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Gallium Nitride Materials and Devices XVII (OE107)

Conference Chairs: Hiroshi Fujioka, Institute of Industrial Science, The Univ. of Tokyo (Japan); Hadis Morkoç, Virginia Commonwealth Univ. (United States); Ulrich T. Schwarz, Technische Univ. Chemnitz (Germany)

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

Important dates

Abstract submission deadline	11 August 2021
Author notification	11 October 2021
Submission system opens for presentations and manuscripts*	29 November 2021
Manuscript due date	29 December 2021
Oral presentation videos due	29 December 2021
Poster PDF and preview videos due	29 December 2021
Oral presentation slide deadline	20 January 2022

*Authors must register prior to uploading.

What you will need to submit

- Title
- Author(s) information
- 250-word abstract for technical review
- 100-word summary for the program
- Keywords used in search for your paper (optional)
- Check the individual conference Call for Papers for additional requirements (for example, some conferences require 2- to 3-page extended summary for technical review, or have instructions for award competitions)

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

How to submit your abstract

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

Application track

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

Submission agreement

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

- Register and pay the author registration fee.
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- Submit a 4-page-minimum manuscript by the advertised due date, for online conference viewing during the event and publication in the Proceedings of SPIE on the SPIE Digital Library.
- Obtain funding for registration fees, travel, and accommodations, independent of SPIE, through their sponsoring organizations.
- Ensure that all clearances, including government and company clearance, have been obtained to present and publish. If you are a DoD contractor in the USA, allow at least 60 days for clearance.
- Attend the meeting.
- Present at the scheduled time.

Review and program placement

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

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