haisheng Rong, Intel Corp. (USA); Gary M. Smith, MIT Lincoln Lab. (USA); Nelson Tansu, Lehigh Univ. (USA); Miriam S. Vitiello, CNR-NANO (Italy); Qi Jie Wang, Nanyang Technological Univ. (Singapore); Wanhua Zheng, Institute of Semiconductors, Chinese Academy of Sciences (China)

High-quality, in-plane semiconductor lasers exhibit improved performance over a wide range of emission wavelengths from ultraviolet into the THz range. Devices are finding an ever-increasing number of applications in, for example, telecommunications, printing, spectroscopy, displays, and medical diagnostics and therapy.

Well-developed GaAs- and InP-based lasers operating from the 0.8 to 2-μm are achieving multi-watt output powers with beams of high spatial and spectral purity. Lasers made from new material systems, such as dilute nitride-antimonides, bismides or quantum-dot active regions, are pushing performance and spectral coverage. Mode-locked diode lasers are demonstrating improvements such as reduced pulse length and timing jitter. Applications in communication are pushing advances in laser dynamics, including the use of coupled and/or chaotic semiconductor lasers. The GaN based laser field continues to innovate and make progress in terms of e.g. power, reliability and to extend operation deeper into the green and the ultraviolet parts of the spectrum. In the infrared, Sb-based quantum well lasers display high performance at wavelengths up to ~ 5 μm, and quantum cascade lasers operate at wavelengths from just below 3 μm to almost 300 μm. Emerging applications in the mid/far-infrared stimulate the development of high-efficiency, high-power quantum cascade lasers operating at an ambient temperature and with new functionalities such as ultrashort pulse generation, frequency combs, injection locking, and beam control. Novel laser sources utilize recent advances in plasmonics, nanophotonics, and nonlinear optics for efficient generation and manipulation of light. A variety of approaches are being developed for silicon-based lasers, including hybrid structures by local area growth or wafer bonding. Laser sources based on novel two-dimensional and topological materials are being proposed.

This conference provides a forum for the most recent breakthroughs in device design and performance. We solicit papers describing novel designs that achieve higher performance levels and unique operational characteristics, as well as papers describing the technical limitations of the current in-plane laser technology and lasers tailored to particular applications such as heat-assisted magnetic recording. We are interested in new methods of fabrication or new methods of characterization that are necessary for improved performance. Papers of experimental and/or theoretical nature are welcome.

Examples of in-plane laser types of interest include, but are not limited to:
- quantum cascade
- organic lasers
- InGaAsP/InP and InGaAsP/GaAs
- InGaAsN, InGaAsNSb or GaAsBi
- AlInGaP/GaAs visible
- Sb-based
- GaN- and ZnSe-based UV, blue and visible
- silicon-based lasers
- quantum dot lasers
- type-II quantum-well and superlattice lasers
- communications lasers
- sub-wavelength scale lasers
- photonic bandgap and microcavity lasers
- DFB and DBR lasers
- multi-segment and ring lasers
- mode-locked lasers
- coherent and incoherent laser arrays
- MOPA and/or flared-waveguide lasers
- high-brightness lasers
- narrow-linewidth lasers
- vertically-coupled in-plane lasers.

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Light-Emitting Devices, Materials, and Applications for Illumination, Information, and Beyond (OE126)

Conference Chairs: Jong Kyu Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Michael R. Krames, Arkesso, LLC (USA); Martin Strassburg, OSRAM Opto Semiconductors GmbH (Germany)

Program Committee: Yong-Hoon Cho, KAIST (Korea, Republic of); Aurelien David, Soraa, Inc. (USA); Amélie Dussaigne, CEA-LETI (France); Kolja Haberland, LayTec AG (Germany); Michael Heuken, AIXTRON SE (Germany); Christoph G. A. Hoelen, Philips Lighting B.V. (Netherlands); Heonsu Jeon, Seoul National Univ. (Korea, Republic of); Satoshi Kamiyama, Meijo Univ. (Japan); Soo Min Lee, Veeco Compound Semiconductor Inc. (USA); Yun-Li Li, PlayNitride Inc. (Taiwan); Tien-Chang Lu, National Chiao Tung Univ. (Taiwan); Hee Jin Kim, Lumileds, LLC (USA); Juanita N. Kurtin, OSRAM Opto Semiconductors (USA); Matteo Meneghini, Univ. degli Studi di Padova (Italy); Sungwon D. Roh, LG Innotek (Korea, Republic of); Tish Shute, Huawei Technologies Co., Ltd. (USA); Klaus P. Streubel, OSRAM GmbH (USA); Tetsuya Takeuchi, Meijo Univ. (Japan); Li-Wei Tu, National Sun Yat-Sen Univ. (Taiwan); Marie Anne van de Haar, Seaborough Research B.V. (Netherlands); Dong-Sing Wuu, National Chung Hsing Univ. (Taiwan); Erin C. Young, Univ. of California, Santa Barbara (USA)

Light-emitting diodes (LEDs) have been evolving as the dominant light source in mobile phones, displays, automobiles, and now also general lighting. The availability of devices emitting not only in the full visible color range including white, but also in ultraviolet and infrared, enables a variety of exciting applications.

Novel materials and device architectures combined with increasingly sophisticated manufacturing processes promise low-cost solid-state light sources with high efficiency and luminous flux. With the recent advances in efficiency, radiance, output power, and white quality, LEDs are seriously competing with conventional lighting technologies in all areas of lighting including the huge general lighting market. Now, LED technology is well positioned to disrupt other markets such as displays, automobiles, visible light communications, water and air purification, sanitization, projection, bio sensing, sensors for internet of things (IoT), and lighting for health, amenity, medical diagnostics, and urban farming.

The objective of this conference is to bring together scientists and engineers working on material and device aspects as well as manufacturing and application aspects of LEDs for illumination, information, and beyond, and to review the current state of the art, development trends, and outlooks in efficiency, spectral quality, reliability, brand new emerging applications and other relevant factors. Theoretical and experimental papers will include, but will not be limited to the following areas:

**LED APPLICATIONS AND SOLID-STATE LIGHTING**
- LEDs, LED modules, and LED systems for solid state lighting (SSL), including general and special lighting applications, quality of white light, phosphors for SSL, packages for SSL, and white binning
- quality of light including spectral, spatial, and temporal aspects, human centric spectral distributions including impact on biological stimuli, etc.
- light quality metrics
- horticultural and agricultural lighting
- lighting for automobiles, health, emotion, medical diagnostics, etc.

**NOVEL ELECTROLUMINESCENT SEMICONDUCTOR MATERIALS AND DEVICES FOR SSL**
- perovskites and other novel electroluminescent semiconductor materials
- stimulated emission devices, including super-luminescent and laser diodes
- vertical cavity surface emitting LEDs, SLEDs, and lasers.

**WAVELENGTH CONVERSION MATERIALS AND COMPONENTS**
- novel down-conversion materials, including narrow-band luminescent conversion materials
- spectral shaping with down-converter materials, e.g., narrow-band emitters
- photoluminescent semiconductor materials for wavelength down-conversion
- single-crystalline conversion materials
- transparent and engineered-translucency wavelength converters
- high power density converters and solutions for phosphor “droop”
- depreciation mechanisms and reliability of luminescent materials and components
- fundamental physics and modeling of down conversion mechanisms and devices.

**NOVEL TECHNOLOGIES FOR LED DESIGN AND FABRICATION**
- simulations and optimization
- novel LED fabrication methods
- materials, architectures, packaging and mounting technologies for high power density operation.

**MEASUREMENTS AND CHARACTERIZATIONS FOR LED MATERIALS AND DEVICES**
- optical, electrical, thermal, compositional, morphological, structural, etc. properties of LEDs
- point, line, planar, and bulk defects analyses
- degradation mechanisms and reliability issues.

**HIGH-CURRENT PERFORMANCE AND “DROOP” IN III-NITRIDES LEDS**
- fundamental physics and modeling
- droop-free and droop-optimized structures.
LED MANUFACTURING
- metalorganic chemical vapor deposition (MOCVD), molecular beam epitaxy (MBE), hydride vapor phase epitaxy (HVPE)
- LED processing (etching, bonding, patterning, novel processes, e.g., for micro-LED displays)
- LED packaging.

NOVEL SUBSTRATES FOR LED EPITAXIAL GROWTH
- non- and semi-polar substrates
- LEDs on non-sapphire crystalline substrates, including silicon, GaN, Ga2O3, etc.
- LEDs on large area substrates including metal foils, glass, plastic, etc.

NOVEL SUBMOUNTS FOR LED MOUNTING
- LEDs on large area submounts including metal foils, glass, plastic, etc.
- ultra-low-cost submounts
- submounts for extremely high power density emitters
- submounts for (driver/sensor-) integrated, smart, and multi-pixel or matrix devices.

QUANTUM-DOT-BASED LEDS
- both photo-injected and electrically injected quantum-dot based light-emitting devices for applications to displays and illumination, among others.

2D OPTOELECTRONICS MATERIALS
- graphene, boron nitride, and related materials
- transition metal dichalcogenides (TMDCs) for optoelectronic applications.

NANOMATERIALS AND NANOSTRUCTURES FOR LEDS
- nanowires, quantum dots, and low-dimensional structures
- photonic crystals and surface plasmons
- nano-phosphors.

UV and DUV LEDs and their applications
- LEDs for near- and deep-UV emission, including semiconductor and packaging materials and device architectures
- applications for UV/DUV LEDs.

NIR/IR-EMITTING LEDS
- LEDs for near-IR and IR emission including arsenides and phosphides
- applications for NIR/IR LEDs
- sensors for IoT.

AUGMENTED AND VIRTUAL REALITY
- technologies and platforms for the augmented and virtual reality (AR/VR) applications
- small pixel size solutions including brightness and color purity
- thermal management issues for AR/VR
- light emitters for 3D sensing.

LED-BASED SENSORS AND COMMUNICATION
- autonomous vehicles
- drones
- geolocation
- LiFi.

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ABSTRACTS DUE:
25 July 2018

AUTHOR NOTIFICATION:
1 October 2018
The contact author will be notified of acceptance by email.

OPTO POST-MEETING MANUSCRIPT DUE DATE:
(All conferences except OE115 and OE131-OE133)
9 January 2019

OPTO ON-SITE MANUSCRIPT DUE DATE*:
(*Conferences OE115 and OE131-OE133. Manuscripts will be published on first day of conference):
12 December 2018

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a manuscript for publication in the conference proceedings.

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Emerging Liquid Crystal Technologies XIV (OE127)

Conference Chair: Liang-Chy Chien, Kent State Univ. (USA)
Conference Co-Chairs: Dirk J. Broer, Technische Univ. Eindhoven (Netherlands); Igor Mušević, Jožef Stefan Institute (Slovenia); Byoungho Lee, Seoul National Univ. (Korea, Republic of)

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Join us at the 2019 Emerging Liquid Crystal Technologies XIV (ELCT-XIV) conference. This conference provides forum for academic and industrial scientists and engineers to present frontier and high-impact scientific and technological research on recent advances in materials, devices, and applications. Numerous emerging topics on liquid crystal science and technology have taken advantages of unique anisotropic properties of liquid crystal materials to significantly improve the performance of existing devices or create new device applications. The conference will feature keynote, invited, topical oral and poster sessions and an industrial exhibition. Attend ELCT-XIV for enlightened discussions and exchange ideas on frontier science and technologies on liquid crystal materials, devices, and applications.

Papers are solicited but not limited to the following areas:

• 3D displays
• head-mounted and near-eye displays
• light-field and holographic displays
• wearable and e-paper displays
• liquid crystal lenses and diffractive optical elements
• switchable diffractive waveplates
• spatial light modulators
• LC applications in the terahertz, infrared and microwave
• lasing, waveguides, nonlinear optics, and plasmonic effects
• new materials and effects
• chiral phases and device applications
• nano-dispersions and nanostructured materials
• photo-patterning and photoalignment
• polarizers, optical retarders and other display components
• polymers and LC composites
• holographically-formed materials, devices and applications
• lyotropic and biological self-assemblies
• organic semiconductor and photovoltaic devices
• energy harvesting, saving, and storage nanostructured systems and metamaterials
• tweezing, imaging, manipulating or self-assembled nanoparticles
• dyes, colloids, and nanoparticles-doped composites
• smart windows
• sensors and actuators.
In all market segments and applications, expectations for display performance have grown at a rapid pace, driving not only the accelerated development of diverse display technologies but also supporting control algorithms and image-processing methodology. Display technologies have evolved to support a wide range of applications. The diversity in display technologies with enormous difference in operating principles, imaging qualities and functions presents both opportunities and challenges for application-specific displays development. Although some advancements in display performance focus on the applications, there are general trends toward improved spatial and temporal resolution, higher dynamic range, wide color gamut, and augmented and virtual reality.

Join us at the 2019 Advances in Display Technologies IX (ADT IX) conference. This conference will provide a forum for presentations on advances in display technologies, featuring plenary sessions, parallel topical sessions, poster sessions, and an industrial exhibition. Papers are solicited but not limited to the following areas:

- VR/AR (virtual and augmented reality) displays
- HUD (head-up display), NTE (near-to-eye) and wearable displays
- laser displays, speckle issues, and screen technology
- 3D, 2D/3D convertible displays
- holographic and light-field displays
- OLED and OLET displays
- micro LED materials and displays
- quantum-dot displays (QDDs)
- SLM, LCOS, and MEMS for displays
- projection displays
- electrophoretic (EPD) and photophoretic (PPD) displays
- electrowetting displays
- oxide TFTs
- touch and interactive displays
- flexible displays
- transparent displays
- high-resolution (8K) displays
- graphene, CNT, and nanotechnologies in displays
- electronics and optics for displays and display systems
- energy-efficient technologies for displays
- display metrology, human factors, and image quality
- display manufacturing and equipment
- other novel and emerging display technologies.

Submit your abstract today: [www.spie.org/opto19call](http://www.spie.org/opto19call)
Ultra-High-Definition Imaging Systems II (OE129)

In recent years, Ultra-High-Definition (UHD) displays such as 4K and 8K resolutions have been rapidly developed for the increasing demands for overwhelmingly realistic imaging quality for many applications such as entertainment, education, especially medical imaging and diagnosis that require highly precise display performance, security, defense and so on. Ultra-high definition images and video data give observers the feeling of being at a real scene. It can contribute to wide-ranging applications. In medical applications, UHD microscopy and endoscopy give wide viewing area as well as high-resolution images. This means an enormous improvement in medical research and diagnosis. This has accelerated research and development of 4K/8K distribution technologies for consumers to watch full-scale broadcastings.

This emerging technology of UHD imaging systems needs the high-performance optical design, high-quality imaging systems, data storage, and advanced communication systems with high-speed and high-bandwidth. In this conference we focus on the state-of-the-art technologies to support the UHD Imaging System with an interdisciplinary approach in various areas, for example, high-speed optical fibers, holographic storage for large volume data, photonics polymer materials for display parts to realize real colors on displays just as actual objects, and more.

The conference Ultra-High-Definition Imaging Systems II welcomes participants who are active in various fields exchanging the latest information in each area of materials, components, and technologies that are aiming to develop the highest quality UHD Imaging Systems. Papers are solicited in the following topics and related areas:

- ultra-high-definition TV systems
- ultra-high-definition display systems
- ultra-high-definition data storage
- high-speed and wide-band communication systems
- processing of UHD images
- medical high-definition images and their applications
- art and entertainment with UHD images
- advanced photonics polymers for display
- inorganic and organic materials for displays.

Submit your abstract today: www.spie.org/opto19call
Practical Holography XXXIII: Displays, Materials, and Applications (OE130)

Conference Chairs: Hans I. Bjelkhagen, Glyndwr Univ. (United Kingdom), Hanshola Consulting Ltd. (United Kingdom); V. Michael Bove Jr., MIT Media Lab. (USA)

Program Committee: Maria Isabel Azevedo, Univ. de Aveiro (Portugal); David Brotherton-Ratcliffe, Geola Technologies Ltd. (United Kingdom); Frank C. Fan, Dymek Co. Ltd. (China); Gerald L. Heidt, Wasatch Photonics, Inc. (USA); Toshio Honda, Toppan Printing Co., Ltd. (Japan); Fujio Iwata, Toppan Printing Co., Ltd. (Japan); Michael A. Klug, Magic Leap, Inc. (USA); Alkiviadis Lembessis, The Hellenic Institute of Holography (Greece); Deanna McMillen, EOTech, Inc. (USA); Martina L. Mrongovius, RMIT Univ. (Australia), Ctr. for the Holographic Arts (USA), Academy of Media Arts, Cologne KHM (Germany); Hiroshi Yoshikawa, Nihon Univ. (Japan)

DISPLAYS
Widely regarded as the ultimate 3D display technology, holography has largely become digital in recent years, yet the most visually stunning holograms continue to be made through analog methods. This conference offers the opportunity for sharing the latest advances in both domains.

- techniques and concepts in display holography
- “electro-holography,” meaning the electronic generation, transmission, or display of holographic image information, and the creation of dynamic or interactive holographic images
- spatial light modulators, computational methods, and related technologies relevant to advances in digital holographic imaging
- perceptual issues related to viewing of holographic images

MATERIALS
The widespread application of holography to commercial electronics and communication applications requires recording holograms and diffractive elements in real materials. Successful engineering solutions require understanding of handling and process issues, as well as familiarity with the performance properties of existing and designed materials. This conference will focus on holographic recording materials and processes used in display, engineering, medical, energy, and data storage applications, and on holographic optical elements (HOEs), which take advantage of material properties. New materials will be discussed, as well as advances in existing materials.

- materials for holography and diffractive optics
- holographic performance and optical properties
- mechanism of image formation
- modeling and analysis of holographic performance
- durability and environmental testing of materials and devices, and materials issues affecting device construction
- HOEs and DOEs utilizing materials properties for enhanced performance
- improved processing of materials, including techniques and processes for production of holograms, HOEs, and DOEs
- real-time and active holographic materials and processes for information storage and dynamically switchable holograms
- WDM applications of holographic materials
- applications and demonstrations of new or improved materials in display holography, security holograms, HOEs, DOEs, holographic information storage, and real-time holography.

APPLICATIONS
Holography has emerged from the research laboratory to find applications to communication and engineering problems, capture of historical artifacts, and artistic expression. This conference will highlight advances of holographic and technology, especially those that impact the practice and applications of holography to imaging and display engineering.

- 3D imaging for application in industry, medicine, education, advertising, and other visual communication areas, with an emphasis on the visualization of 3D digital data by holographic means; holographic stereograms and computer-generated image holograms are areas of strong current interest including HOEs in autostereoscopic 3D systems
- processes, hardware, and techniques: new systems and applications for the recording, producing, manufacturing, or optimizing of holograms and diffractive elements
- digital reconstructions of holograms for image analysis
- metrology, microscopy, nondestructive testing, and holographic optical elements, emphasizing the application and engineering issues rather than the underlying scientific principles or component fabrication issues
- artistic applications of holography and the use of holography in recording and display of historical items.
Broadband Access Communication Technologies XIII (OE131)

Conference Chairs: Benjamin B. Dingel, Nasfine Photonics, Inc. (USA); Katsutoshi Tsukamoto, Osaka Institute of Technology (Japan); Spiros Mikroulis, Huawei Technologies (Germany)

Program Committee: Shlomi Arnon, Ben-Gurion Univ. of the Negev (Israel); Harald Haas, The Univ. of Edinburgh (United Kingdom); Atsushi Kanno, National Institute of Information and Communications Technology (Japan); Mohsen Kavehrad, The Pennsylvania State Univ. (USA); Nathaniel Libatique, Ateneo de Manila Univ. (Philippines); Nicholas Madamopoulos, The City College of New York (USA); Ken-ichi Sato, Nagoya Univ. (Japan); Atul K. Srivastava, NEL America, Inc. (USA); Manoj Thakur, Univ. College London (United Kingdom); Junwen Zhang, ZTE USA (USA)

Conference Cosponsors: CORNING

To satisfy the growing demand of end-customers for fast Internet access, new multimedia services, and rapid interactive applications, all telecommunications networks operators are under intense pressure to solve the “last-mile connectivity” problem. This problem is not only the need for huge broadband in one direction but also for high-speed two-way connectivity, and mobile access as opposed to fixed access.

New emerging access technologies such as Optical Coherent Access, optical fiber to the home (FTTH), wireless (WLL), and Radio-over-Fiber (RoF) are increasingly being researched, developed and deployed since they offer huge broadband potential and mobility. We will have special sessions on:

- millimeter-wave radio technologies for fiber-wireless integrated access networks
- 3D printing-assisted photonics integrated circuits for optical communication applications and data centers
- optical wireless communication for data centers (organized by Shlomi Arnon). Original papers are solicited on, but are not limited to, the following topics (please write in the submitted abstract that the paper is direct to the Optical Wireless Communication for Data Centers special session):
  - OWC or FSO (free-space optics) system and subsystem for data centers
  - VLC (visible light communication) for data center applications
  - advanced devices for high-speed data center links
  - pointing, acquisition, and tracking for data centers
  - transmitters, receivers, subsystems, optical and optoelectronic components for OWC data centers
  - optics for electronic module interconnects
  - advanced optical components and modules
  - waveguide and optoelectronic devices
  - advanced optical modulation and detection schemes
  - high-speed optical transmissions
  - optical network applications and services
  - energy issues
  - optical interconnection
  - nano-photonics and micro/nano optics
  - microwave photonics
  - quantum and nonlinear optics.

This conference will also address (but not limited to) the following topics:

**NEXT-GENERATION OPTICAL BROADBAND ACCESS TECHNOLOGIES**
- coherent access network design and optimization
- next-gen PON (WDM-, CWDM-PON technologies)
- 100G/400G ethernet-based networks, ethernet over first mile
- fiber-in-the-loop (FITL), FTTP, FTTH, FTTC, HFC
- advanced optical components, optical fiber and equipment
- passive optical network (PON)-based access and deployments (EPON, GPON, SuperPON)
- advanced devices, optical fiber, equipment for PON
- advanced modulation formats and digital signal processing for PON
- security for future broadband access.

**LI-FI BROADBAND ACCESS, VISIBLE LIGHT COMMUNICATION (VLC), AND DATA CENTERS**
- advanced components and novel architecture
- green technologies for accessing data centers
- demo and novel VLC implementation.

**TECHNO-ECONOMIC ANALYSIS OF BROADBAND ACCESS**
- economics of broadband access
- pricing strategies for access
- advanced and cost-effective power management.

**RADIO-OVER-FIBER (ROF) BROADBAND ACCESS TECHNOLOGIES**
- RoF and mm-wave RoF-based distributed antenna systems, wireless access, and wireless networks
- advanced opto-electronic devices, optical fiber and equipment for RoF and mm-wave RoF-based access
- digital RoF networks
- fiber wireless, hybrid systems, and network (indoor/outdoor wireless architectures).
CALL FOR PAPERS

WIRELESS BROADBAND ACCESS TECHNOLOGIES
• wireless access, components, and protocols
• emerging and advanced components to support Wi-Fi, UWB, Bluetooth
• long term evolution (LTE) and LTE Advanced
• 5G and mm-wave technologies
• MIMO technologies for high-speed mobile users
• mobile front-haul/backhaul network technologies
• resilient wired and wireless access networks.

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To be eligible for the Best Student Paper Award, you must:
• be a student without a doctoral degree (undergraduate, graduate, or PhD student)
• be listed as an author on an accepted paper within conferences OE131, OE132, or OE133
• have conducted the majority of the work to be presented
• submit your manuscript online by 12 December 2018
• present your paper as scheduled
• be present at the Awards Ceremony.

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How to Apply
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IMPORTANT: The Proceedings for this conference will be published on the SPIE Digital Library on the first day of the meeting. Manuscript submission (6-page minimum) is obligatory for participation in the conference. Note the earlier manuscript due date of 12 December 2018.
This conference will focus on the optical network architecture and components for metro networks, data centers and short reach data links including high-performance computing. It promotes discussion on optical network strategies regarding high-data rate and cost-optimized architectures for these networks. It provides a forum for discussion on the recent technological advances in metro, datacenter and optical short-reach transmission systems, network equipment, modules, and related components.

**DIGITAL TRANSMISSION SYSTEMS**
- metro and short haul transmission: system solutions, experiments, and field demonstrators
- efficient high-capacity and high-speed WDM/TDM
- 100Gbit/s and higher rate line and client interfaces (ethernet and OTN)
- advanced modulation formats and super channels for 400Gbit/s and 1Tbit/s systems
- modulation techniques including OFDM
dise: sliceable bandwidth transceivers (flexible rate, flexible modulation format)
- coherent detection and digital signal processing
- black link approach and compatibility of link and line interfaces
- advanced coherent transceivers for filterless optical channel selection by tunable local oscillator
- direct detection based data center interconnects
- probabilistic constellation shaping
- RF overlay networks for video distribution.

**NETWORK ARCHITECTURES AND APPLICATIONS**
- access, aggregation, and transport networks and enablers
- aggregation networks with filterless detection via local oscillator
- operational impact of different network architectures (e.g. smart ROADM based vs. filterless networks)
- cost-optimized network approaches (CapEx, OpEx), optimization tools resilient architectures, mesh-, star-, ring topologies
- multilayer network integration
- IP integration into optical layer
- carrier-grade ethernet including MPLS-TP
- control plane including SDN and openflow, open daylight and other protocols/interfaces
- transport SDN and NFV use cases for different network domains

- architectures for inter-intra-datacenter interconnects and networks
- infrastructure as a service (IaaS), incorporating datacenter and transport network entities
- reconfigurable WDM technology for elastic and flexible networking
- interconnectivity of servers and storage devices
- very low latency high-performance server-to-server connectivity
- approaches for cost, size, and power dissipation optimization
- novel approaches to interconnect topology
- architectures to support diverse web services and cloud computing
- back-haul and front-haul networks for 5G mobile networks.

**SUBSYSTEMS COMPONENTS AND LINK ARCHITECTURES FOR DATA CENTERS, HPC, AND SHORT-REACH LINKS**
- optical backplanes
- embedded optics
- advanced optical components/sub-systems for photonic switching
- optical packet and burst switching, components for high-speed switching and routing
- integrated transmitter and receiver components including pluggable modules
- active optical cables
- applications and requirements for ROADM networks in the data centers
- performance monitoring techniques.

**COMPONENTS AND ADVANCED TRANSCIEVER TECHNOLOGY FOR DATA CENTERS, HPC, AND SHORT-REACH LINKS**
- 100Gb/s, 400Gb/s and higher rate transceivers
- novel modulation formats and direct detection robust schemes
- silicon photonics
- integrated photonic components
- CMOS-based photonic devices
- backplane, board-to-board, and chip-to-chip optical connectivity
- high-data-rate PIN and APD receivers
- reliability of optical components under high-temperature operation
- software-controlled transceivers
CALL FOR PAPERS

• low-power dissipation transceiver design
• novel fibers for datacenter and short-reach links
• coherent detection and digital signal processing
• visible light and free-space communication.

NETWORK COMPONENTS, EQUIPMENT, AND SUB-SYSTEMS
• hybrid electrical-optical network equipment
• advanced optical components/sub-systems for circuit switching
• integrated transmitter and receiver components including pluggable and MSA modules
• WSS-based ROADM networks including colorless, directionless, and contentionless architectures
• flexible grid ROADM components high port count and twin WSS architecture
• performance monitoring techniques
• fault isolation strategies in complex meshed optically transparent islands, distributed monitoring, correlation analysis tools, and instruments for practical field deployment
• technologies for information transfer between layers, PCE
• virtual network elements, e.g. virtual routers, virtual CPE
• space-division multiplexing, advances in fiber technology, multi-core fibers, multi-mode fibers
• advances in pluggable transponder technologies, pluggable modules, client transport schemes.

SERVICES AND NETWORK SECURITY
• routing, congestion control, peer-to-peer/overlay
• novel routing strategies for optimized traffic flow, e.g. segment routing and alternatives
• reliability and quality of service
• network service chaining in an NFV-SDN-data-center environment
• protocols such as VPLS, SIP and IMS applications and services such as L2/L3 VPNs, VoIP, IPTV, content and data services and location-based services
• security encoding at different OSI layers, direct resource efficient encoding at layer L1 (OTN)
• security issues in datacenter networks
• quantum key distribution.

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Submit your abstract today: www.spie.org/opto19call
Next-Generation Optical Communication: Components, Sub-Systems, and Systems VIII (OE133)

Conference Chairs: Guifang Li, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Xiang Zhou, Google (USA)

Program Committee: Kazi S. Abedin, OFS Fitel LLC (USA); Jin-Xing Cai, TE SubCom (USA); Hwan Seok Chung, Electronics and Telecommunications Research Institute (Korea, Republic of); Benjamin B. Dingel, Nasfine Photonics, Inc. (USA); Ezra Ip, NEC Labs. America, Inc. (USA); Yongmin Jung, Univ. of Southampton (United Kingdom); Inuk Kang, NOKIA Bell Labs (USA); Tsuyoshi Konishi, Osaka Univ. (Japan); Ming-Jun Li, Corning Incorporated (USA); Chao Lu, The Hong Kong Polytechnic Univ. (Hong Kong, China); Akihiro Maruta, Osaka Univ. (Japan); Takashi Sasaki, Innovation Core SEI, Inc. (USA); Siyuan Yu, Univ. of Bristol (United Kingdom); Yanjun Zhu, Huawei Technologies Co., Ltd. (USA)

This conference provides a forum to present the latest advances in technology and product developments in next-generation optical communication including coherent, space- and mode-division multiplexed optical transmission systems. The conference program encompasses components and subsystems related to next-generation optical communication technology as well as coherent, space- and mode-division multiplexed optical communication systems. Early-stage concepts and controversial solutions are also welcome and encouraged.

We particularly invite students to submit their thesis work to this conference. Students who are first authors will be eligible for the Optical Communications Best Student Paper Awards.

Topics for the conference include but are not limited to:

- advanced components for coherent transmitters and receivers
- photonic and optoelectronic integration
- subsystems including DSP algorithms
- coherent transport systems
- coherent detection for networking including access networks
- components for space-division multiplexing
- components for mode-division multiplexing
- electrical and optical signal processing for space- and mode-division multiplexing
- space- and mode-division multiplexed optical communication systems
- SDM Networks.

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Free-Space Laser Communications XXXI (LA402)
Conference Chairs: Hamid Hemmati, Facebook Inc. (USA); Don M. Boroson, MIT Lincoln Lab. (USA)
Program Committee: Abhijit Biswas, Jet Propulsion Lab. (USA); Donald M. Cornwell Jr., NASA Goddard Space Flight Ctr. (USA); Frank F. Heine, Tesat-Spacecom GmbH & Co. KG (Germany); William S. Rabinovich, U.S. Naval Research Lab. (USA); Zoran Sodnik, European Space Research and Technology Ctr. (Netherlands); Linda M. Thomas, U.S. Naval Research Lab. (USA); Morio Toyoshima, National Institute of Information and Communications Technology (Japan)

This conference will provide a forum for all professionals involved in technologies related to free-space laser communications, and broadband optical communications. The conference will cover subjects related to the latest research and technology advances, and provide an overview useful to lasercom specialists, technology managers, and communication engineers. Papers are encouraged on ongoing laser communication programs, free-space laser communication system requirements, technology and subsystem advancements, and in-depth analysis of present status and future trends. Original papers are solicited on, but are not limited to, the following topics:

FREE-SPACE LASER COMMUNICATION TECHNOLOGIES AND ATMOSPHERIC PROPAGATION
• present and future laser communication systems; space-based systems, airborne links terrestrial/indoor/commercial links
• next generation lasercom technologies
• modulation and error correction encoding
• pointing, acquisition, and tracking
• atmospheric propagation, transmission effects, and compensation techniques
• transmitters for space, receivers, subsystems, optical and optoelectronic components
• flight qualification, lifetime and reliability
• ground receivers, particularly low-cost large apertures (telescope, dome, gimbal)
• optics for electronic module interconnects
• quantum communication and cryptography
• global communications systems that make use of wireless-terrestrial, air, and space optical connections
• free-space-laser-based gravitational wave sensing systems.

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Save the date
ABSTRACTS DUE: 25 July 2018
AUTHOR NOTIFICATION: 1 October 2018
The contact author will be notified of acceptance by email.
OPTO POST-MEETING MANUSCRIPT DUE DATE: (All conferences except OE115 and OE131-OE133)
9 January 2019
OPTO ON-SITE MANUSCRIPT DUE DATE*: (*Conferences OE115 and OE131-OE133. Manuscripts will be published on first day of conference):
12 December 2018
PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a manuscript for publication in the conference proceedings.
Get more exposure from your work—include your abstract in a Photonics West Applications Track

If your BiOS, LASE, or OPTO paper has applications for translational research, 3D printing, Brain/Neuro research, then you are eligible to include your abstract in one of the Photonic West Applications Tracks. See details below on how to submit your abstract.

**Translational Research**

SPIE Translational Research 2019 will highlight papers that showcase the latest photonics technologies, tools, and techniques with high potential to impact healthcare.
- Photonic Therapeutics and Diagnostics
- Neurophotonics, Neurosurgery, and Optogenetics
- Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering
- Clinical Technologies and Systems
- Biomedical Spectroscopy, Microscopy, and Imaging
- Nano/Biophotonics

**SYMPOSIUM CHAIRS:**
- Bruce Tromberg
  Beckman Laser Institute, Univ. of California, Irvine (USA)
- Gabriela Apiou
  Harvard Medical School, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA)

**Brain/Neuro Research**

SPIE Brain 2019 will highlight papers that describe the development of innovative technologies that will increase our understanding of brain function.
- Clinical and Translational Neurophotonics
- Neural Imaging, Sensing, Optogenetics, and Optical Manipulation
- Clinical Technologies, Laser Tissues Interaction, and Tissue Engineering
- Nanobiophotonics

**SYMPOSIUM CHAIRS:**
- David Boas
  Boston Univ. (USA)
- Elizabeth Hillman
  Columbia Univ. (USA)

**3D Printing**

SPIE Applications of 3D Printing 2019 highlights papers that showcase innovative ways to apply this multidimensional/multidisciplinary technology.
- Additive Manufacturing
- Selective Laser Melting, Maser Sintering, Laser Photopolymerization
- Novel Materials, Protean Materials, and Laser Interactions
- Software That Increases Efficiencies and Speed
- In-situ Sensors or Probes to Verify and Quantify Additive Manufacturing Processes in Real Time
- Conformal Photonics/Electronics

**SYMPOSIUM CHAIR:**
- Henry Helvajian
  The Aerospace Corp. (USA)

**Steps:**
- Choose your conference in BiOS, LASE, or OPTO.
- When submitting your conference abstract, enter related Applications Track (translational research, 3D printing, or brain/neuro research).
- If paper is accepted in the conference, it will be cross-listed in the Applications Track of your choice in online and printed programs.
- To compete for a Best Paper Award in the Applications Track (optional), submit a 1-2-page summary when prompted by SPIE staff.
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- Make the presentation as scheduled in the program.
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- Obtain funding for registration fees, travel, and accommodations, independent of SPIE, through their sponsoring organizations.
- Ensure that all clearances, including government and company clearances, have been obtained to present and publish. If you are a DoD contractor in the USA, allow at least 60 days for clearance.
- Submit an abstract and summary online at: www.spie.org/opto19call

- Please submit a 250-word text abstract for technical review purposes that is suitable for publication. SPIE is authorized to circulate your abstract to conference committee members for review and selection purposes.
- Please also submit a 100-word text summary suitable for early release. If accepted, this summary text will be published prior to the meeting in the online or printed programs promoting the conference.
- To provide the research community with enhanced access to information presented at SPIE conferences, SPIE will record the audio plus screen content of oral presentations and, with author permission only, will publish the recordings on the SPIE Digital Library. When submitting an abstract, you will be asked to respond to the permission request.
- Some conferences have additional requirements. Please check the individual call for papers to see if the conference you are submitting to requires a longer abstract, a supplemental file, etc.
- Only original material should be submitted.
- Abstracts should contain enough detail to clearly convey the approach and the results of the research.
- Commercial papers, papers with no new research/development content, and papers where supporting data or supplemental file, etc. are required for technical reasons will not be accepted for presentation in this conference.
- Please do not submit the same, or similar, abstracts to multiple conferences.

SPECIAL TOPICS HIGHLIGHTED IN PROGRAM

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