SPIE. PHOTONICS WEST OPTO

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17 July 2024

Gallium Nitride Materials and Devices XX (OE107)

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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 be limited to, scientific and technological advances in all aspects of materials, including bulk GaN, ternaries and quaternaries, heterostructures, micro- and nanostructures, new substrates and new methodologies employed for alternative substrates, materials physics, devices (electronic and optical), device physics, novel devices such as microcavity based ones, processing, and particularly devices with emphasis on light-emitters in the visible and UV regions of the optical spectrum, novel growth techniques, and device reliability.

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

EPITAXIAL GROWTH, BULK GROWTH, AND GROWTH OF NANOSTRUCTURES

MOVPE, MBE, HVPE, substrates (patterned and planar, alternative orientations), solution growth methods both very high pressure and not so high pressure, or by any other method, precursors for dopants and constituents, epitaxial lateral overgrowth, alloys, low-dimensional systems; growth, and exploitation of non-polar and semi-polar surfaces; high-resistivity bulk GaN.

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. Impact of defects and doping on electronic and optical devices.

OPTICAL, ELECTRICAL, AND MATERIAL CHARACTERIZATION

Structural, electrical, and optical characterization of nanostructures, bulk material, optical and electrical devices, both on macroscopic and microscopic scales. For optical characterization, this includes photoluminescence, electroluminescence, cathodoluminescence, optical-emission imaging, non-linear optics, reflection spectroscopy, experimental measurement of energy band parameters and band structure, etc. For electrical characterization it includes Hall effect, carrier transport, magneto-transport, photoconductivity, thermally stimulated currents, etc., and for structural characterization, x-ray, TEM and its variants, local charge mapping, AFM detection of dislocations, stacking faults, etc.

III-NITRIDE MICRO- AND NANOSTRUCTURES, PHOTONIC INTEGRATED DEVICES (PIC), AND MOEMS

Model nanostructures such as self-assembled and ordered quantum dots, quantum wires and related low-dimensional structures, for microstructures micro-rods, and micro-fin-structures, and optoelectronic and electronic devices based on these structures are among the topics envisioned for discussion. Naturally these structures include waveguides, photonic crystals, and micro-cavities for linear and non-linear optics, both as stand alone and as components for photonic integrated devices. Micro-opto-electronic-mechanical systems employing the particular properties of III-nitrides will also be among the topics of discussion.

FUNDAMENTAL PHYSICS OF III-NITRIDE SEMICONDUCTORS

Band structure (including quantum well heterostructures), quantum size effects, strain effects, excitons (free and bond), polaritons, nanocavities, plasmonic effects, surface phenomena, polarization effects, piezoelectric effects, theoretical models.

IN-PLANE LASER DIODES, SLEDS, AND VCSEL FOR THE SHORT VISIBLE TO UV SPECTRAL REGION

Topics to be covered include development, characterization, and modelling of laser diodes, superluminescent diodes (SLEDs) and vertical cavity surface emitting lasers (VCSEL) for high optical power with applications to even material processing, high speed modulation for applications such as virtual/augmented/mixed reality, VR/AR/MR and big data communication, efficient illumination, low power consumption, and single longitudinal mode operation. Extending the wavelengths toward longer and shorter wavelengths, in particular into UV will be considered.

ELECTRONIC DEVICES

Vertical GaN devices, and HFETs, 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 along with application are solicited. Moreover, biological sensors, field-emitters, integrated GaN electronics, and integration with other technologies are among the topics to be discussed.

VISIBLE AND UV LEDS, MICRO-LEDS, AND DETECTORS

Topics include single photon-sources to high-power and high-efficiency LEDs, with a special emphasis on micro-LEDs for display and other applications, and on photo diodes including avalanche varieties, inclusive of devices physics (theory and simulations), device processing, and applications in general as well as specific ones aimed at lighting, automotive, displays, bio-medicine, spectroscopy, quantum optics, etc. Topics particularly on efficiency, reliability, and extending wavelengths toward longer and shorter wavelengths, e.g. for UV LEDs and optical detectors will be featured.

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Present your research at SPIE Photonics West

Follow the instructions below to develop a successful abstract for submission to a conference and review policies for publication in the Proceedings of SPIE in the SPIE Digital Library. Submissions subject to chair approval.

Important dates

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

*Contact author or speaker must register prior to uploading
**After this date slides must be uploaded onsite at Speaker Check-in

What you will need to submit

- Presentation title
- Author(s) information
- Speaker biography (1000-character max including spaces)
- Abstract for technical review (200-300 words; text only)
- Summary of abstract for display in the program (50-150 words; text only)
- Keywords used in search for your paper (optional)
- Check the individual conference call for papers for additional requirements (i.e., special abstract requirements or instructions for award competitions)

Note: Only original material should be submitted. Commercial papers, papers with no new research/development content, and papers with proprietary restrictions will not be accepted for presentation.

How to submit your abstract

- Visit the conference page: www.spie.org/oe107call
- Choose one conference that most closely matches the topics of your abstract. You may submit more than one abstract, but submit each abstract only once
- Click the title of the conference to view the full description and submit by clicking the "Submit an Abstract" button on that page
- Sign in to your SPIE account, or create an account if you do not already have one
- Follow the steps in the submission wizard until the submission process is completed
- If your submission is related to an application track below, indicate the appropriate track when prompted during the submission process

Application track

Listed below are the application tracks available for this meeting. Application tracks aggregate presentations and focus on emerging technical and societal needs that require a multidisciplinary approach.

- **AI/ML:** Papers that highlight the use of artificial intelligence, machine learning, and deep learning to create and implement intelligent systems across multiple sectors, technologies, and applications
- **Sustainability:** Papers that highlight the use of optics and photonics for renewable energy, natural resource management, sustainable manufacturing, and greenhouse gas mitigation in support of the UN Sustainable Development Goals
- **Brain function:** Papers that highlight the development of innovative optics and photonics technologies that increase our understanding of brain physiology and function
- **Translational research:** Papers that highlight the transition from bench to bedside using the latest photonics technologies, tools, and techniques for healthcare
- **3D printing:** Papers that highlight the innovative use of optics and photonics in multidisciplinary applications for multidimensional manufacturing
- **Photonic chips:** Papers that highlight advances in materials, design, fabrication, integration, testing and packaging of photonic components at the chip level

Submission agreement

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

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

Review and program placement

- To ensure a high-quality conference, all submissions will be assessed by the conference chair/editor for technical merit and suitability of content
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- Final placement in an oral or poster session is subject to chair discretion

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