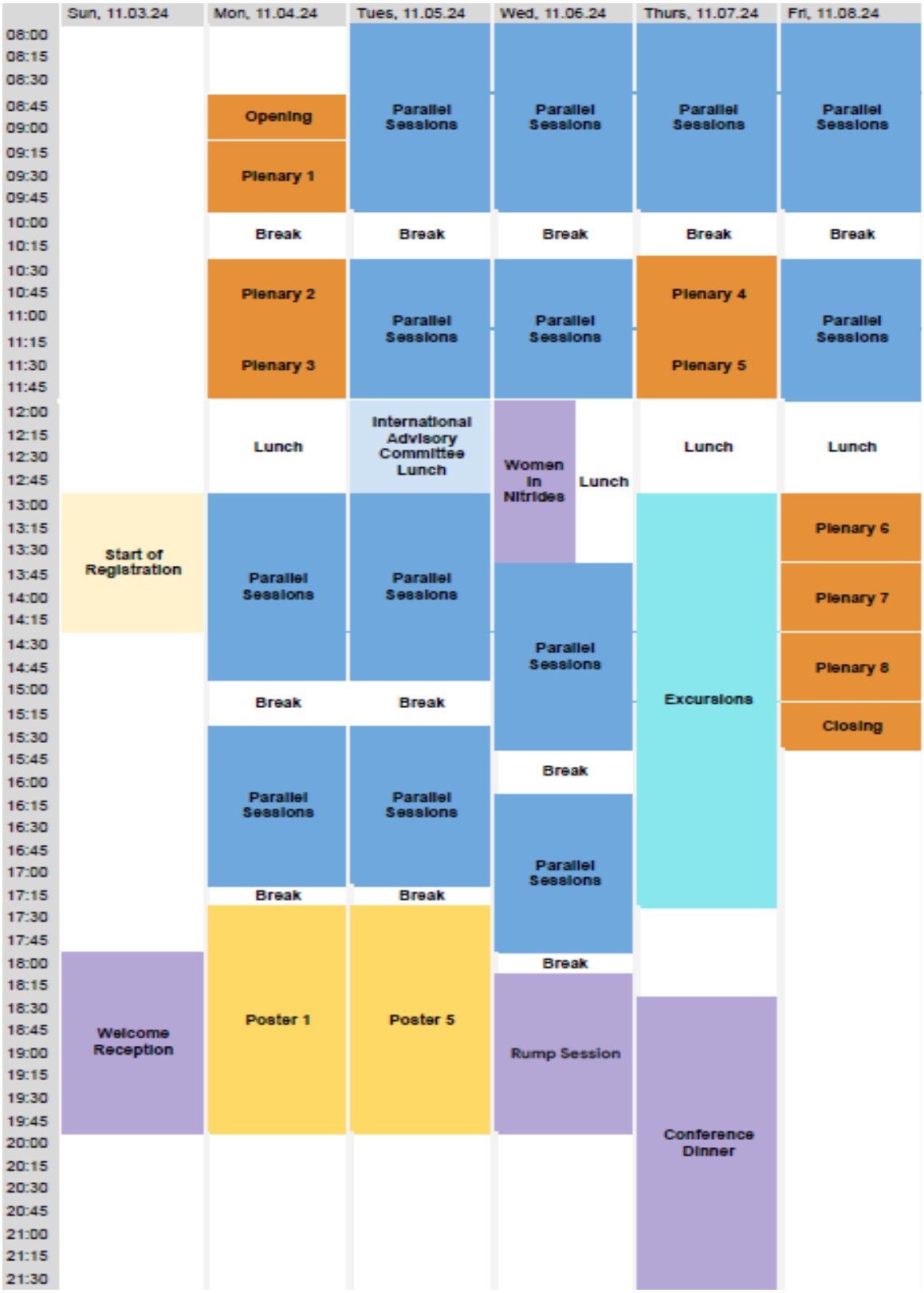
International Workshop on Nitride Semiconductors

November 3-8,2024
O'ahu, Hawai'i, USA
www.iwn2024.org

PROGRAM OVERVIEW



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Welcome from the Conference Chairs


Dear colleagues,

It is with great pleasure that we welcome you to the International Workshop on Nitride Semiconductors (IWN 2024) here in the beautiful city of Honolulu, Hawai'i. This marks the 12th installment in a workshop series that has spanned a remarkable quarter-century, during which we have witnessed many transformative advancements enabled by III-Nitrides.

Reflecting on our journey, we began in Nagoya, Japan, at IWN 2000, and have since gathered in diverse locations – Aachen, Germany (IWN 2002), Pittsburgh, USA (IWN 2004), Kyoto, Japan (IWN 2006), Montreux, Switzerland (IWN 2008), Tampa, USA (IWN 2010), Sapporo, Japan (IWN 2012), Wrocław, Poland (IWN 2014), Orlando, USA (IWN 2016), Kanazawa, Japan (IWN 2018), and Berlin, Germany (IWN 2022) – each workshop contributing to our collective knowledge and fostering collaboration in this dynamic field. Each venue has enriched our discussions, and we are thrilled to continue this tradition in such a picturesque setting. IWN 2024 is designed to serve as a vibrant forum for exploring the latest developments, addressing unmet challenges, and envisioning the future potential of nitride semiconductors.

Our program includes topical symposia and plenary sessions featuring renowned experts who will share insights on growth, characterization, optoelectronic and electronic devices, as well as novel materials and nanostructures. Additionally, our three parallel rump sessions will allow for in- depth discussions on specific topics identified as critical for future innovation. We hope this workshop will be a catalyst for lively exchanges, inspiring new collaborations and innovative ideas that will drive our field forward.

As you immerse yourselves in the sessions, I encourage you to take some time to enjoy the rich history and natural beauty of the Hawaiian archipelago. Whether you're exploring its stunning landscapes or engaging in outdoor activities, may your stay be both productive and relaxing.

Once again, welcome to IWN 2024! Let's make this a memorable and impactful experience together.

Zlatko Sitar and Ramón Collazo – IWN 2024 Chairs

Welcome from the Program Chair

Dear colleagues,

On behalf of the IWN 2024 Program Committee, I would like to extend a warm welcome to each of you attending this year's conference. We are excited to share with you the outcomes of our careful planning and collaborative efforts in crafting a program that reflects the vibrant interests of the IWN community. The development of our program was a structured and inclusive process. The Program Chair was selected by the IWN 2024 Co-Chairs, who then appointed seven Sub-Topic Chairs to ensure comprehensive coverage of key areas: Growth, Electronic Devices, Optoelectronic Devices, Characterization, and Novel Materials and Nanostructures. To enhance geographic diversity, three Regional Program Chairs were also chosen, ensuring that all continents were represented.

Our extensive 108-member program committee was formed, with members organized by the five sub-topics. The initial suggestions for committee members came from the Program Chair, fostering a collaborative environment. In selecting invited speakers, the Sub-Topic Chairs led their respective committees in nominating and ranking candidates. From this process, the top 16 nominations in each sub-topic were invited, while the Co-Chairs and Program Chair directly selected eight plenary speakers.

Contributed and late news abstracts underwent a rigorous evaluation by the program committee, with numeric rankings serving as a basis for classification. Notably, grading was conducted within each sub-topic to maintain impartiality and minimize bias. As a result of this thorough and fair process, approximately 60% of abstracts were accepted for oral presentations, 37% for posters, and about 3% were not suitable for the conference.

I would like to take this opportunity to express my sincere gratitude to the authors and particularly to all the Program Committee members for their timely and selfless contributions to developing our program. Your dedication has been instrumental in bringing together such an exceptional lineup of presentations. We look forward to an engaging and productive conference.

Alan Doolittle – IWN 2024 Program Chair

Organizational Information

Venue

Hilton Hawaiian Village Waikiki Beach Resort
2005 Kalia Road,
Honolulu, HI 96815

Workshop Homepage

www.iwn2024.org

Organizing Committee Chairs

Zlatko Sitar, NC State University (USA)
Ramón Collazo, NC State University (USA)

Honorary Chairs

Asif Khan, University of South Carolina (USA)
Russell Dupuis, Georgia Institute of Tech. (USA)

Conference Secretary

Ronny Kirste, NC State University (USA)

Conference Organization

NC State Continuing and Lifelong Education
ContinuingEducation@ncsu.edu
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Program Committee Chair

Alan Doolittle, Georgia Institute of Technology (USA)

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Europe	Juergen Christen, OvGU, Magdeburg (Germany)
America	Christian Wetzel, Rensselaer Polytechnic Inst. (USA)

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Growth	Michael Bockowski, UNIPRESS (Poland) Izabella Grzegory, UNIPRESS (Poland)
Characterization	Mitsuru Funato, Kyoto University (Japan)
Optoelectronic Devices	Jean Yves Duboz, CRHEA (France)
Electronic Devices	Srabanti Chowdhury, Stanford University (USA) Douglas Yoder, Georgia Institute of Tech (USA)
Novel Materials and Nanostructures	Zetian Mi, University of Michigan (USA)

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Yasushi Nanishi, Ritsumeikan University (Japan)
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Hui Yang, Gusu Lab (China)
Euijoon Yoon, Korea Institute of Energy Technology (Korea)

Symposium Program Committee

Symposium on Growth

Andrew Allerman, Sandia National Labs (USA)
Erdem Arkum, HRL LLC. (USA)
Matthias Bickerman, Leibniz Institute for Crystal Growth (Germany)
Michal Bockowski, UNIPRESS (Poland)
Alex Chaney, USA Airforce Research Labs (USA)
Benjamin Damilano, CRHEA (France)
Theeradetch Detchprohm, Georgia Institute of Technology (USA)
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Yoshinao Kumagai, Tokyo University of Agriculture & Technology (Japan)
Takashi Matsuoka, Tohoku University (Japan)
Elke Meissner, Fraunhofer IISB (Germany)
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Yusuke Mori, Osaka Univ (Japan)
Yasushi Nanishi, Ritsumeikan University (Japan)
Siddha Pimputkar, Lehigh University (USA)
Shiva Rai, Applied Materials (USA)
Leo Schowalter, UCF (USA)
Shadi Shahedipour, SUNY New York (USA)
Agnes Trassoudaine, Université Clermont Auvergne (France)
Tim Wernicke, TU Berlin (Germany)
Markus Weyers, FBH (Germany)
Jinquiao Xie, Qorvo Inc. (USA)

Symposium on Characterization

Martin Albrecht, IKZ (Germany)
Matthias Auf der Maur, University of Rome (Italy)
Raphaël Butté, EPFL (Switzerland)
Shigefusa Chichibu, Tohoku University (Japan)
Mona Ebrish, Vanderbilt University (USA)
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Yoshihiro Ishitani, Chiba University (Japan)
Mihee Ji, Army Research Laboratory (USA)
Ryuji Katayama, Osaka University (Japan)
Martin Kuball, University of Bristol (UK)

Robert Martin, University of Strathclyde (UK)
Kunimichi Omae, NICHIA CORPORATION (Japan)
Tania Paskova, ARL (USA)
Jim Speck, UCSB (USA)
Nelson Tansu, University of Adelaide (Australia)
Maria Tchernycheva, CNRS, Universite Paris-Sud (France)
Shigetaka Tomiya, NAIST (Japan)
Carol Trager-Cowan, University of Strathclyde (UK)
Filip Tuomisto, Helsinki University (Finland)
Chris Van de Walle, University of California (USA)
Yoichi Yamada, Yamaguchi University (Japan)
Atsushi Yamaguchi, Kanazawa Institute of Technology (Japan)
Chih-Chung Yang, National Taiwan University (Taiwan)

Symposium on Optoelectronic Devices

Josh Brown, Bluglass (Australia)
Benjamin Damilano, CNRS (France)
Jean-Yves Duboz, CRHEA (France)
Daniel Feezell, University of New Mexico(USA)
Nicolas Grandjean, EPFL (Switzerland)
Åsa Haglund, Chalmers (Sweden)
Hideki Hirayama, RIKEN (Japan)
Motoaki Iwaya, Meijo University (Japan)
Kazunobu Jojima, Osaka University (Japan)
Hee Jin Kim, Lumileds (USA)
Jong Kyu Kim, Pohang University of Science & Technology (Korea)
Michael Kneissl, TU Berlin (Germany)
Michael Krames, ARKESSO (USA)
Maki Kushimoto, Nagoya University (Japan)
Kei May Lau, Hongkong University (China)
Tien-Chang Lu, National Chiao Tung University (Taiwan)
Robert Martin, University of Strathclyde (UK)
Shubhra Pasayat, University of Wisconsin (USA)
Piotr Perlin, Unipress (Poland)
Siddharth Rajan, Ohio State University (USA)
Martin Straßburg, OSRAM (Germany)
Hong Tang, Yale University (USA)
Jonathan Wierer, NCSU (USA)
Yuh-Renn Wu, National Taiwan University (Taiwan)
Thomas Wunderer, Palo Alto Research Center (USA)
Euijoon Yoon, Seoul National University (Korea)
Baoping Zhang, Xiamen University (China)

Symposium on Electronic Devices

Travis Anderson, Naval Research Lab (USA)

Subramaniam Arulkumaran, NTU (Singapore)
MVS Chandrashekhar, University of South Carolina (USA)
Paul Chow, Rensselaer Polytechnic Institute (USA)
Srabanti Chowdhury, Stanford University (USA)
Yvon Cordier, CRHEA (France)
Vanya Darakchieva, Linkoping University (Sweden)
Alan Doolittle, Georgia Institute of Technology (USA)
Chirag Gupta, UW (USA)
Grace Huili, Cornell University (USA)
Debdeep Jena, Cornell University (USA)
Andrew Koehler, U.S. Naval Research Laboratory (USA)
Junji Kotani, Sumitomo (Japan)
Elison Matioli, EPFL (Switzerland)
Matteo Meneghini, University of Padova (Italy)
Umesh Mishra, UCSB (USA)
Clemens Ostermaier, Infineon Technologies Austria AG (Austria)
Tomás Palacios, Massachusetts Institute of Technology (USA)
Spyridon Pavlidis, NCSU (USA)
Siddarth Rajan, Ohio State University (USA)
Keisuke Shinohara, Teledyne Technologies (USA)
Jun Suda, Nagoya University (Japan)
Marko Tadjer, U.S. Naval Research Laboratory (USA)
Andrei Vescan, RWTH, Aachen (Germany)
Patrick Waltereit, IAF (Germany)
Joachim Würfl, FBH (Germany)
Doug Yoder, Georgia Institute of Technology (USA)
Shuzhen You, IMEC (Belgium)

Symposium on Novel Materials and Nanostructures

Donat As (Universität Paderborn, DE)
Enrique Calleja (Tech. Univ. of Madrid, ES)
Guillaume Cassabois (Université de Montpellier, FR)
Martin Eickhoff (Universtiy of Bremen, DE)
Giorgia Fugallo (CNRS & University of Nantes, FR)
Mark Holmes (Lumileds, US)
Hongxing Jiang (Texas Tech, US)
Xiaohang Li (KAUST, SA)
Zetian Mi (Univ. of Michigan, US)
Eva Monroy (CEA, FR)
Abdallah Ougazzaden (GT Lorraine, FR)
Peter Parbrook (University College Cork, IE)
Lars Samuelson (Lund Univ., SE)
Tetsuya Takeuchi (Meijo University, JP)
Christian Wetzel (Rensselaer Polytechnic Inst., US)
Songrui Zhao, McGill University (Canada)

General Information

Abstracts

All accepted abstracts in the issue are printed as submitted and listed within the presenting author index. The full abstract text may be downloaded from Oxford Abstracts either by scanning the QR code on your name badge, or by accessing the Program Schedule page on the workshop's website.

Name Tag

Access to all scientific sessions, the exhibition, and to the Luau banquet, is only possible with your personalized name badge received at the registration desk. All participants are requested to wear their name badge throughout the workshop.

Program Breaks

During the program breaks, refreshments will be provided in the Coral Lounge, during which time, participants are encouraged to visit the exhibition.

Lunch will be provided on Tuesday and Friday in the Coral Lounge. Participants may eat lunch in Nautilus, Coral 4/5, or in the Coral Lounge.

Lunch will also be provided on Wednesday for those participating in the Women in Nitrides event.

For those that have signed up for an excursion, a boxed lunch will be provided during the excursion.

Cloakroom

A cloakroom is available on the first floor. You can also store your luggage there.

Internet

WiFi is available throughout the Mid-Pacific Conference Center free of charge.

Network: **Hilton_Meetings**

Password: **iwn2024**

Photography and Recording Policy

Photography or video/audio recording during presentations is strictly prohibited.

Bag Storage at Check Out

Hotel guests of the Hilton Hawaiian Village may store their luggage with bell services until their departure from the hotel.

Plenary: Monday, November 4 | 09:15-10:00 | Coral 4/5

Isik Kizilyalli, Senior Director of Technology (R&D)

Sustainability Accelerator, Stanford University

Critical Role of Energy Technologies and Power Electronics Towards a More Electric and Sustainable Future

Advances in power electronics have been one of the primary enablers of the unprecedented growth of renewable energy sources on the electrical power grid over the past several decades, along with the current evolution towards ever-higher levels of electrification, the process of replacing fossil fuels with electricity as the source of energy. Electricity generation currently accounts for 40% of primary energy consumption in the U.S., and over the next 25 years, it is projected to increase to more than 50% worldwide. It continues to be the fastest growing form of end-use energy. Power electronics is responsible for controlling and converting electrical power to provide optimal conditions for transmission, distribution, and load-side consumption. Estimates suggest that the fraction of electricity processed through power electronics could be as high as 80% by 2030 (including generation and consumption), more than a twofold increase. Widespread utilization of high-performance power converters offers substantial energy saving opportunities both directly via inherently more efficient designs, and indirectly, by facilitating higher levels of adoption for fundamentally higher performing wide bandgap (WBG) materials such as SiC and GaN. High impact opportunities exist across a wide variety of applications.

Motor Drives: Across all sectors, electric motors account for approximately 40% of total U.S. electricity demand. It is estimated that 40-60% of currently installed electric motors could benefit from variable frequency drives (VFDs).

Automotive: Power electronics has a major impact on the efficiency of electric vehicles (EVs) in two ways: directly through its internal losses attributable to switching and ohmic dissipation, and indirectly by adding volume and weight.

Data Centers: Energy consumption in data centers accounts for ~4% of electricity use in the U.S. in 2022 and is expected to reach 6% by 2026. High power density converters based on WBG devices can be key enablers to improve the energy efficiency of power delivery architectures of most modern data centers.

More Electrified Aviation: Aviation is a difficult industry to decarbonize and electrify. WBG-based converters will offer many pathways to achieving significant energy savings in propulsion, auxiliary functions, and ground operations.

Distributed Energy Resources: In grid applications, such as solar PV and wind, HVDC and FACTS power conditioners are required to process and control the flow of electricity. Power electronics is responsible for a loss of ~4% of all the electricity generated and is the dominant point of system failure.

Decarbonized Industrial Applications: Industry (petroleum refining, chemicals, iron and steel, and cement) represents 30% of U.S. primary energy-related carbon dioxide (CO_2) emissions (1.36 Gtons of CO_2). No matter what industry is electrified, all will require efficient, compact, and multi-MW power converters and controllers.

In this presentation, we will discuss the future role of critical role of energy technologies and power electronics towards a more electric and sustainable future with an emphasis on opportunities and challenges facing WBG power semiconductor devices.

Plenary: Monday, November 4 | 10:30-11:15 | Coral 4/5

Xinqiang Wang, Peking University

State Key Laboratory of Artificial Microstructure and Mesoscopic Physics

Strain modulation in heteroepitaxy for high-efficiency III-nitride red- and UV-LEDs

III-nitride semiconductors have attracted tremendous interest in optoelectronics due to their excellent material properties. In recent decades, significant progress has been made in various applications, especially in blue LEDs for solid-state lighting. Currently, the application fields are gradually expanding to include high-In-content InGaN alloys and high-Al-content AlGaN alloys, such as Micro-LED displays and UV LEDs. Strain modulation is particularly important for enhancing the epitaxy quality and device performance in these applications due to the significant lattice mismatches between the epitaxial structures and the substrates. Here, we systematically explored strain engineering in heteroepitaxial AlN and GaN on sapphire substrates. We discussed strain modulation strategies for both high-Al-content AlGaN/AlN systems and high-In-content InGaN/GaN systems. By precisely tailoring the strain through substrate patterning, growth mode transitions,

and epitaxial structure design, we achieved high-efficiency UV-C, UV-B, and red LEDs. This study highlights the critical role of strain engineering in III-nitride semiconductor heteroepitaxy and is expected to advance the application of III-nitride optoelectronics.

Plenary: Monday, November 4 | 11:15-12:00 | Coral 4/5

Chris Van De Walle

Materials Department, University of California at Santa Barbara

Nitrides for Quantum Applications

Quantum technologies have become a top research priority. However, the underlying hardware still requires major development. I will describe two applications in which nitride semiconductors can offer key advantages: as a host for qubits or single photon emitters, and for quantum transduction.

Point defects or impurities in wide-bandgap semiconductors can act as functional atomic-like centers, providing a platform that combines the environmental isolation necessary to maintain the coherence of quantum states with the ability to perform electrical and optical manipulation. First-principles analyses of a prototype quantum defect, the nitrogen-vacancy (NV) center in diamond, elucidate its properties and form a foundation for predicting which centers in other materials might exhibit similarly favorable properties. We have developed the capability to predict transition energies, lineshapes, and radiative and nonradiative rates. These techniques enable us to analyze, identify, and predict quantum point defects, as will be illustrated with examples for GaN, AlN, and BN (in cubic and hexagonal polymorphs).

Quantum transduction between the microwave and optical regimes is a key enabling technology. Superconducting qubits, which operate in the microwave regime, are currently a leading platform in quantum computing. However, directly transmitting quantum states at microwave frequencies over long distances is challenging; in contrast, optical photons exhibit low decoherence and dissipation rates and are thus ideal information carriers for quantum communication. Creating links between superconducting quantum processors and realizing distributed quantum networks thus requires frequency conversion. Currently used nonlinear optical materials exhibit limited efficiency and are not compatible with CMOS fabrication. AlN has shown promise, and there is hope that AlScN alloys will provide even higher electro-optic coefficients. I will discuss our first-principles calculations of the nonlinear optical properties, which also provide insight into the underlying mechanisms as well as guidelines for enhancing the coefficients through microstructure or strain engineering.

Work performed in collaboration with A. Alkauskas, L. C. Bassett, K. Czelej, C. E. Dreyer, A. Janotti, M. R. Lambert, J. Lyons, M. Maciaszek, M. Mackoit, S. Mu, M. Turiansky, H. Wang L.Weston, and D. Wickramaratne, and supported by DOE, NSF, and DoD.

Plenary: Thursday, November 7 | 10:30-11:15 | Coral 4/5

Zetian Mi

Department of Electrical Engineering & Computer Science, University of Michigan

Ferroelectric Nitride Semiconductors: Challenges and Opportunities

The incorporation of group IIIB elements, e.g., Sc and Y, can transform conventional III-nitride semiconductors to be ferroelectric, with significantly enhanced electrical, dielectric, piezoelectric, and linear and nonlinear optical properties. As such, ferroelectric nitride semiconductors have garnered significant attention for a wide range of applications in high power, high frequency, and high temperature electronics, optoelectronics, ferroelectrics, acoustoelectric, and quantum photonic devices and systems. To ensure that nitride ferroelectrics can meet the stringent requirements of modern microelectronics and photonics, significant challenges must be addressed. These include large coercive fields, low endurance, poor stability, high leakage current, and high optical loss. To date, the realization of ferroelectric nitride semiconductors has been largely achieved through sputter deposition, which often results in limited crystalline quality. Improving the material quality, achieving robust ferroelectric polarization switching, and demonstrating new device concepts using state-of-the-art nitride-ferroelectric-based heterostructures and nanostructures are essential for the advancement and application of this fascinating class of ferroelectrics.

Recently, significant efforts and advancements have been made in the epitaxial growth of single-crystalline wurtzite phase ferroelectric nitrides, including ScAlN and YAlN, utilizing standard epitaxial approaches such as molecular beam epitaxy (MBE) and metal-organic chemical vapor deposition (MOCVD). In this talk, we will begin with a brief overview of the latest research advancements and delve into the challenges and opportunities associated with ferroelectric nitride semiconductors. We will highlight their distinctive properties and notable achievements in areas such as physics, material synthesis, operational mechanisms, and related devices. Additionally, we will address the obstacles currently faced by nitride ferroelectrics in practical applications. Finally, we will discuss potential solutions, future research directions, and the prospects for further developments in this active field.

Plenary: Thursday, November 7 | 11:15-12:00 | Coral 4/5

Yoichi Kawakami

Department of Electronic Science & Engineering, Kyoto University

Elucidating Fundamental Properties of AlGaN-based Semiconductors and Prospects for DUV Emitters

AlGaN-based semiconductors are classified as ultra-wide-bandgap semiconductors and have attracted a lot of attention for deep-ultraviolet (DUV) light-emitting diodes (LEDs), DUV laser diodes (LDs), and various electronic devices. Although there has been active research competition, the external quantum efficiencies (EQEs) of commercially available DUV LEDs are still several percent in the 260-280 nm range and more than one order of magnitude lower in the 220-240 nm range. Those values are significantly lower than those of InGaN-based blue LEDs, which reached to almost 90%. In order to improve EQEs of DUV LEDs, it is important to improve the current injection efficiency (CIE) and light extraction efficiency (LEE) by controlling the electrical conductivity and transparency of AlGaN with high Al compositions, as well as the internal quantum efficiency (IQE) of the AlGaN quantum well light emitting layer. However, early studies in MOVPE growth of AlN reported very large Si donor and Mg acceptor levels of 280 meV and 630 meV for AlN, respectively, and many people were pessimistic about the possibility of low-resistive n-type and p-type AlN. Recent fundamental optical characterization of high-quality AlN crystals has revealed that the above values are caused by DX and AX-like centers, and that the Si donor and Mg acceptor levels formed intrinsic to the impurities are 65 meV and 330 meV (±80 meV), respectively. In recent years, efforts to realize highly conductive AlN have also been reported. In addition, the conductivity control by polarization engineering in Al-composition graded AlGaN layers has also made great progress. From the approach with optical characterization, EQEs of LEDs can be evaluated separately into IQE, CIE, and LEE, but a unified view has not yet been obtained in some aspects. In this IWN2024, I will review the latest research with adding my personal view on AlGaN-based semiconductors and would like to propose some hints towards higher EQEs such as approaches with ultra-thin GaN, lower dimensional confinement and utilization of semi-polar planes.

Plenary: Friday, November 8 | 13:00-13:45 | Coral 4/5

Subhashish Bhattacharya

Department of Electrical and Computer Engineering, NC State University

GaN HEMT Enabled High Power Converters: Challenges and Opportunities

The continuous push for increasing the power density and efficiency of power electronics converters has been a primary focus with WBG power semiconductor devices. GaN HEMTs have enabled unprecedented power density, efficiency and performance metrics in the low voltage and low power converters to successfully penetrate the consumer market worldwide. This presentation explores the question is whether GaN HEMTs can enable a similar quantum leap for higher voltages such as 800V DC and 3-phase, 480V AC systems and at higher power levels of 50-100kW. This presentation discusses innovative solutions to overcome the challenges of using GaN HEMTs for high-power converters. The advantages and opportunities of using GaN HEMTs for electric transportation applications with high-speed motors will enumerated. The innovations in GaN Bidirectional switch to enable new power conversion systems will be highlighted.

Plenary: Friday, November 8 | 13:45-14:30 | Coral 4/5

Czeslaw Skierbiszewski

Institute of High Pressure Physics, Polish Academy of Sciences

Tunnel Junctions for Novel Nitride Optoelectronic Devices

There has been increasing attention given to the interband tunnel junctions (TJs) for efficient carrier conversion between electrons and holes in nitride-based devices. Application of TJs creates more freedom in device design – e.g. eliminates the need for resistive p-type metal contact or enables vertical stacking of different devices. The main challenge in development of low resistance TJs in nitrides is related with growth process. For metal-organic vapor phase epitaxy (MOVPE) activation of the p-type conductivity in buried Mg doped InAlGaN layers is critical. One of the directions to overcome this issue is growth of III-N structures by hydrogen free plasma-assisted molecular beam epitaxy (PAMBE).

In this work we discuss development of PAMBE for nitride laser diodes (LDs) and light emitting diodes (LEDs) [1]. A modification of the PAMBE system allowed us to obtain molecular beam fluxes of unprecedentedly high magnitude, not used in MBE of any other material system, which enabled exploration of a new growth regime – high temperature growth of InGaN. The increase of the nitrogen flux was key element in successful application of PAMBE technology for nitrides.

The overview of nitride devices with TJs is presented. Properties of low resistance TJs grown by PAMBE will be discussed [2]. Application of TJs allows to design new architectures of nitride devices like (a) multicolor LDs and LEDs [3], (b) distributed-feedback LDs [4], (c) micro-LEDs [5], (d) inverted LEDs and LDs operating at cryogenic temperatures [6], (e) bi-directional LEDs, which emits light from the same active region for both positive and negative bias voltages [7].

Finally, we will discuss the challenges and prospects of MBE. The path towards realization of highly efficient structures by MBE has been proposed. We believe that further improvement of the growth conditions will lead to demonstration of novel devices, obtainable only with the MBE technique.

[1] C. Skierbiszewski et al., J. Phys. D: Appl. Phys. 47, 073001 (2014); [2] M. Żak et al., Physical Review Applied 15, 024046 (2021); [3] M. Siekacz et al., Optics Express 27, 5784 (2019); [4] G. Muziol et al., Optics Express 28, 35321 (2020); [5] J. Slawinska et al., Optics Express 30, 27004 (2022); [6] M. Chlipala et al., Optics Express 28, 30299 (2020); [7] M. Żak et al., Nat. Comm. 14, 7562 (2023).

Plenary: Friday, November 8 | 14:30-15:15 | Coral 4/5

Debdeep Jena

Department of Electrical & Computer Engineering, Cornell University

Aluminum Nitride Kick-Starts the Ultrawide Bandgap Electronics Story

Aluminum nitride with its ultra-wide direct energy bandgap of ~6 eV currently powers ultraviolet photonics. Owing to its excellent piezoelectric properties, it is used in RF filters in cell phones, and due to its excellent thermal properties and chemical stability, it is increasingly finding use in silicon CMOS for thermal dissipation. But it has resisted use for electronic devices to date. In this talk, I will discuss how the nitride community is starting to make Aluminum Nitride electronics a reality by controlling the electronic conductivity by careful materials science and careful device physics. If successful, AlN will take semiconductor electronic devices to voltage and power regimes that are unattainable by SiC and GaN, just as it has already done in the UV photonic device area.

Invited Talks

Symposium on Growth

Alan Doolittle, Georgia Institute of Technology
Low Temperature AlN Epitaxy, Doping, and Devices

Hajime Fujikura, Sumitomo Chemical
Recent Progress in HVPE-based GaN and AlGaN Growth

James Grandusky, Crystal IS
Development of 100 mm AlN Single-Crystal Growth and Subsequent Substrate Preparation

Douglas Irving, NC State University
Predicting Point Defect Distributions in III-Nitrides and Their Alloys During Growth and Processing

Satoru Izumisawa, Mitsubishi Chemical Corporation
Scaling up Acidic Ammonothermal Crystal Growth for Mass Production of 4-inch GaN Substrates

Taishi Kimura, Toyota Cent Res & Dev Labs Inc
Halogen-Free Vapor Phase Epitaxy

Tim Kolbe, Ferdinand-Braun-Institut
Advances in the Epitaxial Growth of Heterostructures for far-ultraviolet C Light Emitting Diodes

Stefano Leone, Fraunhofer Institute
AlScN and AlYN: From MOCVD Growth to Devices

Takashi Matsuoka, Tohoku University
The Underemphasized Concept of Crystal Polarity in Semiconductors and Its Device Application

Hisashi Murakami, Tokyo University of Agriculture and Technology
Halide Vapor Phase Epitaxy of Thick GaN and AlGaN using GaCl, GaCl3 and AlCl3

Robert Nemanich, Arizona State University
Epitaxial Growth of c-BN on Diamond and Strategies for Electronic Applications

Siddha Pimputkar, Lehigh University
Progress in Bulk Single Crystal Growth of Boron Nitride

Shadi Shahedipour-Sandvik, State University of New York-Albany
Novel Be Doping Techniques to Enable High-Efficiency P-Type III-Nitrides

Henryk Turski, Institute of High Pressure Physics
Epitaxy of III-Nitride Devices on Opposite Facets of the Same Polar Crystal: New Perspectives in Materials Engineering

Fujiwara Yasufumi, Osaka University
Control and Reconfiguration of Eu Emission Centers in GaN for Efficient Red LEDs

Symposium on Characterization

Oliver Ambacher, University of Freiburg
Structural, Dielectric and Elastic Properties of ScAlN Layers for Applications in Piezoacoustic Devices

Gordon Callsen, University of Bremen
Combined Optical and Thermal Characterization of III-nitride Membranes by Microphotoluminescence and Raman Thermometry

Vanya Darakchieva, Linkoping University
THz EPR Ellipsometry

Gregory Fuchs, Cornell University
Room Temperature Optically Detected Magnetic Resonance of Single Spins in GaN

Sylvia Hagedorn, Ferdinand-Braun-Institut
Origin of the Parasitic Luminescence of 235 nm UVC LEDs

Jennifer Hite, University of Florida
Development of GaN for Vertical Applications

Shuhei Ichikawa, Osaka University
Surface Carrier Dynamics of Nitride Semiconductors Evaluated by Time-resolved Photoemission Spectroscopy

Yoshihiro Ishitani, Chiba University
Phonon Dynamics Analysis of InGaN/GaN Heterostructures by Raman Spectroscopy Using a Double Laser System

Peter Parbrook, University College Cork
Prospects for Boron Containing Nitride Alloys for Visible and UV Optoelectronics

Stacia Keller, University of California, Santa Barbara
Growth and Characterization of Relaxed InGaN

Naoki Ohashi, NIMS
Investigation on Ferroelectricity in Aluminum Nitride and it's Solid Solutions

Jun Suda, Nagoya University
Characterization of Extrinsic and Intrinsic Point Defects in Homoepitaxial GaN

Symposium on Optoelectronic Devices

Robert Armitage, Lumileds
Development of InGaN LEDs for Color Display Applications

Daniel Feezell, University of New Mexico
Measurement of Carrier Dynamics in Commercial-Grade InGaN/GaN Light-Emitting Diodes Using Small-Signal Electroluminescence

Åsa Haglund, Chalmers University of Technology
The Quest for Surface Emitting Lasers in the Ultraviolet

Hideki Hirayama, RIKEN
Efficiency Increase in 220-230 nm Far-UVC LEDs fabricated on c-sapphire and Demonstration of 200 mW Class 230 nm Power LED Module

Motoaki Iwaya, Meijo University
Current Status and Challenges of AlGaN-based UV-B Laser Diodes Fabricated on Lattice Relaxed AlGaN

Michael Kneissl, TU Berlin
Carrier Recombination, Transport Dynamics and Degradation in Far-UVC LEDs: Assessing Efficiency Limits

Hirotsugu Kobayashi, Asahi Kasei
Recent Progress of Far UV-C LEDs on AIN Substrate

Tomoaki Koizumi and Susumu Noda, Kyoto University
Realization of High-power and High-beam Quality Blue Photonic-crystal Surface-emitting Lasers

Maki Kushimoto, Nagoya University
Deep Ultraviolet Semiconductor Laser with Polarisation Control Technology

Kazuhiro Ohkawa, KAUST
InGaN-based Red Emitters on Sapphire and ScAlMgO4 Substrates

Marco Rossetti, EXALOS
High-efficiency and Long-wavelength Green Laser Diodes and Superluminescent Diodes with AlInN Layers

Tetsuya Takeuchi, Meijo University
Progress on GaN-Based VCSELs

Claude Weisbuch, Ecole Polytechnique France/USCB
What We Learned From Photo and Electro Emission Experiments in III-Nitrides

Thomas Wunderer, Palo Alto Research Center
Tunable Single-Frequency Photonic Integrated UV-A and Visible Laser Diodes

Symposium on Electronic Devices

Andrew Binder, Sandia National Laboratory
An Outlook on Vertical Gallium Nitride Compared to Incumbent Technology

Peter Brückner, Fraunhofer
IAF GaN Technology Towards 200 GHz

Srabanti Chowdhury, Stanford University
More Power to GaN with Diamond Integration

Rongming Chu, The Pennsylvania State University
GaN Super-Heterojunction Devices and Integration

Karen Geens (presented by Benoit Bakeroot), IMEC
GaN Power Devices on 200 mm Engineered Substrates

Brianna Klein, Sandia National Laboratory
Ultrawide Bandgap AlGaN transistors for High Operating Temperature Electronics

Martin Kuball, University of Bristol
The Next Generation of RF Electronics: Can GaN-on-Diamond Replace GaN-on-SiC Electronics?

Takeru Kumabe, Nagoya University
High-Al-Content AlGaN p-n Diodes Enabled by Distributed Polarizing Doping

Elison Matioli, EPFL
Emerging technologies for GaN electronics: Polarization-engineering for high-performance power devices

Farid Medjdoub, CNRS
Recent Progress of Vertical GaN-on-Silicon Devices

Matteo Meneghini, University of Padua
Vertical GaN Devices: Degradation Physics and Recent Case Studies

Tomas Palacios, Massachusetts Institute of Technology
GaN Technologies and Devices to Enable the Full Potential of Back-Side Power Delivery

Spyros Pavlidis, NC State University
Harnessing Mg Implantation and Ultra-high Pressure Annealing for High-performance Vertical GaN Power Diodes

Biplab Sarkar, Indian Institute of Technology
GaN Camel Diode: A Unipolar Diode Enabled by the Mg-diffusion Process in III-polar and N-polar GaN

E. Bahat Treidel, Ferdinand-Braun-Institut
Vertical Devices on Bulk GaN and on Foreign Substrates

Douglas Yoder, Georgia Institute of Technology
Theoretical Analysis of GaN-based Gunn Effect Devices

Yuhao Zhang, Virginia Tech
Multidimensional Power Devices in GaN: Superjunction, Multi-channel, and FinFET

Symposium on Novel Materials and Nanostructures

Hongxing Jiang, Texas Tech
Development of Wafer-Scale h-BN Quasi-bulk Crystals

Satoshi Kamiyama, Meijo University
GaInN-based Multi-Quantum Shells (MQSs) on GaN Nanowires Toward High-power and High-beam-quality Lasers

Jong-Kyu Kim, Postech
Hexagonal Boron Nitrides Grown by MOCVD for Photonics and Electronics Applications

Akihiko Kikuchi, Sophia University
Fabrication of GaN-based Nanostructures and Photonic Crystals by Hydrogen Environment Anisotropic Thermal Etching (HEATE)

Manos Kioupakis, University of Michigan
Excitons and Exciton-phonon Quantum Processes in Atomically Thin Nitride Heterostructures

Xiuling Li, University of Texas, Austin
Unleaching MicroLED Potential: Damage-free Anisotropic Etching for Enhanced Pixel Density

Yong-Ho Ra, Jeonbuk National University
Vertical Light-Emitting InGaN Nanorod Lasing Heterostructures for Ultra-Compact Micro-Displays

Lars Samuelson, Institute of Nanoscience and Applications, Lund University; Hexagem AB
A Bottom-up Approach to Efficient Red-emitting MicroLEDs at Sub-µm Pixel Scale

Ulrich T. Schwarz, Technical University of Chemnitz
Estimating Loss Mechanisms in Short Wavelength Visible and UV PCSEL

Ian Sharp, Walter Schottky Institut, Munich University of Technology
Engineering III-N Interfaces via Atomic Layer Deposition: From Solar Fuels to 2D Materials Integration

Andreas Waag, Technische Universität Braunschweig
Structured Light by MicroLEDs From Chip Processing to Optical Neuromorphic Computing

Songrui Zhao, McGill University
Epitaxial, Scalable III-nitride Nanowire Lasers and Photodetectors

Rump Sessions | Chair: Ronny Kirste | Wednesday, November 6 | 18:15–20:00 |

Rump Session 1 | Chair: Isik Kizilyalli | Coral 4/5

Future of III-Nitride Power Electronics

The rump session provides a dynamic platform for discussing ongoing and future developments in the field of III-Nitride power diodes, particularly focusing on the performance and applications of AlN versus GaN materials. Attendees explored the benefits of AlN's higher breakdown voltage and thermal conductivity compared to GaN, alongside GaN's well-established usage in power electronics, emphasizing how each material addresses different needs in high-power, high-frequency applications

Rump Session 2 | Chair: Matthew Hardy | Coral 1

Novel Nitride Materials

GaN is already now the material of choice for power conversion up to 650 V. Despite a similar breakdown field as SiC, GaN is not compatible for higher voltages up to 10 kV. The figures of merit predict a really strong performance with experimental results lagging. In the rump session, we will discuss what is currently limiting the performance of GaN based power electronics and how to overcome these limits. Additionally, the nitride family also offers a wider range of materials, e.g., AlGaN and AlN with even wider band gaps with breakdown fields surpassing SiC and even diamond. Theoretically these materials could be the next generation semiconductors for power electronics. We will critically discuss the actions that need to be taken to align theoretical expectations with experimental results.

Panelists include experts in GaN power devices, native substrate growth and preparation, AlGaN and AlN power electronics as well as an intimate knowledge of the industry and their requirements for a successful transfer into the market.

Rump Session 3 | Chairs: Michael Kneissl & Thomas Wunderer | Coral 2

Challenges in UVC Emitters - LEDs and Lasers

The session on AlGaN-based UVC LEDs and lasers will focus on recent breakthroughs in the development of AlGaN materials for deep ultraviolet (UVC) light sources and ongoing limitations that keep these devices from performing at the same level as their visible counterpart. Key discussions will include improvements in efficiency and wavelength tunability for UVC LEDs and lasers, and the challenges associated with enhancing material quality and light extraction to achieve higher output powers and longer device lifetimes in the UVC spectral range.

Social Program

Sunday, November 3

Welcome Reception | 18:00–20:00 |

We kindly invite you to our opening reception for this year's International Workshop on Nitride Semiconductors in the Coral Lounge.

Wednesday, November 6

Women in Nitrides | 12:00–13:45 |

This event is the fourth of its kind event, following Women in Nitrides at ICNS in Fukuoka 2023, IWN 2022 in berlin, and ICNS in Seattle. The luncheon will feature a panel discussion of established researchers to inspire the scientific and professional careers of women working in nitride semiconductors. Seating is limited and RSVP is required.

Thursday, November 7

Excursions | 13:00–17:30 |

Two group excursions are available with Hawaii Tours:

- Pearl Harbor USS Missouri and City Tour of Honolulu
- Half-Island Sightseeing Tour

Luau Banquet | 18:30–21:30

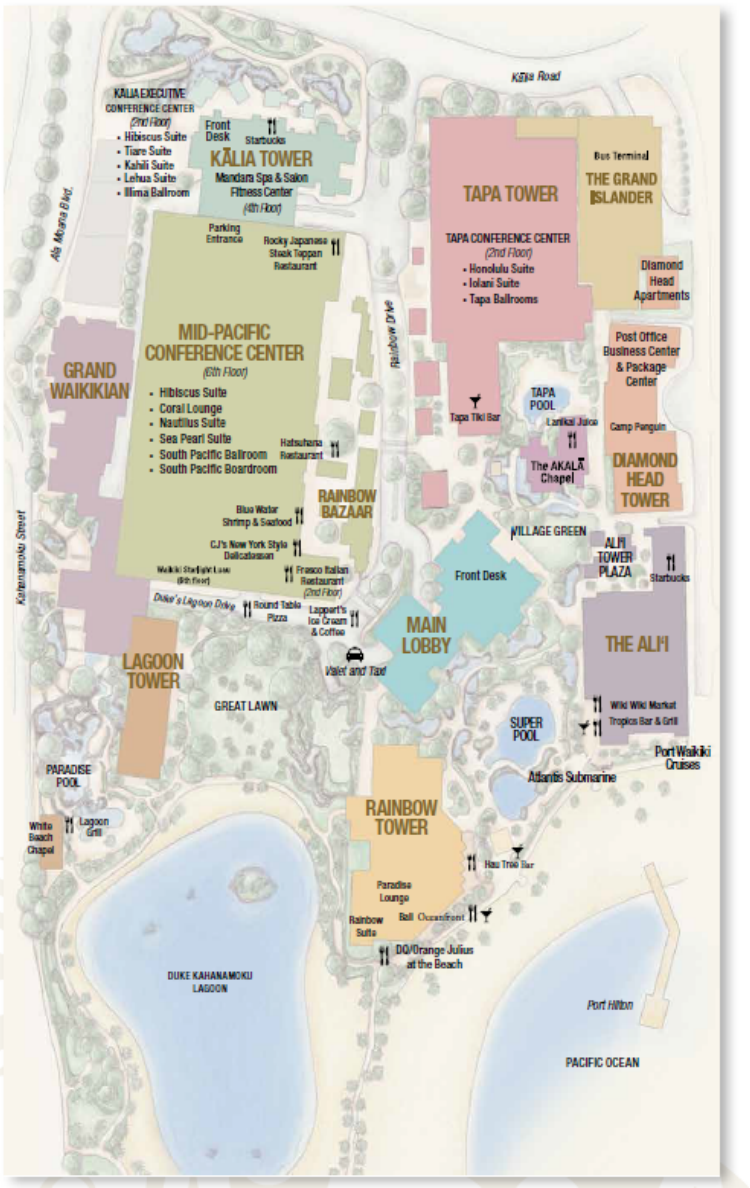
Experience the Waikiki Starlight Luau. You will be treated to Hawaiian games and crafts and will partake in a buffet of delicious island-inspired cuisine and be led on a journey across the South Pacific in an exciting show. Tickets are included with your registration.

Restaurant options

Restaurant options for lunch and dinner are listed on the property map below. Please check with hotel for any individual restaurant openings.

Note: Lunch will be provided on the following conference days: Tuesday, November 5, 12:00-13:00 in the Coral Lounge; Wednesday, November 6, 12:00-13:45 in Coral 3 [this is for the Women in Nitrides luncheon, RSVP is required]; Thursday, November 7 [boxed lunch will be provided excursion participants]; Friday, November 8, 12:00-13:00 in the Coral Lounge

Hilton Hawaiian Village Property Map



Restaurants & Bars

RESTAURANTS:

Bali Oceanfront
Rainbow Tower
Breakfast & Dinner
Tuesday–Saturday
Reservations recommended
808-941-BALI (2254)

Wiki Wiki Market
The Ali'i
Grab-n-Go Sandwiches, Salads, Snacks, Shave Ice, Ice Cream

Starbucks Coffee Gourmet Coffees and Teas, Breakfast, Lunch, Snacks The Ali'i and Kalia Towers

Tropics Bar & Grill®
The Ali'i
Breakfast, Lunch, Dinner Live entertainment nightly

Aloha Bowls & Tea
Tapa Pool
Lunch & Snacks Daily

DQ/Orange Julius Rainbow Tower Beach Front Ice Cream, Lunch, Snacks

Hau Tree Bar
Super Pool
Mexican -
Lunch, Snacks, Cocktails

BARS AND LOUNGES:

MixBar
The Ali'i Pool
Cocktails and Lunch Exclusively for The Ali'i Guests

Tapa Bar
Tapa Tower
Live entertainment nightly

LOCATED AT RAINBOW BAZAAR:

Aoki Teppanyaki
Teppanyaki table-side cooking
Lunch, Dinner
Reservations recommended
808-955-5955

CJ's New York Style Deli
Breakfast, Lunch, Dinner

Fresco Italian Restaurant
Lunch, Dinner
Reservations recommended
808-941-8868

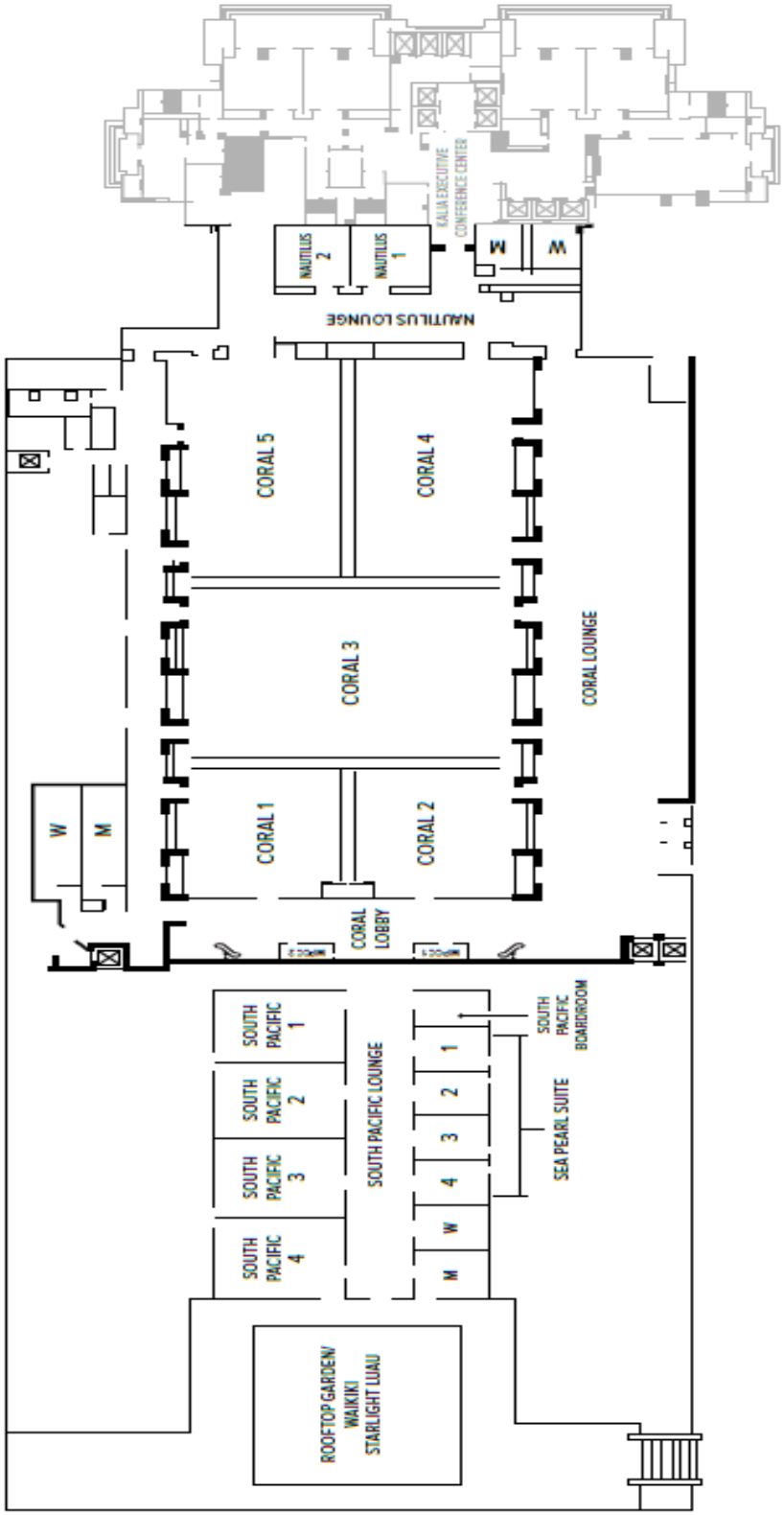
Blue Water Shrimp & Seafood Market
Lunch, Dinner

Hatsuhana
Japanese - Breakfast, Lunch, Dinner
808-944-1761

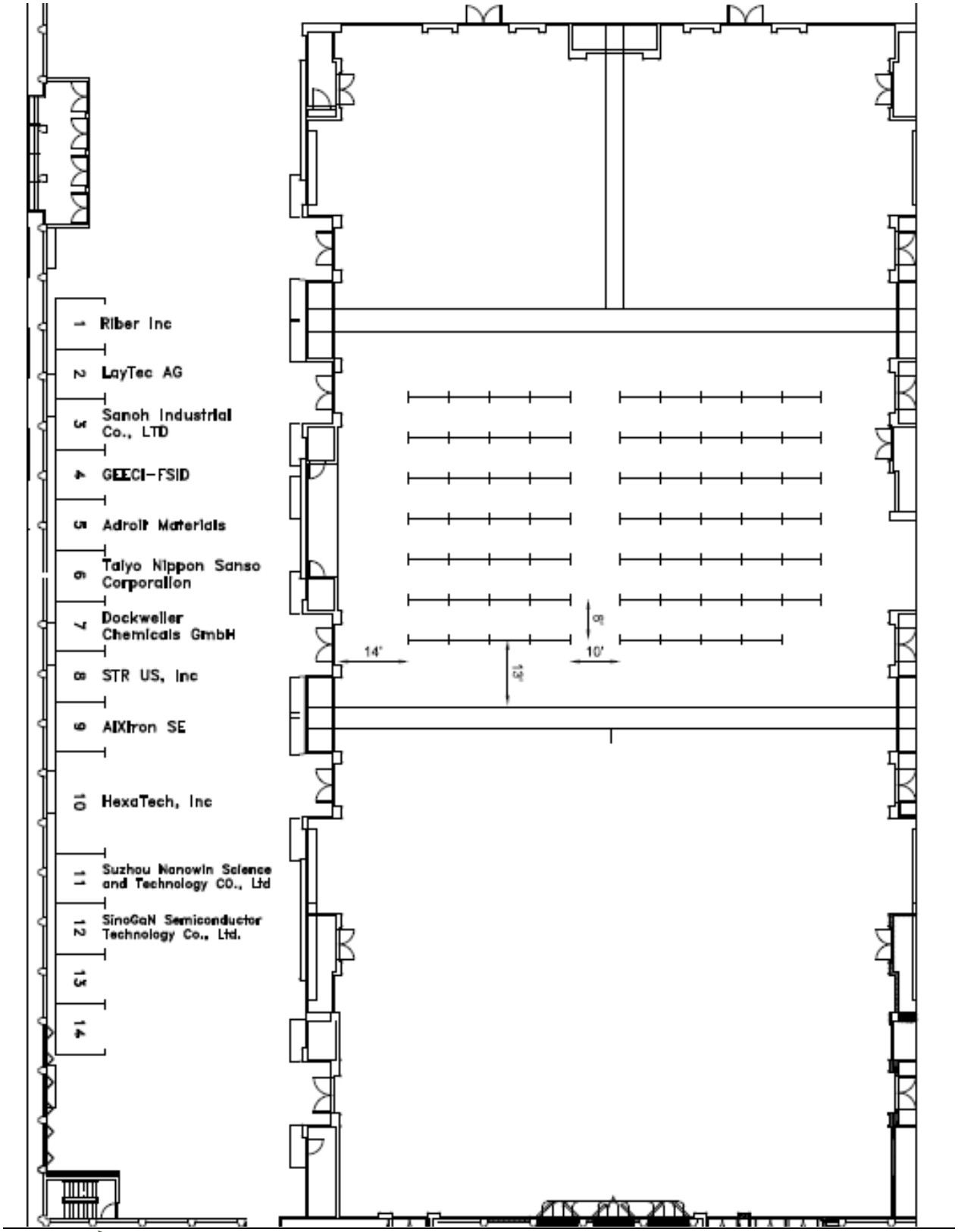
Round Table Pizza
Pizza, Lunch, Dinner
808-955-0137

Lappert's Ice Cream
Gourmet Ice Cream, Coffee, Breakfast

Map of the Conference Area: Mid-Pacific Conference Center



Industrial Exhibits: Coral Lounge



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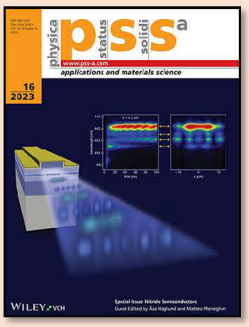
Call for Papers – Invitation to Authors: Nitride Semiconductors special issue in *pss*



The *pss* (*physica status solidi*) journals and Wiley are proud to partner with IWN 2024 and once again support the global nitride semiconductor community.

Please visit the Call for Papers
iwn2024.org/publication
Guest Editors:
Ronny Kirste, Biplab Sarkar, and Gordon Callsen
Submission deadline: **15 December 2024**
Contact: pssa@wiley-vch.de
WWW: www.pss-journals.com

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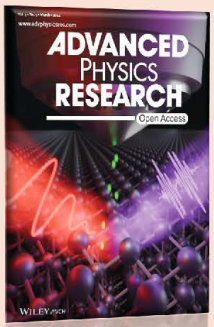

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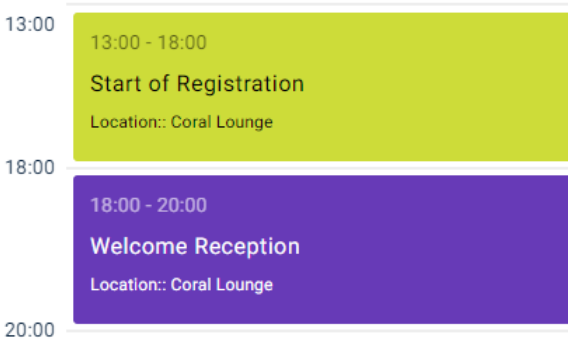
Program Schedule

Sunday, November 3, 2024



Monday, November 4, 2024

08:45	08:45 - 09:15 Opening Location: Coral 4/5				
09:15	09:15 - 10:00 Plenary - Isik Kizilyalli Location: Coral 4/5				
10:00	10:00 - 10:30 Break				
10:30	10:30 - 11:15 Plenary - Xinqiang Wang Location: Coral 4/5				
11:15	11:15 - 12:00 Plenary - Chris Van De Walle Location: Coral 4/5				
12:00	12:00 - 13:00 Lunch (on your own)				
13:00	13:00 - 15:00 Characterization: UV Emission Location: Coral 1	13:00 - 15:00 Novel Concepts BN Location: Coral 2	13:00-15:00 Growth: AlScN Materials Location: South Pacific 1/2	13:00-15:00 Optical Devices: LEDs 1 (UV) Location: South Pacific 3/4	13:00-15:00 Electronic Devices: Power/High Voltage 1 Location: Coral 4/5
15:00	15:00 - 15:30 Break				
15:30	15:30-17:15 Characterization: Ferro and Piezoelectricity Location: Coral 1	15:30-17:15 Optical Devices: Nano and Optical Components Location: Coral 2	15:30-17:15 Growth: Bulk 1 Location: South Pacific 1/2	15:30-17:15 Optical Devices: UV Surface Emitters Location: South Pacific 3/4	15:30-17:15 Electronic Devices: Insulated Gate FETs 1 Location: Coral 4/5
17:15	17:15 - 17:30 Break				
17:30	17:30 - 20:00 Poster Session 1 Location: Coral 3				
20:00					

Tuesday, November 5, 2024

08:00	08:00 - 10:00 Characterization: InN and InGaN Location: Coral 1	08:00 - 10:00 Characterization: Advanced Characterization Methods Location: Coral 2	08:00 - 10:00 Growth: Novel Templates and Pseudosubstrates Location: South Pacific 1/2	08:00 - 10:00 Optical Devices: Long Wavelength Location: South Pacific 3/4	08:00 - 10:00 Electronic Devices: Diodes and Superjunctions Location: Coral 4/5
10:00	10:00 - 10:30 Break				
10:30	10:30 - 12:00 Characterization: Power and RF Devices Location: Coral 1	10:30 - 12:00 Electronic Devices: Processing Location: Coral 2	10:30 - 12:00 Growth: Bulk 2 Location: South Pacific 1/2	10:30 - 12:00 Electronic Devices: Circuits and Device Components Location: South Pacific 3/4	10:30 - 12:00 Electronic Devices: Power/High Voltage 2 Location: Coral 4/5
12:00	12:00 - 13:00 Industrial Advisory Committee Lunch Location: Sea Pearl 3/4	12:00 - 13:00 Networking Lunch Location: Coral Lounge			
13:00	13:00 - 15:00 Characterization: AlN Doping and Electronics Location: Coral 1	13:00 - 15:00 Novel Concepts: MicroLEDs Location: Coral 2	13:00 - 15:00 Growth: AlGaN Location: South Pacific 1/2	13:00 - 15:00 Optical Devices: UV Laser Diodes Location: South Pacific 3/4	13:00 - 15:00 Electronic Devices: Insulated Gate FETs 2 Location: Coral 4/5
15:00	15:00 - 15:30 Break				
13:00	13:00 - 15:00 Characterization: AlN Doping and Electronics Location: Coral 1	13:00 - 15:00 Novel Concepts: MicroLEDs Location: Coral 2	13:00 - 15:00 Growth: AlGaN Location: South Pacific 1/2	13:00 - 15:00 Optical Devices: UV Laser Diodes Location: South Pacific 3/4	13:00 - 15:00 Electronic Devices: Insulated Gate FETs 2 Location: Coral 4/5
15:00	15:00 - 15:30 Break				

Wednesday, November 6, 2024

08:00	08:00 - 10:00 Characterization: Doping and Def Location: Coral 1	08:00 - 10:00 Characterization: Membranes and ALD Location: Coral 2	08:00 - 10:00 Growth: Growth of Nitrides Location: South Pacific 1/2	08:00 - 10:00 Electronic Devices: RF Location: South Pacific 3/4	08:00 - 10:00 Electronic Devices: HEMTs1 (Novel Gate Structures) Location: Coral 4/5
10:00	10:00 - 10:30 Break				
10:30	10:30 - 12:00 Characterization: Carrier Dynamics 1 Location: Coral 1	10:30 - 12:00 Characterization: Growth and Transport Location: Coral 2	10:30 - 12:00 Growth: Doping and Defects 2 (GaN and AlGaN Location: South Pacific 1/2	10:30 - 12:00 Electronic Devices: HEMTs 2 Location: South Pacific 3/4	10:30 - 12:00 Electronic Devices: Diodes and Vertical Devices Location: Coral 4/5
12:00	12:00 - 13:45 Women in Nitrides Lunch Location: Coral 3				
13:45	13:45 - 15:45 Characterization: Carrier Dynamics 2 Location: Coral 1	13:45- 15:45 Novel Concepts: Nanosctructures 1 Location: Coral 2	13:45- 15:45 Growth: Bulk 3 (HVPE) Location: South Pacific 1/2	13:45- 15:45 Optical Devices: Micro-LEDs Location: South Pacific 3/4	13:45- 15:45 Electronic Devices: Power/High Voltage 3 Location: Coral 4/5
15:45	15:45 - 16:15 Break				
16:15	16:15 - 18:00 Characterization: Thermal Properties Location: Coral 1	16:15 - 18:00 Novel Concepts: Nanostructures 2 Location: Coral 2	16:15 - 18:00 Growth: Polarity Control Location: South Pacific 1/2	16:15 - 18:00 Optical Devices: Laser Diodes Location: South Pacific 3/4	16:15 - 18:00 Electronic Devices: High Temperature Location: Coral 4/5
18:00	18:00 - 18:15 Break				
18:15	18:15 - 20:00 Rump Session: Future of III-Nitride Power Electronics Location: Coral 4/5	18:15 - 20:00 Rump Session: Novel Nitride Materials Location: Coral 1	18:15 - 20:00 Rump Session: Challenges in UVC Emitters - LEDs and Lasers Location: Coral 2		
20:00					

Thursday, November 7, 2024

08:00	08:00 - 10:00 Characterization: Doping and Defects 3 Location: Coral 1	08:00 - 10:00 Growth: InGaN and Other Novel Concepts Location: Coral 2	08:00 - 10:00 Growth: Alternative Substrates and Cubic Phases Location: South Pacific 1/2	08:00 - 10:00 Optical Devices: LEDs 3 Location: South Pacific 3/4	08:00 - 10:00 Electronic Devices: HEMTs 3 (Novel Design) Location: Coral 4/5
10:00	10:30 - 11:15 Plenary - Zetian Mi Location: Coral 4/5				
11:15	10:30 - 11:15 Plenary - Yoichi Kawakami Location: Coral 4/5				
12:00	12:00 - 13:00 Lunch (on your own)				
13:00	13:00 - 17:30 EXCURSIONS				
17:30					
18:30	18:30 - 21:30 BANQUET				
21:30					

Friday, November 8, 2024

08:00	08:00 - 10:00 Characterization: Optical Properties Location: Coral 1	08:00 - 10:00 Elecrtonic Devices: Heterostructures and Interfaces Location: Coral 2	08:00 - 10:00 Growth: HEMTs Location: South Pacific 1/2	08:00 - 10:00 Optoelectronic Devices: Visible Emitters and Detectors Location: South Pacific 3/4	08:00 - 10:00 Electronic Devices: Alternative Approaches to Transistors and Diodes Location: Coral 4/5
10:00	10:00 - 10:30 Break				
10:30	10:30 - 12:00 Characterization: AlGaN Materials Location: Coral 1	10:30 - 12:00 Optical Devices: Detectors Location: Coral 2	10:30 - 12:00 NA	10:30 - 12:00 Optical Devices: Lasers and Late News LED Location: South Pacific 3/4	10:30 - 12:00 Electronic Devices: Processing Location: Coral 4/5
12:00	12:00 - 13:00 Networking Lunch Location: Coral Lounge				
13:00	13:00 - 13:45 Plenary - Subhashish Bhattacharya Location: Coral 4/5				
13:45	13:45 - 14:40 Plenary - Czeslaw Skierbiszewski Location: Coral 4/5				
14:30	14:30 - 15:15 Plenary - Debdeep jena Location: Coral 4/5				
15:15	15:15 - 15:45 CLOSING Location: Coral 4/5				
15:45					

Scientific Program

Sunday, November 3, 2024

Start of Registration
13:00 - 18:00
Location Coral Lounge

Welcome Reception
18:00 - 20:00
Location Coral Lounge

Monday, November 4, 2024

Opening
08:45 - 09:15
Location Coral 4/5

Plenary - Dr. Isik Kizilyalli
09:15 - 10:00
Location Coral 4/5
Critical Role of Energy Technologies and Power Electronics Towards a More Electric and Sustainable Future
Isik C. Kizilyalli (Formerly with ARPA-E and Stanford University)

Plenary - Professor Xinqiang Wang
10:30 - 11:15
Location Coral 4/5
Strain modulation in heteroepitaxy for high-efficiency III-nitride red- and UV-LEDs
Xinqiang Wang1, Zhaoying Chen1, Tai Li1, Shangfeng Liu1, Fang Liu1, Tao Wang1, Ping Wang1, Ye Yuan2, Weikun Ge1, Bo Shen1
1Peking University, Beijing, China. 2Songshan Lake Materials laboratory, Dongguan, China

Plenary - Professor Chris van de Walle
11:15 - 12:00
Location Coral 4/5
Nitrides for quantum applications
Chris Van de Walle
University of California, Santa Barbara, Santa Barbara, California, USA

Characterization: UV Emission
13:00 - 15:00 Monday, November 4, 2024
Location: Coral 1
Chair: Maki Kushimoto

13:00 - 13:30
(INVITED) Prospects for Boron Containing Nitride Alloys for Visible and UV Optoelectronics
Pet Parbrook, Olivia Shortall, Vitaly Zubialevich, Thomas O'Connor, Cara-Lena Nies, Stefan Schulz
Tyndall National Institute, University College Cork, Cork, County Cork, Ireland

13:30 - 13:45
Temperature dependence of optical polarization in AlGaN multiple quantum wells with emission wavelengths from 220 to 260 nm
Hideaki Murotani1, Kosuke Inai2, Kaichi Tani2, Hiromasa Hayashi2, Aoi Sasaki2, Satoshi Kurai2, Narihito Okada2, Ryota Akaike3, Hideto Miyake3, Yoichi Yamada2
1National Institute of Technology, Tokuyama College, Shunan, Yamaguchi, Japan. 2Yamaguchi University, Ube, Yamaguchi, Japan. 3Mie University, Tsu, Mie, Japan

13:45 - 14:00
Strong far-UVC localized emissions from Ga-rich regions induced by atomic-step meandering of AlGaN on high-temperature annealed AlN templates
Shuhei Ichikawa1,2, Kazuki Saito1, Ryota Akaike3, Kenjiro Uesugi4, Takao Nakamura3, Hideto Miyake3, Kazunobu Kojima1
1Graduate School of Engineering, Osaka University, Suita, Japan. 2Research Center for UHVEM, Osaka University, Ibaraki, Japan. 3Graduate School of Engineering, Mie University, Tsu, Japan. 4Organization for Research Initiative and Promotion, Mie University, Tsu, Japan

14:00 - 14:15
Carrier localization in 230 nm-emitting AlGaN quantum wells
Felix Nippert1, Marcel Schilling1, Nils Bernhardt1, Giulia Cardinali1, Jakob Höpfner1, Tim Wernicke1, Michael Kneissl1,2, Markus R. Wagner3
1Institute of Solid State Physics, Technische Universität Berlin, Berlin, Berlin, Germany. 2Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Berlin, Germany. 3Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Berlin, Germany

14:15 - 14:30
The Electron-Phonon Coupling Strength in hBN UV Color Centers
Nils Bernhardt1, Luca Choi1, Julius Seidel1, Felix Nippert1, Angus Gale2, Igor Aharonovich2, Milos Toth2, Markus Wagner1,3
1Technische Universität Berlin, Berlin, Germany. 2University of Technology Sydney, Sydney, Australia. 3Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany

14:30 - 15:00
(INVITED) Origin of the parasitic luminescence of 235 nm UVC LEDs
Sylvia Hagedorn1, Tim Kolbe1, Gordon Schmidt2, Carsten Netzel1, Frank Bertram2, Juergen Christen2, Markus Weyers1
1Ferdinand-Braun-Institut (FBH), Berlin, Berlin, Germany. 2Otto-von-Guericke-Universität, Magdeburg, Saxony-Anhalt, Germany

Novel Materials and Nanostructures: BN
13:00 - 15:00 Monday, November 4, 2024
Location: Coral 2
Chair: Robert Nemanich

13:00 - 13:30
(INVITED) Hexagonal boron nitrides grown by MOCVD for photonics and electronics applications
Seokho Moon1, Jiye Kim1, Si-Young Choi1, Bernard Gil2, Guillaume Cassabois2, Jong Kytu Kim1
1POSTECH, Pohang, Gyeongbuk, Korea, Republic of. 2CNRS-Universite de Montpellier, Montpellier, France

13:30 - 13:45
High-temperature Molecular Beam Epitaxy of Hexagonal Boron Nitride for Deep-ultraviolet, Single-photon Emitters and Lateral Heterostructures
Sergei Novikov1, Tin Cheng1, Jonathan Bradford1, Christopher Mellor1, Kenji Watanabe2, Takashi Taniguchi2, Igor Aharonovich3, Luiz Zagonel4, Bernard Gil5, Guillaume Cassabois5, Peter Beton1
1University of Nottingham, Nottingham, United Kingdom. 2National Institute for Materials Science, Tsukuba, Japan. 3University of Technology, Sydney, Australia. 4University of Campinas, Campinas, Brazil. 5Laboratoire Charles Coulomb, Montpellier, France

13:45 - 14:00
Wafer-Scale AA-Stacked Hexagonal Boron Nitride Grown on GaN Substrate
Seokho Moon1, Francis Ngome Okello Odongo1, Adrien Rousseau2, Youngjae Kim3, Yunjae Park4, Jiye Kim1, Jaewon Kim5, Pierre Valvin2, Jaehee Cho6, Kenji Watanabe7, Takashi Taniguchi7, Giorgia Fugallo8, Wilfried Desrat2, Feng Ding9, Jaedong Lee3, Bernard Gil2, Guillaume Cassabois2, Si-Young Choi1, Jong Kyu Kim1
1Pohang University of Science and Technology, Pohang, Korea, Republic of. 2UMR5221 CNRS-Universite de Montpellier, Montpellier, France. 3Daegu Gyeongbuk Institute of Science and Technology (DGIST), Daegu, Korea, Republic of. 4Ulsan National Institute of Science and Technology, Ulsan, Korea, Republic of. 5Samsung Advanced Institute of Technology, Suwon, Korea, Republic of. 6Jeonbuk National University, Jeonju, Korea, Republic of. 7National Institute for Materials Science, Tsukuba, Japan. 8Universite de nates, Nantes, France. 9Chinese Academy of Science, Shenzhen, China

14:00 - 14:15
Surface orientation dependence of c-BN epitaxial growth
Kazuyuki Hirama, Kazuhide Kumakura, Yoshitaka Taniyasu
NTT Basic Research Lab., NTT Corp., Atsugi, Kanagawa, Japan

14:15 - 14:45
(INVITED) Development of wafer-scale h-BN quasi-bulk crystals
Hongxing Jiang, Jingyu Lin
Texas Tech University, Lubbock, TX, USA

Growth: AlScN Materials
13:00 - 15:00 Monday, November 4, 2024
Location South Pacific 1/2
Chair: Erdem Arkun

13:00 - 13:30
(INVITED) AlScN and AlYN: From the MOCVD Growth to the Devices
Stefano Leone1, Isabel Streicher1, Patrik Stranak1, Mario Prescher1, Peter Brueckner1, Philipp Döring1, Sebastian Krause1, Stefan Müller1, Patrick Waltereit1, Georg Schönweger2, Niklas Wolff2, Simon Fichtner3, Lutz Kirste1
1Fraunhofer IAF, Freiburg, Germany. 2Univ. Kiel, Kiel, Germany. 3Fraunhofer ISIT, Itzehoe, Germany

13:30 - 13:45
Lattice-matched AlScN/GaN Multiple Channel Heterostructures
Thai-Son Nguyen, Chandrashekhar Savant, Kazuki Nomoto, Huili (Grace) Xing, Debdeep Jena
Cornell University, Ithaca, New York, USA

13:45 - 14:00
Epitaxial Growth of ScAlN on Patterned NbN for integration with GaN on SiC RF Electronics
Matthew Hardy1, Scott Katzer1, Andrew Lang1, James Hardy2, Eric Jin1, Neeraj Nepal1, Brian Downey1, Vikrant Gokhale1, Virginia Wheeler1
1Naval Research Laboratory, Washington, DC, USA. 2Nova Research Inc, Alexandria, VA, USA

14:00 - 14:15
Demonstration of AlScN Growth Using Commercial-Grade MOCVD Equipment Compatible with Low Vapor Pressure Precursor Supply
Yudai Shimizu, Keitaro Ikejiri, Hiroki Tokunaga
Taiyo Nippon Sanso Corp., Tsukuba City, Ibaraki, Japan

14:15 - 14:30
Demonstration of Multi-layer Ferroelectric ScAlN on Si(001) with Controlled Polarity
Shubham Mondal1, Eitan Hershkovitz2, Garrett E. Baucom2, Md Mehedi Hasan Tanim1, Shaurya S. Dabas2, Honggyu Kim2, Roozbeh Tabrizian2, Zetian Mi1
1University of Michigan, Ann Arbor, Michigan, USA. 2University of Florida, Gainesville, Florida, USA

14:30 - 14:45
Epitaxial lattice-matched wurtzite Sc0.14Al0.86N/GaN heterostructures and multi quantum well structures for optoelectronic applications
Rajendra Kumar, Govardan Gopakumar, Zain Ul Abdin, Rosa Diaz, Oana Malis, Michael Manfra
Purdue University, West Lafayette, Indiana, USA

14:45 - 15:00
Self-activated Epitaxial Growth of ScN Films from Molecular N2 at Low Temperatures
Chandrashekhar Savant1, Anita Verma1, Thai Son Nguyen1, Len van Deurzen1, Yu Hsin Chen1, Zhiren He2, Salva S. Rezaie1, Jakob Gollwitzer1, Benjamin Gregory1, Suchismita Sarker3, Jacob Ruff4, Guru Khalsa2, Andrej Singer1, David Muller1, Huili Grace Xing1, Debdeep Jena1, Joseph Casamento5

1Cornell University, Ithaca, NY, USA. 2University of North Texas, Denton, TX, USA. 3Cornell High Energy Synchrotron Source,Cornell University, Ithaca, NY, USA. 4Cornell High Energy Synchrotron Source, Cornell University, Ithaca, NY, USA. 5Massachusetts Institute of Technology, Cambridge, MA, USA

Optoelectronic Devices: LEDs 1 (UV)
13:00 - 15:00 Monday, November 4, 2024
Location South Pacific 3/4
Chair: Michael Kneissl

13:00 - 13:30
(INVITED) Recent progress of far UV-C LEDs on AlN substrate
Hirotsugu Kobayashi, Kosuke Sato, Yoshihisa Kunimi
AsahiKasei, Fuji, Shizuoka, Japan

13:30 - 13:45
High-efficiency ultraviolet-C light-emitting diodes with optical interference effect and package structure
Koji Okuno1,2, Masaki Ohya1, Yoshiki Saito1,2, Shintaro Hakamata1, Takeshi Matsushima1, Aya Kawaoka1, Shota Shimonishi1, Hisanori Ishiguro2, Tetsuya Takeuchi2, Satoshi Kamiyama2, Motoaki Iwaya2
1Toyota Gosei Co., Ltd., Inazawa, Aichi, Japan. 2Meijo University, Nagoya, Aichi, Japan

13:45 - 14:00
10.6% external quantum efficiency germicidal UV LEDs grown on thin highly conductive n-AlGaN
Michael Wang, Feng Wu, Yifan Yao, Christian Zollner, Michael Iza, Michael Lam, Steven DenBaars, Shuji Nakamura, James Speck
University of California, Santa Barbara, Santa Barbara, CA, USA
14:00 - 14:15

Nanoscale Characterization of Carrier Capture into the Active Region of an UVB/UVC dual-wavelength LED
Frank Bertram1, Gordon Schmidt1, Peter Veit1, Juergen Christen1, Tai Li2, Wei Luo3, Xianqiang Wang2
1University of Magdeburg, Magdeburg, Germany. 2Peking University, Beijing, China. 3Songshan Lake Materials Laboratory, Guangdong, China

14:15 - 14:30
Efficiency, optical polarization, and angular emission properties of AlGaN-based far-UVC micro LED arrays on different AlN templates
Jens Rass, Hyun Kyong Cho, Martin Guttmann, Jan Ruschel, Tim Kolbe, Sylvia Hagedorn, Kai Gehrke, Kevin Kunkel, Ralph-Stephan Unger, Sven Einfeldt
Ferdinand-Braun-Institut (FBH), Berlin, Germany

14:30 - 14:45
Temperature-dependent characterization of commercial UV-C LEDs: the role of impurity band conduction in p-AlGaN
Shashwat Rathkanthiwar1, James Loveless1, Pramod Reddy2, Ronny Kirste2, Cristyan Quinones1, Jack Almeter1, Ramon Collazo1, Zlatko Sitar1,2
1North Carolina State University, Raleigh, NC, USA. 2Adroit Materials, Raleigh, NC, USA

14:45 - 15:00
Reliability analysis of UVC LEDs, from scientific grade to commercial devices
Nicola Trivellin1,2, Nicola Roccato2, Francesco Piva2, Marco Pilati2, Carlo De Santi2, Matteo Buffolo2, Norman Susilio3, David Hauer Vidal3, Anton Muhin3, Luca Sulmoni3, Jan Ruschel4, Johannes Glaab4, Jens Raas4, Sven Einfeldt4, Tim Wernicke3, Micheal Kneissl3,4, Gaudenzio Meneghesso2, Enrico Zanoni2, Matteo Meneghini5,6
1Dipartimento di Ingegneria Industriale, Università di Padova, Padova, PD, Italy. 2Dipartimento di Ingegneria dell'Informazione, Università di Padova, Padova, PD, Italy. 3Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany. 4Ferdinand-Braun-Institut (FBH), Berlin, Germany. 5Dipartimento di Ingegneria dell'Informazione, Padova, PD, Italy. 6Dipartimento di Fisica e Astronomia, Università di Padova, Padova, PD, Italy

Electronic Devices: Power/High Voltage 1
13:00 - 15:00 Monday, November 4, 2024
Location: Coral 4/5
Chair: Tomas Palacios

13:00 - 13:30
(INVITED) An Outlook on Vertical Gallium Nitride Compared to Incumbent Technology
Andrew Binder, Jeffrey Steinfeldt, Andrew Allerman, Richard Floyd, Kevin Reilly, Robert Kaplar
Sandia National Laboratories, Albuquerque, NM, USA

13:30 - 13:45
Barrier Height Inhomogeneity in Si-doped AlN Schottky Barrier Diodes on SiC substrates
Takuya Maeda1, Issei Sasaki2, Masanobu Hiroki3, Kazuyuki Hirama3, Kazuhide Kumakura3, Yoshitaka Taniyasu3
1The Univeristy of Tokyo, Tokyo, Tokyo, Japan. 2The Univeristy of Tokyo, Bunkyo, Tokyo, Japan. 3NTT Basic Research Laboratory, NTT Corporation, Atsugi, Kanagawa, Japan

13:45 - 14:00
AlN-based Heterojunction p-n Diodes with Breakdown Voltage >1.1 kV
Cristyan Quiñones1, Shashwat Rathwathiwar1, Dolar Khachariya2, Pramod Reddy2, Ronny Kirste2, Seiji Mita2, Erhard Kohn1, Ramón Collazo1, Zlatko Sitar1,2
1North Carolina State University, Raleigh, NC, USA. 2Adroit Materials, Cary, NC, USA

14:00 - 14:15
Extreme Bandgap Al0.63Ga0.37N Quasi-Vertical Schottky Barrier Diodes with breakdown field 7.8 MV/cm and forward current density 8.2 kA/cm2
Abdullah Mamun1, Shahab Mollah2, Kamal Hussain3, Seongmo Hwang3, Abdullah Al Mamun Mazumder1, MVS Chandrashekhar1, Grigory Simin1, Asif Khan1
1University of South Carolina, Columbia, South Carolina, USA. 2Intel Corporation, Hillsboro, Oregon, USA. 3Texas Instruments Incorporated, Richardson, Texas, USA

14:15 - 14:30
Vertical conduction of AlGaN-on-SiC diodes with buffer-layer-free heterointerfaces
Yoshinao Miura, Hisashi Yamada, Hirohisa Hirai, Akira Nakajima, Kazutoshi Kojima, Shinsuke Harada

AIST, Tsukuba, Ibaraki, Japan

14:30 - 15:00
(INVITED) High-Al-content AlGaN p-n Diodes Enabled by Distributed Polarization Doping
Takeru Kumabe1, Akira Yoshikawa2,1, Seiya Kawasaki1, Maki Kushimoto1, Yoshio Honda1, Manabu Arai1, Jun Suda1, Hiroshi Amano1
1Nagoya University, Nagoya, Japan. 2Asahi Kasei, Tokyo, Japan

Characterization: Ferro and Piezoelectricity
15:30 - 17:15 Monday, November 4, 2024
Location: Coral 1
Chair: Doug Irving

15:30 - 16:00
Advances in AlN-based ternary alloy crystals with regard to their elastic, thermodynamic and piezoelectric properties
Oliver Ambacher, Saskia Mihalic, Niloofar Afshar, Mohamed Yassine, Ali Yassine, Niklas Feil, Björn Christian
Albert-Ludwigs-University Freiburg, Institute for Sustainable Systems Engineering (INATECH), Freiburg, Germany

16:00 - 16:15
Atomic-Level Insights of Polarization Switching in Single-Crystalline Nitride Ferroelectrics
Danhao Wang1, Ding Wang1, Mahlet Molla2, Samuel Yang1, Yujie Liu2, Emmanouil Kioupakis2, Zetian Mi1, Shubham Mondal2
1Department of Electrical Engineering and Computer Science, University of Michigan, ANN ARBOR, Michigan, USA. 2Department of Material Science and Engineering, University of Michigan, ANN ARBOR, Michigan, USA

16:15 - 16:30
New Perspectives on Polarization in Wurtzite III-Nitride Semiconductors
Ding Wang, Danhao Wang, Samuel Yang, Zetian Mi
University of Michigan, Ann Arbor, Michigan, USA

16:30 - 16:45
Correct definition of polarization and impact on ferroelectricity and two-dimensional carrier gases
Chris Van de Walle1, Cyrus Dreyer2, Haochen Wang1, Suhyun Yoo3, Mira Todorova4, Jörg Neugebauer4, Simon Fichtner5
1University of California, Santa Barbara, Santa Barbara, California, USA. 2Stony Brook University, Stony Brook, New York, USA. 3Korea Research Institute of Chemical Technology, Yuseong, Daejeon, Korea, Republic of. 4Max-Planck-Institut für Eisenforschung GmbH, Düsseldorf, North Rhine-Westphalia, Germany. 5Kiel University, Kiel, Schleswig-Holstein, Germany

16:45 - 17:15
(INVITED) Investigation on ferroelectricity in aluminum nitride and its solid solutions
Takao Shimizu1,2, Kota Hasegawa1,3, Takeo Ohsawa1, Isao Sakaguchi1, Naoki Ohashi1,3,4

1National Institute for Materials Science, Tsukuba, Ibaraki, Japan. 2Japan Science and Technology Agency, Kawaguchi, Saitama, Japan. 3Kyushu University, Kasuga, Fukuoka, Japan. 4Tokyo Institute of Technology, Yokohma, Yokohama, Japan

Optoelectronic Devices: Nano and Optical Components
15:30 - 17:15 Monday, November 4, 2024
Location: Coral 2
Chair: Gordon Callsen

15:30 - 16:00
(INVITED) Epitaxial, Scalable III-Nitride Nanowire Lasers and Photodetectors
Songrui Zhao
McGill University, Montreal, QC, Canada

16:00 - 16:15
High-quality AlN buffer for ultraviolet meta-lens and circular polarization meta-splitter
Chia-Yen Huang, Tien-Chiu Chen, Wen-Hsuan Hsieh, Tsung-Sheng Kao
National Yang Ming Chiao Tung University, Hsinchu, Hsinchu, Taiwan

16:15 - 16:30
Optical fiber approximation of GaN-based vertical-cavity surface emitting laser diodes with monolithic curved mirror
Kazuki Ohnishi1, Naoki Higuchi1,2, Masayoshi Cho1,2, Masatoshi Tamaru1,2, Tatsushi Hamaguchi1,3
1Innovation Center for Semiconductor and Digital Future, Mie University, Tsu, Mie, Japan. 2Faculity of Engineering, Mie University, Tsu, Mie, Japan. 3Graduate School of Engineering, Mie University, Tsu, Mie, Japan

16:30 - 16:45
Low-loss Aluminium Nitride based Integrated Photonics Devices for Blue and Infrared Spectral Range
Rany Miranti-Augustin1, Arstan Bisianov1, Christoph Margenfeld1, Emily Goscheva-Uka1,2, Juliane Breitfelder1, Daesung Park2, Christian Schoerner3, Stephan Janka3, Georg Rossbach3, Thomas Weimann2, Jana Hartmann1, Andreas Waag1
1Institute of Semiconductor Technology, Technische Universität Braunschweig, Braunschweig, Lower Saxony, Germany. 2Physikalisch-Technische Bundesanstalt, Braunschweig, Lower Saxony, Germany. 3ams-OSRAM International GmbH, Regensburg, Bavaria, Germany

16:45 - 17:00
Far-Ultraviolet Second Harmonic Generation in Polarity Inverted AlN Bilayer Channel Waveguide Pumped by CW Laser
Hiroto Honda1, Akinori Asai2, Kento Tome2, Keiji Morishita2, Shin Kato2, Hiroyasu Fujiwara2, Kanako Shojiki3,4, Hideto Miyake3,5, Masahiro Uemukai1, Tomoyuki Tanikawa1, Ryuji Katayama1
1Graduate School of Engineering, Osaka University, Suita, Osaka, Japan. 2Hamamatsu Photonics K.K., Hamamatsu, Shizuoka, Japan. 3Graduate School of Engineering, Mie University, Thu, Mie, Japan. 4Graduate School of Engineering, Kyoto University, Kyoto, Kyoto, Japan. 5Innovation Center for Semiconductor and Digital Future, Mie University, Thu, Mie, Japan

17:00 - 17:15
Demonstration of 230nm far-UV second harmonic generation in a vertical non-inverted AlN/AlGaN strained-layer superlattice channel waveguide
Shahzeb Malik1, Ryo Momosaki1, Hiroto Honda1, Kanako Shojiki2, Hideto Miyake3, Masahiro Uemukai1, Tomoyuki Tanikawa1, Ryuji Katayama1
1Osaka University, Suita, Osaka, Japan. 2Kyoto University, Kyoto, Japan. 3Mie University, Tsu, Japan

Growth: Bulk 1
15:30 - 17:15 Monday, November 4, 2024
Location: South Pacific 1/2
Chair: Michal Bockowski

15:30 - 16:00
(INVITED) Scaling up Acidic Ammonothermal Crystal Growth for Mass Production of 4-inch GaN Substrates and Beyond
Satoru Izumisawa1, Akira Maki2, Aya Sawada2, Takanori Suzuki2, Yutaka Mikawa1, Yuji Kagamitani1, Takayuki Ishinabe1, Hirotaka Ikeda1, Tae Mochizuki1, Kouhei Kurimoto3, Quanxi Bao3
1Mitsubishi Chemical Corporation, Ushiku, Ibaraki, Japan. 2Mitsubishi Chemical Corporation, Yokohama, Kanagawa, Japan. 3The Japan Steel Works, Ltd., Muroran, Hokkaido, Japan

16:00 - 16:15
Growth of semi-insulating Mn-GaN by the near equilibrium ammonothermal method and its application to high-voltage photoconductive semiconductor switch
Tadao Hashimoto1, Edward Letts1, Daryl Key1, Austin Gregory2, Matthew Gaddy2, James Dickens2
1SixPoint Materials, Inc., Buellton, California, USA. 2Texas Tech University, Lubbock, Texas, USA

16:15 - 16:30
Study of gallium nitride solubility in ammonothermal alkaline solution
Karolina Grabianska, Robert Kucharski, Mikolaj Amilusik, Michal Bockowski
Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland

16:30 - 16:45
Optimizing and Scaling Up of Ammonothermal Autoclaves via Computational Simulation of Convective Flow and Heat Transfer
Marek Zak, Pawel Kempisty, Boleslaw Lucznik, Robert Kucharski, Michal Bockowski
Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland

16:45 - 17:00
Bulk GaN Crystal Growth using a Lithium Flux
Florian Metzger, Jonathan Valenzuela, Tenzin Sherpa, Nathan Stoddard, Siddha Pimputkar
Lehigh University, Bethlehem, PA, USA

17:00 - 17:15
Repeated Homoepitaxial Growth of GaN crystals by Na-flux Method on a Native Seed
Masayuki Imanishi1, Kanako Okumura1, Kosuke Murakami1, Kosuke Nakamura1, Keisuke Kakinouchi1, Kenichi Kawabata1, Shigeyoshi Usami1, Masashi Yoshimura1,2, Yusuke Mori1

1Graduate School of Engineering, Osaka University, Suita-shi, Osaka, Japan. 2Institute of Laser Engineering, Osaka University, Suita-shi, Osaka, Japan

Optoelectronic Devices: UV Surface Emitters
15:30 - 17:15 Monday, November 4, 2024
Location: South Pacific 3/4
Chair: Zetian Mi

15:30 - 16:00
(INVITED) The Quest for Surface Emitting Lasers in the Ultraviolet
Åsa Haglund1, Estrella Torres1, Doğukan Apaydın1, Lars Persson1, Sarina Graupeter2, Lukas Uhlig3, Hjalmar Andersson1, Giulia Cardinali2, Erik Strandberg1, Filip Hjort1, Nelson Rebelo1, Massimo Grigoletto2, Michael A. Bergmann1, Johannes Enslin2, Luca Sulmoni2, Munise Cobet2, Tim Kolbe4, Ryan Page1, Philippe Tassin1, Ulrich T. Schwarz3, Joachim Ciers1, Tim Wernicke2, Michael Kneissl2,4
1Chalmers University of Technology, Gothenburg, Sweden. 2Technische Universität Berlin, Berlin, Germany. 3Chemnitz University of Technology, Chemnitz, Germany. 4Ferdinand-Braun-Institut (FBH), Berlin, Germany

16:00 - 16:15
GaN-based edge-emitting laser diode with air-claddings
Oliwia Gołyga1, Mateusz Hajdel1, Marta Sawicka1, Henryk Turski[1], Anna Feduniewicz-Żmuda[1], Cedric Corley-Wiciak[2], Carsten Richter[3], Marcin Siekacz[1], Czeslaw Skierbiszewski[1], Greg Muziol[1]
[1]Institute of High Pressure Physics PAS, Warsaw, Poland. [2]ESRF – European Synchrotron Radiation Facility, Grenoble, France. [3]Leibniz Institute for Crystal Growth, Berlin, Germany

16:15 - 16:30
370 Highly efficient and three-modes controlled GaN-based VCSELs with a long cavity and a curved mirror structure
Tomohiro Makino1, Maiko Ito1, Kentaro Hayashi1, Maho Ohara1, Hiroyuki Miyahara1, Koichi Sato1, Yuki Nakamura1, Takumi Watanabe1, Yuichiro Kikuchi1, Tatsuro Jyokawa1, Yukio Hoshina1, Eiji Nakayama1, Rintaro Koda1, Noriyuki Futagawa1, Tatsushi Hamaguchi2
1Sony Semiconductor Solutions Corporation, Atsugi-Shi, Japan. 2Mie-University, Tsu-Shi, Japan

16:30 - 16:45
Will AlGaN VCSELs with all-dielectric DBRs die from heat?
Lars Persson, Giulia Cardinali, Åsa Haglund
Chalmers University of Technology, Gothenburg, Sweden

16:45 - 17:00
Influence on threshold by detuning and temperature in optically pumped 10λ-cavity UVC VCSELs
Estrella Torres1, Joachim Ciers1, Sarina Graupeter2, Nelson Rebelo1, Lars Persson1, Filip Hjort1, Michael Bergmann1, Tim Wernicke2, Michael Kneissl2,3, Åsa Haglund1
1Chalmers University of Technology, Gothenburg, Sweden. 2Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany. 3Ferdinand-Braun-Institut (FBH), Berlin, Germany
17:00 - 17:15

Impact of photonic crystal size and lattice period on the performance of UVC photonic crystal surface-emitting lasers

Doğukan Apaydın1, Lukas Uhlig2, Hjalmar Andersson1, Sarina Graupeter3, Lars Persson1, Joachim Ciers1, Giulia Cardinali3, Tim Wernicke3, Michael Kneissl3,4, Philippe Tassin1, Ulrich Theodor Schwarz2, Åsa Haglund1
1Chalmers University of Technology, Gothenburg, Sweden. 2Chemnitz University of Technology, Chemnitz, Germany. 3Technical University of Berlin, Berlin, Germany. 4Ferdinand-Braun-Institut, Berlin, Germany

Electronic Devices: Insulated Gate FETs 1

15:30 - 17:15 Monday, November 4, 2024
Location: Coral 4/5
Chair: Rongmin Chu

15:30 - 16:00
(INVITED) GaN Technologies and Devices to Enable the Full Potential of Back-Side Power Delivery

Tomas Palacios, Pradyot Yadav, Gillian Micale, John Niroula, Patrick Darmawi-Iskandar, Deniz Erus
Massachusetts Institute of Technology, Cambridge, MA, USA

16:00 - 16:15
Minimization of Positive Bias Instability in AlSiO/AlN/p-type GaN MOSFETs Using Interface Polarization

Hiroko Iguchi1, Tetsuo Narita1, Kenji Ito1, Shiro Iwasaki1, Emi Kano2, Nobuyuki Ikarashi2, Kazuyoshi Tomita2, Daigo Kikuta1
1Toyota Central R&D Labs., Inc., Nagakute, Aichi, Japan. 2Nagoya University, Nagoya, Aichi, Japan

16:15 - 16:30
PBTI Saturation in Scaled Oxide sub-100nm LG Enhancement Mode High-K Gallium Nitride MOSHEMT Transistors

Ahmad Zubair, Soumitra Roy Joy, Samuel Bader, Jason Peck, Michael Beumer, Pratik Koirala, Marko Radosavljevic, Heli Vora, Thomas Hoff, Joseph Voeller, Curtis Hoffman, Prafful Golani, Inanc Meric, Han Wui Then
Foundry Technology Research, Intel Corporation, Hillsboro, OR, USA

16:30 - 16:45
Low-Voltage AlN/GaN/AlGaN-on-Si MISHEMT with Record Pout of 1.7 W/mm at 6V and 30GHz

Hanchao Li1, Hanlin Xie2,3, Qingyun Xie2,3, Yue Wang4, Siyu Liu1, Yuxuan Wang5, Yihao Zhuang1, Kumud Ranjan2,3, Xiao Gong5, Geok Ing Ng1,2,3,4
1School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Singapore, Singapore. 2Institute of Microelectronics (IME), Agency for Science, Technology and Research (A*STAR), Singapore, Singapore. 3National GaN Technology Centre (NGTC), Agency for Science, Technology and Research (A*STAR), Singapore, Singapore. 4Low Energy Electronic Systems, Singapore-MIT Alliance for Research and Technology, Singapore, Singapore. 5Department of Electrical and Computer Engineering, National University of Singapore, Singapore, Singapore, Singapore

16:45 - 17:00
Refractory T-Gate AlGaN/GaN MISHEMTs with ALD AlON Gate Dielectric

John Niroula1, Qingyun Xie1, Elham Rafie Borujeny1, Shisong Luo2, Matthew Taylor1, Yuji Zhao2, Tomás Palacios1
1Massachusetts Institute of Technology, Cambridge, MA, USA. 2Rice University, Houston, TX, USA

17:00 - 17:15
GaN-on-Si Vertical Trench MOSFETs with Low RON.sp and High Vth by Enhanced Channel Conductivity
Yuanzhi He1, Renqiang Zhu2,1, Jialun Li1, Kei May Lau3
1Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong. 2Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen, Guangdong, China. 3Division of Emerging Interdisciplinary Area, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong

Poster Session 1
17:30 - 20:00 Monday, November 4, 2024
Location: Coral 3

[Poster 1] Accelerated learning in wide bandgap AlN artificial photonic synaptic devices: Impact on suppressed shallow trap level
Moonsang Lee1,2, Myung Gwan Hahm1,2, Sang Jin Lee1
1Inha University, Incheon, Incheon, Korea, Republic of. 2MSG Solution, Incheon, Incheon, Korea, Republic of

[Poster 2] On-chip Integration of Large-ER Resonators with Grating Couplers and Waveguides on GaN-on-Sapphire for O-band applications
Yuefei Cai
Southern University of Science and Technology, Shenzhen, Guangdong, China

[Poster 3] Investigation of GaN-based Micro-LED Display Technology for Augmented Reality
Junchi Yu1, Feifan Xu1, Tao Tao1, Bin Liu1, Yimeng Sang1, Dongqi Zhang1, Ting Zhi1, Youdou Zheng1, Kai Huang2, Rong Zhang2
1Nanjing University, Nanjing, Jiangsu, China. 2Xiamen University, Xiamen, Fujian, China

[Poster 4] Correlated photoluminescence blinking phenomenon on InGaN/GaN NanoPillars structures
Kotaro Oikawa1, Koichi Okamoto2, Mitsuru Funato3, Yoichi Kawakami3, Ruggero Micheletto1
1Yokohama City University, Yokohama, Kanagawa, Japan. 2Osaka Metropolitan University, Sakai, Osaka, Japan. 3Kyoto University, kyoto, Kyoto, Japan

[Poster 5] Low Damage GaN etching for µLED Applications
Andrew Newton1, Sean Cho1, Zhengfei Wei1, Stuart Robertson2, Toon Coenen3, Marcin Zielinski3
1Oxford Instruments, Bristol, United Kingdom. 2Loughborough Materials Characterisation Centre,, Loughborough, United Kingdom. 3Delmic BV, Delft, Netherlands

[Poster 6] Measurement Method of Internal Quantum Efficiency for Ultra-Violet AlGaN/GaN Light-Emitting Diodes Using Thermal Characterization
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Abu Bashar Mohammad Hamidul Islam1, Tae Kyoung Kim2, Yu-Jung Cha1, Hyeondong Lee1, Ji un Oh1, Minji Kim1, Jae Won Seo1, Chan Park1, June O Song2, Dong-Soo Shin3, Jong-In Shim3, Joon Seop Kwak1
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[Poster 10] GaN-based Micro LEDs Fabricated by Photoelectrochemical Etching and Transfer-Printing

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[Poster 11] Extremely collimated light emission using multi-phase level Fresnel zone plate for deep-ultraviolet micro light-emitting diodes

Lingjie Wei, Shin-ichiro Inoue
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[Poster 13] Sub-5-µm GaN blue micro-LED fabricated by hydrogen iodide neutral beam

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Lei Fu1, Ning Tang1, Yuqing Hu2, Huaiyuan Yang1, Xionghui Jia1, Guoping Li1, Junxi Duan2, Weikun Ge1, Bo Shen1
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Hongjian Li
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Masafumi Jo1, Yuri Itokazu1,2, Kazuki Iimura1,2
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Junichi Suzuki1, Shunki Hayashi1, Shunsuke Shibui1, Masahiro Koga1, Ryusei Takahashi1, Reo Aoyama1, Takahiro Noguchi1, Takahiro Fujisawa2, Toshihiko Fukamachi3, Koichi Naniwae3, Shiori Ii4, Ruka Watanabe4, Makoto Miyoshi2, Tetsuya Takeuchi4, Satoshi Kamiyama4, Shiro Uchida1
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Mohit Raghuwanshi1, Balasubramanian Sundarapandian1, Radhakant Singh2, Thomas Rijil2, Stephan Suckow2, Max Lemme2
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Kazuhiro Mochizuki, Tomoaki Nishimura, Tomoyoshi Mishima
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Mingfei Xu1, Ziyi He2, Abhijit Biswas1, Shisong Luo1, Tao Li1, Cheng Chang1, Chenxi Li1, Bing Gao1, Robert Vajtai1, Pengcheng Dai1, Pulickel Ajayan1, Yuji Zhao1
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[Poster 21] Cross-correlated GaN polarity characterization of engineered substrates for high performance next-generation RF/power substrates development
Alexis Drouin1, Brooke Jablon2, Carolina Ferreira Cerqueira2, Jonathan Moffat3, Christopher Mulcahy3, Gweltaz Gaudin1
1SOITEC S.A., Bernin, France. 2Oxford Instruments, Les Ulis, France. 3Oxford Instruments, High Wycombe, United Kingdom

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Tomoaki Sumi, Hiroyuki Handa, Masahiro Ogawa, Naohiro Tsurumi, Junichi Takino, Satoshi Tamura, Yoshio Okayama

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[Poster 23] Improved ohmic contacts for p-type Mg-doped Al-rich AlGaN grown on AlN substrates
Guo-Dong HAO, Washiyama Shun, Tomonori Matsushita, Shin-ichiro Inoue
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Anna Honda, Hirotaka Watanabe, Takeshi Kato, Yoshio Honda, Hiroshi Amano
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[Poster 26] Determination of hole trap state and its correlation with negative polarization interface in N-polar and Ga-polar HEMTs
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Amy Albrecht1, Jan Beyer1, Christian Röder2,1, Gleb Lukin2, Andreas Lesnik2, Sven Besendörfer2, Elke Meißner2, Jochen Friedrich2, Franziska Beyer2, Johannes Heitmann1
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[Poster 28] Fabrication and evaluation of Mg-doped GaN sputtering target
Yoshihiro Ueoka, Ko Bando, Erisa Kano, Hidehiko Misaki, Masami Mesuda
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[Poster 29] Rough Grinding Process for GaN Substrates with High Efficiency
Natsuko Omiya1, Keito Ishibashi2, Shuhei Awa1, Hidetoshi Takeda2, Hideo Aida2
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[Poster 30] Selective Incorporation of Group-V Dopants in Gallium Nitride
Yujie Liu, Ishtiaque Navid, Zetian Mi, Emmanouil Kioupakis
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[Poster 32] Effect of structural change of SiO2/GaN interfacial oxide layer by post-deposition annealing on electrical properties

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[Poster 33] Atomic resolution analyses of Mg distribution and defect formation in Mg+N ion-implanted GaN

Emi Kano1, Jun Uzuhashi2, Kosuke Ishikawa1, Tetsuo Narita3, Kacper Sierakowski4, Michal Bockowski4, Tadakatsu Ohkubo2, Tetsu Kachi1, Nobuyuki Ikarashi1
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[Poster 34] Corrosion of ScN heated up to 900 K at ambientlab conditions

Jona Grümbel, Elias Baron, Jürgen Bläsing, Florian Hörich, Anja Dempewolf, Armin Dadgar, Rüdiger Goldhahn, Martin Feneberg
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[Poster 35] MXene/GaN Interface for Contact Engineering: Exploring Electronic Phenomena through Spectroscopic Analysis

Dominika Majchrzak1, Karol Kulinowski2, Wojciech Olszewski1,3, Rafał Kuna1, Daria Hlushchenko1, Adrianna Piejko1,4, Miłosz Grodzicki1,2, Detlef Hommel1,5, Robert Kudrawiec1,2
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[Poster 36] Large increase in the internal quantum efficiency of thick molecular beam epitaxial (In,Ga)N layers by means of thermal annealing

Jingxuan Kang, Aidan Campbell, Jonas Lähnemann, Lutz Geelhaar, Oliver Brandt
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[Poster 37] Determining the electrical transport properties of MBE-grown cubic GaN layers

Hannes Hergert, Mario F. Zscherp, Silas A. Jentsch, Jörg Schörmann, Sangam Chatterjee, Matthias T. Elm, Peter J. Klar
Justus Liebig University Giessen, Giessen, Germany

[Poster 38] Investigation of the water-GaN(10$\bar{1}$0) and water-GaN(0001) interface by XPS, UPS and molecular dynamics simulation.

Stefan Krischok, Fabian Ullmann, Marius Otto, Christian Dressler
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[Poster 39] Optical properties of cubic InxGa1-xN (0 ≤ x ≤ 1)
Jonas Rose1, Elias Baron1, Mario Zscherp2, Silas Jentsch2, Rüdiger Goldhahn1, Sangam Chatterjee2, Jörg Schörmann2, Martin Feneberg1
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[Poster 40] X-ray investigation of the thermal expansion coefficient of cubic Gallium Nitride on 3C-SiC (001)/Si (001) substrates
Donat Josef As, Falco Meier, Cedrik Meier
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[Poster 41] Effect of Ag nanoparticles on the photoluminescence spectra of planar GaN nanowires
Galia Pozina1, Natalia Abrikossova1, Carl Hemmingsson1, Mikhail Kaliteevski2
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[Poster 42] On the integrated p-type region free of electron blocking layer for AlGaN-based deep-ultraviolet light emitting diodes
Jing Lang, Fujun Xu, Jiaming Wang, Chen Ji, Xueqi Guo, Weikun Ge, Bo Shen
Peking University, Beijing, China

[Poster 43] Electron-phonon interaction in AlN under resonant excitation
Guoping Li, Ning Tang, Lei Fu, Erfei Zhang, Fujun Xu, Tongjun Yu, Weikun Ge, Bo Shen
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[Poster 44] Characterization and Analysis of Porous Al0.04Ga0.96N Distributed Bragg Reflectors with Excellent Stability at High Temperature
Yang Bao1, Weifang Lu1, Mengtong Wang1, Zhaoxia Bi2, Jinchai Li1, Kai Huang1, Rong Zhang1
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[Poster 45] Peripheral defects related to processing technique in GaN-on-GaN vertical devices
Maroun Dagher1, Georges Brémond1, Camille Sonneville2, Dominique Planson2, Helge Haas3, Mohamed-Reda Irekti3, Julien Buckley3, Vishwajeet Maurya3, Matthew Charles3, Jean-Marie Bluet1
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[Poster 46] Exploring the Thermodynamic and Electronic Properties of Domain Walls in Wurtzite Ferroelectrics
Mahlet Molla, Yujie Liu, Ding Wang, Danhao Wang, Zetian Mi, Emmanouil Kioupakis
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[Poster 47] Electrical behavior of dry etching induced damage on polar and non-polar GaN MIS interface properties
Koji Yoshitsugu1, Takahiro Yamada1, Yuki Takiguchi1, Shingo Tomohisa1, Takashi Takenaga1, Yasuyuki Miyamoto2

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[Poster 48] Carbon-related Trap Dynamics in Semi-insulating Buffer Layer of GaN-on-Si substrate
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[Poster 49] Optimization of GaN HEMT geometry for High Performance RF Application
Hyun-Wook Jung, Il-Gue Choi, Sung-Jae Chang, Ho-Kyun Ahn, Dong-Min Kang, Jong-Won Lim
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[Poster 50] Transistor-free Analog Switching Memristors Based on Hexagonal Boron Nitride Grown on Gallium Nitride Substrate
Jaesub Song, Seokho Moon, Jinho Byun, Jiye Kim, Inyong Hwang, Changwook Ji, Seyoung Kim, Jong Kyu Kim
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[Poster 51] Growth and performance of n++GaN/InAlN/AlN/GaN heterostructures for E/D-mode HEMTs applications
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[Poster 52] Large Forward Current Operation of Vertical GaN p-n Junction Diodes Fabricated on Extra-Heavily Ge-Doped GaN Substrates
Tomoyoshi Mishima1, Hiroshi Ohta1, Takashi Sato2, Yoshinobu Narita2, Toshio Kitamura2, Tetsuji Fujimoto2, Hajime Fujikura2
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[Poster 53] Quaternary Barrier AlInGaN Growth on Si with Different AlGaN Back Barrier Thickness
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[Poster 54] High DC and RF performance of AlGaN/GaN HEMT with AlN buffer layer
Jeong hoon Choe1, Dong han Kim1, Byoung Tak Lee2, Hae Chan Lee1, Hyun Jung Lee1, Chu-young Cho3, Jung-Hee Lee2, Jeong-Gil Kim4, Hong Sik Park1
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[Poster 55] Development of advanced functional structures and its implementation in AlGaN/GaN HEMT transistors for microwave power electronics

Marek Ekielski1, Karolina Olucha1, Magdalena Zadura1, Wioleta Słaba1, Maciej Kamiński1,2, Jarosław Tarenko1,2, Oskar Sadowski1,2, Justyna Wierzbicka1, Andrzej Taube1, Anna Szerling1
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[Poster 56] Scaling Down of a Normally-OFF AlGaN/GaN HEMT with a p-GaN Nanowire Structure for Stable VTH and Self-clamped Gate Leakage

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[Poster 57] High power GaN-on-Diamond HEMTs devices fabricated applying GaN-HEMTs based SiC

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[Poster 58] Employment of 3 nm-thick h-BN passivation layer for RF performance improvement in GaN-based HEMTs

Sung-Jae Chang1, Seokho Moon2, Hyun-Wook Jung1, Il-Gyu Choi1, Youn-Sub Noh1, Seong-Il Kim1, Sang-Heung Lee1, Ho-Kyun Ahn1, Jong-Won Lim1, Jong Kyu Kim2, Dong-Min Kang1
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[Poster 59] Characterisation of under 5nm AlGaN barrier depths gate recessed AlGaN/GaN MIS-HEMTs by atomic layer etch process with in-situ etch depth monitoring

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[Poster 60] Threshold Voltage Engineering of Lateral Gallium Nitride Accumulation Fin Channels

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[Poster 61] The Effect of Carbon-doped GaN Layer Thickness on Dynamic RON of AlGaN/GaN HEMTs on Si

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[Poster 62] High Breakdown Voltage and Low Current Dispersion in AlGaN/GaN HEMTs with High Quality AlN Buffer Layer

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[Poster 63] Fabrication of Recessed-gate AlGaN/GaN HEMTs utilizing Contactless Photoelectrochemical (CL-PEC) Etching
Yugo Oki, Naoki Shiozawa, Taketomo Sato
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[Poster 64] Reduction of hole traps in SiO2/GaN MOS structures by properly designing the oxide interlayer
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[Poster 65] Evaluation of the Interface State Density of Gallium Nitride HEMTs by Analyzing the Frequency Dispersion of Capacitance-Voltage Curves
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[Poster 66] TCAD modeling of GaN HEMTs with superlattice buffer based on mechanism of back gate characteristic
Kosuke Miura, Takeshi Suwa, Ryohei Nega, Takao Noda
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[Poster 67] TCAD study of leakage current suppression mechanism by deep P layer and additional source electrode in GaN HEMTs
Takeshi Suwa, Kosuke Miura, Ryohei Nega
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[Poster 68] Study on On-resistance Lowering of p-GaN Gated Anode Rectifier Diode for Energy Harvesting
Naotaka Iwata, Shota Hayakawa, Taisei Awashima, Maria Emma C. Villamin
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[Poster 69] Heterogeneous Integration CMOS Inverter with GaN n-HEMT and Si p-MOSFET
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[Poster 70] Advanced Design of III-Nitride micro-Light-emitting Diode via Machine Learning
Ying Jiang1, Zhuoying Jiang1, Mengyu Chen1,2, Jinchai Li3,2,4, Cheng Li1,2, Lin Li1, Kai Huang3,4,2, Rong Zhang2,4,5
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[Poster 71] Leakage current reduction with an atomically smooth GaN (0001) surface fabricated by photoelectrochemical reaction-assisted catalyst-referred etching

Kiyoto Kayao, Tatsuya Fukagawa, Daisetsu Toh, Jumpei Yamada, Kazuto Yamauchi, Yasuhisa Sano
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[Poster 172] Double negative differential resistance features in series AlN/GaN double-barrier resonant tunneling diodes vertically integrated by PA-MBE
Jiajia Yao, Junshuai Xue, Jincheng Zhang, Yue Hao
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[Poster 73] Accurate in-situ etch depth control to optimize a critical process step for pGaN HEMT structures
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[Poster 74] High Temperature Operation of Al2O3/Ga2O3 Bi-layer Gate Stack for GaN MOSHEMT up to 450°C with Suppressed Gate Leakage
Mritunjay Kumar, Vishal Khandelwal, Dhanu Chettri, Haicheng Cao, Ganesh Mainali, Xiao Tang, Xiaohang Li
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[Poster 75] AlGaN/GaN MIS-HEMTs with Al2O3/HfO2 Bilayer Gate Insulators
Junseok Heo, Janghyun Kim
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[Poster 76] Process-Dependent Performance of Recessed-Gate Enhancement-Mode GaN p-FET
Teng Li1,2, Meng Zhang2, Jingjing Yu1, Jiawei Cui1, Junjie Yang1, Zheyang Zheng3, Mengyuan Hua4, Xuelin Yang1, Maojun wang1, Shiwei Feng2, Bo Shen1, Jin Wei1
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[Poster 77] Impact Ionization Induced VTH Instability of Schottky-Type p-GaN Gate HEMTs under Semi-on Stress Conditions
Haohao Chen1, Zuoheng Jiang1, Junting Chen1, Jinjin Tang1, Junlei Zhao1, Jin Wei2, Jun Ma1, Xiaolong Chen1, Mengyuan Hua1
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[Poster 78] TCAD Modelling of Electron Transport Dynamics in GaN Gunn Diodes
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[Poster 79] Comparison of vanadium- and titanium-based mentalization as an ohmic contact to n-type GaN
Oskar Sadowski1,2, Maciej Kamiński1,2, Jarosław Tarenko1,2, Justyna Wierzbicka1, Marek Guziewicz1, Marek Wzorek1, Justyna Maleszyk1, Anna Szerling1, Paweł Prystawko3, Izabella Grzegory3, Michał Boćkowski3, Andrzej Taube1

1Lukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Mazovian Voivodeship, Poland. 2Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Mazovian Voivodeship, Poland. 3Institute of High Pressure Physics of the Polish Academy of Sciences, Warsaw, Mazovian Voivodeship, Poland

[Poster 80] Analytical Model Development for Vertical GaN Fin-MOSFETs using Symbolic Regression Method

Smriti Singh, Aasim Ashai, Ankita Mukherjee, Tanmoy Pramanik, Biplab Sarkar
Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, India

[Poster 81] Optimized PECVD SiNx Passivation for RF GaN HEMTs

Hossein Yazdani, Ina Ostermay, Ali Koyucuoglu, Enrico Brusaterra, Hans-Joachim Wuerfl, Oliver Hilt
Ferdinand-Braun-Institute, Berlin, Germany

[Poster 82] Significant improvement of AlN/Al0.8Ga0.2N Schottky Barrier Diode by Atomic Layer Etching with low Ideality Factor of 1.56

Tingang Liu, Haicheng Cao, Mingtao Nong, Zixian Jiang, Zhiyuan Liu, Xiao Tang, Xiaohang Li
KAUST, Jeddah, Saudi Arabia

[Poster 83] A bulk 4-inch free-standing GaN single crystal grown by HVPE on foreign substrate

Haixiao Hu, Baoguo Zhang, Yongzhong Wu, Yongliang Shao, Xiaopeng Hao
Qilu University of Technology (Shandong Academy of Science), Jinan, Shandong, China

[Poster 84] Kinetic Monte Carlo Simulations of m-plane {1-100} GaN Growth: Role of Nitrogen Desorption

Soumyadip Saha, Madhav Ranganathan
Indian Institute of Technology Kanpur, Kalyanpur, Kanpur, Uttar Pradesh, India

[Poster 85] GaN nano-channel epitaxy on r-plane sapphire substrate using nano-patterned graphene mask

Shigeya Naritsuka, Ryoya Yokoi, Shogo Karino, Yuta Yanase, Kohei Osamura, Takahiro Maruyama
Meijo University, Nagoya, Japan

[Poster 86] A study on the thickness of InAlN barrier in the InAlN/GaN heterostructure grown on 4-inch SiC substrate by Hybrid-MBE

Eun-Ah Cheon1,2, Yu-Jeong kim1, Young-Kyun Noh2, Young-Heon Kim1
1Graduate School of Analytical Science and Technology, Chungnam National University, 99, Daehak-ro, Yuseong-gu, Daejeon 34134, Korea, Republic of. 2IVWorks Co., Ltd., 10-27, Expo-ro 339beon-gil, Yuseong-gu, Daejeon 34122, Korea, Republic of

[Poster 87] Fabrication of 4-inch AlN Single Crystal Substrates via Solid-Phase Epitaxy Assisted by Liquid Phase

Kyohei Atsuji1, Yosuke Sato1, Hiroharu Kobayashi1, Jun Yoshikawa1, Yoshinori Imoto2, Sho Iwayama2, Motoaki Iwaya2
1NGK INSULATORS, LTD., Nagoya, Japan. 2Meijo University, Nagoya, Japan

[Poster 88] Impact of heavy silicon doping on the structural and optical properties of pulsed sputtered grown GaN

Frank Bertram1, Gordon Schmidt1, Juergen Christen1, Kohei Ueno2, Hiroshi Fujioka2
1University of Magdeburg, Magdeburg, Germany. 2University of Tokyo, Tokyo, Japan

[Poster 89] Influence of n-type and p-type doping on optical, structural and electrical properties of pencil-like GaN nanowires

Zarko Gacevic1, Jovana Obradovic1, Miguel Tinoco Rivas2, Almudena Torres2, Sergio Fernández-Garrido1, Álvaro Guzmán1
1Institute for Optoelectronic Systems and Microtechnology (ISOM), Universidad Politécnica de Madrid, Madrid, Spain. 2Inorganic Chemistry Department, Chemical Sciences Faculty, Universidad Complutense de Madrid, Madrid, Spain

[Poster 90] Tunnel junction enables controlling the polarization of InGaN-based micro-LEDs through the reverse structure

Tae-Hoon Chung1, Jung-Hong Min1, Sung Hoon Jung1, Shang Hern Lee1, Hwa Sub Oh1, June Key Lee2
1Korea Photonics Technology Institute (KOPTI), Gwangju, Korea, Republic of. 2Chonnam National University, Gwangju, Korea, Republic of

[Poster 91] Film texture in epitaxial Al0.7Sc0.3N layers on Si(111)

Dmytro Solonenko1, Nastaran Behravan1, Yaoxuan Feng2, Bernd Heinz2, Julian Pilz1, Tamara Terzic1, Vladimir Pashchenko1, Sanjay Nayak1, Ravindra Bisht1, Jérémy Streque1, Gudrun Bruckner1, Mohssen Moridi1, Marco Deluca1
1Silicon Austria Labs, Villach, Austria. 2Evatec AG, Trübbach, Switzerland

[Poster 92] Characterization of AlGaN/GaN HEMT Structures Epitaxially Grown on Bonded Semi-Insulating LPE-GaN/SiC Substrates

Kentaro Nonaka, Ryozo Kishimoto, Yoshinori Isoda, Hiroki Kobayashi, Yoshitaka Kuraoka, Kei Sato, Takashi Yoshino
NGK Insulators, Ltd., Nagoya, Japan

[Poster 93] Molecular beam homoepitaxy of nitrogen-polar GaN epilayer on bulk GaN substrates

ZeHui Li, JunShuai Xue, GuanLin Wu, JinYuan Yuan, HaoRan Hu, JinCheng Zhang, Yue Hao
Xidian university, Xi'an, Shaanxi, China

[Poster 94] Epitaxial TiN layers: A gateway to vertical GaN-on-Si technology?

Florian Hörich, Jürgen Bläsing, Armin Dadgar, André Strittmatter
Otto-von-Guericke University, Magdeburg, Germany

[Poster 95] Redefining the MBE growth window for AlGaN/GaN nanowires

Rudolfo Hötzel1, Stephan Figge1, Lukas Lübken1, Florian Krause1, Andreas Rosenauer1,2, Martin Eickhoff1,2
1Institute of Solid State Physics, University of Bremen, Bremen, Bremen, Germany. 2MAPEX Center for Materials and Processes, University of Bremen, Bremen, Bremen, Germany

[Poster 96] Fabrication of ZrN nano mask for selective growth of GaN/AlGaN nanowires arrays for efficient UV light emitters

Magdalena Zadura1, Marta Sobanska2, Marek Ekielski1, Marek Guziewicz1, Karol Olszewski2, Zbigniew Zytkiewicz2, Anna Szerling1
1Institute of microelectronics and Photonics, Warsaw, Poland. 2Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland

[Poster 97] Impact of unidirectional supply of atoms in MBE on orientation of GaN nanowires epitaxially linked to a polycrystalline substrate

Marta Sobanska, Karol Olszewski, Aleksandra Wierzbicka, Zbigniew Zytkiewicz
Institute of Physics, Polish Academy of Sciences, Warsaw, Poland

[Poster 98] Exploration method for crystal growth conditions using sparse modelling: Application to high-temperature annealing of sputtered AlN films

Taichi Hara1, Akira Kusaba2, Yoshihiro Kangawa2, Hideto Miyake3, Tetsuji Kuboyama4
1Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Kasuga, Fukuoka, Japan. 2Research Institute for Applied Mechanics, Kyushu University, Kasuga, Fukuoka, Japan. 3Graduate School of Engineering, Mie University, Tsu, Mie, Japan. 4Computer Centre, Gakushuin University, Toshima-ku, Tokyo, Japan

[Poster 99] Phase diagrams and thermodynamics for the ammonothermal synthesis of III-Nitrides

Wenhao Sun
University of Michigan, Ann Arbor, MI, USA

[Poster 100] Growth of InGaN thermoelectric thin films with whole In content range using RF-MBE

Shota Hattori, Tsutomu Araki, Momoko Deura
Ritsumeikan University, Kusatsu, Shiga, Japan

[Poster 101] GaN Metal-organic Vapor Phase Epitaxy on Sc2O3/Si Templates for Group III-nitride Monolithic Integration to Si Technology

Tomas Grinys1, Arūnas Kadys1, Tadas Malinauskas1, Petras Lapukas1, Žydrūnas Podlipskas1, Rimantas Gudaitis2, Mindaugas Andrulevičius2, Šarūnas Meškinis2
1Institute of Photonics and Nanotechnology, Vilnius University, Vilnius, Lithuania. 2Institute of Material Science, Kaunas University of Technology, Kaunas, Lithuania

[Poster 102] Comparison of N-type doping of GaN by germanium: epitaxy, ion implantation and bulk growth

Kacper Sierakowski1, Tomasz Sochacki2, Arianna Jaroszynska1, Karolina Grabianska1, Marcin Turek3, Robert Czarnecki1, Michal Bockowski1
1Institute of High Pressure Physics PAS, Warsaw, Warsaw, Poland. 2Institute of High Pressure Physics PAS, Warsaw, Poland. 3Maria Sklodowska Curie University, Lublin, Poland

[Poster 103] Vertical and lateral diffusion in Mn-implanted GaN: The case of Am-GaN:Mn and HVPE-GaN:Mn

Arianna Jaroszyńska1, Kacper Sierakowski1, Rafał Jakieła2, Marcin Turek3, Michał Fijałkowski1, Robert Kucharski1, Karolina Grabiańska1, Tomasz Sochacki1, Michał Boćkowski1

1Institute of High Pressure Physics of the Polish Academy of Sciences, Warsaw, Poland. 2Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland. 3Maria Curie-Sklodowska University, Lublin, Poland

[Poster 104] Fabrication of GaN Freestanding Membrane Using Solid Phase Epitaxial α-Aluminum Oxide Layer on Graphene

Jeongwoon Kim1, Hyuk Jun Lee2, Jongil Kim3, Seoung Hyeok Lee1, Hoe-Min Kwak4, Sangho Oh3, Young Jun Joo2, Dong-Seon Lee1
1Gwangju Institute of Science and Technology, Gwangju, Korea, Republic of. 2Korea Institute of Ceramic Engineering and Technology, Jinju, Korea, Republic of. 3Korea Institute of Energy Technology, Naju, Korea, Republic of. 4Electronics and Telecommunications Research Institute, Daejeon, Korea, Republic of

[Poster 105] Anneal-free Sputtered n+ GaN Contact for Nitrogen-Polar GaN Heterostructure

Maliha Noshin1, Shinji Yamada2, Rohith Soman1, Jeongkyu Kim1, Suda Jun2,3, Srabanti Chowdhury1
1Department of Electrical Engineering, Stanford University, Stanford, California, USA. 2Graduate School of Engineering, Nagoya University, Nagoya, Aichi, Japan. 3IMaSS, Nagoya University, Nagoya, Aichi, Japan

[Poster 106] Fabrication of reverse tapered GaN edge structures for positive beveled edge termination

Masataka Imura, Takayoshi Oshima, Yuichi Oshima
NIMS, Tsukuba, Japan

[Poster 107] Effects of morphology during coalescence of GaN crystals on dislocation propagation in the Na-flux point seed technique

Ryotaro Sasaki1, Shogo Washida1, Masayuki Imanishi1, Kosuke Murakami1, Shigeyoshi Usami1, Mihoko Maruyama1, Yusuke Mori1, Masashi Yoshimura1,2
1Graduate School of Engineering, Osaka University, Suita, Osaka, Japan. 2Institute of Laser Engineering, Osaka University, Suita, Osaka, Japan

[Poster 108] Reduction of Dislocations in {20-21}-Plane GaN Crystals during Facet Growthin Na Flux Method

Takumi Miyamoto1, Masayuki Imanishi1, Shogo Washida1, Kosuke Murakami1, Shigeyosi Usami1, Mihoko Maruyama1, Masashi Yoshimura1,2, Yusuke Mori1
1OSAKA UNIVERSITY, Suita, OSAKA, Japan. 2Institute of Laser Engineering in OSAKA UNIVERSITY, Suita, OSAKA, Japan

[Poster 109] Thermodynamic and experimental studies of OVPE-GaN growth under the low nucleation frequency conditions

Tsubasa Nakazono1, Shigeyoshi Usami1, Masayuki Imanishi1, Tomoaki Sumi2, Junichi Takino2, Yoshio Okayama2, Mihoko Maruyama1, Masashi Yoshimura3, Masahiko Hata4, Masashi Isemura5, Yusuke Mori1
1Grad. School of Eng., Osaka University, Suita, Osaka, Japan. 2Panasonic Holdings Corporation, Kadoma, Osaka, Japan. 3ILE, Osaka University, Suita, Osaka, Japan. 4Itochu Plastics Incorporated, Osaka, Osaka, Japan. 5Sosho-Ohshin Incorporated, Katano, Osaka, Japan

[Poster 110] Epitaxial deposition of GaN layers on ceramic substrates

Dimiter Alexandrov, Robert Dubreuil, Jonny Tot
Lakehead University, Thunder Bay, Ontario, Canada

[Poster 111] Structural and optical changes of the InGaN/GaN quantum wells depending on the growth temperature of the layers below the QWs

Szymon Grzanka, Ewa Grzanka, Julita Smalc-Koziorowska, Lucja Marona, Artur Lachowski, Mikolaj Grabowski, Roman Hrytsak, Robert Czernecki, Mike Leszczynski
Institute of High Pressure Physics PAS, Warsaw, Poland

[Poster 112] The proposal to the new convergent devices of nitride and diamond: Possibilities and Challenges

Taemyung Kwak, Yoonseok Nam, Okhyun Nam
Tech university of Korea, Sihueng-si, GyeongGi-do, Korea, Republic of

[Poster 113] Investigating the impact of hydrogen (H2) addition on atomic layer etching (ALE) of titanium nitride (TiN) in BCl3 inductively coupled plasma

Jiyong Lee1, Kisang Eom1, Heeyeop Chae2,3
1Dept. of Semiconductor and Display Engineering Sungkyunkwan University, Suwon,16419, Korea, Republic of. 2School of Chemical Engineering, Sungkyunkwan University (SKKU), Suwon,16419, Korea, Republic of. 3Department of Nano Science and Technology, SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University (SKKU), Suwon, 16419, Korea, Republic of

[Poster 114] Atomic Layer Etching of Silicon Nitride in Direct Current Superposed Dual-Frequency Capacitively Coupled Plasmas

Kisang Eom1, Jiyong Lee1, Heeyeop Chae2,3
1Dept. of Semiconductor and Display Engineering Sungkyunkwan UniversityUniversity, Suwon,16419, Gyeonggi-do, Korea, Republic of. 2School of Chemical Engineering, Sungkyunkwan University (SKKU), Suwon,16419, Gyeonggi-do, Korea, Republic of. 3Department of Nano Science and Technology, SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University (SKKU), Suwon,16419, Gyeonggi-do, Korea, Republic of

[Poster 115] A highly efficient laser diode with an InGaN tunnel junction for superior performance in high-resolution display

Ji-Hyeon Park1, Young Jin Lee1, Dae-Woo Jeon1, Yong-Ho Ra2
1Korea Institute of Ceramic Engineering and Technology, JinJu, Korea, Republic of. 2Jeonbuk National University, Jeonju, Korea, Republic of

[Poster 116] On the optimization of p-body epitaxial structures for vertical GaN Trench-MOSFETs

Maciej Kamiński1,2, Jarosław Tarenko1,2, Oskar Sadowski1,2, Justyna Wierzbicka1, Anna Szerling1, Marek Wzorek1, Ernest Brzozowski1, Aneta Gołębiowska1,2, Kamil Abendroth1,3, Marek Ekielski1, Magdalena Zadura1, Paweł Prystawko4, Michał Boćkowski4, Izabella Grzegory4, Andrzej Taube1
1Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland. 2Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland. 3Faculty of Physics, University of Warsaw, Warsaw, Poland. 4Institute of High Pressure Physics, Polish Academy of Sciences, Warsaw, Poland

[Poster 117] New approach to interpretation of Hall-effect measurements in highly doped p-type gallium nitride

Maciej Kamiński1,2, Kamil Abendroth1,3, Andrzej Taube1
1Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland. 2Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland. 3Faculty of Physics, University of Warsaw, Warsaw, Poland

[Poster 118] GaN p-FET with Al2O3 as the dielectric layer operational at 200 °C
Cheng Chang1, Shisong Luo1, Mingfei Xu1, Tao Li1, Ziyi He2, Yuji Zhao1
1Department of Electrical and Computer Engineering,Rice University, Houston, Texas, USA. 2School of Electrical, Computer, and Energy Engineering,Arizona State University, Tempe, Arizona, USA

Tuesday, November 5, 2024

Characterization: InN and InGaN
08:00 - 10:00 Tuesday, November 5, 2024
Location: Coral 1
Chair: Robert Armitage

08:00 - 08:15
Phase diagrams of GaN and InN:towards closing the gaps?
Izabella Grzegory, Jacek Piechota, Bohdan Sadovyi, Petro Sadovyi, Sylweter Porowski, Stanisław Krukowski
Institute of High Pressure Physics Unipress PAS, Warsaw, Poland

08:15 - 08:30
MOCVD Growth of InN
Michael Carter1, MD Fahel Bin Noor1, Masahiro Kamiyama1, Ronny Kirste2, Seiji Mita2, Ramón Collazo1, Zlatko Sitar1,2
1North Carolina State University, Raleigh, NC, USA. 2Adroit Materials, Cary, NC, USA

08:30 - 08:45
Underlayer effects for the carrier dynamics in InGaN multiple quantum well systems based on time-resolved photoluminescence spectroscopy
Itsuki Shimbo1, Hiroki Tosa1, Shoki Jinno1, Keito Mori-Tamamura1, Atsushi A. Yamaguchi1, Kazunori Iwamitsu2, Shigetaka Tomiya2
1Kanazawa Institute of Technology, Nonoichi, Ishikawa, Japan. 2Nara Institute of Science and Technology, Ikoma, Nara, Japan

08:45 - 09:00
Spatio-time-resolved cathodoluminescence study of InGaN/GaN multiquantum shells
Kohei Shima1, Weifang Lu2, Tetsuya Takeuchi2, Satoshi Kamiyama2, Shigefusa Chichibu1
1Tohoku University, Sendai, Miyagi, Japan. 2Meijo University, Nagoya, Aichi, Japan

09:00 - 09:15
Study on blue InGaN single quantum well beneath efficient red InGaN active layer by atomic force microscopy and scanning near-field optical microscopy

Zhaozong Zhang1, Ryota Ishii1, Kanako Shojiki1, Mitsuru Funato1, Daisuke Iida2, Kazuhiro Ohkawa2, Yoichi Kawakami1
1Kyoto Univiersity, Kyoto city, Kyoto, Japan. 2King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia
09:15 - 09:30

Optimal substrate and n-type layer selection to minimize the thermal stability issue of InGaN/GaN quantum wells

Artur Lachowski1, Ewa Grzanka1, Robert Czernecki1, Szymon Grzanka1, Mikołaj Grabowski1, Roman Hrytsak1, František Hajek1,2, Alice Hospodkova2, Jakub Čížek3, Michał Leszczyński1, Julita Smalc-Koziorowska1
1Institute of High Pressure Physics "Unipress", PAS, Warsaw, Poland. 2Institute of Physics of the Czech Academy of Sciences, Prague, Czech Republic. 3Faculty of Mathematics and Physics, Department of Low-Temperature Physics, Charles University, Prague, Czech Republic

09:30 - 09:45

Non-negative matrix factorization analysis for multi-modal luminescence spectral imaging of InGaN quantum well

Shigetaka Tomiya1, Kazunori Iwamitsu1, Kenta Sakai2, Zentaro Akase1, Atsushi A. Yamaguchi2
1Nara Institute of Science and Technology, Ikoma, Nara, Japan. 2Kanazawa Institute of Technology, Nonoichi, Ishikawa, Japan

09:45 - 10:00

Enhanced Optical Gain for InGaN Laser Diodes via Strain Relaxed Template with reduced Threading Dislocation Density

Hsun-Ming Chang, Norleakvisoth Lim, Vincent Rienzi, Michael Gordon, Steven P. DenBaars, Shuji Nakamura
University of California, Santa Barbara, Santa Barbara, California, USA

Characterization: Advanced Characterization Methods
08:00 - 10:00 Tuesday, November 5, 2024
Location: Coral 2
Chair: Vanya Darakchieva

08:00 - 08:15

Low-energy electron microscopy (LEEM) for nitride materials and devices

claude weisbuch1,2, James Speck2, Tanay Tak2, Wan Ying Ho2, Cameron Johnson3, Andreas Schmid4, Yi Chao Chow2, Shuji Nakamura2, Mylene Sauty5, jacques peretti1
1Ecole Polytechnique, Palaiseau, France. 2UCSB, Santa Barbara, California, USA. 3Molecular Foundry, Lawrence Berkeley National Laboratory, berkeley, california, USA. 4Molecular Foundry, Lawrence Berkeley National Laboratory, berkeley, California, USA. 5CEA, Saclay, France

08:15 - 08:30

Advancing Nitride Semiconductor Characterization through Terahertz Time-Domain Spectroscopy and Ellipsometry

Verdad Agulto1, Toshiyuki Iwamoto1,2, Kosaku Kato1, Jia Wang3,4, Hiroshi Amano3,4, Makoto Nakajima1
1Institute of Laser Engineering, Osaka University, Suita, Osaka, Japan. 2Nippo Precision Co., Ltd., Nirasaki, Yamanashi, Japan. 3Institute for Advanced Research, Nagoya University, Nagoya, Aichi, Japan. 4Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi, Japan

08:30 - 08:45
Atomic-level evaluation of the gallium oxide layer at the gate-dielectric/GaN interface using photoelectron hologram
Mutsunori Uenuma1, Ryota Atsumi2, Hiroto Tomita2, Shougo Yamada2, Yuya Yamada2, Momoko Yoshida2, Zexu Sun2, Yusuke Hashimoto2, Tomohiro Matsushita2, Yukiharu Uraoka2
1National Institute of Advanced Industrial Science and Technology, Tosu, Saga, Japan. 2Nara Institute of Science and Technology, Ikoma, Nara, Japan

08:45 - 09:00
Higher Energy Conduction Band Satellite Valleys of GaN as Measured by Electron Emission Spectroscopy
Tanay Tak1, Wan Ying Ho1, Yi Chao Chow1, Shuji Nakamura1,2, Steven DenBaars1,2, Jacques Peretti3, Claude Weisbuch1,3, James Speck1
1Materials Department, University of California, Santa Barbara, USA. 2Department of Electrical and Computer Engineering, University of California, Santa Barbara, USA. 3Laboratoire de Physique de la Matière Condensée, École Polytechnique, Palaiseau, France

09:00 - 09:15
Compensation of n-type doping of AlN with Si: Al vacancies, Si DX, or something else?
Filip Tuomisto, Igor Prozheev, Ilja Makkonen, René Bès
University of Helsinki, Helsinki, Finland

09:15 - 09:30
Atom-probe tomography of strain-induced composition fluctuation and nitrogen deficit in UVC light-emitting diode epitaxy
Chia-Yen Huang1, Ying-Chun Chao2, Hung-Wei Yen2
1National Yang Ming Chiao Tung University, Hsinchu, Taiwan, Taiwan. 2National Taiwan University, Taipei, Taiwan, Taiwan

09:30 - 09:45
Crystal-face-dependent electron trapping behavior under high-field stress in Al2O3/GaN MOS structures fabricated through a dummy SiO2 process
Masahiro Hara1,2, Toshihide Nabatame2, Tomomi Sawada2, Manami Miyamoto2, Hiromi Miura2, Yoshihiro Irokawa2, Tsunenobu Kimoto1, Yasuo Koide2
1Kyoto University, Kyoto, Japan. 2National Institute for Materials Science, Tsukuba, Japan

09:45 - 10:00
4D-STEM Measurement of Electric-Field in UWBGS
Alexana Roshko1, Edwin Supple1, Matt Brubaker1, Kris Bertness1, Allison Mis2, Megan Holtz2
1National Institute of Standards and Technology, Boulder, CO, USA. 2Colorado School of Mines, Golden, CO, USA

Growth: Novel Templates and Pseudosubstrates
08:00 - 10:00 Tuesday, November 5, 2024
Location: South Pacific 1/2
Chair: Erdem Arkun

08:00 - 08:15
Towards Crack-Free AlN Growth on Silicon (111) by Introducing Boron Incorporated Buffer Layer via MOCVD
Mingtao Nong, xiao tang, Che-hao liao, Haicheng Cao, Tingang liu, zixian jiang, Dhanu chettri, kexin ren, xiaohang li
KAUST, Thuwal, Thuwal, Saudi Arabia

08:15 - 08:30
Epitaxial lift-off of III-Nitrides on AlN with carbon buffer by hydride vapor phase epitaxy
Hae-Yong Lee, Hae-Gon Oh, Young-Jun Choi
LumiGNtech Co., Ltd., Gwangmyeong, Gyeonggi, Korea, Republic of

08:30 - 08:45
Comparison of aluminum nitride thin films prepared by magnetron sputter epitaxy in nitrogen and ammonia atmosphere
Balasubramanian Sundarapandian1, Dat Q Tran2, Lutz Kirste1, Patrik Straňák1, Andreas Graff3, Mario Prescher1, Akash Nair1, Mohit Raghuwanshi1, Vanya Darakchieva2,4, Plamen P Paskov2, Oliver Ambacher5
1Fraunhofer Institute for Applied Solid State Physics, Freiburg im Breisgau, Germany. 2Center for III-Nitride Technology (C3NiT - Janzén,) and Department of Physics, Chemistry and Biology, Linköping, Sweden. 3Fraunhofer Institute for Microstructure of Materials and Systems, Halle, Germany. 4NanoLund and Solid State Physics, Lund, Sweden. 5Institute for Sustainable Systems Engineering (INATECH)), University of Freiburg, Freiburg im Breisgau, Germany

08:45 - 09:00
AlN heteroepitaxial films approaching bulk-class quality
Jiaming Wang, Nan Xie, Fujun Xu, Lisheng Zhang, Jing Lang, Xiangning Kang, Zhixin Qin, Xuelin Yang, Ning Tang, Xinqiang Wang, Weikun Ge, Bo Shen
Peking University, Beijing, China

09:00 - 09:15
Epitaxial Growth of Crack-Free Thick AlN Film on Si Substrate Using Ductile Interlayers
Jae-Hyun Ryou1, Muhammad Aqib1, Mina Moradnia1, Mihee Ji2, Vijay Parameshwaran2, Wendy Sarney2, Sara Pouladi1, Nam-In Kim1, Rheno Paul Rajesh Kumar1, Gregory Garrett2, Anand Sampath2, Rebecca Forrest1
1University of Houston, Houston, TX, USA. 2Army Research Lab, Adelphy, MD, USA

09:15 - 09:30
Homoepitaxial growth regimes of AlN by NH3-MBE on AlN template substrates.
Ashley Wissel-Garcia, James Speck

Materials Department, UC Santa Barbara, Santa Barbara, California, USA

09:30 - 09:45
Fully relaxed (In,Ga)N pseudosubstrates fabricated by coalescence overgrowth of top-down nanowires
Jingxuan Kang, Huaide Zhang, Aidan Campbell, Mikel Gómez Ruiz, Van Duc Dinh, Philipp John, Thomas Auzelle, Jonas Lähnemann, Oliver Brandt, Lutz Geelhaar
Paul-Drude-Institut für Festkörperelektronik, Berlin, Berlin, Germany

09:45 - 10:00
Sonic Lift-off of 25µm-thick Layers to Enable 2" Bulk GaN Substrate Reuse
Pablo Guimera Coll, Taylor Black, Jessica Abraham, Saideep Kamishetty, Arno Merkle, Lara Bathurst, Mariana Bertoni
Crystal Sonic, Phoenix, AZ, USA

Optoelectronic Devices: Long Wavelength
08:00 - 10:00 Tuesday, November 5, 2024
Location: South Pacific 3/4
Chair: Henryk Turski

08:00 - 08:30
(INVITED) InGaN-based red emitters on sapphire and ScAlMgO4 substrates
Kazuhiro Ohkawa, Rawan Jalmood, Mohammed Najmi, Daisuke Iida
KAUST, Thuwal, Saudi Arabia

08:30 - 08:45
Growth mechanism of red-emitting InGaN/GaN nanocolumn arrays on Si substrates grown via nanotemplate selective area growth
Kota Hoshino1, Rie Togashi1,2, Katsumi Kishno1,2
1Sophia University, 7-1, Kioi-cho, Chiyoda-ku, Tokyo, Japan. 2Sophia Nanotechnology Research Center, 7-1, Kioi-cho, Chiyoda-ku, Tokyo, Japan

08:45 - 09:00
Improving emission of high In content InGaN QWs by growth on microstructures: microphotoluminescence and scanning nearfield optical microscopy studies
Anna Kafar1, Conny Becht2, Zhaozong Zhang3, Kanako Shojiki3, Adam Brejnak1, Ryota Ishii3, Łucja Marona1,4, Szymon Grzanka1,4, Piotr Perlin1,4, Mitsuru Funato3, Ulrich T. Schwarz2, Yoichi Kawakami3
1Institute of High Pressure Physics PAS, Warsaw, Poland. 2Technische Universität Chemnitz, Chemnitz, Germany. 3Kyoto University, Kyoto, Japan. 4TopGaN Sp. z o.o., Warsaw, Poland

09:00 - 09:15
Influence of V-defects, alloy fluctuations, and defective tail states on the correct fitting of red InGaN MQW LEDs
Huai-Chin Huang1, Shih-Min Chen1, Claude Weisbuch2, James Speck2, Yuh-Renn Wu1
1Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei, Taiwan. 2Material Departments, University of California, Santa Barbara, Santa Barbara, USA

09:15 - 09:30
Red-shift in InGaN based Light Emitting Diodes using Planar Porous Technology in Red InGaN MicroLEDs
Surjava Sanyal, Qinchen Lin, Timothy Shih, Shijie Zhang, Guangying Wang, Swarnav Mukhopadhyay, Jonathan Vigen, Wentao Zhang, Md Mobinul Haque, Chirag Gupta, Shubhra Pasayat
University of Wisconsin Madison, Madison, Wisconsin, USA

09:30 - 10:00
(INVITED) What we learned from photo and electro emission experiments in III-nitrides
claude weisbuch1,2, James S. Speck2, Tanay Tak3, wan ying Ho4, justin iveland5, daniel myers6, marco piccardo7, Saulius Marcinkevicius8, lucio martinelli9, mylène sauty10, jacques peretti1
1Ecole Polytechnique, Palaiseau, France. 2University of California at Santa Barbara, Santa Barbara, California, USA. 3University of California at Santa Barbara, Santa Barbara, california, USA. 4Praevium Research, Goleta, california, USA. 5Google quantum, Goleta, california, USA. 6Meta, Reality Labs, redmond, WA, USA. 7Instituto Superior Tecnico, Lisbon, Portugal. 8KTH Royal Institute of Technology, Kista, Sweden. 9Institut Néel, Grenoble, France. 10Commissariat à l'Energie Atomique et aux Energies Nouvelles, Saclay, France

Electronic Devices: Diodes and Superjunctions
08:00 - 10:00 Tuesday, November 5, 2024
Location: Coral 4/5
Chair: Jun Suda

08:00 - 08:30
(INVITED) GaN Super-Heterojunction Devices and Integration
Rongming Chu
The Pennsylvania State University, University Park, PA, USA

08:30 - 08:45
Achieving Near-Ideal Schottky Contacts on Si-Doped AlN via Atomic Layer Etching
Haicheng Cao1, Xiao Tang1, Biplab Sarkar2, Ying Wu1, Xiaohang Li1
1King Abdullah University of Science and Technology, Jeddah, Makkah, Saudi Arabia. 2Indian Institute of Technology, Roorkee, Roorkee, Uttarakhand, India

08:45 - 09:00
0.77 mΩ.cm² / 540 V high performance GaN Schottky diodes with low turn-on voltage and without any edge termination optimization
Hugo Bouillaud, Beatriz Orfao, Yannick Roelens, Malek Zegaoui, Mohammed Zaknoune
IEMN, Villeneuve d'Asq, Nord, France

09:00 - 09:15
First demonstration of >3 kV intrinsic Polarization SuperJunction (iPSJ) GaN-on-Si SBDs with flat and repeatable reverse characteristics
Luca Mazzone, Yuan Zong, Elison Matioli
EPFL, Lausanne, Vaud, Switzerland

09:15 - 09:30
AlN-on-AlN Schottky Barrier Diodes for High-Voltage and High-Temperature Electronics
Dinusha Herath Mudiyanselage, Dawei Wang, Bingcheng Da, Ziyi He, Houqiang Fu
Arizona State University, Tempe, Arizona, USA

09:30 - 10:00
(INVITED) Harnessing Mg implantation and ultra-high pressure annealing for high-performance vertical GaN power diodes
Spyridon Pavlidis1, Dolar Khachariya2, Shane Stein1, Md Azizul Hasan1, Matt Alessi1, William Mecouch2, Shashwat Rathknathiwar1, Seiji Mita2, Pramod Reddy2, James Tweedie2, Ronny Kirste2, Kacper Sierakowski3, Grzegorz Kamler3, Michal Bockowski3, Erhard Kohn1, Ramón Collazo1, Zlatko Sitar1,2
1North Carolina State University, Raleigh, NC, USA. 2Adroit Materials, Cary, NC, USA. 3Institute of High Pressure Physics of the Polish Academy of Sciences, Warsaw, Poland

Characterization: Power and RF Devices
10:30 - 12:00 Tuesday, November 5, 2024
Location: Coral 1
Chair: Srabanti Chowdhury

10:30 - 11:00
(INVITED) Development of GaN for Vertical Applications
Jennifer Hite1, Travis Anderson1, Jaime Freitas2, James Gallagher2, Alan Jacobs2, Michael Mastro2
1University of Florida, Gainesville, Florida, USA. 2US Naval Research Laboratory, Washington, DC, USA

11:00 - 11:15
Degradation Phenomena of Vertical GaN-on-Si Trench MOSFETs for Power Switching Applications
Nicolò Zagni1, Manuel Fregolent2, Carlo De Santi2, Giovanni Verzellesi3, Gaudenzio Meneghesso2, Enrico Zanoni2, Christian Huber4, Matteo Meneghini2, Paolo Pavan1
1DIEF, University of Modena and Reggio Emilia, Modena, Italy. 2DEI, University of Padova, Padova, Italy. 3DISMI and EN&TECH, University of Modena and Reggio Emilia, Reggio Emilia, Italy. 4Robert Bosch, GmbH, Renningen, Germany

11:15 - 11:30
In situ nanobeam X-ray diffraction of vertical power devices grown on OVPE-GaN substrates
Yusuke Hayashi1,2, Tetsuya Tohei2, Kazushi Sumitani3, Yasuhiko Imai3, Shigeru Kimura3, Shigeyoshi Usami4, Masayuki Imanishi4, Yusuke Mori4, Akio Wakejima5, Hirotaka Watanabe6, Shugo Nitta6, Yoshio Honda6, Hiroshi Amano6, Akira Sakai2
1NIMS, Tsukuba, Ibaraki, Japan. 2Grad. Sch. Eng. Sci., Osaka Univ., Toyonaka, Osaka, Japan. 3JASRI, Koto, Hyogo, Japan. 4Grad. Sch. Eng., Osaka Univ., Suita, Osaka, Japan. 5Kumamoto Univ., Kumamoto, Kumamoto, Japan. 6Nagoya Univ., Nagoya, Aichi, Japan

11:30 - 11:45
Analysis of Leakage Channel with Different Al Composition Back-Barrier in AlN/GaN High Electron Mobility Transistors on Si

Siyu Liu1,2, Yihao Zhuang2, Hanchao Li1, Qingyun Xie3,4, Yue Wang5, Hanlin Xie3,4, Kumud Ranjan3,4, Geok Ing Ng1,2,3,4,5
1School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Singapore. 2Energy Research Institute, Nanyang Technological University, Singapore, Singapore. 3National GaN Technology Centre, Agency for Science, Technology and Research, Singapore, Singapore. 4Institute of Microelectronics, Agency for Science, Technology and Research, Singapore, Singapore. 5Low Energy Electronic Systems, Singapore-MIT Alliance for Research and Technology, Singapore, Singapore

11:45 - 12:00
Quantifying Strain Relaxation and Interface Roughness in AlN/GaN/AlN QW HEMTs on Bulk AlN Substrates with Record Low Sheet Resistance
Naomi Pieczulewski, Yu-Hsin Chen, Jimy Encomendero, Huili Xing, Debdeep Jena, David Muller
Cornell University, Ithaca, NY, USA

Electronic Devices: Processing
10:30 - 12:00 Tuesday, November 5, 2024
Location: Coral 2
Chair: Douglas Yoder

10:30 - 10:45
Leakage Current Reduction in GaN p-i-n Homojunction Avalanche Photodiodes via Shallow-Bevel-Mesa Edge Termination
Russell Dupuis1, Zhiyu Xu1, Theeradetch Detchprohm1, Shyh-Chiang Shen1, A. Nepomuk Otte2
1School of ECE, Georgia Institute of Technology, Atlanta, GA, USA. 2School of Physics, Georgia Institute of Technology, Atlanta, GA, USA

10:45 - 11:00
Low Contact Resistivity at 10-4 Ω·cm2 Level Directly on n-type AlN
Haicheng Cao1, Xiao Tang1, Biplab Sarkar2, Ying Wu1, Xiaohang Li1
1King Abdullah University of Science and Technology, Jeddah, Saudi Arabia. 2Indian Institute of Technology, Roorkee, Uttarakhand, India

11:00 - 11:15
Mg-annealed contact layers to reduce the on-resistance of vertical GaN PN diodes formed via Mg implantation
Md Azizul Hasan1, Matthew Alessi1, Dolar Khachariya2, Will Mecouch2, Seiji Mita2, Pramod Reddy2, James Tweedie2, Kacper Sierakowski3, Grzegorz Kamler3, Michal Bockowski3, Erhard Kohn3, Zlatko Sitar1, Ramón Collazo1, Spyridon Pavlidis1
1North Carolina State University, Raleigh, NC, USA. 2Adroit Materials, Cary, NC, USA. 3Polish Academy of Sciences, Warsaw, Poland

11:15 - 11:30
Effects of Subsequent Annealing on Etching Resistance and Electrical Properties of n-type GaN Films Deposited by Reactive Sputtering Method
Shinji Yamada1, Kiho Tanaka1, Manabu Arai2, Tetsu Kachi2, Jun Suda1,2

1Graduate School of Engineering, Nagoya University, Nagoya, Aichi, Japan. 2IMaSS, Nagoya University, Nagoya, Aichi, Japan

11:30 - 11:45
Impact of Gate Recess on High Al-content (70%) AlGaN HEMTs
Hridibrata Pal1, Qingyun Xie1, John Niroula1, Mihee Ji2, Ronald Green2, Aivars Lelis2, Tomas Palacios1
1Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. 2Army Research Laboratory, Adelphi, Maryland, USA

11:45 - 12:00
Influence of laser processing point on GaN Crystal in laser slicing
Atushi Tanaka1, Toshiki Yui2, Tomomi Aratani2, Takashi Ishida3, Yoshio Honda1, Junji Ohara3, Takashi Kanemura3, Yoshitaka Nagasato3, Shoichi Onda1, Jun Suda1, Hiroshi Amano1
1Nagoya University, Nagoya, Aichi, Japan. 2Hamamatsu Photonics K.K., Hamamatsu, Shizuoka, Japan. 3MIRISE Technologies Corp., Nisshin, Aichi, Japan

Growth: Bulk 2
10:30 - 12:00 Tuesday, November 5, 2024
Location: South Pacific 1/2
Chair: Zlatko Sitar

10:30 - 11:00
(INVITED) Development of 100 mm AlN Single-Crystal Growth and Subsequent Substrate Preparation
James Grandusky, Robert Bondokov, Justin Mark, Kasey Hogan, Griffin Norbury
Crystal IS, Green Island, New York, USA

11:00 - 11:15
Development of N-Polar AlN Substrates for Growth of Novel Device Structures
Rafael Dalmau, Toru Kinoshita, Samuel Kirby, Jeffrey Britt, Raoul Schlesser
HexaTech, Inc., Morrisville, North Carolina, USA

11:15 - 11:30
Hexagonal BN crystallization under high pressure of N2 gas: characteristics of the use of Ni and Ni-Cr systems as solvents
Petro Sadovyi1, Bohdan Sadovyi1,2, Borys Turko2, Andrii Nikolenko3, Viktor Strelchuk3, Igor Petrusha4, Sylwester Porowski1, Izabella Grzegory1
1Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland. 2Faculty of Physics Ivan Franko National University of Lviv, Lviv, Ukraine. 3V.E. Lashkaryov Institute of Semiconductor Physics NAS of Ukraine, Kyiv, Ukraine. 4V. Bakul Institute for Superhard Materials NAS of Ukraine, Kyiv, Ukraine

11:30 - 12:00
(INVITED) Progress in Bulk Single Crystal Growth of Boron Nitride
Florian Metzger, Jacob Dooley, Jonathan Valenzuela, Tenzin Sherpa, Nathan Stoddard, Kai Landskron, Siddha Pimputkar
Lehigh University, Bethlehem, PA, USA

Electronic Devices: Circuits and Device Components
10:30 - 12:00 Tuesday, November 5, 2024
Location: South Pacific 3/4
Chair: Pramod Reddy

10:30 - 10:45
Investigation of Charges Originated from Near-Surface Defects in p-type GaN Using X-ray Photoelectron Spectroscopy and MOS Diodes
Masamichi AKazawa, Yining Jiao, Masanobu Takahashi, Takahiro Shimazaki, Taketomo Sato
RCIQE, Hokkaido University, Sapporo, Hokkaido, Japan

10:45 - 11:00
A GaN-based Monolithic Bi-Directional Switch with Balanced Performance
Zheng Wu1, Sirui Feng1, Tao Chen1, Yat Hon Ng1, Zongjie Zhou1, Yingchen Yang1, Yutao Geng1, Yan Cheng1, Hang Liao1, Zheyang Zheng2, Kevin Chen1
1The Hong Kong University of Science and Technology, Hong Kong, China. 2University of Science and Technology of China, Hong Kong, Anhui, China

11:00 - 11:15
A GaN-based Hybrid Logic Circuitry with Low Power Consumption and Enhanced Fanout Capability
Shaoyan Ma1,2, Qimeng Jiang1, Sen Huang1,2, Xinhua Wang1,2, Xinyu Liu1,2
1High-Frequency High-Voltage Device and Integrated Circuits R&D Center, Institute of Microelectronics, Chinese Academy of Sciences, Beijing, China. 2University of Chinese Academy of Sciences, Beijing, China

11:15 - 11:30
Monolithically Integrated GaN CMOS Comparator
Yutao Geng1,2, Zheyang Zheng1,2, Li Zhang2, Yan Cheng1,2, Tao Chen1,2, Sirui Feng1,2, Yat Hon Ng1,2, Jiahui Sun2, Ji Shu2, Hang Liao2, Han Xu2, Haochen Zhang2, Kevin J. Chen1,2
1The Hong Kong University of Science and Technology Shenzhen Research Institute, Shenzhen, Guangdong, China. 2The Hong Kong University of Science and Technology, Hong Kong, China

11:30 - 11:45
Heterostructure Engineering for sub-10-6 Ohm-cm2 contact to UWBG (> 80% Al-Content) AlGaN
Yinxuan Zhu1, Andrew Allerman2, Chandan Joishi1, Jonathan Pratt1, Agnes Maneesha Dominic Merwin Xavier1, Brianna Klein2, Andrew Armstrong2, Siddharth Rajan1
1The Ohio State University, Columbus, Ohio, USA. 2Sandia National Laboratories, Albuquerque, New Mexico, USA

11:45 - 12:00
MOCVD growth of heavily doped AlGaN alloys enabling low resistance contacts to Al-rich, AlGaN lateral transistors
Andrew Allerman1, Andrew Armstrong1, Brianna Klein1, Yinzuan Zhu2, Chandan Joishi2, Siddharth Rajan2
1Sandia National Laboratories, Albuquerque, NM, USA. 2The Ohio State University, Columbus, OH, USA

Electronic Devices: Power/High Voltage 2
10:30 - 12:00 Tuesday, November 5, 2024
Location: Coral 4/5
Chair: Erdem Arkun

10:30 - 11:00
(INVITED) More power to GaN with Diamond integration
Srabanti Chowdhury
Stanford University, Stanford, CA, USA

11:00 - 11:15
High Temperature Reverse Bias Stressing of 3.3kV Planar GaN Diodes with Implanted Termination
Alan Jacobs[1], James Lundh[1], Geoffrey Foster[1], Andrew Koehler[1], James Gallagher[1], Brendan Gunning[2], Robert Kaplar[2], Travis Anderson[1], Karl Hobart[1], Michael Mastro[1]
[1]US Naval Research Laboratory, Washington, DC, USA. [2]Sandia National Labs, Albuquerque, NM, USA

11:15 - 11:30
kV-class p-NiO/LiNiO/GaN heterojunction PiN diodes: a potential replacement for p-GaN
Zheng Hao, Alessandro Floriduz, Yuan Zong, Elison Matioli
École Polytechnique Fédérale de Lausanne, Lausanne, Vaud, Switzerland

11:30 - 11:45
Monolithic Bidirectional AlGaN/GaN HEMT with >3kV breakdown voltage
Md Tahmidul Alam, Swarnav Mukhopadhyay, Md Mobinul Haque, Shubhra S. Pasayat, Chirag Gupta
University of Wisconsin-Madison, Madison, Wisconsin, USA

11:45 - 12:00
Experimental and Numerical Analysis of Surface-Related Dynamic RON in p-GaN Power HEMTs
Nicolò Zagni1, Giovanni Verzellesi2, Ferdinando Iucolano3, Marcello Cioni3, Giovanni Giorgino3,1, Maria Concetta Nicotra3, Maria Eloisa Castagna3, Alessandro Bertacchini2, Mattia Borgarino1, Alessandro Chini1
1University of Modena and Reggio Emilia, Modena, Italy. 2University of Modena and Reggio Emilia, Reggio Emilia, Italy. 3STMicroelectronics, Catania, Italy

Characterization: AlN Doping and Electronics
13:00 - 15:00 Tuesday, November 5, 2024
Location: Coral 1
Chair: Andrew Alleman

13:00 - 13:15
Impact of Annealing Budget on Electrical and Optical Characteristics of Ge- and Si-implanted AlN
Chao-I Liu1, Shashwat Rathkanthiwar1, Masahiro Kamiyama1, Auditee Majumder1, Cristyan Quiñones-García1, Seiji Mita2, Pramod Reddy2, Ronny Kirste2, Ramón Collazo1, Zlatko Sitar1,2
1North Carolina State University, Raleigh, NC, USA. 2Adroit Materials, Cary, NC, USA

13:15 - 13:30
Surface Accumulation of Beryllium in Aluminum Nitride by Post-ion Implantation Diffusion
Yingying Lin1, Jia Wang2, Haitao Wang3, Yoshida Honda3, Hiroshi Amano3
1Deep Tech Serial Innovation Center Laboratory, Nagoya University, Nagoya, Aichi, Japan. 2Institute for Advanced Research, Nagoya University, Nagoya, Aichi, Japan. 3Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi, Japan

13:30 - 13:45
Characterizations of Defects-induced Two-photon Absorption in Aluminum Nitride across UV-visible Spectrum Using Z-scan Method
Tao Li1, Jingan Zhou1, Xuan Zhao1, Xiang Zhang1, Jacques Doumani1, Mingfei Xu1, Shisong Luo1, Cheng Chang1, Ziyi He2, Jacob Robinson1, Pulickel Ajayan1, Junichiro Kono1, Yuji Zhao1
1Rice University, Houston, TX, USA. 2Arizona State University, Tempe, AZ, USA

13:45 - 14:00
Electron mobility in AlN from first principles
Amanda Wang1, Woncheol Lee1,2, Nick Pant1,3, Emmanouil Kioupakis1
1University of Michigan, Ann Arbor, MI, USA. 2University of California, Santa Barbara, Santa Barbara, CA, USA. 3The University of Texas at Austin, Austin, TX, USA

14:00 - 14:15
Low field electron transport in wurtzite AlN: An ab-initio approach
Animesh Datta, Ankit Sharma, Matinehsadat Hosseinigheidari, Uttam Singisetti
University at Buffalo, Buffalo, NY, USA

14:15 - 14:30
Diffusion of magnesium in AlGaInN layers grown by MOVPE
Mikolaj Grabowski1, Ewa Grzanka1, Pawel Michalowski2, Rafal Jakiela3, Robert Czernecki1, Andrzej Turos2, Mike Leszczynski1
1Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland. 2Lukasiewicz Network Institute of Microelectronics and Photonics, Warsaw, Poland. 3Institute of Physics Polish Academy of Sciences, Warsaw, Poland

14:30 - 14:45
Ultrawide-Bandgap AlN and Wide-Bandgap GaN Thin-Film Piezoelectric Physical Sensors for Harsh Environment Applications
Jae-Hyun Ryou1, Nam-In Kim1, Asad Ali1, Muhammad Aqib1, Mihee Ji2, Vijay Parameshwaran2, Wendy Sarney2, Marc Litz2, John Demaree2, Leighann Larkin2
1University of Houston, Houston, TX, USA. 2Army Research Lab, Adelphy, MD, USA

14:45 - 15:00
2kV AlN-on-AlN Metal-Semiconductor Field-Effect Transistors MESFETs
Bingcheng Da, Dinusha Herath Mudiyanselage, Houqiang Fu
Arizona State University, Tempe, Arizona, USA

Novel Materials and Nanostructure: MicroLEDs
13:00 - 15:00 Tuesday, November 5, 2024
Location: Coral 2
Chair: Hongxing Jiang

13:00 - 13:30
(INVITED) A Bottom-up Approach to Efficient Red-emitting MicroLEDs at Sub-µm Pixel Scale
Lars Samuelson
Institute of Nanoscience and Applications (INA), SUSTech, Shenzhen, China. NanoLund, Lund University, Lund, Sweden. Hexagem AB, Science Park “Ideon”, Lund, Sweden

13:30 - 13:45
InGaN QDs µLED formed by novel in-situ etch process through MOCVD
Cheng Liu, Qinchen Lin, Nikhil Pokharel, Alec Berg, Miguel A. Betancourt Ponce, Shining Xu, Guangying Wang, Shijie Zhang, Padma Gopalan, Chirag Gupta, Shubhra Pasayat, Luke Mawst
University of Wisconsin - Madison, Madison, WI, USA

13:45 - 14:00
Sub-micron light emitting diode arrays and high-purity single-photon sources with InGaN quantum structures using nanoscale optical quenching technique
Yong-Hoon Cho
Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, Republic of

14:00 - 14:15
Spontaneously arrayed multicolor InGaN micro-LEDs for spectrum-controllable broadband light emitters
Yoshinobu Matsuda, Haruyoshi Miyawaki, Mitsuru Funato, Yoichi Kawakami
Kyoto University, Kyoto, Kyoto, Japan

14:15 - 14:30
Tailoring carrier localization in InGaN QW for enhanced EQE in micro-LEDs by introducing a SiNx interlayer
Markus Pristovsek, Joeng-Hwan Park, Wong Kwoon, Haejong Cheong, Hiroshi Amano
Nagoya University, Nagoya, Japan

14:30 - 15:00
(INVITED) Structured Light by microLEDs From Chip Processing to Optical Neuromorphic Computing
Andreas Waag1, Georg Schöttler1, Maximilian Vergin1, Steffen Higgins-Wood1, Stefan WEolter1, Florian Meierhofer1, Rany Miranti-Augustin1, Jana Hartmann1, Victor Moro2, Ángel Diéguez2, Joan Canals2, Robert Kraneis1, Maximilian Müller1, Noah Kaelin3, Christian Werner3, Norwin von Malm4, Juan Daniel Prades1,2
1Nitride Technology Center,, TU Braunschweig, Germany. 2Dept. of Electronic and Biomedical Engineering, University of Barcelona, Spain. 3Eastern Switzerland University of Applied Sciences, Rapperswil-Jona, Switzerland. 4ams OSRAM International GmbH, Regenburg, Germany

Growth: AlGaN
13:00 - 15:00 Tuesday, November 5, 2024
Location: South Pacific 1/2
Chairs: Wei Guo, Tim Kolbe

13:00 - 13:30
(INVITED) Advances in the epitaxial growth of heterostructures for far-ultraviolet C light emitting diodes
Tim Kolbe1, Sylvia Hagedorn1, Jens Rass1, Hyun Kyong Cho1, Jakob Höpfner2, Anton Muhin2, Jan Ruschel1, Tim Wernicke2, Michael Kneissl1,2, Sven Einfeldt1, Markus Weyers1
1Ferdinand-Braun-Institut (FBH), Berlin, Germany. 2Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany

13:30 - 13:45
Highly reflective Al-rich AlGaN/AlN deep UV distributed Bragg reflectors on AlN native substrates
Shun Washiyama, Tomonori Matsushita, Shin-ichiro Inoue
National Institute of Information and Communications Technology, Kobe, Hyogo, Japan

13:45 - 14:00
Biaxial Strain Management in AlGaN Growth via 2D FACELO
Michael Carter1, Jack Almeter1, Shashwat Rathkanthiwar1, Ronny Kirste2, Seiji Mita2, Ramón Collazo1, Zlatko Sitar1,2
1North Carolina State University, RALEIGH, NC, USA. 2Adroit Materials, Cary, NC, USA

14:00 - 14:15
Avoiding relaxation by pyramidal slip to grow fully coherent AlGaN devices on AlN-on-sapphire templates.
Ashley Wissel-Garcia, Feng Wu, James Speck
Materials Department, UC Santa Barbara, Santa Barbara, California, USA

14:15 - 14:30
Homoepitaxial Regrowth of AlGaN on AlGaN Templates Prepared via Chemical Mechanical Polishing and its Application to UV-B Laser Diodes
Yamada Ryoya
Meijo university, Nagoya, Aichi, Japan

14:30 - 14:45
MOCVD growth of N-polar AlxGa1-xN layers on bulk AlN substrates
toru kinoshita, Samuel Kirby, Jeffrey Britt, Raoul Schlesser, Rafael Dalmau
HexaTech, Inc., Morrisville, North Carolina, USA

14:45 - 15:00
Quantitative analysis of graded AlGaN hole injection layer in 233nm UV-C LED structure with optical in-situ metrology
Volker Blank1, Tim Kolbe2, Markus Weyers2, Joachim Rest1, Kolja Haberland1, Patrick Arnold1, Claudine Groß1
1LayTec AG, Berlin, Germany. 2Ferdinand-Braun-Institut (FBH), Berlin, Germany

Optoeelctronic Devices: UV laser diodes
13:00 - 15:00 Tuesday, November 5, 2024
Location: South Pacific 3/4
Chair: James Grandusky

13:00 - 13:30
(INVITED) Deep ultraviolet semiconductor laser with polarization control technology
Maki Kushimoto1, Ziyi Zhang2, Akira Yoshikawa2, Koji Aoto1, Yoshio Honda1, Chiaki Sasaoka1, Hiroshi Amano1
1Nagoya University, Nagoya, Japan. 2Asahi Kasei Corporation, Tokyo, Japan

13:30 - 13:45
Optimization of AlGaN Electron Blocking Layer for Semipolar (20-2-1) GaN Edge-Emitting Laser Diodes
Jiaao Zhang, Emily Trageser, Dan Cohen, Arturo Juan, Shuji Nakamura, Steven DenBaars
University of California, Santa Barbara, Santa Barbara, California, USA

13:45 - 14:00
Design and Characterization of Semipolar InGaN-based Distributed Feedback Laser Diodes
Emily Trageser1, Jiaao Zhang1, Daniel Cohen1, Haojun Zhang1, Theodore Morin1, Ryan Anderson2, John Bowers1, Shuji Nakamura1, Steven DenBaars1
1University of California, Santa Barbara, Santa Barbara, California, USA. 2BluGlass, Ltd., Silverwater, NSW, Australia

14:00 - 14:15
Enhanced External Quantum Efficiencies of Double-heterostructure-based Far-UVC LEDs Compared to MQWs-based Far-UVC LEDs
Ryota Akaike1, Kenjiro Uesugi1, Hiroki Yasunaga1, Shuhei Ichikawa2, Takao Nakamura1, Masahiko Tsuchiya3, Kazunobu Kojima2, Hideto Miyake1
1Mie University, Tsu, Japan. 2Osaka University, Suita, Japan. 3Stanley Electric Co., Yokohama, Japan

14:15 - 14:30
High output power (>3 W) GaN UV-A (376nm) LASER diode with GaN waveguide
Guangying Wang1, Qinchen Lin1, Cheng Liu1, Surjava Sanyal1, Matthew Dwyer2, Matthew Seitz3, Jiahao Chen1, Tom Earles2, Nelson Tansu4, Jing Zhang3, Luke Mawst1, Chirag Gupta1, Shubhra Pasayat1
1University of Wisconsin-Madison, madison, WI, USA. 2DRS Daylight Solutions, madison, WI, USA. 3Rochester Institute of Technology, Rochester, NY, USA. 4The University of Adelaide, Adelaide, SA, Australia

14:30 - 15:00
(INVITED) Current Status and Challenges of AlGaN-based UV-B Laser Diodes Fabricated on Lattice Relaxed AlGaN
Motoaki Iwaya1, Sho Iwayama1, Tetsuya Takeuchi1, Satoshi Kamiyama1, Hideto Miyake2
1Meijo University, Nagoya, Japan. 2Mie University, Tsu, Japan

Electronic Devices: Insulated Gate FETs 2
13:00 - 15:00 Tuesday, November 5, 2024
Location: Coral 4/5
Chair: Dolar Khachariya

13:00 - 13:15
Realization of p-type high concentration GaN layer by sequential Mg and N ion-implantation
Ryo Tanaka1, Shinya Takashima1, Jun Uzuhashi2,3, Jun Chen2, Tadakatsu Ohkubo2, Takashi Sekiguchi2,3, Masaharu Edo1
1Fuji Electric Co., Ltd., Hino, Tokyo, Japan. 2National Institute for Materials Science, Tsukuba, Ibaraki, Japan. 3University of Tsukuba, Tsukuba, Ibaraki, Japan

13:15 - 13:30
Growth and Characterization of AlN/AlGaN/AlN Structures Grown by HT-MOCVD demonstrating >2E13 cm-2 2DEG
Hadi Sena, Jackson Meng, Srabanti Chowdhury
Stanford University, Stanford, California, USA

13:30 - 13:45
Extreme Bandgap recessed gate MOSHFET with drain current 0.28 Amm−1 and threshold voltage -1.5 V
Abdullah Al Mamun Mazumder1, Abdullah Mamun1, Kenneth Stephenson1, Kamal Hussain2, Tariq Jamil1, MVS Chandrashekhar1, Grigory Simin1, Asif Khan1
1University of South Carolina, Columbia, South Carolina, USA. 2Texas Instruments Incorporated, Richardson, Texas, USA

13:45 - 14:00
Superior trade-off between Vth and mobility in GaN-MOSFETs by Al-doped surface and Mg doping
Tsurugi Kondo1, Katsunori Ueno1, Ryo Tanaka1, Shinya Takashima1, Masaharu Edo1, Tomoyuki Suwa2
1Fuji Electric, Hino, Tokyo, Japan. 2NICHe Tohoku University, Sendai, Miyagi, Japan

14:00 - 14:15
A Transport Property of an AlSiO/AlN/p-type GaN MOSFET Revealed By Temperature-Dependent Hall-Effect Analysis of the Electron Inversion Channel
Tetsuo Narita1, Kenji Ito1, Kazuyoshi Tomita2, Hiroko Iguchi1, Shiro Iwasaki1, Masahiro Horita3, Emi Kano2, Nobuyuki Ikarashi2, Daigo Kikuta1
1Toyota Central R&D Labs., Inc., Nagakute, Aichi, Japan. 2IMaSS, Nagoya University, Nagoya, Aichi, Japan. 3Graduate School of Engineering, Nagoya University, Nagoya, Aichi, Japan

14:15 - 14:30
Comparative study of a new ALD high-k gate dielectric and MOCVD SiN gate dielectric in N-polar Deep Recess GaN HEMTs
Oguz Odabasi1, Xin Zhai2, Md. Irfan Khan2, Kamruzzaman Khan3, Rijo Baby1, Manoj CHANDRA1, Bill Mitchell3, Elaheh Ahmadi1
1University of California Los Angeles, Los Angeles, California, USA. 2University of Michigan Ann Arbor, Ann Arbor, Michigan, USA. 3University of California Santa Barbara, Goleta, California, USA

14:30 - 14:45
Bias voltage and temperature dependence of threshold voltage instability due to positive bias stress in GaN planer MOSFETs with SiO2 gate dielectric
Yuki Ichikawa1, Katsunori Ueno2, Tsurugi Kondo2, Ryo Tanaka2, Shinya Takashima3, Jun Suda1,4
1Nagoya University, Nagoya, Aichi, Japan. 2Fuji Electric Co., Ltd, Hino, Tokyo, Japan. 3Fuji Electric, Hino, Tokyo, Japan. 4IMass, Nagoya, Aichi, Japan

14:45 - 15:00
Demonstration of high-mobility AlN/GaN channel of recessed GaN-MOSFET with alkaline wet etching
Mariko Shimizu1, Masahiko Kuraguchi1, Hiroshi Ono1, Aya Shindome1, Miyoko Shimada1, Akira Yoshioka2, Yosuke Kajiwara1
1Toshiba Corporation, Kawasaki, Japan. 2Toshiba Electronic Devices & Storage Corporation, Kawasaki, Japan

Characterization: Doping and Defects 1
15:30 - 17:15 Tuesday, November 5, 2024
Location: Coral 1
Chair: Kelsey Mirrielees

15:30 - 16:00
(INVITED) THz EPR ellipsometry
Viktor Rindert1, Vanya Darakchieva1, Mathias Schubert2
1Lund University, Lund, Scania, Sweden. 2University of Nebraska, Lincoln, Nebraska, USA

16:00 - 16:15
Correlative TEM/APT/CL analyses on the effect of ultra-high-pressure annealing for Mg-implanted p-type GaN
Jun Uzuhashi1,2, Jun Chen1, Ryo Tanaka3, Shinya Takashima3, Kacper Sierakowski4, Michal Bockowski4, Tetsu Kachi5, Masaharu Edo3, Takashi Sekiguchi1,2, Tadakatsu Ohkubo1
1National Institute for Materials Science, Tsukuba, Ibaraki, Japan. 2University of Tsukuba, Tsukuba, Ibaraki, Japan. 3Advanced Technology Laboratory, Fuji Electric Co., Ltd., Hino, Tokyo, Japan. 4Institute of High Pressure Physics Polish Academy of Sciences, Sokolowska, Warsaw, Poland. 5IMass, Nagoya University, Nagoya, Aichi, Japan

16:15 - 16:30
Quantification of Mn oxidation state in bulk GaN:Mn
Katarzyna Gas1,2, Dariusz Sztenkiel1, Piotr Wisniewski3, Rafal Jakiela1, Yadhu Edathumkandy1, Malgorzata Iwinska4, Tomasz Sochacki4, Hanka Przybylinska1, Michal Bockowski4, Maciej Sawicki1,5
1Institute of Physics, Polish Academy of Sciences, Warszawa, Poland. 2Center for Science and Innovation in Spintronics, Tohoku University, Sendai, Japan. 3Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wroclaw, Poland. 4Institute of High Pressure Physics, Polish Academy of

Sciences, Warszawa, Poland. 5Research Institute of Electrical Communication, Tohoku University, Sendai, Poland

16:30 - 16:45
2D-Mgi doping in GaN: A fresh look at the interplay of GaN and interstitial Mg
Jia Wang, Hiroshi Amano
Nagoya University, Nagoya, Aichi, Japan

16:45 - 17:00
Reduction of Compensating Donor Concentration by Sequential N-ion Implantation in Mg-ion Implanted p-GaN
Kensuke Sumida1, Keita Kataoka2, Tetsuo Narita2, Masahiro Horita1,3, Tetsu Kachi1,3, Jun Suda1,3
1Department of Electronics, Nagoya University, Nagoya, Aichi, Japan. 2Toyota Central R&D Labs., Inc., Nagakute, Aichi, Japan. 3Nagoya University, IMaSS, Nagoya, Aichi, Japan

17:00 - 17:15
P-type conductivity in GaN:Be epitaxial layers
Marcin Zajac1, Leszek Konczewicz1,2, Michael Reshchikov3, Benjamin McEwen4, Fatemeh Shahedipour-Sandvik4
1Institute of High Pressure Physics, Polish Academy of Sciences, Warsaw, Poland. 2Laboratoire Charles Coulomb (L2C), Université de Montpellier, CNRS, Montpellier, France. 3Virginia Commonwealth University, Richmond, USA. 4University at Albany, Albany, USA

Growth: LEDs and InGaN
15:30 - 17:15 Tuesday, November 5, 2024
Location: Coral 2
Chair: Sylvia Hagedorn

15:30 - 15:45
Electrical analysis of III-nitride blue and green micro-light-emitting diodes
Matthew Wong, Tanay Tak, Kent Nitta, James Speck, Steve DenBaars
UC Santa Barbara, Santa Barbara, CA, USA

15:45 - 16:00
Thermodynamic analysis of point defects formation in the InxGa1-xN (x=0, 0.11, 0.22) thin films – ab initio calculations
Roman Hrytsak1,2, Pawel Kempisty1, Mike Leszczynski1, Malgorzata Sznajder2
1Institute of High Pressure Physics "Unipress", PAS, Warsaw, Poland. 2Institute of Physics, University of Rzeszow, Rzeszow, Poland

16:00 - 16:15
Real-time X-ray Monitoring of the Dynamics of Atomic-Scale Surface Steps during (In)GaN Growth by MOVPE
Guangxu Ju1, Wenyuan Ouyang1, Dongwei Xu2, Carol Thompson3, Matthew Highland4, Jeffrey Eastman4, Weronika Walkosz5, Peter Zapol4, Bo Shen1, G. Brian Stephenson4

1Peking University, Beijing, China. 2Huazhong University of Science and Technology, Wubei, China. 3Northern Illinois University, DeKalb, USA. 4Argonne National Laboratory, Lemont, USA. 5Lake Forest College, Lake Forest, USA

16:15 - 16:30
Realization of sharp heterojunction interface in AlGaN-based UV-B laser diodes and resulting improvement of device performances
Takumu Saito1, Rintaro Miyake1, Ryoya Yamada1, Yoshinori Imoto1, Shundai Maruyama1, Yusuke Sasaki1, Sho Iwayama1, Hideto Miyake2, Satoshi Kamiyama1, Tetsuya Takeuchi1, Motoaki Iwaya1
1Aichi, Nagoya, Japan. 2Mie, Tsu, Japan

16:30 - 16:45
Planarization of Surfaces in V-Defect Engineered III-Nitride LEDs
Tanay Tak1, Alejandro Quevedo2, Feng Wu1, Srinivas Gandrothula1, Jacob Ewing1, Stephen Gee1, Shuji Nakamura1,2, Steven DenBaars1,2, James Speck1
1Materials Department, University of California, Santa Barbara, USA. 2Department of Electrical and Computer Engineering, University of California, Santa Barbara, USA

16:45 - 17:00
Development of long wavelength V-defect GaN-based LEDs
James Speck, Alejandro Quevedo
University of California, Santa Barbara, CA, USA

17:00 - 17:15
Design proposal of pure circularly polarized emitters using (0001) InGaN LEDs with GaN nanopillar metasurface
Yohei Taguchi1, Kyohei Suzuki1, Yuki Murata1, Shintaro Toda2, Shuhei Ichikawa1,3, Kazunobu Kojima1
1Graduate School of Engineering, Osaka University, Suita, Osaka, Japan. 2ULVAC-Osaka University Joint Research Laboratory for Future Technology, Suita, Osaka, Japan. 3Research Center for UHVEM, Ibaraki, Osaka, Japan

Growth: Doping and Defects 1 (AlN & AlGaN)
15:30 - 17:15 Tuesday, November 5, 2024
Location: South Pacific 1/2
Chair: Ramon Collao

15:30 - 16:00
(INVITED) Predicting point defect distributions in III-Nitrides and their alloys during growth and processing
Douglas Irving
North Carolina State University, Raleigh, NC, USA

16:00 - 16:15
Investigation of Growth Conditions to Reduce Impurity Concentration in Quaternary AlGaInN Grown by MOVPE

Yuto Yamada1, Takeru Kumabe1, Hirotaka Watanabe2, Shugo Nitta2, Yoshio Honda2,3,4, Hiroshi Amano2,3,4
1Graduate School of Engineering, Nagoya University, Nagoya, Aichi 464-8601, Japan. 2Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi 464-8601, Japan. 3Deep Tech Serial Innovation Center, Nagoya University, Nagoya, Aichi 464-8601, Japan. 4Institute for Advanced Research, Nagoya University, Nagoya, Aichi 464-8601, Japan

16:15 - 16:30
Impurity Band Conduction in Mg-doped Al-rich AlGaN
Seiji Mita1,2, Shashwat Rathkanthiwar2, Pegah Bagheri2, Pramod Reddy1,2, Cristyan Quiñones-Garcia22, Dolar Khachariya1, James Loveless2, Masahiro Kamiyama2, Tim Eldred2, Baxter Moody1,2, Ronny Kirste1,2, Ramón Collazo2, Zlatko Sitar2
1Adroitmaterials, Cary, NC, USA. 2North Carolina State University, Raleigh, NC, USA

16:30 - 16:45
Ultralow Resistivity Al-rich AlGaN Grown on C-face 4H-SiC by Molecular Beam Epitaxy
Shubham Mondal, Pat Kezer, Md Mehedi Hasan Tanim, Ding Wang, John T. Heron, Zetian Mi
University of Michigan, Ann Arbor, Michigan, USA

16:45 - 17:15
(INVITED) Low Temperature AlN Epitaxy, Doping, and Devices
W. Alan Doolittle1, Christopher M. Matthews2, Habib Ahmad2, Keisuke Motoki2, Sangho Lee2, Emily N. Marshall2, Amanda L. Tang2, Paul-Stephen Hutchinson-Maltaghati2, Aheli Ghosh2
1Georgia Institute of Technology, Atlanta, GA, USA. 2

Optoelectronic Devices: LEDs 2 (UV)
15:30 - 17:15 Tuesday, November 5, 2024
Location: South Pacific 3/4
Chair: Hirotsugu Kobayashi

15:30 - 16:00
(INVITED) Efficiency Increase in 220-230 nm Far-UVC LEDs fabricated on c-sapphire and Demonstration of 200 mW Class 230 nm Power LED Module
Hideki Hirayama
RIKEN, Wako, Saitama, Japan

16:00 - 16:15
Impact of growth conditions on IQE of Far-UVC LEDs
Shashwat Rathkanthiwar1, Maki Kushimoto2, Hiroshi Amano2,3, Yudai Shimizu4, Kazutada Ikenaga4, Mayank Bulsara4, Keitaro Ikejiri4, Leo J Schowalter1,3,5
1Lit Thinking, Orlando, Florida, USA. 2Graduate School of Engineering, Nagoya University, Nagoya, Japan. 3Center for Integrated Research of Future Electronics, Institute of Materials Research and System for Sustainability, Nagoya University, Nagoya, Japan. 4Taiyo Nippon Sanso, Innovation Unit, Yokohama, Kanagawa, Japan. 5Department of Materials Science and Engineering, University of Central Florida, Orlando, Florida, USA

16:15 - 16:30
Emission characteristics and carrier injection of far-UVC light emitting diodes with emission wavelength between 218 nm and 242 nm
Tim Kolbe1, Jakob Höpfner2, Paula Vierck2, Sylvia Hagedorn1, Jens Rass1, Hyun Kyong Cho1, Tim Wernicke2, Michael Kneissl2,1, Sven Einfeldt1, Markus Weyers1
1Ferdinand-Braun-Institut (FBH), Berlin, Germany. 2Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany

16:30 - 16:45
(Al,Ga)N UV-C LEDs with graphene-based transparent conductive support layers
Wolfgang Mertin, Johanna Meier, Hehe Zhang, Umut Kaya, Yannik Korte, Gerd Bacher
University of Duisburg-Essen, Werkstoffe der Elektrotechnik & CENIDE, Duisburg, Germany

16:45 - 17:15
(INVITED) Carrier Recombination, Transport Dynamics, and Degradation in Far-UVC LEDs: Assessing Efficiency Limits
M. Kneissl1,2, G. Cardinali1, S. Graupeter1, M. Grigoletto1, M. Guttmann1,2, V. Montag1, A. Muhin1, M. Schilling1, T. Wernicke1, H.K. Cho2, J. Glaab2, T. Kolbe2, J Ruschel2, S. Hagedorn2, N. Lobo-Ploch2, C. Netzel2, J. Rass2, S. Einfeldt2, M. Weyers2
1Institute of Solid State Physics, TU Berlin, Berlin, Germany. 2Ferdinand-Braun-Institut, Berlin, Germany

Electronic Devices: RF HEMTs
15:30 - 17:15 Tuesday, November 5, 2024
Location: Coral 4/5
Chair: Elison Matioli

15:30 - 16:00
(INVITED) IAF GaN-technology towards 200 GHz operation
Peter Brückner, Dirk Schwantuschke, Philipp Neininger, Stefano Leone, Lutz Kirste, Patrick Waltereit, Michael Mikulla, Rüdiger Quay
Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany

16:00 - 16:15
First Demonstration of GaN-on-Si HEMT for D-Band Power Amplification
Hanchao Li1, Qingyun Xie2,3, Zhongzhiguang Lu1, Hanlin Xie2,3, Yihao Zhuang1,4, Siyu Liu1,4, Yuxuan Wang5, Yue Wang6, Kumud Ranjan2,3, Xiao Gong5,3, Yuanjin Zheng1, Geok Ing Ng1,2,3,4,6
1School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Singapore. 2National GaN Technology Centre (NGTC), Agency for Science, Technology and Research (A*STAR), Singapore, Singapore. 3Institute of Microelectronics (IME), Agency for Science, Technology and Research (A*STAR), Singapore, Singapore. 4Energy Research Institute, Nanyang Technological University, Singapore, Singapore. 5Department of Electrical and Computer Engineering, National University of Singapore, Singapore, Singapore. 6Low Energy Electronic Systems, Singapore-MIT Alliance for Research and Technology, Singapore, Singapore

16:15 - 16:30
fmax > 400 GHz Al0.4Ga0.6N/GaN HEMTs with Al0.08Ga0.92N back barrier

Wan-Soo Park1, Hyeok-Jun Lee1, Su-Min Choi1, Sang-Kuk Kim2, Jae-Hak Lee1, Tae-Woo Kim3, Kyounghoon Yang4, Dae-Hyun Kim1
1Kyungpook National University, Daegu, Daegu, Korea, Republic of. 2QSI, Cheon-An, Chungcheongnam-do, Korea, Republic of. 3Texas Tech University, Lubbock, Texas, USA. 4Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Daejeon, Korea, Republic of

16:30 - 16:45
First Demonstration of Normally-Off N-polar GaN Deep Recess HEMT
Oguz Odabasi1, Md. Irfan Khan2, Kamruzzaman Khan3, Elaheh Ahmadi1
1University of California Los Angeles, Los Angeles, California, USA. 2University of Michigan Ann Arbor, Ann Arbor, Michigan, USA. 3University of California Santa Barbara, Goleta, California, USA

16:45 - 17:00
High Power Linearity and Steep Subthreshold GaN-based HEMTs for mmWave applications
Hao Lu, Ling Yang, Bin Hou, Xiaohua Ma, Yue Hao
Xidian University, Xian city, Shaanxi Province, China

17:00 - 17:15
CMOS-Compatible AlGaN/GaN-on-Si HEMTs featuring Record ft / fmax = 61/156 GHz with Novel 80nm Copper T-Gate and Regrown Contacts
Pradyot Yadav1, John Niroula1, Qingyun Xie1, Sheikh Rahman2, Jan Strate3, William Harmon4, Cesar Neve3, Eduardo Chumbes4, Jeffery Laroche4, Siddharth Rajan2, Ruonan Han1, Tomás Palacios1
1Massachusetts Institute of Technology, Cambridge, MA, USA. 2The Ohio State University, Columbus, OH, USA. 3Soitec, Hasselt, Belgium. 4Raytheon Missiles and Defense, Tewksbury, MA, USA

Poster Session 2
17:30 - 20:00 Tuesday, November 5, 2024
Location Coral 3

[Poster 119] Design and optimization of three-zone step-etched junction termination structures for vertical GaN power devices
Andrzej Taube1, Maciej Kamiński1,2
1Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland. 2Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland

[Poster 120] Improved DUV LED contact performance by atomic layer etching technology
Zhiyuan Liu, Tingang Liu, Haicheng Cao, Zixian Jiang, Na Xiao, Glen Isaac Maciel García, Yi Lu, Xiao Tang, Xiaohang Li
King Abdullah University of Science and Technology, Jeddah, Makkah, Saudi Arabia

[Poster 121] Self-alignment fabrication process for ultra-small DUV micro-LEDs
Zhiyuan Liu, Haicheng Cao, Tingang Liu, Na Xiao, Yi Lu, Xiao Tang, Xiaohang Li
King Abdullah University of Science and Technology, Jeddah, Makkah, Saudi Arabia

[Poster 122] Fabrication of nanostructures for GaN-based lasers

Magdalena Zadura1, Marek Ekielski1, Karolina Olucha1, Karolina Bogdanowicz1,2, Wioleta Slaba1, Joanna Jankowska-Sliwinska1, Anna Kafar3, Piotr Perlin3, Tomasz Czyszanowski2, Anna Szerling1
1Institute of microelectronics and photonics, Warsaw, Poland. 2Institute of Physics, Lodz University of Technology, Lodz, Poland. 3Institute of High Pressure Physics, Warsaw, Poland

[Poster 123] Improving efficiency of nanorod GaN LED using control the defect and morphology of side wall

Ja-Yeon Kim1, EunA Hong1, Min-Ki Kwon2
1Korea Photonics Technology Institute, Gwangju, Korea, Republic of. 2chosun university, Gwangju, Korea, Republic of

[Poster 124] A comparison of green LED device performance between InGaN/GaN multiple quantum wells grown on (0001) sapphire and (0001) free-standing GaN substrates

Rongzi Ni1, Mark Hopkinson1, James Griffiths2
1The University of Sheffield, Sheffield, United Kingdom. 2Huawei research and development UK, Ipswich, United Kingdom

[Poster 125] New Advances in GaN-based microcavity Lasers

Peng Chen1, Jing Zhou2, Yuyin Li1, Ziwen Yan1, Zili Xie1, Xiangqian Xiu1, Hong Zhao1, Rong Zhang1, Youdou Zheng1
1School of Electronic Science and Engineering, Nanjing Univerisity, Nanjing, Jiangsu, China. 2School of integrated circuits, AnHui University, Hefei, Anhui, China

[Poster 126] Reduced sidewall damage related external quantum efficiency (EQE) drop in red InGaN microLEDs (>630 nm at 1 A/cm2) in 2-5 µm devices

Surjava Sanyal, Qinchen Lin, Timothy Shih, Shijie Zhang, Guangying Wang, Swarnav Mukhopadhyay, Jonathan Vigen, Wentao Zhang, Md Mobinul Haque, Chirag Gupta, Shubhra Pasayat
University of Wisconsin Madison, Madison, Wisconsin, USA

[Poster 127] MOCVD-Grown AlxInyGa1-x-yN-Based Integrated Quantum Well Infrared Photodetector with Visible Emitter

Alireza Lanjani1, Benjamin McEwen1, Vincent Meyers1, David Hill2, Winston K. Chan2, Emma Rocco1, Shadi Omranpour1, F. Shahedipour-Sandvik1
1Department of Nanoscale Science and Engineering, State University of New York-Albany, Albany, NY, USA. 2SRI International, Princeton, NJ, USA

[Poster 128] Analysis of thermal dynamics of GaN-based micro LED using time-resolved optical technique

Park Jung-Ki1, Jae-sun kim1, Gyeongen Choi1, kyung-rok kim1, Hye-jun Yun1, Sung-min Hwang2, Won Taeg Lim2, Seoungyoung Lim3, Jung Hoon Song1,4
1Kongju National University, Gongju-si, Chungcheongnam-do, 56,Gongjudaehak-ro, Korea, Republic of. 2soft-efi, Hwaseong-si,Gyeonggi-do, Room 1301,614,Dongtangiheung-ro, Korea, Republic of. 3Accu Optotec, Gongju-si, Chungcheongnam-do, 56,Gongjudaehak-ro, Korea, Republic of. 4Accu Optotec, Seoul, Korea, Republic of

[Poster 129] Enhancing spectrum width in nitride superluminescent diodes through novel active region designs

Grzegorz Staszczak1, Łucja Marona1,2, Anna Kafar1, Grzegorz Muzioł1, Szymon Grzanka1,2, Ewa Grzanka1,2, Piotr Perlin1,2, Czesław Skierbiszewski1, Tadeusz Suski1
1Institute of High Pressure Physics, Warsaw, Poland. 2TopGaN Ltd, Warsaw, Poland

[Poster 130] Demonstration of InGaN-based red LEDs on 8-inch Silicon Substrates

Bumjoon Kim, Soo Min Lee, Frank Ramos, Drew Hanser
Veeco, Somerset, NJ, USA

[Poster 131] Electrical analysis of III-nitride micro-light-emitting diodes with different sidewall treatments

Matthew Wong, Tanay Tak, Kent Nitta, James Speck, Steven DenBaars
UC Santa Barbara, Santa Barbara, CA, USA

[Poster 132] Physics and Simulation of Blue, Green, and Red Cubic-phase InGaN/GaN Single- and Multi-quantum-well Light Emitting Diodes

Jaekwon Lee1,2, Jean-Pierre Leburton1,2,3, Can Bayram1,2
1Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA. 2Nick Holonyak, Jr. Micro and Nanotechnology Laboratory, University of Illinois at Urbana-Champaign, Urbana, IL, USA. 3Department of Physics, University of Illinois at Urbana-Champaign, Urbana, IL, USA

[Poster 133] Modelling of InGaN/GaN multi-quantum well solar cells

Matthias Auf der Maur1, Eugene A. Katz2, Daniele Soccodato1, Alessia Di Vito1, Alessandro Pecchia3
1CHOSE Centre for Hybrid and Organic Solar Energy, Department of Electronic Engineering, University of Rome “Tor Vergata”, Rome, Italy. 2Department of Solar Energy and Environmental Physics, Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Sede Boqer Campus, Israel. 3CNR-ISMN, Monterotondo, Rome, Italy

[Poster 134] Impact of GaN:Eu-based µ-LED shape on excitation efficiency

Hodaka Kubo1, Shuhei Ichikawa1,2, Yasufumi Fujiwara3,4,5, Kazunobu Kojima1
1Graduate School of Engineering, Suita, Osaka, Japan. 2Research Center for UHVEM, Ibaraki, Osaka, Japan. 3Research Organization of Science and Technology, Kusatsu, Shiga, Japan. 4SANKEN, Suita, Osaka, Japan. 5R3 Institute of Newly-Emerging Science Design, Toyonaka, Osaka, Japan

[Poster 135] Impact of strain and temperature on polarization of light emitted from deep-UV LEDs

Daria Zimina1, Kirill Bulashevich2, Mikhail Rudinsky2
1STR US, Richmond, VA, USA. 2Semiconductor Technology Research d.o.o. Beograd, Belgrade, Serbia

[Poster 136] Demonstration of near-size independent on-wafer EQE (~ 5.5 %) for 368 nm UV micro-LEDs

Guangying Wang, Shuwen Xie, yuting Li, Wentao Zhang, Jonathan Vigen, Timothy Shih, Qinchen Lin, Jiarui Gong, Zhenqiang Ma, Shubhra Pasayat, Chirag Gupta
University of Wisconsin-Madison, madison, WI, USA

[Poster 137] Monolithic Integration of 2T1C Driving Circuit with GaN Micro-LED

Dong Ik Oh, Hee Jae Oh, Seung Su Kim, Jong Hyeok Sim, Ho Young Cha
School of Electrical and Electronic Engineering, Hongik University, Seoul, Korea, Republic of

[Poster 138] Monolithically-integrated GaN micro-LED array using GeTe memristor
SeokHee Hong, Ho Jin Lee, Tae Geun Kim
Korea University, Seoul, Korea, Republic of

[Poster 139] Improving III-Nitride Green Light Emitting Diode Performance through V-defects Generated from Pure Edge Dislocation Half-Loops
Alejandro Quevedo, Feng Wu, Jacob Ewing, Tanay Tak, Shuji Nakamura, Steven DenBaars, James Speck
UC Santa Barbara, Santa Barbara, CA, USA

[Poster 140] Breaking efficiency bottleneck of near-red InGaN micro-light-emitting diodes scaled down to 1 micron
Jordan Smith, panpan Li, Ryan Ley, Matthew Wong, Michael Gordon, James Speck, Shuji Nakamura, Steven Denbaars
UCSB, Goleta, CA, USA

[Poster 141] X-ray detection using a p-GaN/AlGaN/GaN Heterostructure
Xing Lu1, Leidang Zhou2
1Sun Yat-sen University, Guangzhou, China. 2Xi'an Jiaotong University, Xi'an, China

[Poster 142] Elimination of size effects in InGaN quantum dot cyan-green Micro-LEDs by constructing a full-M-plane hexagonal structure
Peng Zhang1,2, Jianjun Zhu2, Shulong Lu1,2, Shibing Long1, Wenxian Yang2
1School of Microelectronics, University of Science and Technology of China, Hefei, Anhui, China. 2Key Lab of Nanodevices and Applications, Suzhou Institute of Nano-Tech and Nano-Bionics (SINANO), Chinese Academy of Sciences (CAS), Suzhou, Jiangsu, China

[Poster 143] Three-Dimensional Photonic Crystal Phosphors for Efficient Color Conversion in Micro-LED Technologies
Taehun Kim, Seung-Eon Ahn, Kyungtaek Min
Tech University of Korea, Siheung-si, Gyeonggi-do, Korea, Republic of

[Poster 144] Light extraction efficiency in AlGaN-based UV LEDs
Ronny Kirste1,2, James Loveless2, Jack Almeter2, Baxter Moody1, Pramod Reddy1, Shashwat Rathkanthiwar2, Ramon Collazo2, Zlatko Sitar2
1Adroit Materials, Cary, NC, USA. 2NCSU, Raleigh, NC, USA

[Poster 145] Analysis of Carrier Dynamics in InGaN-Based Hybrid-Quantum-Well Red Light-Emitting Diodes by Selective Optical Excitations
Joohan Bae1, Sangjin Min1, Ilgyu Choi1, Subin Choi1, Bumjoon Kim2, Soo Min Lee2, Dong-Soo Shin1, Jong-In Shim1
1Hanyang University, Ansan-si, Gyeonggi-do, Korea, Republic of. 2Veeco Instruments Inc., Somerset, New jersey, USA

[Poster 146] Optimization of UV-A Micro-Light-Emitting Diodes

Alexandra Dolgashev1, Theeradetch Detchprohm1, Hunter Chan2, Zhitao Kang2, Russell Dupuis1
1Georgia Institute of Technology, Atlanta, GA, USA. 2Georgia Tech Research Institute, Atlanta, GA, USA

[Poster 147] N-type electrode-free high performance GaN-based flat-type light-emitting diode with local breakdown-induced conductive channels

Dae-Choul Choi1, Seung Hun Lee1, Yoon Seok Kim2, Sung-Nam Lee1,2
1Department of IT & Semiconductor Engineering, Tech University of Korea, Siheung, Gyeonggi-do, Korea, Republic of. 2Department of Nano & Semiconductor Engineering, Tech University of Korea, Siheung, Gyeonggi-do, Korea, Republic of

[Poster 148] Effect of AlGaN thickness on the long-term memory properties of AlGaN/GaN high-electron-mobility transistor-based optoelectronic in-sensing memory

Hee-Jin Kim, Yeon Seok Kim, Sung-Nam Lee
Department of IT & Semiconductor Engineering, Tech University of Korea, Siheung, Gyeonggi-do, Korea, Republic of

[Poster 149] Investigation of AlCrN as a promising alternative to AlScN for MEMS applications

Stefan Krischok1, Bernd Hähnlein1, Hauke Honig1, Björn Christian2, Mohamed Yassine2, Peter Schaaf1, Oliver Ambacher2
1TU Ilmenau, Ilmenau, Thuringia, Germany. 2University of Freiburg, Freiburg, Baden-Württemberg, Germany

[Poster 150] Microscopic line-scanning of simultaneous photo-acoustic & photoluminescence measurements in InGaN-quantum wells on a stripe-core GaN substrate

Shoki Jinno1, Keito Mori2, Atsushi Yamaguchi1, Susumu Kusanagi3, Yuya Kanitani3, Shigetaka Tomiya4, Yoshihiro Kudo3
1Kanazawa Institute of Technology, Nonoichi, Ishikawa, Japan. 2University of Osaka, Suita, Osaka, Japan. 3Sony Semiconductor Solutions Corporation, Atsugi, Kanagawa, Japan. 4Nara Institute of Science and Technology, Ikoma, Nara, Japan

[Poster 151] Resonant Raman scattering of the A1(LO) phonons in thick InGaN layers and red InGaN quantum wells

Daqi Wang, Zhizhong Chen, Fei Huang, Zuojian Pan, Chuhan Deng, Haodong Zhang, Yian Chen, Boyan Dong, Yuchen Li, Mengqing Hua, Ling Hu, Lvyun Chen, Yiran Wu, Weihua Chen, Fei Jiao, Xiangning Kang, Qi Wang, Bo Shen
Peking University, Beijing, Beijing, China

[Poster 152] Modification of electrical properties of GaN by ion implantation and UHPA

Kacper Sierakowski1, Tomasz Sochacki1, Arianna Jaroszynska1, Robert Kucharski1, Lutz Kirste2, Patrik Straak2, Marcin Turek3, Rafal Jakiela4, Michal Bockowski1
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[Poster 153] Impact of UHPA processing on structural properties of ion-implanted GaN: A HR-XRD study

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[Poster 154] A Unifying Perspective for Understanding Polarization in Wurtzite III-Nitrides Semiconductors
Haotian Ye, Ping Wang, Rui Wang, Jinlin Wang, Xifan Xu, Ran Feng, Tao Wang, Xinqiang Wang
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[Poster 155] A simple but novel methodology on carrier transport for GaN HEMTs
Seung-Woo Son, Su-Min Choi, Min-Seo Yu, Hyeok-Jun Lee, Wan-Soo Park, Jae-Hak Lee, Dae-Hyun Kim
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[Poster 156] Temperature and strain dependence of single-photon emitters from defects in GaN
Gyeong Eun Choi1, Jae Sun Kim1, Jung Ki Park1, Kyung Rok Kim1, Hye Jun Yun1, Seong Young Lim2, Jung-Hoon Song1,2
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[Poster 157] Study on synergistic effect of heavy-ion irradiation and operating temperature ambient on AlGaN/GaN HEMTs
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[Poster 158] Electron traps with extremely long capture time constant related to threading dislocations in n-type GaN with oxygen ion implantation and annealing
Keisuke Hayashi1, Masahiro Horita1,2, Ryo Tanaka3, Shinya Takashima3, Katsunori Ueno3, Jun Suda1,2
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[Poster 159] Determination of deformation potentials for InGaN with low In composition region based on the k·p perturbation theory
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[Poster 160] Correlating modeling of disordered alloys with atom-resolved characterization
Alessia Di Vito1, Anh-Luan Phan1, Aurelia Trevisan2, Paul Koenraad2, Alessandro Pecchia3, Matthias Auf der Maur1
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[Poster 161] Characterization of Deep Region Trapping Effects in AlN/GaN HEMTs with an AlGaN Back Barrier Utilizing Tri-State Pulsed IV Technique

Yihao Zhuang1,2, Kumud Ranjan3,4, Qingyun Xie3,4, Hanlin Xie3,4, Hanchao Li2, Yue Wang5, Siyu Liu1,2, Geok Ing Ng1,2,3,4,5
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[Poster 162] How V-defect energy barriers affect carrier dynamics in InGaN alloys

Zydrunas Podlipskas, Mantas Migauskas, Kazimieras Nomeika, Ramunas Aleksiejunas
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[Poster 163] A Novel Compact Model for Predicting the Complex Behavior of the GaN HEMTs Kink Effect

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[Poster 164] Characterisation of photoemission from hot electrons in GaN/AlGaN RF High Electron Mobility Transistors (HEMT)

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[Poster 165] Spontaneously Forming AlGaN Lateral Heterostructures with High Internal Quantum Efficiency Grown by High Temperature Plasma-Assisted MBE

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[Poster 166] Analysis of heavy-ion irradiation effects in AlGaN/GaN HEMTs with and without biasing

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[Poster 167] Dislocation-Governed Hole-Transport Mechanism in GaN Power Device with Carbon-Doped Buffer

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[Poster 168] Reduction of Resistivity in High-Al-Composition n-AlGaN by employing AlGaN/AlN periodic structures
Masafumi Jo1, Yuri Itokazu1,2, Iimura Kazuki1,2
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[Poster 169] Probing the role of n-AlN SBD's Ohmic Contact Process to the Schottky Contact
Haicheng Cao, Xiao Tang, Ying Wu, Xiaohang Li
King Abdullah University of Science and Technology, Jeddah, Makkah, Saudi Arabia

[Poster 170] Capturing the ionization energy of the Mg acceptor in AlGaN with density functional theory
Kelsey Mirrielees, Douglas Irving
North Carolina State University, Raleigh, NC, USA

[Poster 171] Residual Stress Analysis of Diamond-GaN Heterostructure
Mohamadali Malakoutian, Kelly Woo, Rohith Soman, Srabanti Chowdhury
Stanford University, Stanford, CA, USA

[Poster 172] Modeling and Optimization of the 2DEG Charge Density in AlScN/GaN based Ferroelectric Heterostructure
Ruilin Wang, Kexin Li
Arizona State University, Tempe, AZ, USA

[Poster 173] Structural and elastic properties of wurtzite ScxAl1-xN, ScxGa1-xN, and ScxIn1-xN
Hang Cui, William Doolittle, Lucas Graber, Doug Yoder
Georgia Institute of Technology, Atlanta, Georgia, USA

[Poster 174] Effect of kinetic energy transfer on excitonic luminescence in ultra-thin AlN/GaN/AlN-quantum well studied by phononic–excitonic–radiative model
Masaya Chizaki, Yoshihiro Ishitani
Chiba University, Chiba, Chiba, Japan

[Poster 175] Raman study of doped and undoped cubic III-Nitrides epitaxial thin films
Limei Chen, Mario Fabian Zscherp, Silas Aurel Jentsch, Jörg Schörmann, Sangam Chatterjee, Peter Jens Klar
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[Poster 176] Stoichiometry Engineering of PECVD Amorphous Silicon Nitride for GaN MMIC Applications
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[Poster 177] First principles study of calcium in wurtzite GaN
Kotaro Oikawa1, Giovanni Alfieri2, Micheletto Ruggero1 1Yokohama City University, Yokohama, Kanagawa, Japan. 2Hitachi Energy, Lenzburg, Aargau, Switzerland

[Poster 178] Metastable Shallow Donors and Origin of n-type Doping in AlN and AlGaN
Yujie Liu1, Sieun Chae2, Emmanouil Kioupakis1
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[Poster 179] Thermal hot spot and its dissipation to substrate investigated by submicron thermal imaging in AlGaN/GaN-on-Si power device structure
Jae Sun Kim1, Gyeong Eun Choi1, Jung Ki Park1, Kyung Rok Kim1, Hye Jun Yun1, Seongyoung Lim2, Deok Gyu Bae3, Young Boo Moon4, Jung Hoon Song1,2
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[Poster 180] High-Resolution Temperature Monitoring of GaN HEMTs Using Monolithically Integrated Micro-Thin Film Thermocouples
Hassan Irshad Bhatti, Saravanan Yuvaraja, Chuanju Wang, Xiaohang Li
King Abdullah University of Science and Technology (KAUST), Thuwal, Makkah, Saudi Arabia

[Poster 181] TCAD Simulations to Explore Thermal Solutions for GaN-on-Silicon HEMTs
Deniz Erus, John Niroula, Pradyot Yadav, Tomás Palacios
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[Poster 182] Impact of carbon impurities on carrier recombination process in highly pure GaN crystals assessed by internal quantum efficiency mapping measurements
Koshi Sano1, Hajime Fujikura2, Taichiro Konno2, Shota Kaneki2, Shuhei Ichikawa1, Kazunobu Kojima1
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[Poster 183] Investigation of Heating Response of GaN using Single-Mode Microwave Annealing and Development of Heating Process
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[Poster 184] The Study of Stress Relaxation Mechanism in the Dislocation- and Pit-free InGaN Platelet Structure
Wentao Cai1, Jia Wang1,2, Yuta Furusawa1, Heajeong Cheong1,3, Shugo Nitta1, Yoshio Honda1,2, Hiroshi Amano1,2,3,4
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[Poster 185] High gate stress stability of P-GaN/p-AlGaN/AlGaN/GaN HFET
Jun-Hyeok Yim1, Dong-Guk Kim2, Min-Geun Lee1, Hyungtak Kim1, Ho-Young Cha1
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[Poster 186] A modified noise model for GaN MIS-HEMTs
Jiaqi Guo, Ke Wei, Sheng Zhang, Xiaoqiang He, Kaiyu Wang, Jianchao Wang, Xinhua Wang, Xinyu Liu
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[Poster 187] P-type GaN Ohmic Contact Using Annealed Mg Process
Min-Jeoung Kim1, Jeong-Jin Kim2, Nak-Hyeon Kim1, Ho-Young Cha1,2
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[Poster 188] Enabling Optical & Electrical Characterization of Al2O3/GaN Interfaces with Transparent Indium Tin Oxide Contacts
Caleb Glaser1,2, Brian Rummel1, Joseph Klesko1, Peter Dickens1, Melissa Meyerson1, Andrew Binder1, Robert Kaplar1, Daniel Feezell2
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[Poster 189] p-GaN/AlGaN/GaN HEMT with Extended MOS Gate
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1Hongik University, Seoul, Korea, Republic of. 2ChipsK Corporation, Anyang, Korea, Republic of

[Poster 190] A Broadband High-Efficiency S-band Continuous Class-F-1 GaN MMIC Power Amplifiers Using Low-Pass Filtering Matching Network
Xin Jiang1,2, Qingyang Dong1,2, Chenhao Li1,2, Ke Wei1,2, Xinhua Wang1,2, Xinyu Liu1,2, weijun luo1,2
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[Poster 191] P-GaN/AlGaN/GaN HFET with Dual Dielectric T-Gate Structure
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[Poster 192] Optimization of the Ohmic Contact Performance with SiN partical interlayer for GaN HEMT
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[Poster 193] Influence of Epitaxial Layer Thickness on Dynamic Ron in AlGaN/GaN HEMTs
Hyun-Seop Kim
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[Poster 194] Threshold voltage instability depending on drain stress bias in p-GaN/AlGaN/GaN HEMTs
Myeongsu Chae, Hyungtak Kim
Hongik University, Seoul, Korea, Republic of
[Poster 195] Exploring Dielectric Materials for Enhanced Performance of GaN MISHEMTs
Kevin Limanta, Tomas Palacios
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[Poster 196] N-polar GaN/AlGaN/AlN FET on high-quality N-polar AlN template with Al-polar tiny-pit AlN layer and polarity inversion grown by MOVPE
Narihito Okada
Yamaguchi Univ., Ube, Yamaguchi, Japan

[Poster 197] Comparative Performance Evaluation of Bidirectional 1.2–10kV Conventional and Superjunction GaN Current Aperture Vertical Electron Transistors
Giorgian Borca-Tasciuc, Tat-Sing Paul Chow
Rensselaer Polytechnic Institute, Troy, New York, USA

[Poster 198] Radiation-Tolerant III-N Epitaxy: A Novel Design & Simulation Approach
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[Poster 199] Analysis and Simulation of Cryogenic GaN HEMTs Transport Behavior
Hao Lee, Chin-Jung Chiu, Yuh-Renn Wu
National Taiwan University, Taipei, Taiwan

[Poster 200] Polarization engineering of III-nitride heterostructure towards high performance enhancement-mode GaN-based p-FETs
Yingjie Wang1,2, Sen Huang1,2, liu Wang1,2, Qimeng Jiang1,2, Xinhua Wang1,2, Xinguo Gao1,2, Haibo Yin1, Ke Wei1, Xinyu Liu1,2, Qian Sun3, Kevin J Chen4
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[Poster 201] Enhanced threshold voltage stability in NiOx/SiNx gate stack GaN MIS-HEMTs up to 400°C
Mritunjay Kumar, Vishal Khandelwal, Saravanan Yuvaraja, Haicheng Cao, Xiao Tang, Xiaohang Li
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[Poster 202] Scaling of Vertical GaN FinFETs
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[Poster 203] 150 nm Gate-Recess E-mode AlN/GaN HEMTs on Si with Vth>1 V and fT × LG = 12 GHz·µm
Guangjie Gao1,2, Zhihong Liu1,2, Lu Hao1,2, Xiaojin Chen1,2, Xin Feng2, Hanghai Du1,2, Weichuan Xing2, Hong Zhou1,2, Gong Xiao3, Jincheng Zhang1,2, Yue Hao1,2
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[Poster 204] Improvement of the Thermal Performance of the GaN-on-Si RF HEMTs by Introducing a Thick AlN Passivation

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[Poster 205] P-GaN-Gate GaN Power HEMTs Through NH3 Acceptor Re-Passivation with Excellent Dynamic and Thermal Stability

Zhaofeng Wang1,2, Zhihong Liu1,2, Xiaojin Chen1,2, Yanyi Li2, Hu Wei1,2, Xing Chen3, weichuan xing2, Weihang Zhang2,1, Shenglei Zhao2,1, Xiangdong Li2, Jincheng Zhang2,1, Yue Hao1,2
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[Poster 206] Impact of low Al Concentration AlGaN Back Barrier on Drain Lag in Thin Barrier AlGaN RF HEMTs.

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[Poster 207] P-GaN Gate E-mode GaN-on-Si HEMTs with 600 mA/mm Idmax with Acceptor Re-passivating GaN Cap

Jiaqi He1,2, Zhihong Liu1,2, Yanyi Li2, Zhaofeng Wang1,2, Hu Wei1,2, Hanghai Du1,2, Weichuan Xing2, Hong Zhou1, Han Wang3, Jincheng Zhang1,2, Yue Hao1,2
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[Poster 208] Scaled AlGaN/GaN Metal-Semiconductor-Metal Varactor with Cutoff Frequency Up To 4.6 THz

Xiaojin Chen1,2, Zhihong Liu1,2, Hu Wei1,2, Hanghai Du1,2, Xin Feng2, Weichuan Xing2, Hong Zhou1, Han Wang3, Jincheng Zhang1,2, Yue Hao1,2
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[Poster 209] An AlN/GaN MISHEMT on Si with High Temperature Stability During 400 ℃ 30h Aging Test in Air

Weiran Li1,2, Zhihong Liu1,2, Lu Hao1, Wei Hu2, Hanghai Du1, Weichuan Xing2, Hong Zhou1, Gong Xiao3, Jincheng Zhang1, Yue Hao1
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[Poster 210] Ringing noise reduction method for high-speed GaN switching converter

Toshihide Ide, Takahiro Gotow, Ryousaku Kaji, Katsumi Furuya, Hisashi Yamada
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[Poster 211] First-Principles Structural Analysis of Polarity Inversion Boundary in GaN

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[Poster 212] In-situ Epitaxial Growth Analysis in MBE Process Using RHEED Data-driven In-plane Lattice Spacing Deep Learning Model

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[Poster 213] Epitaxial and fiber textured molybdenum electrodes for aluminum scandium nitride based bulk acoustic wave resonators

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[Poster 214] The origins of the high-energy and low-energy peaks in electroluminescence spectra of micro-LED

Chuhan Deng1, Zhizhong Chen1, Boyan Dong1, Haodong Zhang1, Ling Hu1, Weihua Chen1, Jiao Fei1,2, Xiangning Kang1, Qi Wang3, Guoyi Zhang1,3, Bo Shen1,4
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[Poster 215] Red InGaN LED with Low Blueshift (<5 nm) in Large Current Injection Range by Strain Relaxation of Trench Structures

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[Poster 216] Tailored GaN Growth Modes via Graphene Defects: A Path to control growth mode of graphene assisted growth

Jeongwoon Kim1, Hyeon Woo Kim2,3, Jongil Kim4, Je-Sung Lee1, Hoe-Min Kwak5, Jaeyoung Baik1, Soo-Young Choi1, Jinsoo Kim1, Si-Young Bae3, Sung Beom Cho6, Sangho Oh4, Young-Joon Hong7, Dong-Seon Lee1
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[Poster 217] Demonstration of MOCVD system with advanced mass production performance
Mizuki Yamanaka, Kenichi Eriguchi, Keitaro Ikejiri, Hiroki Tokunaga
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[Poster 218] From NWs to micro-domains: a novel synthesis path for GaN
Arthur Sauvagnat1, Elias Semlali1, Geoffrey Avit1, Yamina André1, Evelyne Gil1, Dyhia Tamsaout2, Jean-Christophe Harmand2, Maria Tchernycheva2, Ludovic Largeau2, Stefano Pirotta2, Agnès Trassoudaine1
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[Poster 219] SAG of InGaN NWs for the fabrication of InGaN micro-substrates: a promising way to efficient nitride-based red emission
Arthur Sauvagnat1, Elias Semlali1, Geoffrey Avit1, Yamina André1, Evelyne Gil1, Vladimir G. Dubrovskii2, Philip Shields3, Andriy Moskalenko3, Névine Rochat4, Eric Tournié5, Thierry Taliercio5, Agnès Trassoudaine1
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[Poster 220] Monolithic integration of GaN micro-platelets on metallic TiN substrates
Philipp John1, Blandine Alloing2, Pierre-Marie Coulon2, Marc Portail2, Hans Tornatzky1, Kagiso Loeto1, Jonas Lähnemann1, Oliver Brandt1, Lutz Geelhaar1, Thomas Auzelle1
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[Poster 221] The evolution of dislocations and strains in AlN grown by high temperature metal-organic-chemical-vapor-deposition
Qiushuang Chen, Jichun Ye, Wei Guo
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[Poster 222] MOCVD Epitaxial Growth of High-Quality GaN on Single-Crystal Diamond (111) with a Special AlN Nucleation Layer
Hongcai Yang1, Xuelin Yang1, Han Yang1, Yuxia Feng2, Junkang Wu1, Haojie Wang1, Zhenghao Chen1, Kexin Zhang1, Bo Shen1
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[Poster 223] Formation Process of AlGaN During the Self-Assembled Growth of AlN/AlGaN Superlattices Using Metal Modulated Epitaxy
Alexander Chaney1,2, Thaddeus Asel2, Shin Mou2
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[Poster 224] Plasma-enhanced ALD deposition of high breakdown field Al(O, N) and Ga2O3
Dadam Kang, Loïs Talli, John Niroula, Tomás Palacios, Joseph Casamento
MIT, Cambridge, MA, USA

[Poster 225] Low-temperature plasma-enhanced ALD of highly-oriented GaN
Lois TALLI1, Dadam Kang1, John Niroula2, Tomás Palacios2, Joseph Casamento1
1Department of Materials Science and Engineering, MIT, Cambridge, MA, USA. 2Department of Electrical Engineering and Computer Science, MIT, Cambridge, MA, USA

[Poster 226] Red-emission nanocolumn LEDs with semi-polar (10-11) InGaN/InGaN MQW grown on underlying bulk InGaN buffer
Ryuta Shindo1, Hiromi Akagawa1, Tomohiro Yamaguchi1, Rie Togashi2,3, Takeyoshi Onuma1, Ichiro Nomura2,3, Tohru Honda1, Katsumi Kishino2,3
1Kogakuin Univ., 2665-1, Nakano-Cho, Hachioji-Shi, Tokyo, Japan. 2Sophia nanotech., 7-1, Kioi-Cho, Chiyoda-ku, Tokyo, Japan. 3Sophia Univ., 7-1, Kioi-Cho, Chiyoda-ku, Tokyo, Japan

[Poster 227] High quality AlN grown on Si(111) with Boron pretreatment by MOCVD
Mingtao Nong, xiao tang, che-hao liao, haicheng cao, tingang liu, Patsy Miranda Cortez, Dhanu Chettri, Glen Maciel García, xiaohang li, Thuwal, Thuwal, Thuwal, Saudi Arabia

[Poster 228] Machine Learning Assisted Hybrid-MBE for Producing 200 mm GaN on Si Epiwafers : Advanced Production Technologies for 200 mm GaN HEMT and NWs LED on Si
Young-Kyun Noh, Dong-Hee Shin, Sin-Young Jeong, Woo-Seck Sim, Geon Kim, Dong-Jun Kim
IVWorks Co., Ltd., Daejeon, Korea, Republic of

[Poster 229] Reduction of polycrystalline GaN crystals derived from melt back of seed substrate in the Na-flux method
Shogo Washida1, Masayuki Imanishi1, Kosuke Murakami1, Shigeyoshi Usami1, Mihoko Maruyama1, Masashi Yoshimura1,2
1Graduate School of Engineering, Osaka University, Suita, Osaka, Japan. 2Institute of Laser Engineering, Osaka University, Suita, Japan

[Poster 230] Curvature Engineering of AlGaN Drift Layers for Vertical Power Devices
Byeongchan So1, Adamantia Logotheti1,2, Jovana Colvin1, Dat Q. Tran3, Minho Kim3, Navya sri Garigapati1, Erik Lind1, Michal Bockowski4, Vanya Darakchieva1,3
1Lund University, Lund, Sweden. 2Volvo Car Corporation, Gothenburg, Sweden. 3Linköping University, Linköping, Sweden. 4Polish Academy of Sciences, Warsaw, Poland

[Poster 231] Scandium nitride and scandium aluminum nitride as examples of reactive transition metals enhancing the nitride ecosystem
Joseph CasamentoMIT, Cambridge, MA, USA

[Poster 232] High n-type doping of epitaxial GaN layers by sputtering from elemental targets
Florian Hörich, Jona Grümbel, Matthias Wieneke, Jürgen Bläsing, Martin Feneberg, Rüdiger Goldhahn, Armin Dadgar, André Strittmatter
Otto-von-Guericke University, Magdeburg, Germany

[Poster 233] Simple Metal-Organic Vapor Phase Epitaxy Model Towards Improvement of Controllability of InxGa1-xN Alloy Composition
Masataka Imura1, Takanobu Hiroto1, Takaaki Mano1, Yuri Itokazu2, Masafumi Jo2
1NIMS, Tsukuba, Japan. 2RIKEN, Wako, Japan

Wednesday, November 6, 2024

Characterization: Doping and Defects 2
08:00 - 10:00 Wednesday, November 6, 2024
Location: Coral 1
Chair: Shadi Shahedipour-Sandvik

08:00 - 08:30
(INVITED) Room temperature optically detected magnetic resonance of single spins in GaN
Gregory Fuchs
Cornell University, Ithaca, NY, USA

08:30 - 08:45
Polarity dependence of iron incorporation in GaN epitaxial films and theoretical analysis using universal neural network potential
Shigeki Yoshida1, Isao Makabe1, Shunsuke Hosoumi1, Tatsuya Takakuwa2, Takuji Yamamura1, Kozo Makiyama1, Ken Nakata1
1Transmission Devices Laboratory, Sumitomo Electric Industries, Ltd., Yokohama, Kanagawa, Japan. 2IoT R&D center, Sumitomo Electric Industries, Ltd., Osaka, Osaka, Japan

08:45 - 09:00
Depth-Resolved Photoluminescence for Channeling Implantation of Mg or Mg/N ions into GaN After Ultra-High Pressure Annealing
Tetsuo Narita1, Keita Kataoka1, Kazuyoshi Tomita2, Shinji Yamada3, Tetsu Kachi2
1Toyota Central R&D Labs., Inc., Nagakute, Aichi, Japan. 2IMaSS, Nagoya University, Nagoya, Aichi, Japan. 3Graduate School of Engineering, Nagoya, Aichi, Japan

09:00 - 09:15
Diffusion of acceptor metal for semi-insulating-GaN in GaN channel
Kenji Iso1,2, Satoru Izumisawa1
1Mitsubishi Chemical, Ushiku, Ibaraki, Japan. 2Nagoya university, Nagoya, Aichi, Japan

09:15 - 09:30
Determination of the Spin Mixing Conductance in Pt/(Ga,Mn)N Interface

Aaron Mendoza-Rodarte1,2, Katarzyna Gas3,4, Manuel Herrera-Zaldívar2, Detlef Hommel5, Maciej Sawicki3,6, Marcos Guimarães1
1Zernike Institute for Advanced Materials, University of Groningen, Groningen, Netherlands. 2Centro de Nanociencias y Nanotecnología-Universidad Nacional Autónoma de México, Ensenada, Baja California, Mexico. 3Institute of Physics, Polish Academy of Sciences, Warszawa, Poland. 4Center for Science and Innovation in Spintronics, Tohoku University, Sendai, Japan. 5Lukasiewicz Research Network - PORT Polish Center for Technology Development, Wroclaw, Poland. 6Research Institute of Electrical Communication, Tohoku University, Sendai, Japan

09:30 - 09:45
Ion implantation of acceptors into gallium nitride
Kacper Sierakowski1, Rafal Jakiela2, Tomasz Sochacki1, Malgorzata Iwinska1, Arianna Jaroszynska1, Michal Fijalkowski1, Marcin Turek3, Lutz Kirste4, Michal Bockowski1
1Intitute of High pressure Physics PAS, Warsaw, Poland. 2Institute of Physics PAS, Warsaw, Poland. 3Maria Sklodowska Curie University, Lublin, Poland. 4Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany

09:45 - 10:00
Silicon Doping of N-polar Gallium Nitride Grown by Atomic Layer Deposition
Boyu Wang, William Mitchell, Chulong Wang, Robert Hamwey, Kamruzzaman Khan, Stacia Keller, Umesh Mishra
UCSB, Santa Barbara, CA, USA

Characterization: Membranes and ALD
08:00 - 10:00 Wednesday, November 6, 2024
Location Coral 2
Chair: Wei Guo

08:00 - 08:30
(INVITED) Combined optical and thermal characterization of III-nitride membranes by microphotoluminescence and Raman thermometry
Mahmoud Elhajhasan1, Julian Themann1, Katharina Dudde1, Guillaume Würsch1, Ian Rousseau2, Jean-François Carlin2, Raphaël Butté2, Joachim Ciers3, Nakib H. Protik4, Giuseppe Romano5, Åsa Haglund3, Nicolas Grandjean2, Gordon Callsen1
1Institut für Festkörperphysik, Universität Bremen, Bremen, Germany. 2Institute of Physics, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Waadt, Switzerland. 3Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden. 4Institut für Physik und IRIS Adlershof, Humboldt-Universität zu Berlin, Berlin, Germany. 5MIT-IBM Watson AI Lab, IBM Research, Cambridge, Massachusetts, USA

08:30 - 08:45
X-ray Nanobeam Diffraction of a Single GaN-based 5-quantum Shells on a GaN Substrate Extracted by using Focused-ion-beam Microsampling
Takao Miyajima1, Shoya Ota1, Ryota Kobayashi1, Nobuhiro Yasuda2, Tomoyo Nakao3, Shigeo Arai3, Kazuki Nishimura1, Koki Aoyama1, Kazushi Sumitani2, Yasuhiro Imai2, Shigeru Kimura2, Satoshi Kamiyama1, Daichi Imai1

1Meijo University, Nagoya, Aichi, Japan. 2JASRI, Sayo, Hyogo, Japan. 3Nagoya University, Nagoya, Aichi, Japan

08:45 - 09:00
In-Situ Photoluminescence of microLEDs during Mesa Etching by ICP-RIE
Georg Schöttler1,2, Stefan Wolter1,2, Juliane Breitfelder1,2, Rany Miranti-Augustin1,2, Jana Hartmann1,2, Andreas Waag1,2
1Institute of Semiconductor Technology, TU Braunschweig, Braunschweig, Lower Saxony, Germany. 2Nitride Technology Center, TU Braunschweig, Braunschweig, Lower Saxony, Germany

09:00 - 09:15
Optical characterizations of in-gap states in GaN-based tunnel junctions
Daichi Imai, Hayato Ichikawa, Hinata Uda, Motoki Kondo, Tetsuya Takeuchi, Takao Miyajima
Meijo University, Nagoya, Aichi, Japan

09:15 - 09:30
Skin-Attachable III-N Thin-Film Physical Sensors for Personal Healthcare Monitoring Applications
Jae-Hyun Ryou, Nam-In Kim, Asad Ali, Sara Pouladi
University of Houston, Houston, TX, USA

09:30 - 10:00
(INVITED) Engineering III-N Interfaces via Atomic Layer Deposition: From Solar Fuels to 2D Materials Integration
Ian Sharp
Walter Schottky Institute and Physics Department, Technical University of Munich, Munich, Germany

Growth: Growth of Nitrides
08:00 - 10:00 Wednesday, November 6, 2024
Location South Pacific 1/2
Chair: Siddha Pimputkar

08:00 - 08:30
Morphological Evolution During Bulk GaN Growth
Tomasz Sochacki1, Magdalena Zajac1,2, Robert Kucharski1, Karolina Grabianska1, Leszek Konczewicz1, Arianna Jaroszynska1, Kacper Sierakowski1, Jan Weyher1, Lutz Kirste3, Michal Bockowski1
1Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland. 2Military University of Technology, Faculty of New Technologies and Chemistry, Warsaw, Poland. 3Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany

08:30 - 08:45
Advanced Processing Techniques for Ammonothermal GaN Substrates: From Bulk Crystal to Epi-Ready Wafer
Tomasz Sochacki, Robert Kucharski, Karolina Grabianska, Aneta Sidor-Zak, Jaroslaw Skladanowski, Grzegorz Kamler, Michal Bockowski
Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland

08:45 - 09:00
Development of High-Efficiency Crystallographic Damage Removal Method for Seed GaN Crystal Using Photoelectrochemical Etching
Tatsuya Fukagawa, Kiyoto Kayao, Daisetsu Toh, Jumpei Yamada, Kazuto Yamauchi, Yasuhisa Sano
Osaka University, Suita, Osaka, Japan

09:00 - 09:15
Analysis of the interface and surface properties of rs-ScN(111) on polar wz-GaN
Stefan Krischok1, Fabian Ullmann1, Bernd Hähnlein1, Oliver Ambacher2
1TU Ilmenau, Ilmenau, Thuringia, Germany. 2University of Freiburg, Freiburg, Baden-Württemberg, Germany

09:15 - 09:30
Effects of Sc composition and lattice constraint on polarization switching of ScAlN alloys: a first-principles study
Toru Akiyama, Takuto Miyamoto, Takahiro Kawamura
Mie University, Tsu, Japan

09:30 - 10:00
(INVITED) Epitaxial Growth of c-BN on Diamond and Strategies for Electronic Applications
Robert Nemanich1, Ali Ebadi Yekta1, Avani Patel1, Saurabh Vishwakarma1, Jesse Brown2
1Arizona State University, Tempe, AZ, USA. 2Advend Diamond Inc., Tempe, AZ, USA

Electronic Devices: RF
08:00 - 10:00 Wednesday, November 6, 2024
Location South Pacific 3/4
Chair: Georges Pavlidis

08:00 - 08:30
(INVITED) Traveling Charge Domains in a Planar AlGaN/GaN Triode Structure
Douglas Yoder
Georgia Tech, Atlanta, GA, USA

08:30 - 08:45
Proposal of AlGaN/GaN Gated-Anode Diode Model Incorporating Internal HEMT Structure for Loss Analysis towards Efficient Microwave Rectification
Tomoya Watanabe1, Hidemasa Takahashi1, Akio Wakejima2, Yuji Ando1,3, Jun Suda1,3
1Department of Electronics, Nagoya University, Nagoya, Aichi, Japan. 2Research and Education Institute for Semiconductors and Informatics, Kumamoto University, Kumamoto, Kumamoto, Japan. 3IMaSS, Nagoya University, Nagoya, Aichi, Japan

08:45 - 09:00
High temperature operating life test assessment of buffer-free GaN-on-SiC HEMTs for millimeter-wave applications
François Grandpierron1, Elodie Carneiro1, Lyes Ben hammou1, Farid Medjdoub1, Jr-Tai Chen2, Anders Lundskog2
1IEMN, Lille, France. 2SweGaN, Linköping, Sweden

09:00 - 09:15
Investigation of RF Stability in E-mode p-GaN Gate HEMTs
Yan Cheng, Yat Hon Ng, Yichen Liu, Liuqing Gao, Kevin J. Chen
The Hong Kong University of Science and Technology, Hong Kong, Hong Kong

09:15 - 09:30
First experimental verification of the difference of universal mobility characteristics between N-polar and Ga-polar GaN HEMT
Akira Mukai, Junji Kotani, Shigeki Yoshida, Akihiro Hayasaka, Kozo Makiyama, Ken Nakata
Transmission Devices Laboratory, Sumitomo Electric Industries, Ltd., Yokohama, Kanagawa, Japan

09:30 - 10:00
(INVITED) The next generation of RF electronics: Can GaN-on-Diamond replace GaN-on-SiC electronics ?
Martin Kuball
University of Bristol, Bristol, Bristol, United Kingdom

Electronic Devices: HEMTs 1 (Novel Gate Structures)
08:00 - 10:00 Wednesday, November 6, 2024
Location Coral 4/5
Chair: Pramod Reddy

08:00 - 08:15
RF Operation of AlN-based Polarization-Doped Field-Effect Transistors with High-Al-Content Graded AlxGa1−xN Channel
Seiya Kawasaki, Masanobu Hiroki, Kazuyuki Hirama, Kazuhide Kumakura, Yoshitaka Taniyasu
NTT Basic Research Laboratories, NTT Corporation, Kanagawa, Japan

08:15 - 08:30
Light-Triggered AlInN/GaN HEMTS with Sub-microsecond Switching Times
Jonathan Wierer, Elia Palmese, Haotian Xue, Daniel Rogers
North Carolina State University, Raleigh, NC, USA

08:30 - 08:45
All-GaN-Based Monolithic HEMT-Integrated Micro-LED Pixels for Active Matrix Displays
Yuta Furusawa1, Cai Wentao1, H.J. Cheong2, H Amano1,2,3
1Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi, Japan. 2Deep Tech Serial Innovation Center, Nagoya University, Nagoya, Aichi, Japan. 3Institute for Advances Research,, Nagoya, Aichi, Japan

08:45 - 09:00
Fabrication and characterization of AlGaN/GaN-on-Si HEMTs with p-type NiO-based gate stack
Andrzej Taube1, Wojciech Hendzelek1, Aneta Gołębiowska1,2, Oskar Sadowski1,2, Jarosław Tarenko1,2, Maciej Kamiński1,2, Justyna Wierzbicka1, Joanna Jankowska-Śliwińska1, Marek Wzorek1, Anna Szerling1
1Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland. 2Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland

09:00 - 09:15
Enhanced-Mode GaN High Electron Mobility Transistors with Fully-Epitaxial ScAlN and Monolayer ScN Ferroelectric Gate Stacks
Ding Wang, Jiangnan Liu, Md Tanvir Hasan, Shubham Mondal, Zetian Mi
University of Michigan, Ann Arbor, Michigan, USA

09:15 - 09:30
Diamond Encasement for Thermal Management of GaN HEMTs
James Spencer Lundh1, Tatyana Feygelson1, Alan Jacobs1, Andrew Koehler1, Bradford Pate1, Karl Hobart1, Travis Anderson1, Michael Mastro1, Daniel Francis2, Marko Tadjer1
1U.S. Naval Research Laboratory, Washington, DC, USA. 2Akash Systems, Inc., San Francisco, CA, USA

09:30 - 09:45
Surface Oxidation, Band Alignment, and Charge Transport of Nitride Ferroelectrics/III-nitride HEMTs
Danhao Wang, Ding Wang, Samuel Yang, Shubham Mondal, Zetian Mi
Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan, USA

09:45 - 10:00
Ammonia source molecular beam epitaxy of ScAlN barrier HEMTs
Caroline Elias, Maxime Hugues, Florian Bartoli, Sebastien Chenot, Philippe Vennéguès, Yvon Cordier
CRHEA-CNRS, Valbonne, France

Characterization: Carrier Dynamics 1
10:30 - 12:00 Wednesday, November 6, 2024
Location Coral 1
Chair: Shigefusa Chichibu

10:30 - 11:00
(INVITED) Phonon dynamics analysis of InGaN/GaN heterostructures by Raman spectroscopy using a double laser system
Yoshihiro Ishitani1, Thee Ei Khaing Shwe1, Tatsuya Asaji1, Bei Ma1, Daisuke Iida2, Mohammed Najmi2, Kazuhiro Ohkawa2
1Chiba University, Chiba, Chiba, Japan. 2KAUST, Thuwal, Saudi Arabia

11:00 - 11:15
Femtosecond pump-probe ellipsometry of degenerately doped cubic GaN
Elias Baron1, Rüdiger Goldhahn1, Michael Deppe2, Donat J. As2, Shirly Espinoza3, Martin Zahradník3, Martin Feneberg1
1Otto-von-Guericke University, Magdeburg, Germany. 2University Paderborn, Paderborn, Germany. 3ELI Beamlines Facility, Dolní Břežany, Czech Republic

11:15 - 11:30
Do alloy fluctuations really localize carriers in InGaN alloys?
Nick Pant1,2, Vishal Subramanian2, Vikram Gavini2, Emmanouil Kioupakis2
1University of Texas at Ausin, Austin, TX, USA. 2University of Michigan, Ann Arbor, MI, USA

11:30 - 11:45
Carrier diffusion processes in InGaN quantum wells measured by time-resolved PL measurements
Osuke Ito1, Atsushi Yamaguchi1, Maiko Ito2, Rintaro Koda2, Tatsushi Hamaguchi3
1Kanazawa Institute of Technology, Nonoichi, Ishikawa, Japan. 2Sony Semiconductor Solutions Corporation, Atsugi, Kanagawa, Japan. 3Mie University, Tsu, Mie, Japan

11:45 - 12:00
Dislocations or point defects: what limits the efficiency in InGaN alloys?
Zydrunas Podlipskas, Kazimieras Nomeika, Mariamija Nikitina, Ramunas Aleksiejunas
Vilnius University, Vilnius, Lithuania

Characterization: Growth and Transport
10:30 - 12:00 Wednesday, November 6, 2024
Location Coral 2
Chair: Shashwat Rathkanthiwar

10:30 - 10:45
Shubnikov-de Haas oscillations in pseudomorphic GaN quantum wells on single-crystal AlN substrates in pulsed magnetic fields up to 60 T
Jimy Encomendero1, Yu-Hsin Chen1, Eungkyun Kim1, Joseph Dill1, Thai-son Nguyen1, Oscar Ayala-Valenzuela2, Fedor Balakirev2, Scott Crooker2, Debdeep Jena1, Grace Xing1
1Cornell University, Ithaca, NY, USA. 2Los Alamos National Laboratory, Los Alamos, NM, USA

10:45 - 11:00
Highly doped nitrides: correlation between plasma frequencies and band gap shifts
Elias Baron, Rüdiger Goldhahn, Martin Feneberg
Otto-von-Guericke University, Magdeburg, Germany

11:00 - 11:15
In Situ Real-time Synchrotron X-ray Monitoring of the Nucleation and Growth of AlN Epitaxial Films on Sapphire (0001)
Guangxu Ju, Wenyuan Ouyang, Jiale Wang, Yunhao Ye, Erqi Xu, fujun xu, Xuelin Yang, Bo Shen
Peking University, Beijing, China

11:15 - 11:30
Nanoscale investigation of 3D epitaxy for pseudo-substrates
Gordon Schmidt1, Peter Veit1, Amalia Fernando-Saavedra2, Ana Bengoechea Encabo2,3, Christoph Margenfeld4, Frank Bertram1, Miguel Angel Sanchez-Garcia2, Enrique Calleja Pardo2, Andreas Waag4, Juergen Christen1
1Otto-von-Guericke-University Magdeburg, Magdeburg, Germany. 2ISOM and Dept. Ingeniería Electrónica, ETSI Telecomunicación, Universidad Politécnica de Madrid, Madrid, Spain. 3Tianrui Semiconductor Materials (Suzhou) Ltd.co, Suzhou, China. 4Institute of Semiconductor Technology, Technische Universität Braunschweig, Braunschweig, Germany

11:30 - 11:45
Hole transport in Mg-doped Ga- and N-polar GaN
Masahiro Kamiyama1, Shashwat Rathkanthiwar1, Cristyan Quiñones García1, Seiji Mita2, Pramod Reddy2, Ronny Kirste2, Ramón Collazo1, Zlatko Sitar1,2
1North Carolina State University, Raleigh, North Carolina, USA. 2Adroit Materials, Cary, North Carolina, USA

11:45 - 12:00
Controlling Point Defects in UV Emitters
Douglas Cameron1, Marcel Schilling2, Gunnar Kusch3, Paul Edwards4, Viesturs Spulis3, Tim Wernicke2, Michael Kneissl2, Rachel Oliver3, Robert Martin4
1Gatan Inc., Pleasanton, California, USA. 2Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany. 3Department of Materials Science and Metallurgy, University of Cambridge, Cambridge, United Kingdom. 4Department of Physics, SUPA, University of Strathclyde, Glasgow, United Kingdom

Growth: Doping and Defects 2 (GaN and AlGaN)
10:30 - 12:00 Wednesday, November 6, 2024
Location South Pacific 1/2
Chair: Brianna Klein

10:30 - 11:00
(INVITED) Novel Be Doping Techniques to Enable High-Efficiency P-Type III-Nitrides
F. Shadi Shahedipour-Sandvik1, Benjamin McEwen1, Vincent Meyers1, Alireza Lanjani1, Shadi Omranpour1, Oleksandr Andrieiev2, Mykhailo Vorobiov2, Denis O. Demchenko2, Michael A. Reshchikov2
1SUNY Albany, Albany, NY, USA. 2Virginia Commonwealth University, Richmond, VA, USA

11:00 - 11:15
Pulsed sputtering epitaxy of degenerate n-type AlGaN films using Ge dopants
Aiko Naito, Kohei Ueno, Hiroshi Fujioka
Institute of Industrial Science, The University of Tokyo, Tokyo, Japan

11:15 - 11:30
In Situ Be-Doping in Ultra-Wide Bandgap AlxGa1-xN by MOCVD
Benjamin McEwen1, Vincent Meyers1, Alireza Lanjani1, Shadi Omranpour1, Oleksandr Andrieiev2, Mykhailo Vorobiov2, Denis O. Demchenko2, Michael A. Reshchikov2, F. Shadi Shahedipour-Sandvik1
1SUNY Albany, Albany, NY, USA. 2Virginia Commonwealth University, Richmond, VA, USA

11:30 - 12:00
(INVITED) Control and reconfiguration of Eu emission centers in GaN for efficient red LEDs
Yasufumi FUJIWARA1,2,3, Takenori IWAYA4, Atsushi TAKEO4, Shuhei ICHIKAWA4, Jun TATEBAYASHI4
1Ritsumeikan University, Kusatsu, Japan. 2Osaka University, Ibaraki, Japan. 3Osaka University, Toyonaka, Japan. 4Osaka University, Suita, Japan

Electronic Devices: HEMTs 2
10:30 - 12:00 Wednesday, November 6, 2024
Location South Pacific 3/4
Chair: Peter Brückner

10:30 - 10:45
Materials Study of Flip-Processed Nitrogen-Polar GaN HEMTs
Gillian Micale, John Niroula, Pradyot Yadav, Jung-Han Hsia, Hridibrata Pal, Qingyun Xie, Tomás Palacios
Massachusetts Institute of Technology, Cambridge, MA, USA

10:45 - 11:00
Polarization-Engineered GaN-Based HEMTs for High Power RF Applications
Yu-En Jeng, Nivedhita Venkatesan, Pengcheng Xu, Patrick Fay
University of Notre Dame, Notre Dame, IN, USA

11:00 - 11:15
Transmission Line Description of Thermal Transients for Codesigned III-Nitride Devices
Abdullah Al Mamun Mazumder1, MD Didarul Alam2, Abdullah Mamun1, Mafruda Rahman1, Tariq Jamil1, Kamal Hussain3, Richard Floyd4, Grigory Simin1, Asif Khan1, MVS Chandrashekhar1
1University of South Carolina, Columbia, South Carolina, USA. 2Intel Corporation, Hillsboro, Oregon, USA. 3Texas Instruments Incorporated, Richardson, Texas, USA. 4Sandia National Laboratory, Albuquerque, New Mexico, USA

11:15 - 11:30
Schottky Contact Degradation and Dislocations in AlGaN-GaN HEMTs
Yongkun Sin, Andrew Hall, Laurent Matala-tala, Emily Tang, Jennifer Taggart, Scott Sitzman, In-Tae Bae
The Aerospace Corporation, El Segundo, CA, USA

11:30 - 11:45
Quantifying the electron ensemble velocity enhancement in GaN using Full Band Monte Carlo analysis
Tanmay Chavan, Boyu Wang, Henry Collins, Matthew Guidry, Umesh Mishra
University of California, Santa Barbara, Santa Barbara, CA, USA

11:45 - 12:00
GaN Schottky-gate p-FET Based on a GaN-on-Si Platform Operational at 400℃
Shisong Luo1, Cheng Chang1, Qingyun Xie2, Tao Li1, Mingfei Xu1, Ziyi He3, Tomás Palacios2, Yuji Zhao1
1Department of Electrical and Computer Engineering, Rice University, Houston, Texas, USA. 2Microsystems Technology Laboratories, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. 3School of Electrical, Computer, and Energy Engineering, Arizona State University, Tempe, Arizona, USA

Electronic Devices: Diodes and Vertical Devices
10:30 - 12:00 Wednesday, November 6, 2024
Location Coral 4/5
Chair: Nadeem Mahadik

10:30 - 11:00
(INVITED) Vertical GaN Devices on Native and Foreign Substrates (invited)
Eldad Bahat Treidel, Enrico Brusaterra, Frank Brunner, Oliver Hilt
Ferdinand-Braun-Institut (FBH), Berlin, Berlin, Germany

11:00 - 11:15
1.7kV Robust GaN PiN Diodes achieved by Mg/N co-implanted, triple-zone JTE activated at ultra-high pressure
Hiroki Miyake, Kazuki Ikeyama, Satoshi Ikeda, Kenta Watanabe, Yoshitaka Nagasato
MIRISE Technologies Corporation, Toyota, Aichi, Japan

11:15 - 11:30
Reduction of Current Hysteresis and Early Breakdown Events in Vertical MOCVD GaN-on-GaN Schottky Diodes
Amelia Peterson, Kim Kropka, Anthony Rice, Albert Colon, Jason Neely, Greg Pickrell
Sandia National Laboratories, Albuquerque, NM, USA

11:30 - 11:45
Fabrication and characterization of vertical GaN p-n diodes with ultralow bevel angle mesa termination
Jarosław Tarenko1,2, Maciej Kamiński1,2, Aneta Gołębiowska1, Oskar Sadowski1,2, Anna Szerling1, Krystian Król2, Paweł Prystawko3, Michał Boćkowski3, Izabella Grzegory3, Justyna Wierzbicka1, Magdalena Zadura1, Marek Ekielski1, Renata Kruszka1, Andrzej Taube1
1Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland.
2Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland.
3Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland

11:45 - 12:00
Characterization of GaN vertical JBS diodes fabricated by channeled implantation of Mg ions and subsequent ultra-high-pressure annealing
Kazuki Kitagawa1, Maciej Matys2, Tsutomu Uesugi2, Masahiro Horita1, Tetsu Kachi2, Jun Suda1
1Nagoya Univ., Nagoya, Aichi, Japan. 2Nagoya Univ. IMaSS, Nagoya, Aichi, Japan

Women in Nitrides Lunch
12:00 - 13:45 Wednesday, November 6, 2024
Location Coral 3

Panelists:
Vanya Darakchieva (Linkoping University)
Xuiling Li (UT Austin)
Shadi Shahedipour-Sandvik (University at Albany)
Srabanti Chowdhury (Standford)

Characterization: Carrier Dynamics 2
13:45 - 15:45 Wednesday, November 6, 2024
Location Coral 1
Chair: Daniel Feezell

13:45 - 14:15
(INVITED) Surface carrier dynamics of nitride semiconductors evaluated by time-resolved photoemission spectroscopy
Shuhei Ichikawa1,2, Yoshinobu Matsuda3, Mitsuru Funato3, Yoichi Kawakami3, Kazunobu Kojima1
1Graduate School of Engineering, Osaka University, Suita, Japan. 2Research Center for UHVEM, Osaka University, Ibaraki, Japan. 3Kyoto University, Kyoto, Japan

14:15 - 14:30
Trap-assisted Auger-Meitner recombination in nitrogen-polar III-nitrides
Kazimieras Nomeika, Žydrūnas Podlipskas, Lukas Šiaulys, Arūnas Kadys, Saulius Nargelas, Gintautas Tamulaitis, Ramūnas Aleksiejūnas
Institute of Photonics and Nanotechnology, Vilnius University, Vilnius, Lithuania

14:30 - 14:45
Minority carrier capture coefficients of major midgap recombination centers in the state-of-the-art GaN substrates, epilayers, and Mg-implanted layers
Shigefusa Chichibu1, Kohei Shima1, Akira Uedono2, Shoji Ishibashi3, Hiroko Iguchi4, Tetsuo Narita4, Keita Kataoka4, Ryo Tanaka5, Shinya Takashima5, Katsunori Ueno5, Masaharu Edo5, Hirotaka Watanabe6, Atsushi Tanaka6, Yoshio Honda6, Jun Suda6, Hiroshi Amano6, Tetsu Kachi6, Toshihide Nabatame7, Yoshihiro Irokawa7, Yasuo Koide7
1Tohoku University, Sendai, Miyagi, Japan. 2University of Tsukuba, Tsukuba, Ibaraki, Japan. 3National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan. 4Toyota Central R&D Labs., Inc, Nagakute, Aichi, Japan. 5Fuji Electric Co., Ltd., Hino, Tokyo, Japan. 6Nagoya University, Nagoya, Aichi, Japan. 7National Institute for Materials Science, Tsukuba, Ibaraki, Japan

14:45 - 15:00
Unravelling carrier transport in AlGaN multi-quantum wells by temperature dependent electroluminescence measurements of multicolor UVC LEDs
Jakob Höpfner1, Florian Kühl1, Marcel Schilling1, Franz Biebler1, Anton Muhin1, Martin Guttmann2, Jan Ruschel2, Massimo Grigoletto1,2, Gregor Hofmann3, Friedhard Römer3, Hyun Kyong Cho2, Jens Rass2, Sven Einfeldt2, Tim Wernicke1, Bernd Witzigmann3, Michael Kneissl1,2
1Technische Universität Berlin, Berlin, Germany. 2Ferdinand-Braun-Institut (FBH), Berlin, Germany. 3Lehrstuhl für Optoelektronik, Department EEI, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

15:00 - 15:15
Identification of excitonic transitions in homoepitaxial AlN(000-1) by temperature-dependent high-resolution cathodoluminescence spectroscopy
Domenik Spallek1, Gwénolé Jacopin2, Len van Deurzen3, Jashan Singhal4, Jimy Encomendero4, Debdeep Jena3,4, Oliver Brandt1, Jonas Lähnemann1
1Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund e.V., Berlin, Germany. 2Institute Néel, Centre National de la Recherche Scientifique, Grenoble, France. 3School of Applied and Engineering Physics, Cornell University, Ithaca, New York, USA. 4Department of Electrical and Computer Engineering, Cornell University, Ithaca, New York, USA

15:15 - 15:30
Mechanically Induced Electron-Hole Separation at GaN/Si Heterojunction Interfaces under Polarization Synergy
Haitao Wang, Jia Wang, Yingying Lin, Hiroshi Amano
Nagoya University, Nagoya, Aichi, Japan

15:30 - 15:45
Transient imaging of carrier transport in proximity to nitride defects
Zydrunas Podlipskas, Oleg Kravcov, Kazimieras Nomeika, Ramunas Aleksiejunas
Vilnius University, Vilnius, Lithuania

Novel Materials and Nanostructures: Nanostructures 1
13:45 - 15:45 Wednesday, November 6, 2024
Location Coral 2
Chair: Akihiko Kikuchi

13:45 - 14:15
(INVITED) Vertical Light-Emitting InGaN Nanorod Lasing Heterostructures for Ultra-Compact Micro-Displays
Yong-Ho Ra
Jeonbuk National University, Jeonju, Jeonbukdo, Korea, Republic of

14:15 - 14:45
(INVITED) GaInN-based multi-quantum shells (MQSs) on GaN nanowires toward high-power and high-beam-quality lasers
Satoshi Kamiyama, Tetsuya Takeuchi, Motoaki Iwaya
Meijo University, Nagoya, Aichi, Japan

14:45 - 15:00
Real-time sound tuning of antibunched photons emitted from GaN/InGaN dot-in-a-nanowire heterostructures
Snezana Lazic Knezevic1,2, Sanja Djurdjic Mijin1,3
1Departamento de Física de Materiales, Universidad Autónoma de Madrid (UAM), Madrid, Madrid, Spain. 2Instituto Universitario de Ciencia de Materiales “Nicolás Cabrera” (INC) and Condensed Matter Physics Center (IFIMAC), UAM, Madrid, Madrid, Spain. 3Institute of Physics Belgrade, University of Belgrade, Belgrade, Belgrade, Serbia

15:00 - 15:15
Polarized Luminescence from Core-Shell InGaN Quantum Wells Grown on N-polar Nanowire Arrays and Coupling to In-Plane Optical Modes
Matt Brubaker1, Alexana Roshko1, Mikel Gomez Ruiz2, Jonas Laehnemann2, Kris Bertness1
1National Institute of Standards and Technology, Boulder, CO, USA. 2Paul-Drude-Institut fur Festkorperelektronik, Berlin, Germany

15:15 - 15:30
High quality factor monolithic GaN-based microcavity enabled by bound states in the continuum

Tomasz Czyszanowski1, Dmitriy Yavorskiy2, Tomasz Fąs3, Marta Sawicka2, Grzegorz Muziol2, Emilia Pruszyńska-Karbownik3, Jan Suffczyński3
1Institute of Physics, Technical University of Lodz, Łódź, Poland. 2Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Poland. 3Institute of Experimental Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland

15:30 - 15:45
Circularly polarized light emission from (20-21) InGaN quantum wells coupled with Si3N4 stripe-shaped metasurface
Yuki Murata1, Shuhei Ichikawa2,3, Shintaro Toda4, Yasufumi Fujiwara5,6,7, Kazunobu Kojima1
1Graduate School of Engineering, Osaka University, Suita-shi, Osaka, Japan. 2Graduate School of Engineering, Osaka University, Suita, Osaka, Japan. 3Research Center for UHVEM, Osaka University, Ibaraki, Osaka, Japan. 4ULVAC-Osaka University Joint Research Laboratory for Future Technology, Suita, Osaka, Japan. 5Research Organization of Science and Technology, Ritsumeikan University, Kusatsu, Shiga, Japan. 6SANKEN, Osaka University, Suita, Osaka, Japan. 7R3 Institute of Newly-Emerging Science Design, Osaka University, Toyonaka, Osaka, Japan

Growth: Bulk 3 (HVPE)
13:45 - 15:45 Wednesday, November 6, 2024
Location South Pacific 1/2
Chair: Tomasz Sochacki

13:45 - 14:15
(INVITED) Recent progress in HVPE-based GaN and AlGaN growth
Hajime Fujikura, Taichiro Konno, Tetsuji Fujimoto, Shota Kaneki, Takeshi Kikuchi, Karen Matsuda, Yoshinobu Narita, Kiyoshi Okuyama, Takashi Sato
Sumitomo Chemical Co., Ltd., Hitachi, Ibaraki, Japan

14:15 - 14:45
(INVITED) Reduced Unintentional Impurity Incorporation in Lightly Doped N-Type Gallium Nitride Layer Grown via Halogen-Free Vapor Phase Epitaxy
Taishi Kimura1, Hiroki Shimazu1, Keita Kataoka1, Kenji Itoh1, Tetsuo Narita1, Akira Uedono2, Yutaka Tokuda3, Daiki Tanaka4, Shugo Nitta4, Hiroshi Amano4, Daisuke Nakamura1
1Toyota Central R&D Labs. Inc., Nagakute, Aichi, Japan. 2University of Tsukuba, Tsukuba, Ibaraki, Japan. 3Aichi Institute of Technology, Toyota, Aichi, Japan. 4Nagoya University, Nagoya, Aichi, Japan

14:45 - 15:00
Analysis of defects in HVPE GaN crystallized using different seeding approaches by Bragg diffraction imaging
Lutz Kirste1, Tomasz Sochacki2, Robert Kucharski2, Arianna Jaroszynska2, Karolina Grabianska2, Thu Nhi Tran Caliste3, Patrik Straňák1, Jan L. Weyher2, José Baruchel3, Michal Bockowski2
1Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany. 2Institute of High Pressure Physics (UNIPRESS), Warsaw, Poland. 3European Synchrotron Radiation Facility (ESRF), Grenoble, France

15:00 - 15:15
Halide Vapor Phase Epitaxy of AlxGa1-xN: Perspectives for the development of novel nitride substrates
Arianna Jaroszyńska, Michał Dąbrowski, Petro Sadovyi, Robert Kucharski, Karolina Grabiańska, Robert Czernecki, Michał Boćkowski, Tomasz Sochacki
Institute of High Pressure Physics of the Polish Academy of Sciences, Warsaw, Poland

15:15 - 15:45
(INVITED) Halide Vapor Phase Epitaxy of Thick GaN and AlGaN using GaCl, GaCl3 and AlCl3
Hisashi Murakami, Akinori Koukitu
Department of Applied Chemistry, Tokyo University of Agriculture and Technology, Tokyo, Japan

Optoelectronic Devices: Micro-LEDs
13:45 - 15:45 Wednesday, November 6, 2024
Location South Pacific 3/4
Chair: Guangxu Ju

13:45 - 14:15
(INVITED) Unleaching MicroLED Potential: Damage-free Anisotropic Etching for Enhanced Pixel Density
Xiuling Li1,2, Clarence Chan2, Zetian Mi3, Henry Roberts1, Yixin Xiao3
1University of Texas, Austin, TX, USA. 2University of Illinois, Urbana, IL, USA. 3University of Michigan, Ann Arbor, MI, USA

14:15 - 14:30
Demonstration and Analysis of High Bandwidth InGaN Micro-LEDs at Temperatures up to 400°C
Daniel Rogers1, Haotian Xue1, Fred Kish1, Fu-Chen Hsiao1, Bardia Pezeshki2, Alexander Tselikov2, Jonathan Wierer1
1North Carolina State University, Raleigh, NC, USA. 2AvicenaTech Corp., Sunnyvale, CA, USA

14:30 - 14:45
microLED based Structured Micro Illumination Light Engines
Georg Schöttler1,2, Steffen Higgins-Wood1,2, Maximilian Vergin1,2, Juliane Breitfelder1,2, Florian Meierhofer1,2, Rany Miranti-Augustin1,2, Jana Hartmann1,2, Jan Gülink1,2,3, Joan Canals4, Victor Moro4, Angel Dieguez4, J. Daniel Prades1,2,4, Andreas Waag1,2
1Institut of Semiconductor Technology, TU Braunschweig, Braunschweig, Lower Saxony, Germany. 2Nitride Technology Center, TU Braunschweig, Braunschweig, Lower Saxony, Germany. 3QubeDot GmbH, Braunschweig, Lower Saxony, Germany. 4Department of Electronic and Biomedical Engineering, Universitat de Barcelona, Barcelona, Barcelona, Spain

14:45 - 15:00
Damage-free micro-LEDs fabricated by selective thermal oxidation method
Zhiyuan Liu, Yi Lu, Haicheng Cao, Glen Isaac Maciel García, Tingang Liu, Xiao Tang, Na Xiao, Raul Aguileta Vazquez, Mingtao Nong, Xiaohang Li
King Abdullah University of Science and Technology, Jeddah, Makkah, Saudi Arabia

15:00 - 15:15
Arbitrary control of optical polarization of (0001) InGaN radiation using anisotropic strain-relaxation in micro-LED structures

Shuhei Ichikawa1,2, Yoshinobu Matsuda3, Mitsuru Funato3, Yoichi Kawakami3, Kazunobu Kojima1
1Graduate School of Engineering, Osaka University, Suita, Japan. 2Research Center for UHVEM, Osaka University, Ibaraki, Japan. 3Kyoto University, Kyoto, Japan

15:15 - 15:30
Metal Nanowire Bonding for the Heterogeneous Integration of GaN-based MicroLED Arrays with CMOS Backplanes
Maximilian Vergin, Georg Schöttler, Steffen Higgins-Wood, Florian Meierhofer, Andreas Waag
TU Braunschweig, Institute of Semiconductor Technology, Braunschweig, Germany

15:30 - 15:45
Monochromatic tandem InGaN-based micro-LEDs using tunnel junction
Jung-Hong Min, Sung Hoon Jung, Shang Hern Lee, Sungoh Cho, Hwa Sub Oh, Tae-Hoon Chung
Korea Photonics Technology Institute (KOPTI), Gwangju, Korea, Republic of

Electronic Devices: Power/High Voltage 3
13:45 - 15:45 Wednesday, November 6, 2024
Location Coral 4/5
Chair: Biplab Sarkar

13:45 - 14:15
(INVITED) GaN power devices on 200 mm engineered substrates
Benoit Bakeroot1,2, Karen Geens1, Sujit Kumar1, Herbert De Pauw2, Matteo Borga1, Anurag Vohra1, Urmimala Chatterjee1, Stefaan Decoutere1
1imec, Leuven, Belgium. 2CMST, imec and Ghent University, Ghent, Belgium

14:15 - 14:30
Demonstration of High Johnson's Figure of Merit (> 6 THz·V) with extreme bandgap Al0.87Ga0.13N/Al0.64Ga0.36N HFET
Jiahao Chen1, Parthasarathy Seshadri1, Kenneth Stephenson2, Abdullah-Al Mamun2, Zehuan Wang1, Tahmidul Alam1, Asif Khan2, Chirag Gupta1
1University of Wisconsin-Madison, madison, WI, USA. 2University of South Carolina, Columbia, SC, USA

14:30 - 14:45
Optically Controlled Power Switches Based on p-GaN Gated HEMT Structures
Jung-Han Hsia1, John Niroula1, Patrick Darmawi-Iskandar1, Cesar Roda Neve2, Jan Strate2, Tomás Palacios1
1Massachusetts Institute of Technology, Cambridge, MA, USA. 2Soitec Belgium N.V., Hasselt, Belgium

14:45 - 15:00
High Performance Scaled p-GaN-Gate HEMTs for Next Generation Medium-Voltage Power Converters
Patrick Darmawi-Iskandar1, John Niroula1, Qingyun Xie1, Jung-Han Hsia1, Cesar Roda Neve2, Jan Strate2, Tomas Palacios1
1Massachusetts Institute of Technology, Cambridge, MA, USA. 2SOITEC Belgium N.V., Hasselt, Belgium

15:00 - 15:15
Enabling High-Performance, Low Voltage GaN-based Power HEMTs via a pGaN Cap
Wiley Yu, Srabanti Chowdhury
Stanford University, Stanford, CA, USA

15:15 - 15:45
(INVITED) Recent progress of vertical GaN-on-Silicon devices
Youssef Hamdaoui1, sondre michler2, Adrien BIDAUD1, katir ziouche1, farid medjdoub1
1IEMN-CNRS, Lille, France. 2Siltronic, Munich, Germany

Characterization: Thermal Properties
16:15 - 18:00 Wednesday, November 6, 2024
Location Coral 1
Chair: Ronny Kirste

16:15 - 16:30
High-Temperature Characterization of Deep Recessed N-Polar GaN HEMT
Harsh Rana1, Oguz Odabasi1, Christopher Clymore2, Tanmay Chavan2, Kamruzzaman Khan2, Matthew Guidry2, Umesh Mishra2, Elaheh Ahmadi1
1UCLA, Los Angeles, CA, USA. 2UCSB, Santa Barbara, CA, USA

16:30 - 16:45
Switching Performance of High Voltage GaN HEMTs at Cryogenic Temperatures down to 4.2 K
Xin Yang, Matthew Porter, Zineng Yang, Zichen Xi, Qiang Li, Linbo Shao, Yuhao Zhang
Virginia Polytechnic Institute and State University, Blacksburg, VA, USA

16:45 - 17:00
Properties of cubic GaN films deposited on c-BN/Diamond templates
Jaime Freitas1, James Culbertson1, Nadeemullah Mahadik1, David Storm2
1Naval Research Laboratory, Washington, Virginia, USA. 2Army Research Laboratory, Adelphi, Maryland, USA

17:00 - 17:15
Phonon screening of excitons in atomically thin nitrides
Woncheol Lee1,2, Antonios M. Alvertis3,4,5, Zhenglu Li5,4,6, Steven G. Louie4,5, Marina R. Filip7, Jeffrey B. Neaton4,5,8, Emmanouil Kioupakis9
1Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI, USA. 2Materials Department, University of California, Santa Barbara, CA, USA. 3KBR, Inc. NASA Ames Research Center, Moffett Field, CA, USA. 4Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA. 5Department of Physics, University of California Berkeley, Berkeley, CA, USA. 6Mork Family Department of Chemical Engineering and Materials Science, University of Southern California, Los Angeles, CA, USA. 7Department of Physics, University of Oxford, Oxford, United Kingdom. 8Kavli Energy NanoScience Institute at Berkeley, Berkeley, CA, USA. 9Department of Materials Science and Engineering, University of Michigan, Ann Arbor, MI, USA

17:15 - 17:30
Thermal transport in AlGaN/GaN HEMTs grown on SiC, GaN, and AlN substrates
Dat Tran1, Minho Kim1,2, Okhyun Nam3, Vanya Darakchieva1,2,4,5, Plamen Paskov1
1Center for III-nitride Technology, C3NiT-Janzen, Linköping University, 581 83 Linköping, Sweden. 2Wallenberg Initiative Materials Science for Sustainability, Department of Physics, Chemistry, Biology, Linköping University, 581 83 Linköping, Sweden. 3Department of Nano-Semiconductor Engineering, Tech University of Korea (TUK), 15073, 237 Sangidaehak-ro, Siheung, Gyeonggi, Korea, Republic of. 4Center for III-nitride Technology, C3NiT-Janzen and Terahertz Materials Analysis Center, TheMAC, Lund University, 221 00 Lund, Sweden. 5NanoLund and Solid State Physics, Lund University, 221 00 Lund, Sweden

17:30 - 17:45
Machine Learning Potential to Investigate Phonon Transport of Bulk AlN with Defects
Ying Dou1, Koji Shimizu2, Hiroshi Fujioka1, Satoshi Watanabe2
1Institute of Industrial Science, The University of Tokyo, Tokyo, Japan. 2Department of Materials Engineering, The University of Tokyo, Tokyo, Japan

17:45 - 18:00
Temperature-dependent investigation of polarisation doping in 330 nm ultraviolet light-emitting diodes
Peter Milner1,2, Vitaly Z. Zubialevich1, Sandeep M. Singh1,2, Brian Corbett1, Peter J. Parbrook1,2
1Tyndall National Institute, University College Cork, Cork, Ireland. 2School of Engineering, University College Cork, Cork, Ireland

Novel Materials and Nanostructures: Nanostructures 2
16:15 - 18:00 Wednesday, November 6, 2024
Location Coral 2
Xiuling Li

16:15 - 16:45
(INVITED) Fabrication of GaN-based Nanostructures and Photonic Crystals byHydrogen Environment Anisotropic Thermal Etching (HEATE)
Akihiko Kikuchi
Sophia University, Sophia Semiconductor Research Institute, Tokyo, Japan

16:45 - 17:00
AlGaN/GaN heterostructures based on dodecagonal III-nitride microrods – a step towards UV emitters
Łukasz Janicki1, Paulina Ciechanowicz1, Adrianna Piejko1,2, Robert Kudrawiec1,2, Detlef Hommel1,3
1PORT Polish Center for Technology Developement, Wrocław, Poland. 2Wrocław University of Science and Technology, Wrocław, Poland. 3Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wrocław, Poland

17:00 - 17:15
Porous GaN Nanopyramids: Advancing Beyond Conventional Nanostructures for High-Brightness Nano-LEDs.
Hamza Thaalbi, Sang-Wan Ryu
Chonnam National University, Gwangju, Korea, Republic of

17:15 - 17:30
Growth of self-assembled (Al,Sc)N nanowires for the application in piezoelectric energy harvesting
Philipp John1, Natthawadi Buatip2, Rudeesun Songmuang2, Aidan Campbell1, Jonas Lähnemann3, Achim Trampert1, Thomas Auzelle1, Oliver Brandt1, Lutz Geelhaar1
1Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Germany. 2Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France. 3Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, France

17:30 - 18:00
(INVITED) Estimating loss mechanisms in short wavelength visible and UV PCSEL
Ulrich T. Schwarz1, Doğukan Apaydın2, Lars Persson2, Lukas Uhlig1, Åsa Haglund2
1TU Chemnitz, Chemnitz, Germany. 2Chalmers, Göteborg, Sweden

Growth: Polarity Control
16:15 - 18:00 Wednesday, November 6, 2024
Location South Pacific 1/2
Jennifer Hite

16:15 - 16:45
(INVITED) The Underemphasized Concept of Crystal Polarity in Conventional Semiconductors and Its Device Application
TAKASHI MATSUOKA
Tohoku University, Sendai, Miyagi, Japan

16:45 - 17:00
Exploring N-polar AlN for Electronic Application
Markus Pristovsek, Itsuki Furuhashi, Xu Yang
Nagoya University, Nagoya, Japan

17:00 - 17:15
Nonpolar a-plane AlGaN grown by MOVPE on Sputter-deposited and Face-to-face Annealed a-AlN/r-sapphire
Shinnosuke Mori, Ryota Akaike, Hiroki Yasunaga, Takao Nakamura, Hideto Miyake
Mie University, Tsu, Japan

17:15 - 17:30
Semipolar (11-22) AlGaN and AlN Grown by MOVPE on Face-to-Face Annealed Sputter-Deposited (11-22) AlN/m-sapphire
Kensei Oya, Ryota Akaike, Hiroki Yasunaga, Hideto Miyake
Mie University, Tsu, Mie, Japan

17:30 - 18:00
(INVITED) Epitaxy of III-Nitride Devices on Opposite Facets of the Same Polar Crystal: New Perspectives in Materials Engineering
Henryk Turski

Institute of High Pressure Physics "Unipress", PAS, Warsaw, Poland. Department of Electrical and Computer Engineering, Cornell University, Ithaca, New York, USA

Optoeelctronics Devices: Laser Diodes
16:15 - 18:00 Wednesday, November 6, 2024
Location South Pacific 3/4
Åsa Haglund

16:15 - 16:45
(INVITED) Realization of high-power and high-beam quality blue photonic-crystal surface-emitting lasers
Tomoaki Koizumi1,2, Kei Emoto1,2, Masahiro Jutori1, Kenji Ogawa1, Takuya Inoue1, Kenji Ishizaki1, Menaka De Zoysa1, Susumu Noda1
1Department of Electronic Science and Engineering, Kyoto University, Kyoto, Kyoto, Japan. 2R&D Laboratories, Stanley Electric Co., LTD, Hadano, Kanagawa, Japan

16:45 - 17:00
Narrow Ridge III-nitride m-plane Violet Edge-emitting Laser Diodes with Sidewall Passivation using Atomic Layer Deposition
Matthew Wong, Haojun Zhang, Emily Trageser, Stephen Gee, Ryan Anderson, Tanay Tak, James Speck, Shuji Nakamura, Dan Cohen, Steve DenBaars
UC Santa Barbara, Santa Barbara, CA, USA

17:00 - 17:15
n-type AlN/AlGaN superlattice cladding layer for UV laser diodes
Kazuaki Ebata, Kouta Tateno, Kazuyuki Hirama, Kazuhide Kumakura, Yoshitaka Taniyasu
NTT Basic Research Laboratories, NTT Corporation, Atsugi, Kanagawa, Japan

17:15 - 17:30
Influence of tunnel junctions on the dynamical behavior of laser diodes
Jannina Tepaß1, Lukas Uhlig1, Mateusz Hajdel2, Grzegorz Muziol2, Ulrich Theodor Schwarz1
1Chemnitz University of Technology, Chemnitz, Germany. 2Institute of High Pressure Physics, Warsaw, Poland

17:30 - 18:00
Progress on GaN-based VCSELs
Tetsuya Takeuchi
Meijo University, Nagoya, Aichi, Japan

Electronic Devices: High Temperature
16:15 - 18:00 Wednesday, November 6, 2024
Location Coral 4/5
Matteo Meneghini

16:15 - 16:45
(INVITED) Ultrawide Bandgap AlGaN Transistors for High Operating Temperature Electronics
Brianna Klein1, Andrew Allerman1, Andrew Armstrong1, GlenAsia Gonzalez1, Eric Cruz1, Robert Reyna1, Troy Tharpe1, Troy Olsson2, Marko Tadjer3, James Spencer Lundh3, Sean Yen1, Christopher Nordquist1, Giovanni Esteves1
1Sandia National Laboratories, Albuquerque, NM, USA. 2University of Pennsylvania, Philadelphia, PA, USA. 3US Naval Research Laboratory, Washington, DC, USA

16:45 - 17:00
Robust GaN Schottky Diodes Annealed at 600 °Cfor High Power and High Temperature RF Applications
Beatriz Orfao1, Amir Al Abdallah1, Hugo Bouillaud1, Mahmoud Abou Daher2, Guillaume Ducournau2, Yannick Roelens2, Mohammed Zaknoune1, Malek Zegaoui1
1CNRS-IEMN, Villeneuve d'ascq, Lille, France. 2IEMN, Villeneuve d'ascq, Lille, France

17:00 - 17:15
Drift Velocity of 2DEG in AlGaN/GaN in Ultrawide Temperature Range from 25 K to 573 K
Yusuke Wakamoto1, Takahiko Kawahara2, Shigeki Yoshida2, Kozo Makiyama2, Ken Nakata2, Takuya Maeda1
1The University of Tokyo, Bunkyo, Tokyo, Japan. 2Sumitomo Electric Industries, Ltd., Yokohama, Kanagawa, Japan

17:15 - 17:30
High Temperature Gate Leakage Modeling from 25°C to 500°C in High Performance, Scaled AlGaN/GaN HEMTs
Matthew A. Taylor1, John Niroula1, Qingyun Xie1, Shisong Luo2, Yuji Zhao2, Tomás Palacios1
1Microsystems Technology Laboratory, Massachusetts Institute of Technology, Cambridge, MA, USA. 2Department of Electrical and Computer Engineering, Rice University, Houston, TX, USA

17:30 - 17:45
Impact of High Temperature on the Thermal Dynamics of AlGaN Channel Transistors
Muhammad Jamil1, Dominic Myren1, Brianna Klein2, Andrew Armstrong2, Andrew Allerman2, Luke Yates2, Georges Pavlidis1
1University of Connecticut, Storrs, CT, USA. 2Sandia National Lab, Albuquerque, NM, USA

17:45 - 18:00
High-temperature characterization of AlN MESFETs
Masanobu Hiroki, Kazuyuki Hirma, Kazuhide Kumakura, Yoshitaka Taniyasu
NTT Basic Research Laboratories, NTT Corporation, Atsugi, Kanagawa, Japan

Rump Session: Future of III-Nitride Power Electronics
18:15 - 20:00 Wednesday, November 6, 2024
Location Coral 4/5
Chair: Isik Kizilyalli

The rump session provides a dynamic platform for discussing ongoing and future developments in the field of III-Nitride power diodes, particularly focusing on the performance and applications of AlN versus GaN materials. Attendees explored the benefits of AlN's higher breakdown voltage and thermal conductivity compared to GaN, alongside GaN's well-established usage in power electronics, emphasizing how each material addresses different needs in high power, high-frequency applications.

Rump Session: Novel Nitride Materials
18:15 - 20:00 Wednesday, November 6, 2024
Location Coral 1
Chair: Matthew Hardy

The "Novel Nitride Materials" session will highlight advancements in the field of nitride-based semiconductors, with a focus on materials like AlScN, BN, and ferroelectric nitrides. Discussions will revolve around AlScN's enhanced piezoelectric properties for sensor and RF applications, BN's excellent thermal conductivity, and the potential of ferroelectric nitrides in novel device architectures, opening up new avenues for energy-efficient power electronics and memory technologies.

Rump Session: Challenges in UVC Emitters - LEDs and Lasers
18:15 - 20:00 Wednesday, November 6, 2024
Location Coral 2
Chairs: Thomas Wunderer, Michael Kneissl

The session on AlGaN-based UVC LEDs and lasers will focus on recent breakthroughs in the development of AlGaN materials for deep ultraviolet (UVC) light sources and ongoing limitations that keep these devices from performing at the same level as their visible counterpart. Key discussions will include improvements in efficiency and wavelength tunability for UVC LEDs and lasers, and the challenges associated with enhancing material quality and light extraction to achieve higher output powers and longer device lifetimes in the UVC spectral range.

Thursday, November 7, 2024

Characterization: Doping and Defects 3
08:00 - 10:00 Thursday, November 7, 2024
Location Coral 1
Chair: Rafael Dalmau

08:00 - 08:30
(INVITED) Characterization of Extrinsic and Intrinsic Point Defects in Homoepitaxial GaN
Jun Suda, Masahiro Horita
Nagoya University, Nagoya, Aichi, Japan

08:30 - 08:45
Evaluation of Defects and Microstructure of AlGaN films Using High Resolution X-ray Topography and X-ray Mapping
Nadeemullah Mahadik1, James Lundh1, Travis Anderson2, Seiji Mita3, Ramon Collazo4, Zlatko Sitar4
1US Naval Research Laboratory, Washington, DC, USA. 2University of Florida, Gainesville, FL, USA. 3Adroit Materials, Cary, NC, USA. 4North Carolina State University, Raleigh, NC, USA

08:45 - 09:00
Characterization of Deep level Traps in High-Al Al0.85Ga0.15N
Dongseop lee1, Andrew A Alleman2, Steven Ringel1, Aaron Arehart1
1The Ohio State University, columbus, ohio, USA. 2Sandia National Laboratory, Albuquerque, NM, USA

09:00 - 09:15
Investigation of electrically active dislocations in quasi-vertical GaN-on-Si diodes
Manuel Stabentheiner1, Michael Novak1, Aidan Arthur Taylor1, Lauri Knuuttila1, Andreas Jamnig1, Dionyz Pogany2, Clemens Ostermaier1
1Infineon Technologies Austria AG, Villach, Austria. 2TU Wien, Vienna, Austria

09:15 - 09:30
Atomic-scale Climb Process and Asymmetric Jogs of Dislocations in Nitride Semiconductors
Han Yang1, Xiangru Han2, Xuelin Yang1, Guangxu Ju1, Weikun Ge1, Bing Huang2, Bo Shen1
1Peking Unversity, Beijing, China. 2Beijing Computational Science Research Center, Beijing, China

09:30 - 09:45
352 Identification of deep levels originating from nitrogen interstitials in n-type GaN
Meguru Endo, Jun Suda, Masahiro Horita
Nagoya University, Nagoya, Aichi, Japan

09:45 - 10:00
Single-atom vibrational spectroscopy of dislocation core
Hailing Jiang1, Tao Wang1, Weikun Ge1, Ping Wang1, Bo Shen1, Lucas Lindsay2, Xinqiang Wang1
1Peking University, Beijing, Beijing, China. 2Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA

Growth: InGaN and Other Novel Concepts
08:00 - 10:00 Thursday, November 7, 2024
Location Coral 2
Chair: Christian Wetzel

08:00 - 08:30
(INVITED) Growth and characterization of relaxed InGaN
Stacia Keller, Umesh K Mishra
University of California, Santa Barbara, California, USA

08:30 - 08:45
Epitaxial Growth and Characterization of AlInN/GaN Superlattices
Haotian Xue, Elia Palmese, Ben Sekely, Brian Little, Antonio Gonzalez, Fred Kish, John Muth, Jonathan Wierer
North Carolina State University, Raleigh, NC, USA

08:45 - 09:00
Lower Limit of Deposition Temperature for N-polar n-type GaN Films Deposited by Plasma-Assisted Reactive Sputtering
Kiho Tanaka1, Shinji Yamada1, Manabu Arai2, Tetsu Kachi2, Jun Suda1,2
1Nagoya University, Nagoya, Aichi, Japan. 2IMaSS, Nagoya, Aichi, Japan

09:00 - 09:15
The Growth of Phase-pure cubic GaN – Towards Continuous Film
Jaekwon Lee1,2, Yu-Chieh Chiu1,2, Can Bayram1,2
1Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA. 2Nick Holonyak, Jr. Micro and Nanotechnology Laboratory, University of Illinois at Urbana-Champaign, Urbana, IL, USA

09:15 - 09:30
Wurtzite GaNAs grown by MOVPE and its electronic band structure properties
Wojciech Olszewski1,2, Jakub Ziembicki3, Dominika Majchrzak1, Rafał Bartoszewicz3, Paweł Sacharoch3, Miłosz Grodzicki1,3, Damian Pucicki1,4, Jarosław Serafińczuk1,4, Robert Kudrawiec1,3, Detlef Hommel1,5
1Łukasiewicz Research Network – PORT Polish Center for Technology Development, Wrocław, Dolny Śląsk, Poland. 2Institute of Experimental Physics, University of Wrocław, Wrocław, Dolny Śląsk, Poland. 3Department of Semiconductor Materials Engineering, Wrocław, Dolny Śląsk, Poland. 4Department of Nanometrology, Wrocław University of Science and Technology, Wrocław, Dolny Śląsk, Poland. 5Institute of Low Temperature and Structure Research of Polish Academy of Science, Wrocław, Dolny Śląsk, Poland

09:30 - 09:45
Where does phosphorus reside when incorporated into AlN for AlPN?
Xu Yang1, Emi Kano1, Nobuyuki Ikarashi1, Sanowar Gazi2, Frank Brunner2, Eberhard Richter2, Oliver Hilt2, Markus Weyers2, Markus Pristovsek1
1Nagoya University, Nagoya, Aichi, Japan. 2Ferdinand Braun Institut, Berlin, Germany

09:45 - 10:00
Heteroepitaxy of β-Ga2O3 on Ga- and N-polar GaN by MOCVD: Impact of GaN polarity on the heterointerface and microstructure
Emma Rocco1, Daniel Pennachio1, James Lundh1, Hannah Masten1, Marko Tadjer1, Michael Mastro1, Jennifer Hite2
1U.S. Naval Research Laboratory, Washington, D.C., USA. 2University of Florida, Gainesville, FL, USA

Growth: Alternative Substrates and Cubic Phases
08:00 - 10:00 Thursday, November 7, 2024
Location South Pacific 1/2
Chair: Ian Sharp

08:00 - 08:15
MOCVD growth and characterization of Scandium Nitride thin films on Al2O3, Si, GaN, and SiC
Vineeta Muthuraj1, Claire Vozel1, Michael Iza1, Abdullah Alharbi2, Abdullah Almogbel2, Shuji Nakamura1,3, Umesh Mishra3, Stacia Keller3, Steven DenBaars1,3
1Materials Department, University of California, Santa Barbara, Santa Barbara, California, USA. 2King Abdulaziz City for Science and Technology (KACST), Riyadh, Riyadh, Saudi Arabia. 3Electrical & Computer Engineering Department, University of California, Santa Barbara, Santa Barbara, California, USA

08:15 - 08:30
Direct high-temperature MOCVD growth of high-quality GaN on foreign substrates: A pathway for high-performance hetero-epitaxially grown devices
Uiho Choi, Alessandro Floriduz, Zheng Hao, Elison Matioli
École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

08:30 - 08:45
RF-MBE Growth of GaN on Step-free Cleaved ScAlMgO4 Substrates
Tsutomu Araki1, Yasuhiro Yamada1, Nobuaki Hagiwara1, Taiki Kusayama1, Momoko Deura2, Takashi Fujii1
1College of Science and Engineering, Ritsumeikan University, Kusatsu, Shiga, Japan. 2Ritsumeikan Global Innovation Research Organization, Ritsumeikan University, Kusatsu, Shiga, Japan

08:45 - 09:00
Metal modulated growth of cubic InGaN and InGaN/GaN quantum wells by Molecular Beam Epitaxy
Silas A. Jentsch1, Mario F. Zscherp1, Nicolai M. Gimbel1, Markus Stein1, Vitalii Lider2, Celina Becker2, Andreas Beyer2, Anja Henss1, Donat J. As3, Kerstin Volz2, Sangam Chatterjee1, Jörg Schörmann1
1Justus-Liebig-University Giessen, Giessen, Germany. 2Philipps-University Marburg, Marburg, Germany. 3Paderborn University, Paderborn, Germany

09:00 - 09:15
Understanding the growth mechanism of self-assembled cubic InGaN/GaN quantum wells by molecular beam epitaxy
Mario F. Zscherp1, Silas A. Jentsch1, Nicolai M. Gimbel1, Vitalii Lider2, Celina Becker2, Markus Stein1, Andreas Beyer2, Anja Henss1, Donat J. As3, Kerstin Volz2, Sangam Chatterjee1, Jörg Schörmann1

1Justus Liebig University Giessen, Giessen, Germany. 2Philipps-University Marburg, Marburg, Germany. 3Paderborn University, Paderborn, Germany

09:15 - 09:30

Growth of NbN/InAlN structures by plasma-assisted molecular beam epitaxy

Artur Lachowski1, Paweł Wolny1, Ewa Grzanka1, Krzysztof Dybko2, Marcin Siekacz1, Henryk Turski1, Julita Smalc-Koziorowska1, Krzesimir Nowakowski-Szkudlarek1, Czesław Skierbiszewski1

1Institute of High Pressure Physics "Unipress", PAS, Warsaw, Poland. 2Institute of Physics, Polish Academy of Sciences, Warsaw, Poland

09:30 - 09:45

Processing Sequence of III-N/NbN/III-N Semiconductor Hetero-Structures

Nicolas Delpuech1, Antoine Pedeches2, Nicolas MICHEL1, Fabrice Semond2, Helène Rotella2, Jean-Yves Duboz2, Pierre Ruterana3, Marie-Pierre Chauvat3, Magali Morales3

1III-V Lab, Palaiseau, France. 2CRHEA, Valbonne, France. 3CIMAP, Caen, France

09:45 - 10:00

Application of ZrN metallic films for self-assembled and selective area growth of GaN nanowires by PAMBE

Zbigniew Zytkiewicz1, Marta Sobanska1, Karol Olszewski1, Magdalena Zadura2, Aleksandra Wierzbicka1, Marek Guziewicz2, Marek Ekielski2

1Institute of Physics, Polish Academy of Sciences, Warsaw, Poland. 2Lukasiewicz Research Network - Institute for Microelectronics and Photonics, Warsaw, Poland

Optoelectronic Devices: LEDs 3

08:00 - 10:00 Thursday, November 7, 2024

Location South Pacific 3/4

Chair: Ulrich Schwarz

08:00 - 08:30

(INVITED) Measurements of Carrier Dynamics in Commercial-Grade InGaN/GaN Light-Emitting Diodes Using Small-Signal Electroluminescence

Daniel Feezell1, Xuefeng Li1, Elizabeth DeJong1, Nick Pant2, Abdelrahman Elshafiey1, Sheikh Ifatur Rahman3, Andrew Armstrong4, Siddharth Rajan3, Emmanouil Kioupakis2, Robert Armitage5

1University of New Mexico, Albuquerque, NM, USA. 2University of Michigan, Ann Arbor, MI, USA. 3The Ohio State University, Columbus, OH, USA. 4Sandia National Laboratories, Albuquerque, NM, USA. 5Lumileds, San Jose, CA, USA

08:30 - 08:45

Doping engineering of Bidirectional LEDs towards symmetric light emission under AC power

Mikołaj Żak, Grzegorz Muziol, Marcin Siekacz, Mateusz Hajdel, Krzesimir Nowakowski-Szkudlarek, Mikołaj Chlipała, Henryk Turski, Czesław Skierbiszewski

Institute of High Pressure Physics Polish Academy of Sciences, Warsaw, Mazovia, Poland

08:45 - 09:00

Demonstration of InGaN-based yellow/red LEDs on ScAlMgO4 substrates

Rawan Jalmood, Mohammed Najmi, Ivan Kotov, Cesur Altinkaya, Daisuke Iida, Kazuhiro Ohkawa
King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

09:00 - 09:15
First demonstration of yellow InGaN-based LED on sputtered ScAlMgO4 on Sapphire Substrate
Guangying Wang, Shuwen Xie, Surjava Sanyal, Yuting Li, Shubhra Pasayat
University of Wisconsin-Madison, madison, WI, USA

09:15 - 09:30
Carrier Dynamics in V-Pit-Engineered MQW InGaN/GaN LEDs Using a Multiple-Carrier-Lifetime Model
Xuefeng Li1, Elizabeth DeJong1, Rob Armitage2, Daniel Feezell1
1Center for High Technology Materials (CHTM), University of New Mexico, Albuquerque, New Mexico, USA. 2Lumileds LLC, San Jose, California, USA

09:30 - 10:00
(INVITED) Development of InGaN LEDs for Color Display Applications
Robert Armitage, Tsutomu Ishikawa, Mostafa Abdelhamid, Zhongmin Ren
Lumileds LLC, San Jose, CA, USA

Electronic Devices: HEMTs 3 (Novel Design)
08:00 - 10:00 Thursday, November 7, 2024
Location Coral 4/5
Chair: Spyridon Pavlidis

08:00 - 08:30
(INVITED) Vertical GaN devices: degradation physics and recent case studies
Matteo Meneghini1, Manuel Fregolent1, Nicolò Zagni2, Youssef Hamadoui3, Alberto Marcuzzi1, Davide Favero1, Carlo De Santi1, Matteo Buffolo1, Eldad Bahat-Treidel4, Enrico Brusaterra4, Frank Brunner4, Oliver Hilt4, Christian Huber5, Farid Medjdoub3, Gaudenzio Meneghesso1, Giovanni Verzellesi2, Paolo Pavan2, Enrico Zanoni1
1Univ. Padova, Padova, Italy. 2Univ. Modena and Reggio Emilia, Modena and Reggio Emilia, Italy. 3IEMN-CNRS, Lille, France. 4FBH, Berlin, Germany. 56Robert Bosch GmbH, Advanced Technologies and Micro Systems Department (Renningen, Germany), Renningen, Germany

08:30 - 08:45
AlGaN/GaN Field-Effect Rectifier with Junction Termination Extension
Jiawei Cui1, Yanlin Wu1, Junjie Yang1, Jingjing Yu1, Teng Li1, Zheyang Zheng2, Mengyuan Hua3, Meng Zhang4, Xuelin Yang1, Bo Shen1, Maojun Wang1, Jin Wei1
1Peking university, Beijing, China. 2University of Science and Technology of China, Hefei, China. 3Southern University of Science and Technology, Shenzhen, China. 4Beijing University of Technology, Beijing, China

08:45 - 09:00
High-Aluminum composition (64%) AlGaN-channel HEMT with ~2 kVBreakdown Voltage with Passivation and Field-plates

Md Tahmidul Alam1, Jiahao Chen1, Kenneth Stephenson2, Md Abdullah-Al Mamun2, Abdullah Al Mamun Mazumder2, Asif Khan2, Chirag Gupta1
1University of Wisconsin-Madison, Madison, Wisconsin, USA. 2University of South Carolina, Columbia, South Carolina, USA

09:00 - 09:30
(INVITED) Emerging technologies for GaN electronics: Polarization-engineering for high-performance power devices
Elison Matioli
EPFL, Lausanne, Switzerland

09:30 - 10:00
(INVITED) Multidimensional Power Devices in GaN: Superjunction, Multi-channel, and FinFET
Yuhao Zhang
Virginia Tech, Blacksburg, Virginia, USA

Plenary - Professor Zetian Mi
10:30 - 11:15 Thursday, November 7, 2024
Location Coral 4/5
Ferroelectric Nitride Semiconductors: Challenges and Opportunities
Zetian Mi
Department of Electrical and Computer Engineering, University of Michigan, Ann Arbor, MI, USA

Plenary - Professor Yoichi Kawakami
11:15 - 12:00 Thursday, November 7, 2024
Location Coral 4/5
Elucidating Fundamental Properties of AlGaN-based Semiconductors and Future Prospects for DUV Emitters
Yoichi Kawakami
Department of Electronic Science and Engineering, Kyoto University, Kyoto University, Kyoto, Kyoto, Japan

Friday, November 8, 2024

Characterization: Optical Properties
08:00 - 10:00 Friday, November 8, 2024
Location Coral 1
Chair: Jaime Freitas

08:00 - 08:30
(INVITED) Excitons and exciton-phonon quantum processes in atomically thin nitride heterostructures
Emmanouil Kioupakis1, Woncheol Lee1,2
1University of Michigan, Ann Arbor, MI, USA. 2University of California, Santa Barbara, Santa Barbara, CA, USA

08:30 - 08:45
Identification of the shallowest acceptor in GaN
Michael Reshchikov1, Denis Demchenko1, Benjamin McEwen2, Shadi Shahedipour-Sandvik2
1Virginia Commonwealth University, Richmond, VA, USA. 2SUNY University at Albany, Albany, NY, USA

08:45 - 09:00
Room-temperature photoluminescence lifetimes of Mg-doped p-type GaN layers grown by halide vapor phase epitaxy
Shigefusa Chichibu1, Kazuki Ohnishi2, Hirotaka Watanabe2, Shugo Nitta2, Yoshio Honda2, Hiroshi Amano2, Akira Uedono3, Shoji Ishibashi4, Kohei Shima1
1Tohoku University, Sendai, Miyagi, Japan. 2Nagoya University, Nagoya, Aichi, Japan. 3University of Tsukuba, Tsukuba, Ibaraki, Japan. 4National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan

09:00 - 09:15
Photoluminescence study of Si and Ge doped homoepitaxial AlN
Auditee Majumder Momo, Ronny Kirste, James Loveless, Chao I Liu, Seiji Mita, Shashwat Rathkanthiwar, Ramón Collazo, Zlatko Sitar
North Carolina State University, Raleigh, North Carolina, USA

09:15 - 09:30
Observation of green to blue region topological edge propagation by GaN membrane topological PhC
Hinaki Sugiura1, Yamato Takano1, Umito Kurabe1, Xiao Hu2, Akihiko Kikuchi1
1Sophia University, Tokyo, Japan. 2WPI-MANA, NIMS, Ibaraki, Japan

09:30 - 09:45
Electroreflectance studies of electric field distribution in hybrid van der Waals/(Al)GaN heterostructures intended for use in UV detectors
Robert Kudrawiec1,2, Karol Kulinowski1, Ewelina Zdanowicz1, Artur Herman1, Rafał Kuna2, Wojciech Olszewski2, Detlef Hommel2
1Department of Semiconductor Materials Engineering, Wroclaw University of Science and Technology, Wrocław, Poland. 2ŁUKASIEWICZ Research Network PORT-Polish Center for Technology Development, Wrocław, Poland

09:45 - 10:00
Optical Properties of AlN:Ti
Felix Nippert1, Pegah Bagheri2, Ronny Kirste3, Pramod Reddy2, Seiji Mita3, Rafael Dalmau4, Ramón Collazo2, Zlatko Sitar2,3, Markus R. Wagner1,5
1Institute of Solid State Physics, Technische Universität Berlin, Berlin, Berlin, Germany. 2Department of Materials Science and Engineering, North Carolina State University, Raleigh, NC, USA. 3Adroit Materials, Cary, NC, USA. 4Hexatech, Inc., Morrisville, NC, USA. 5Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Berlin, Germany

Electronic Devices: Heterostructures and Interfaces
08:00 - 10:00 Friday, November 8, 2024
Location Coral 2
Chair: Andrew Koehler

08:00 - 08:30
GaN Camel Diode: A Unipolar Diode Enabled by the Mg-diffusion Process in III-polar and N-polar GaN
Biplab Sarkar1, Jia Wang2, Hiroshi Amano2
1Indian Institute of Technology, Roorkee, Uttarakhand, India. 2Nagoya University, Nagoya, Japan

08:30 - 08:45
Interface and Breakdown Characteristics in Al2O3/high Al-content AlGaN Heterostructure Transistors
Seungheon Shin1, Kyle Liddy1, Yinxuan Zhu1, Chandan Joishi1, Brianna A. Klein2, Andrew Armstrong2, Andrew A. Allerman2, Siddharth Rajan1
1The Ohio State University, Columbus, Ohio, USA. 2Sandia National Laboratories, Albuquerque, New Mexico, USA

08:45 - 09:00
First Demonstration of Schottky Barrier Diodes in Multi-Channel AlN/GaN Heterostructures
Hanchao Li1, Qingyun Xie2,3, Yue Wang4, Hanlin Xie2,3, Pradip Dalapati1, Siyu Liu1, Kumud Ranjan2,3, Siewchuen Foo5, Subramaniam Arulkumaran5, Geok Ing Ng1,2,3,4,5
1School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Singapore. 2Institute of Microelectronics (IME), Agency for Science, Technology and Research (A*STAR), Singapore, Singapore. 3National GaN Technology Centre (NGTC), Agency for Science, Technology and Research (A*STAR), Singapore, Singapore. 4Low Energy Electronic Systems, Singapore-MIT Alliance for Research and Technology, Singapore, Singapore. 5Temasek Laboratories@NTU, Nanyang Technological University, Singapore, Singapore

09:00 - 09:15
Optimizing Electron Mobility and Controlling 2DEG/2DHG Densities in N-polar GaN/InAlN/GaN Heterostructures for Advanced HEMT Design
Wei Li1,2,3, Lijuan Jiang1,2,3, Hongling Xiao1,2,3, Chun Feng1,2,3, Jiankai Xu1,3, Qian Wang1,3, Miao Zhou1,2,3
1Institute of Semiconductors, Chinese Academy of Sciences, Beijing, Beijing, China. 2College of Materials Science and Opto-Electronic Technology, University of Chinese Academy of Sciences, Beijing, Beijing, China. 3Beijing Key Laboratory of Low Dimensional Semiconductor Materials and Devices, Beijing, Beijing, China

09:15 - 09:30
Performance Limits of Switching Figure-of-Merit and Power Loss for WBG and UWBG Vertical Power Transistors
Matthew Porter, Xin Yang, Hehe Gong, Bixuan Wang, Zineng Yang, Yuhao Zhang
Virginia Polytechnic Institute and State University, Blacksburg, VA, USA

09:30 - 09:45
Advanced structural and optical characterization of GaN-on-Si pn diodes: impact of SiN interlayers on dislocation reduction
Gordon Schmidt1, Peter Veit1, Frank Bertram1, Cengiz Kuruoglu2, Gao Ziyao2, Michael Heuken2, Jürgen Christen1
1Otto-von-Guericke-University Magdeburg, Magdeburg, Germany. 2AIXTRON SE, Herzogenrath, Germany

09:45 - 10:00
Improved Vth Stability and Reduced Interface State Density in normally-off GaN MIS-HEMTs with Al2O3/ in-situ GaON Gate Dielectrics
Tian Luo, Jichun Ye, Wei Guo
Ningbo Institute of Materials Tech. & Eng. CAS, Ningbo, China

Growth: HEMTs
08:00 - 10:00 Friday, November 8, 2024
Location South Pacific 1/2
Chair: Andrew Binder

08:00 - 08:15
Effects of high Ge concentration (5×10^{20} cm^{-3}) on GaN material characteristics and Ohmic contacts for GaN-HEMT applications
Ravikiran Lingaparthi1, Dharmarasu Nethaji1, Radhakrishnana K1,2, Dinesh Mani2, Rizwana Khanum2, Tian Long Alex Seah1, Geok Ing Ng1,2
1Temasek Laboratories, Nanyang Technological University, Singapore, Singapore. 2Center for Micro/Nano-electronics, School of EEE, Nanyang Technological University, Singapore, Singapore

08:15 - 08:30
Ultra-thin GaN channel in AlGaN/GaN/AlN double heterostructure HEMTs on AlN substrates by hot-wall MOCVD
Minho Kim1,2, Alexis Papamichail1, Dat Q Tran1, Plamen Paskov1, Vanya Darakchieva1,2,3,4
1Center for III-Nitride Technology, C3NiT-Janzén, Linköping University, SE-58183 Linköping, Sweden. 2Wallenberg Initiative Materials Science for Sustainability(WISE), Department of Physics, Chemistry and Biology (IFM), Linköping University, SE-58183 Linköping, Sweden. 3Center for III-Nitride Technology, C3NiT-Janzén, NanoLund and Lund University, S-22100 Lund, Sweden. 4Terahertz Materials Analysis Center, THeMAC, Lund University, S-22100 Lund, Sweden

08:30 - 08:45
Molecular Beam Epitaxy Growth of AlN/GaN/AlN QW HEMTs on 2-inch Single-crystal AlN Substrates
Yu-Hsin Chen1, Jimy Encomendero1, Keisuke Shinohara2, Huili Grace Xing3, Debdeep Jena3
1Cornell Univeristy, Ithaca, NY, USA. 2Teledyne Scientific and Imaging, LLC, Thousand Oaks, CA, USA. 3Cornell University, Ithaca, NY, USA

08:45 - 09:00
527 Growth, fabrication and characterization of AlGaN/GaN HEMTs on 100 mm bulk GaN substrates
Rachid Driad, Stefan Müller, Christian Friesicke, Lutz Kirste, Michael Mikulla

Fraunhofer - IAF, Freiburg, Germany

09:00 - 09:15
Optimization of the epitaxial drift region of GaN-on-GaN vertical devices
Arne Debald1, Matthias Marx1, Soroush Notash1, Herwig Hahn1, Michael Heuken1, Dirk Bastin2, Sven Besendörfer3, Roland Weingärtner3, Eldad Bahat-Treidel4, Enrico Brusaterra4, Frank Brunner4, Oliver Hilt4, Dirk Fahle1
1AIXTRON SE, Herzogenrath, Germany. 2Freiberger Compound Materials GmbH, Freiberg, Germany. 3Fraunhofer IISB, Erlangen, Germany. 4Ferdinand-Braun-Institut, Berlin, Germany

09:15 - 09:30
700V BV pseudo-vertical p-n diode by selective area growth of GaN on 200mm-diameter Si wafer
Yvon Cordier1, Thomas Kaltsounis1,2, Mohammed El Amrani2, David Plaza Arguello2, Hala El Rammouz2, Thomas Jalabert2, Denis Mariolle2, Matthieu Lafossas2, Simona Torrengo2, Alain Gueugnot2, Laurent Mendizabal2, Julien Buckley2, Matthew Charles2
1CNRS-CHREA, Valbonne, France. 2CEA-Leti, Grenoble, France

09:30 - 09:45
Epitaxial Growth and Characterization of AlScN films on (111) Silicon by Molecular Beam Epitaxy
Rishabh Singh, Nikilesh Veeraraghavan, Chandrashekhar Savant, Debaditya Bhattacharya, Thai-son Nguyen, Anand Ithepalli, Pierce Lonergan, Huili Xing, Debdeep Jena
Cornell University, Ithaca, NY, USA

09:45 - 10:00
High Breakdown, Low Dispersion in MOCVD-grown AlN-buffer HEMTs on 4-inch SiC substrates
Austin Hickman1, Shankar Miller-Murthy1, Kazuki Nomoto2, Eungkyun Kim3, Huili Xing3,1, Debdeep Jena3,1, Reet Chaudhuri1
1Soctera, Ithaca, NY, USA. 2Trinix Technologies, Ithaca, NY, USA. 3Cornell University, Ithaca, NY, USA

Optoelectronic Devices: Visible Emitters and Detectors
08:00 - 10:00 Friday, November 8, 2024
Location South Pacific 3/4
Chair: Jonathan Wierer

08:00 - 08:15
Properties Comparison of GaN-based Photoconductive Semiconductor Switches on SiC and Sapphire Substrates
Lijuan Jiang1,2, Wei Li1,2, Hongling Xiao1,2, Jiankai Xu1,2, Ping Cai1,2, Miao Zhou1,2, Chun Feng1,2, Qian Wang1
1Institute of Semiconductors, Beijing, Beijing, China. 2University of Chinese Academy of Sciences, Beijing, Beijing, China

08:15 - 08:30
Alleviate sidewall damage of InGaN green micro-LEDs by atomic layer etching
Zhiyuan Liu, Haicheng Cao, Tingang Liu, Yi Lu, Xiao Tang, Zixian Jiang, Na Xiao, Xiaohang Li
KAUST, Jeddah, Makkah, Saudi Arabia

08:30 - 08:45
High-efficiency Green-emitting cubic InGaN/GaN Active Layer
Jaekwon Lee1,2, Can Bayram1,2
1Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA. 2Nick Holonyak, Jr. Micro and Nanotechnology Laboratory, University of Illinois at Urbana-Champaign, Urbana, IL, USA

08:45 - 09:00
Thermal Effects in a Green GaN-Based LED as Measured by Electron Emission Spectroscopy
Tanay Tak1, Wan Ying Ho1, Yi Chao Chow1, Jacques Peretti2, Claude Weisbuch1,2, James Speck1
1Materials Department, University of California, Santa Barbara, USA. 2Laboratoire de Physique de la Matière Condensée, École Polytechnique, Palaiseau, France

09:00 - 09:15
Fabrication of InGaN/GaN topological photonic crystal cavity resonator in the blue region
Mirai Akimoto1, Takuto Honda1, Hinaki Sugiura1, Umito Kurabe1, Xiao Hu2, Akihiko Kikuchi1,3,4
1Sophia University, Tokyo, Japan. 2WPI MANA, National Institute for Materials Science, Ibaraki, Japan. 3Sophia Photonics Research Center, Tokyo, Japan. 4Sophia Semiconductor Research Insetitute, Tokyo, Japan

09:15 - 09:30
Insight into In incorporation into (In,Ga)N nanoshells grown around pencil-like GaN nanowires
Jovana Obradović1, Miguel Tinoco Rivas2, Almudena Torres2, Víctor Jesús Gómez Hernández3, Laura Monge Bartolomé3, Sergio Fernández-Garrido1, Álvaro Guzmán1, Žarko Gačević1
1Institute for Optoelectronic Systems and Microtechnology (ISOM), Universidad Politécnica de Madrid, Madrid, Spain. 2Inorganic Chemistry Department, Chemical Sciences Faculty, Universidad Complutense de Madrid, Madrid, Spain. 3Nanophotonics Technology Center - Universitat Politècnica de València, Valéncia, Spain

09:30 - 09:45
Diffusion and activation challenges of Mg acceptors during growth of cascaded LEDs with GaN:Ge/GaN:Mg tunnel junctions by MOVPE
Christoph Berger, Armin Dadgar, Frank Bertram, Gordon Schmidt, Jürgen Christen, André Strittmatter
Otto-von-Guericke-University, Magdeburg, Sachsen-Anhalt, Germany

09:45 - 10:00
Breaking the ray-optics limit out-coupling efficiency of PeLED and QLED
xiao wei sun
Southern University of Science and Technology, Shenzhen, Guangdong, China

Electronic Devices: Alternative Approaches to Transistors and Diodes
08:00 - 10:00 Friday, November 8, 2024
Location Coral 4/5
Chair: Isik Kizilyalli

08:00 - 08:15
XHEMTs on Single-Crystal AlN Substrates
Eungkyun Kim, Yu-Hsin Chen, Jimy Encomendero, Debdeep Jena, Grace Xing
Cornell University, Ithaca, NY, USA

08:15 - 08:30
BAWFET: Monolithic integration of Nitride HEMT with a BAW for active filtering
Wenwen Zhao, Kazuki Nomoto, Chandrashekhar Savant, Hari K. P., Reet Chaudhuri, Huili Xing, Debdeep Jena
Cornell University, Ithaca, NY, USA

08:30 - 08:45
Thermal Resistance Reduction Achieved by Substrate Thinning for GaN IMPATT Diode
Zhengliang Bian1, Avery Marshall2, Lisette Zhang2, Tracy Lee2, Srabanti Chowdhury1
1Stanford University, Stanford, CA, USA. 2QuinStar Inc, Torrance, CA, USA

08:45 - 09:00
Advancements in Charge-Balanced GaN Lateral Polar Junctions for Next-Generation Superjunction Power Devices
Dolar Khachariya1,2, Dennis Szymanski2, Masahiro Kamiyama2, Pramod Reddy1, Erhard Kohn2, Zlatko Sitar2,1, Ramon Collazo2, Spyridon Pavlidis2
1Adroit Materials Inc., Cary, NC, USA. 2North Carolina State University, Raleigh, NC, USA

09:00 - 09:15
Lateral GaN Superjunction Diodes through Si-ion Implantation into p-GaN
Minsik Oh1, Joshua Andrew Perozek1, Zachary Biegler2, James S Speck2, Tomas Palacios1
1Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. 2University of California – Santa Barbara, Santa Barbara, California, USA

09:15 - 09:30
Improvement of Transport Property and Specific On-Resistance in GaN Trench CAVET at Cryogenic Temperatures
Xinyi Wen1, Kwangjae Lee1, Hayao Kasai1,2, Maliha Noshin1, Srabanti Chowdhury1
1Stanford University, Stanford, CA, USA. 2Research Institute for Advanced Material and Devices, Corporate R&D Group, Kyocera, Tsukuba City, Japan

09:30 - 09:45
Reduced On-state Resistance of Hybrid Drain GITs by Using Tapered Through Recess and Regrowth Gate (TRRG) Technology
Hideyuki Okita, Masahiro Hikita, Hiroto Yamagiwa, Hisayoshi Matsuo, Keiichi Matsunaga, Daisuke Masunaga, Tetsuzo Ueda
Engineering Division, Panasonic Industry Co., Ltd., Kadoma City, Osaka, Japan

09:45 - 10:00
Investigation of source-connected polarization superjunction (PSJ) FET using PSJ structure as a freewheeling diode for reverse conduction

Eito Kokubo1, Hirotaka Watanabe2, Manato Deki3, Atsushi Tanaka2, Shugo Nitta2, Yoshio Honda2,3,4, Hiroshi Amano2,3,4
1Department of Electronics, Nagoya University, Nagoya, Aichi, Japan. 2Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi, Japan. 3Deep Tech Serial Innovation Center, Nagoya University, Nagoya, Aichi, Japan. 4Institute for Advanced Research, Nagoya University, Nagoya, Aichi, Japan

Characterization: AlGaN Materials
10:30 - 12:00 Friday, November 8, 2024
Location Coral 1
Chair: Ramon Collazo

10:30 - 10:45
Auger-Meitner recombination in AlGaN quantum wells
Nick Pant1,2, Kyle Bushick2, Woncheol Lee2, Chris Van de Walle3, Emmanouil Kioupakis2
1University of Texas at Austin, Austin, TX, USA. 2University of Michigan, Ann Arbor, MI, USA. 3University of California, Santa Barabra, CA, USA

10:45 - 11:00
Nanoscale Analysis of MOCVD-grown p-Type AlxGa1-xN/GaN Multiple Quantum Well Infrared Photodetector
Alireza Lanjani1, Benjamin McEwen1, Vincent Meyers1, Prachi Garg2, Shaon Das2, Emma Rocco1, Shadi Omranpour1, David Hill3, Winston K. Chan3, Baishakhi Mazumder2, F. Shahedipour-Sandvik1
1Department of Nanoscale Science and Engineering, State University of New York-Albany, Albany, NY, USA. 2Department of Materials Design and Innovation, University at Buffalo, Buffalo, NY, USA. 3SRI International, Princeton, NJ, USA

11:00 - 11:15
Conductivity enhancement of Al-rich Al0.8Ga0.2N for high-performance Schottky barrier diodes
Tingang Liu, Zhiyuan Liu, Haicheng Cao, Mingtao Nong, Zixian Jiang, Xiao Tang, Xiaohang Li
KAUST, Jeddah, Saudi Arabia

11:15 - 11:30
Achieving (>1015/cm3) Free Carrier Concentration in Si-Doped Al-Rich (>85%) Al(Ga)N with Close-Coupled-Showerhead Reactors
Swarnav Mukhopadhyay, Parthasarathy Seshadri, Mobinul Haque, Shuwen Xie, Ruixin Bai, Surjava Sanyal, Guangying Wang, Chirag Gupta, Shubhra Pasayat
University of Wisconsin-Madison, Madison, WI, USA

11:30 - 11:45
Ultra-low voltage drop inter-band tunnel junctions on 78% Al-content AlGaN
Agnes Maneesha Dominic Merwin Xavier1, Jonathan Pratt1, Michael Wraback2, Mihee Ji2, Anand V Sampath2, Gregory A Garrett2, Yuanping Chen2, Alex Blackston1, Roberto Myers1, Siddharth Rajan1
1The Ohio State University, Columbus, Ohio, USA. 2Army Research Laboratory, Adelphi, Maryland, USA

11:45 - 12:00
Effects of Ar+ sputtering and contact deposition to highly Silicon doped Al0.73Ga0.27N
Matthew Alessi1, Pramod Reddy2, Cristyan Quinones-Garcia1, Seiji Mita2, Erhard Kohn1, Ramón Collazo1, Zlatko Sitar1,2, Spyridon Pavlidis1
1North Carolina State University, Raleigh, Raleigh, USA. 2Adroit Materials Inc., Cary, North Carolina, USA

Optoelectronic Devices: Detectors
10:30 - 12:00 Friday, November 8, 2024
Location Coral 2
Chair: Gregory Garrett

10:30 - 10:45
New photoresponse mode in GaN based detectors
Jean-Yves Duboz1, Matilde Siviero2, Maxime Hugues1, Lucas Lesourd1, Eric Frayssinet1, Sebastien Chenot1, Petter Hofverberg3, Joel Herault3
1université côte d'azur, CRHEA-CNRS, valbonne, 06, France. 2université côté d'azur, CRHEA-CNRS, valbonne, 06, France. 3Institut Méditerranéen de ProtonThérapie – Centre Antoine Lacassagne, Nice, 06, France

10:45 - 11:00
From single detector to proton beam imaging system
Maxime Hugues1, Matilde Siviero1, Lucas Lesourd1, Nicolas Couret1, Eric Frayssinet1, Sebastien Chenot1, Jean-Yves Duboz1, Marie Vidal2, Petter Hofverberg2, Joël Hérault2
1CNRS-CRHEA, Valbonne, France. 2CAL, Nice, France

11:00 - 11:15
AlGaN/GaN heterojunction ultraviolet photoconductor enabling an ultra-fast nanosecond transient response
Haiping Wang, Haifan You, Hai Lu, Rong Zhang, Youdou Zheng, Dunjun Chen
Nanjing University, Nanjing, Jiangsu, China

11:15 - 11:30
Feasibility of photon counting in high gain and solar-blind avalanche photodiodes based on Al-rich AlGaN grown on AlN substrates
Pramod Reddy1, Dolar Khachariya1, James Loveless2, Ronny Kirste1, Will Mecouch1, Seiji Mita1, Erhard Kohn2, Ramon Collazo2, Zlatko Sitar1,2
1Adroit Materials, Cary, NC, USA. 2NCSU, Raleigh, NC, USA

11:30 - 11:45
Development of Top-Illuminated III-N Ultraviolet Avalanche Photodiodes with AlGaN Windows
Russell Dupuis, Davide Balzerani, Alexandra Dolgashev, Zhiyu Xu, Nepomuk Otte, Shyh-Chiang Shen, Theeradetch Detchprohm
Georgia Institute of Technology, Atlanta, GA, USA

11:45 - 12:00
Experimental Characterization of Impact Ionization in High-Al Content AlGaN

Zhongtao Zhu1, Yashas Satapathy2, Lina Cao3, Juncheng Xiong1, Mateo Gutierrez1, Yu Duan4, Wesley Turner1, Anthony Hoffman1, Spyridon Pavlidis2, Ramón Collazo2, Zlatko Sitar2,5, Pramod Reddy5, Ronny Kirste5, Seiji Mita5, William Mecouch5, Patrick Fay1
1University of Notre Dame, Notre Dame, IN, USA. 2North Carolina State University, Raleigh, NC, USA. 3Keysight Technologies, Pasadena, CA, USA. 4OMNIVISION Technologies, Santa Clara, CA, USA. 5Adroit Materials, Cary, NC, USA

Optoelectronic Devices: Lasers 3 and Late News LED
10:30 - 12:00 Friday, November 8, 2024
Location South Pacific 3/4
Chair: Christian Wetzel

10:30 - 11:00
(INVITED) Tunable Single-Frequency Photonic Integrated UV-A and Visible Laser Diodes
Thomas Wunderer1, Anat Siddharth2, Mark Teepe1, Zhihong Yang1, Simone Bianconi2, Chris Chua1, Tobias Kippenberg2
1SRI, Palo Alto, CA, USA. 2Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland

11:00 - 11:15
A Comprehensive Study on Optical Polarization, Stress Relaxation, and Failure Mechanisms in AlGaN-Based UVC LEDs
Honglin Gong1, Renlong Yang1, Renzhu Zhang1, Chuhui Shen1, Weijie Guo1, Huanting Chen2, Zhong Chen1, Yijun Lu1, Lihong Zhu1
1Xiamen University, Xiamen, Fujian, China. 2Minnan Normal University, Zhangzhou, Fujian, China

11:15 - 11:30
Demonstration of 200 nm diameter GaN blue micro-LEDs fabricated by neutral beam etching
Xuelun Wang1, Xixi Zhao2, Daisuke Ohori3, Seiji Samukawa4,3
1National Institute of Advanced Industrial Science and Technology, Nagoya, Aichi, Japan. 2National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan. 3Tohoku University, Sendai, Miyagi, Japan. 4National Yang Ming Chiao Tung University, Hsinchu, Taiwan

11:30 - 12:00
(INVITED) High-efficiency and long-wavelength green laser diodes and superluminescent diodes with AlInN layers
Marco Rossetti1, Marco Malinverni1, Antonino Castiglia1, Marcus Duelk2
1EXALOS, Lausanne, Switzerland. 2EXALOS, Zurich, Switzerland

Electronic Devices: Processing
10:30 - 12:00 Friday, November 8, 2024
Location Coral 4/5
Chair: Spyridon Pavlidis

10:30 - 10:45
Lightly Doped p-GaN Vertical Diode with >400 V Breakdown Voltage and Comparison between Surface and Sidewall Activations

Zineng Yang1, Yunwei Ma1, Matthew Porter1, Hehe Gong1, Zhonghao Du2, Yi Luo3, Lai Wang3, Han Wang4, Yuhao Zhang1
1Virginia Polytechnic Institute and State University, Blacksburg, VA, USA. 2University of Southern California, Los Angeles, CA, USA. 3Tsinghua University, Beijing, China. 4The University of Hong Kong, Hong Kong, China

10:45 - 11:00
Systematic investigation of the effects of ultra-high-pressure post-deposition annealing on AlSiO/n-GaN MOS properties
Takumi Hirata, Masakazu Kanechika, Tetsu Kachi, Jun Suda
Nagoya University, Nagoya, Aichi, Japan

11:00 - 11:15
Development of Current-narrowing Structure for GaN Devices Using Photo Enhanced Chemical Etching
Hiroki Toyoda1, Woong Kwon1, Seiya Kawasaki1, Yuta Furusawa2, Ryoko Tsukamoto2, Hirotaka Watanabe2, Yoshio Honda2,3,4, Hiroshi Amano2,3,4
1Graduate School of Engineering, Nagoya University, Nagoya, Aichi 464-8601, Japan. 2Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi 464-8601, Japan. 3Deep Tech Serial Innovation Center, Nagoya University, Nagoya, Aichi 464-8601, Japan. 4Institute for Advanced Research, Nagoya University, Nagoya, Aichi 464-8601, Japan

11:15 - 11:30
Fabrication of GaN vertical junction barrier Schottky diode using N/Mg ion-implantation
Woong Kwon1, Yuta Itoh1, Atsushi Tanaka2, Hirotaka Watanabe2, Yoshio Honda2,3,4, Hiroshi Amano2,3,4
1Department of Electronics, Nagoya University, Nagoya, Aichi, Japan. 2Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi, Japan. 3Deep Tech Serial Innovation Center, Nagoya University, Nagoya, Aichi, Japan. 4Institute for Advances Research, Nagoya University, Nagoya, Aichi, Japan

11:30 - 11:45
Extremely selective etching of p-GaN/AlGaN heterostructures by Cl2/O2-based reactive ion etching
Justyna Wierzbicka1, Maciej Kamiński1,2, Jarosław Tarenko1,2, Joanna Jankowska-Śliwińska1, Renata Kruszka1, Aneta Gołębiowska1,2, Oskar Sadowski1,2, Marek Ekielski1, Magdalena Zadura1, Anna Szerling1, Andrzej Taube1
1Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland. 2Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland

11:45 - 12:00
Effect of gate dielectrics on Current Collapse in Extreme Bandgap AlGaN Channel MOS-HEMTs
Abdullah Mamun1, Abdullah Al Mamun Mazumder1, Kamal Hussain2, MD Didarul Alam3, Kenneth Stephenson1, Tariq Jamil1, Md Mosarof Hossain Sarkar1, MVS Chandrashekhar1, Grigory Simin1, Asif Khan1
1University of South Carolina, Columbia, South Carolina, USA. 2Texas Instruments Incorporated, Richardson, Texas, USA. 3Intel Corporation, Hillsboro, Oregon, USA

Plenary - Professor Subhashish Bhattacharya
13:00 - 13:45 Friday, November 8, 2024
GaN HEMT Enabled High Power Converters: Challenges and Opportunities
Location Coral 4/5
Subhashish Bhattacharya

Plenary - Professor Czeslaw Skierbiszewski
13:45 - 14:30 Friday, November 8, 2024
Location Coral 4/5
Tunnel Junctions for Novel Nitride Optoelectronic Devices
Czeslaw Skierbiszewski, Grzegorz Muziol, Henryk Turski, Marcin Siekacz, Marta Sawicka
Institute of High Pressure Physics PAS, Warsaw, Poland

Plenary - Professor Debdeep Jena
14:30 - 15:15 Friday, November 8, 2024
Location Coral 4/5
Aluminum Nitride Kick-Starts the Ultrawide Bandgap Electronics Story
Debdeep Jena
Cornell University, Ithaca, NY, USA

CLOSING
15:15 - 15:45
Location Coral 4/5

Presenting Author Index

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