



International Workshop on Nitride Semiconductors

November 3-8, 2024

O'ahu, Hawai'i, USA

www.iwn2024.org

PROGRAM OVERVIEW

	Sun, 11.03.24	Mon, 11.04.24	Tues, 11.05.24	Wed, 11.06.24	Thurs, 11.07.24	Fri, 11.08.24
08:00			Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
08:15			Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
08:30			Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
08:45		Opening	Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
09:00		Plenary 1	Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
09:15			Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
09:30			Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
09:45			Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions
10:00		Break	Break	Break	Break	Break
10:15			Break	Break	Break	Break
10:30		Plenary 2	Parallel Sessions	Parallel Sessions	Plenary 4	Parallel Sessions
10:45			Parallel Sessions	Parallel Sessions	Plenary 4	Parallel Sessions
11:00		Plenary 3	Parallel Sessions	Parallel Sessions	Plenary 5	Parallel Sessions
11:15			Parallel Sessions	Parallel Sessions	Plenary 5	Parallel Sessions
11:30			Parallel Sessions	Parallel Sessions	Plenary 5	Parallel Sessions
11:45			Parallel Sessions	Parallel Sessions	Plenary 5	Parallel Sessions
12:00		Lunch	International Advisory Committee Lunch	Women in Nitrides	Lunch	Lunch
12:15			International Advisory Committee Lunch	Lunch	Lunch	Lunch
12:30			International Advisory Committee Lunch	Lunch	Lunch	Lunch
12:45			International Advisory Committee Lunch	Lunch	Lunch	Lunch
13:00	Start of Registration	Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	Plenary 6
13:15		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	Plenary 7
13:30		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	Plenary 8
13:45		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	Closing
14:00		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
14:15		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
14:30		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
14:45		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
15:00		Break	Break	Break	Excursions	
15:15		Break	Break	Break	Excursions	
15:30		Parallel Sessions	Parallel Sessions	Break	Excursions	
15:45		Parallel Sessions	Parallel Sessions	Break	Excursions	
16:00		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
16:15		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
16:30		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
16:45		Parallel Sessions	Parallel Sessions	Parallel Sessions	Excursions	
17:00		Break	Break	Parallel Sessions	Excursions	
17:15		Break	Break	Parallel Sessions	Excursions	
17:30		Poster 1	Poster 5	Break		
17:45		Poster 1	Poster 5	Break		
18:00	Welcome Reception	Poster 1	Poster 5	Rump Session	Conference Dinner	
18:15		Poster 1	Poster 5	Rump Session	Conference Dinner	
18:30		Poster 1	Poster 5	Rump Session	Conference Dinner	
18:45		Poster 1	Poster 5	Rump Session	Conference Dinner	
19:00		Poster 1	Poster 5	Rump Session	Conference Dinner	
19:15		Poster 1	Poster 5	Rump Session	Conference Dinner	
19:30		Poster 1	Poster 5	Rump Session	Conference Dinner	
19:45		Poster 1	Poster 5	Rump Session	Conference Dinner	
20:00					Conference Dinner	
20:15					Conference Dinner	
20:30					Conference Dinner	
20:45					Conference Dinner	
21:00					Conference Dinner	
21:15					Conference Dinner	
21:30					Conference Dinner	

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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.

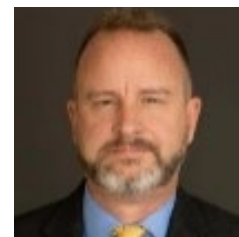
As you immerse yourselves in the sessions, I encourage you to take some time to enjoy the rich history and natural beauty of the Hawaiian archipelago. Whether you're exploring its stunning landscapes or engaging in outdoor activities, may your stay be both productive and relaxing.

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)

Conference Secretary

Ronny Kirste, NC State University (USA)

Honorary Chairs

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

Conference Organization

NC State Continuing and Lifelong Education
ContinuingEducation@ncsu.edu
mckimmoncenter.ncsu.edu

Program Committee Chair

Alan Doolittle, Georgia Institute of Technology (USA)

Regional Program Committee Chairs

Asia
Europe
America

Hiroshi Fujioka, University of Tokyo (Japan)
Juergen Christen, OvGU, Magdeburg (Germany)
Christian Wetzel, Rensselaer Polytechnic Inst. (USA)

Symposium Chairs

Growth

Characterization
Optoelectronic Devices
Electronic Devices

Novel Materials and Nanostructures

Michael Bockowski, UNIPRESS (Poland)
Izabella Grzegory, UNIPRESS (Poland)
Mitsuru Funato, Kyoto University (Japan)
Jean Yves Duboz, CRHEA (France)
Srabanti Chowdhury, Stanford University (USA)
Douglas Yoder, Georgia Institute of Tech (USA)
Zetian Mi, University of Michigan (USA)



International Advisory Committee (IAC)

Chair

Hiroshi Amano, Nagoya University (Japan)

Co-Chair

Russell Dupuis, Georgia Institute of Tech (USA)

Vice Chair

Michael Kneissl, Technical University of Berlin (Germany)

Members

Jen-Inn Chyi, National Central University (Taiwan)
Hiroshi Fujioka, The University of Tokyo (Japan)
Bernard Gil, Montpellier 2 University (France)
Nicolas Grandjean, EPFL, Lausanne (Switzerland)
Izabella Grzegory, UNIPRESS (Poland)
Åsa Haglund, Chalmers University of Technology (Sweden)
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Sergey Ivanov, Ioffe Institute (Russia)
Yoichi Kawakami, Kyoto University (Japan)
Asif Khan, University of South Carolina (USA)
Katsumi Kishino, Sophia University (Japan)
Matteo Meneghini, University of Padova (Italy)
Zetian Mi, University of Michigan (USA)
Umesh K. Mishra, University of California, Santa Barbara (USA)
Hideto Miyake, Mie University (Japan)
Hadis Morkoc, Virginia Commonwealth University (USA)
Yasushi Nanishi, Ritsumeikan University (Japan)
Rachel Oliver, University of Cambridge (UK)
Peter Parbrook, Tyndall National Institute (Ireland)
Fernando Ponce, Arizona State University (USA)
Bo Shen, Peking University (China)
Zlatko Sitar, North Carolina State University (USA)
Maria Tchernycheva, Universite Paris-Sud, CNRS (France)
Andreas Waag, Technische Universität Braunschweig (Germany)
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)
Izabella Grzegory, UNIPRESS (Poland)
Jung Han, Yale University (USA)
Matthew Hardy, USA Naval Labs (USA)
Michael Heuken, Aixtron (Germany)
Sergey Ivanov, Ioffe Inst (Russia)
Yoshihiro Kangawa, Kyushu University (Japan)
Stacia Keller, UCSB (USA)
Yoshinao Kumagai, Tokyo University of Agriculture & Technology (Japan)
Takashi Matsuoka, Tohoku University (Japan)
Elke Meissner, Fraunhofer IISB (Germany)
Hideto Miyake, Mie University (Japan)
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)
Mitsuru Funato, Kyoto University (Japan)
Andreas Hangleiter, TU Braunschweig (Germany)
Jennifer Hite, University of Florida (USA)
Jong In Shim, Hanyang University (Korea)
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, ARKESSE (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 Chandrashekar, University of South Carolina (USA)
Paul Chow, Rensselaer Polytechnic Institute (USA)
Srabanti Chowdhury, Stanford University (USA)
Yvon Cordier, CRHEA (France)
Vanya Darakchieva, Linköping 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 (University 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 (CO₂) emissions (1.36 Gtons of CO₂). 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. Macko, S. Mu, M. Turiansky, H. Wang, L. Weston, and D. Wickramaratne, and supported by DOE, NSF, and DoD.





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.



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

AlGa_N-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 InGa_N-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 AlGa_N with high Al compositions, as well as the internal quantum efficiency (IQE) of the AlGa_N 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 AlGa_N 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 AlGa_N-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 be 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

Czesław 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. Žak 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. Žak 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 AlGaIn 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 AlGaIn 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, Linköping 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 its 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 AlGaIn-based UV-B Laser Diodes Fabricated on Lattice Relaxed AlGaIn



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 AlN 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 AlGaIn 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 AlGaIn 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

GaN-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

Unleashing 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., AlGaIn 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, AlGaIn 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 AlGaIn-based UVC LEDs and lasers will focus on recent breakthroughs in the development of AlGaIn 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.

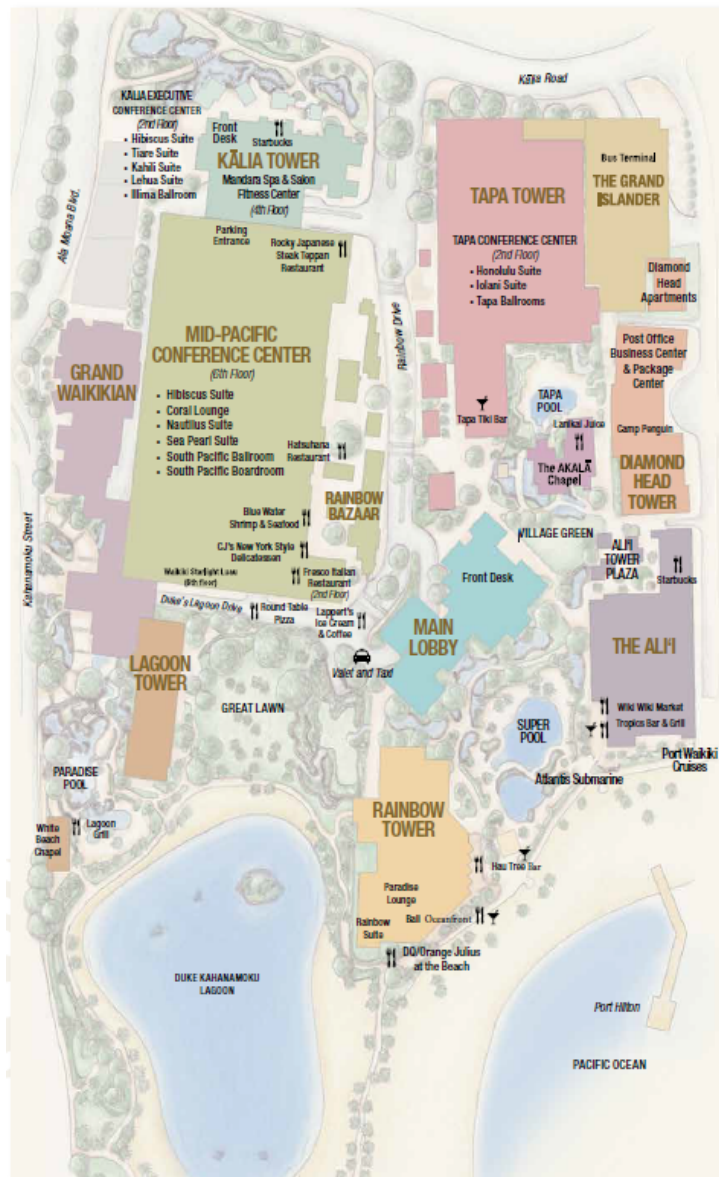


Restaurant options

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

BAR 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

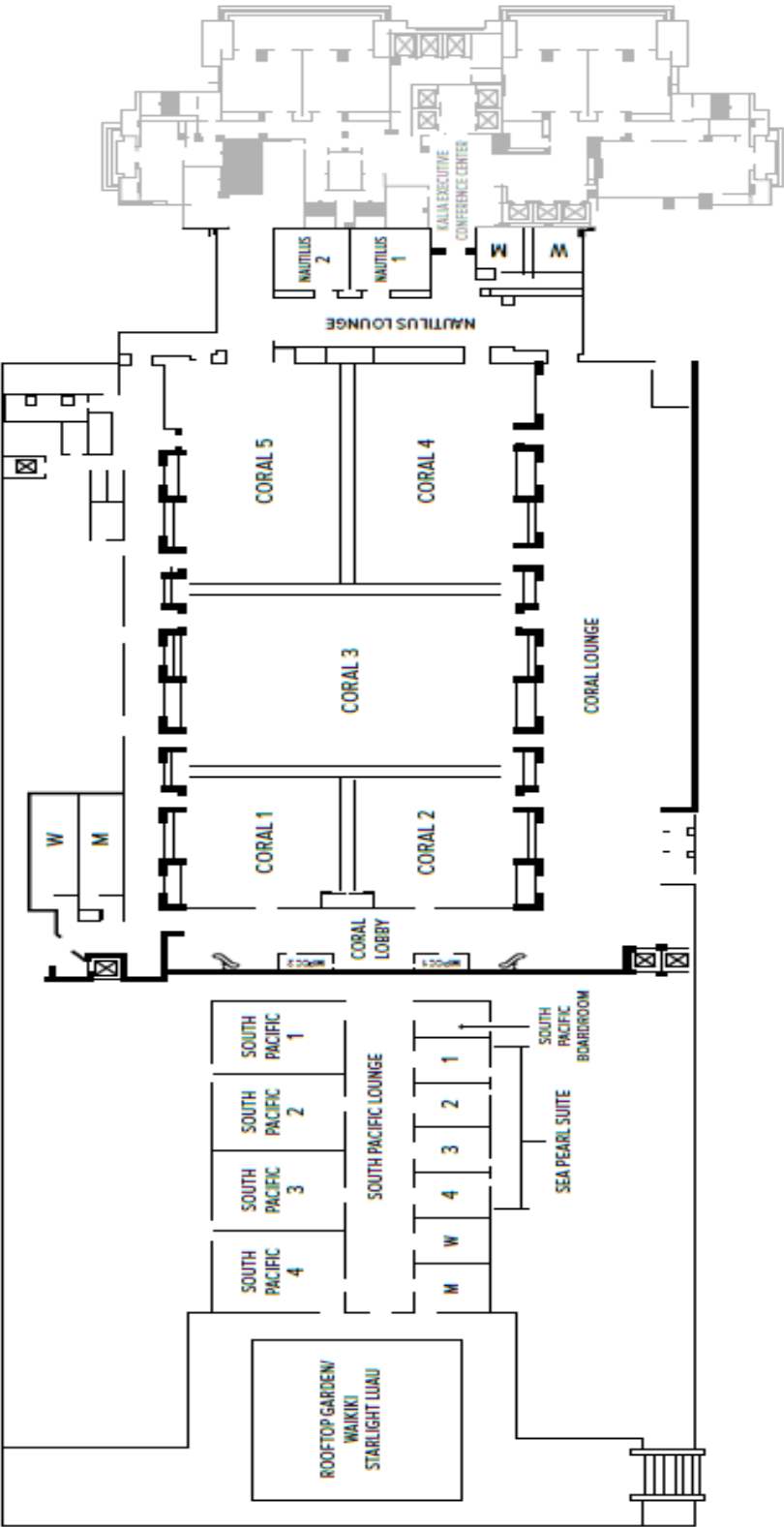
Round Table Pizza

Pizza, Lunch, Dinner
808-955-0137

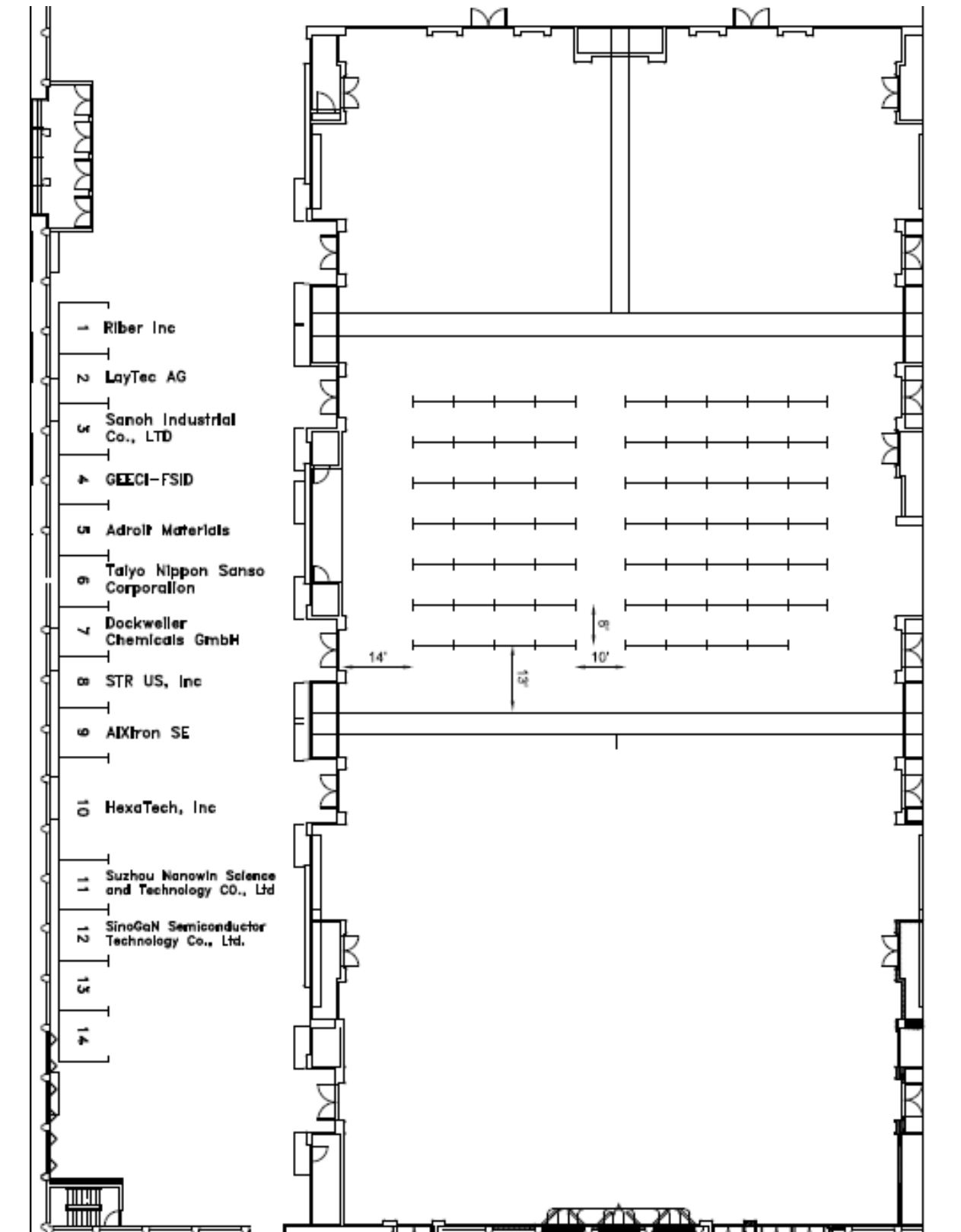
Lappert's Ice Cream

Gourmet Ice Cream, Coffee, Breakfast

Map of the Conference Area: Mid-Pacific Conference Center



Industrial Exhibits: Coral Lounge



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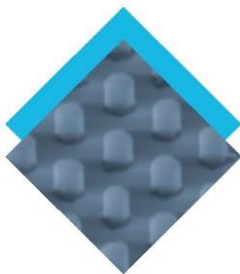


AdroitMaterials

Superior Nitrides Foundry Services

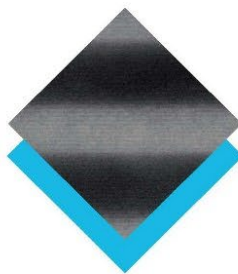
Our Foundry Services:

We provide state of the art crystal quality and client-specific material properties thanks to our unparalleled control of alloy composition and doping. We are focused on the development and deployment of III-nitride technology based on high quality native AlN and GaN substrates as well as sapphire.



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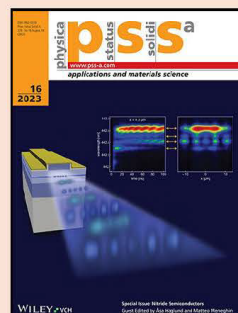
Guest Editors:

Ronny Kirste, Biplab Sarkar, and Gordon Callsen

Submission deadline: 15 December 2024

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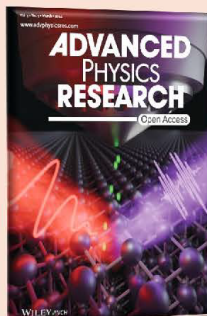


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Program Schedule

Sunday, November 3, 2024

13:00	13:00 - 18:00 Start of Registration Location:: Coral Lounge
18:00	18:00 - 20:00 Welcome Reception Location:: Coral Lounge
20:00	

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: AlGaIn 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: AlGaIn 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 Defects 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 AlGaIn) 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: Nanostructures 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 Electronic 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: AlGaIn 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 Zubialeovich, 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 AlGa_N 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 AlGa_N on high-temperature annealed AlN templates

Shuhei Ichikawa^{1,2}, 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 AlGa_N quantum wells

Felix Nippert¹, Marcel Schilling¹, Nils Bernhardt¹, Giulia Cardinali¹, Jakob Höpfner¹, Tim Wernicke¹, Michael Kneissl^{1,2}, 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 Wagner^{1,3}

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 Kyu 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 Nantes, 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 Hershkowitz², 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 Sc_{0.14}Al_{0.86}N/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 Okuno^{1,2}, Masaki Ohya¹, Yoshiki Saito^{1,2}, 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-AlGaIn

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 AlGaIn-based far-UVC micro LED arrays on different AlN templates

Jens Rass, Hyun Kyong Cho, Martin Guttman, 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-AlGaIn

Shashwat Rathkanthiwar¹, James Loveless¹, Pramod Reddy², Ronny Kirste², Cristyan Quinones¹, Jack Almeter¹, Ramon Collazo¹, Zlatko Sitar^{1,2}
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 Trivellini^{1,2}, 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 Kneissl^{3,4}, Gaudenzio Meneghesso², Enrico Zanoni², Matteo Meneghini^{5,6}

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 Hiramasa³, Kazuhide Kumakura³, Yoshitaka Taniyasu³

¹The University of Tokyo, Tokyo, Tokyo, Japan. ²The University 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 Rathwathiwari¹, Dolar Khachariya², Pramod Reddy², Ronny Kirste², Seiji Mita², Erhard Kohn¹, Ramón Collazo¹, Zlatko Sitar^{1,2}

¹North Carolina State University, Raleigh, NC, USA. ²Adroit Materials, Cary, NC, USA

14:00 - 14:15

[Extreme Bandgap Al_{0.63}Ga_{0.37}N 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 Chandrashekar¹, 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 AlGaIn-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 AlGa_N p-n Diodes Enabled by Distributed Polarization Doping

Takeru Kumabe¹, Akira Yoshikawa^{2,1}, 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 Shimizu^{1,2}, Kota Hasegawa^{1,3}, Takeo Ohsawa¹, Isao Sakaguchi¹, Naoki Ohashi^{1,3,4}



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, Yokohama, 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 Higuchi^{1,2}, Masayoshi Cho^{1,2}, Masatoshi Tamaru^{1,2}, Tatsushi Hamaguchi^{1,3}

¹Innovation Center for Semiconductor and Digital Future, Mie University, Tsu, Mie, Japan. ²Faculty 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-Uka^{1,2}, Juliane Breitsfelder¹, 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 Shojiki^{3,4}, Hideto Miyake^{3,5}, 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 Grabińska, 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 Yoshimura^{1,2}, 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 Kneissl^{2,4}
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 Turski¹, Anna Feduniewicz-Żmuda¹, Cedric Corley-Wiciak², Carsten Richter³, Marcin Siekacz¹, Czesław Skierbiszewski¹, Greg Muziol¹
¹Institute of High Pressure Physics PAS, Warsaw, Poland. ²ESRF – European Synchrotron Radiation Facility, Grenoble, France. ³Leibniz 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 10 λ -cavity UVC VCSELs

Estrella Torres¹, Joachim Ciers¹, Sarina Graupeter², Nelson Rebelo¹, Lars Persson¹, Filip Hjort¹, Michael Bergmann¹, Tim Wernicke², Michael Kneissl^{2,3}, 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 Apaydin¹, Lukas Uhlig², Hjalmar Andersson¹, Sarina Graupeter³, Lars Persson¹, Joachim Ciers¹, Giulia Cardinali³, Tim Wernicke³, Michael Kneissl^{3,4}, 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/AlGaIn-on-Si MISHEMT with Record Pout of 1.7 W/mm at 6V and 30GHz

Hanchao Li¹, Hanlin Xie^{2,3}, Qingyun Xie^{2,3}, Yue Wang⁴, Siyu Liu¹, Yuxuan Wang⁵, Yihao Zhuang¹, Kumud Ranjan^{2,3}, Xiao Gong⁵, Geok Ing Ng^{1,2,3,4}

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 AlGaIn/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 Zhu^{2,1}, 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 Lee^{1,2}, Myung Gwan Hahm^{1,2}, Sang Jin Lee¹

¹Inha University, Incheon, Incheon, Korea, Republic of. ²MMSG 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 \$\mu\$ LED 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 AlGaIn/GaN Light-Emitting Diodes Using Thermal Characterization](#)

Byongjin Ma, Taehee Jung, Sungsoon Choi

Korea Electronics Technology Institute, Seongnam-Si, Gyeonggi-do, Korea, Republic of



[Poster 7] The Effects of Photogenerated Hole Trapping in Ga₂O₃-on-GaN Self-Powered UV-C Photodetectors

Giovanni Verzellesi¹, Andrea Asteriti¹, Giovanna Sozzi², Matteo Bosi³, Roberto Mosca³, Luca Seravalli³, Maura Pavesi⁴, Antonella Parisini⁴, Andrea Baraldi⁴, Abderrahim Moumen⁴, Piero Mazzolini⁴, Roberto Fornari⁴

¹DISMI, University of Modena and Reggio Emilia, Reggio Emilia, Italy. ²Department of Engineering and Architecture, University of Parma, Parma, Italy. ³IMEM-CNR, Parma, Italy. ⁴Department of Mathematical, Physical and Computer Sciences, University of Parma, Parma, Italy

[Poster 8] Degradation of sidewall passivation layer in InGaN/GaN micro-LEDs under forward current-induced stress

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
¹Korea Institute of Energy Technology, Naju, Jeollanam-do, Korea, Republic of. ²Wavelord Inc., Hwaseong-si, Gyeonggi-do, Korea, Republic of. ³Hanyang University ERICA, Ansan, Gyeonggi-do, Korea, Republic of

[Poster 9] Enhanced performance of InGaN light-emitting diodes via Hexagonal 3D Serpentine Mask

Menglai Lei, Huanqing Chen, Xiaodong Hu
Peking University, Beijing, Beijing, China

[Poster 10] GaN-based Micro LEDs Fabricated by Photoelectrochemical Etching and Transfer-Printing

Huanqing Chen¹, Menglai Lei¹, Zhi Li², Brian Corbett², Xiaodong Hu¹
¹Peking University, Beijing, Beijing, China. ²Tyndall Institution, Cork, Cork, Ireland

[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
National Institute of Information and Communications Technology (NICT), Kobe, Hyogo, Japan

[Poster 12] Size-Dependent Degradation via Sidewall Defects and Recombination Processes in InGaN-based Micro LEDs

JEONGHYEON PARK¹, WON SEOK CHO¹, JAWON KIM¹, CHULJONG YOO², BUEM JOON KIM², JUNSEOK JEONG², JONG KYU KIM¹
¹Pohang University of Science and Technology, Pohang, Gyeongsangbuk-do, Korea, Republic of. ²Samsung display Co. Ltd, YONGIN, Gyeonggi-do, Korea, Republic of

[Poster 13] Sub-5- μ m GaN blue micro-LED fabricated by hydrogen iodide neutral beam

Daisuke Ohori¹, Xixi Zhao², Xuelun Wang^{3,2}, Tsau-Hua Hsieh⁴, Seiji Samukawa^{4,1}
¹Institute of Fluid Science, Tohoku University, Sendai, Japan. ²Research Institute for Advanced Electronics and Photonics, AIST, Tsukuba, Japan. ³GaN-OIL, AIST, Nagoya, Japan. ⁴National Yang Ming Chiao Tung University, Hsinchu, Taiwan

[Poster 14] Resonance Raman Spectroscopy of few-layer h-BN in the Deep Ultraviolet



Lei Fu¹, Ning Tang¹, Yuqing Hu², Huaiyuan Yang¹, Xionghui Jia¹, Guoping Li¹, Junxi Duan², Weikun Ge¹, Bo Shen¹

¹State Key Laboratory For Artificial Microstructure and Mesoscopic Physics, School of Physics, Peking University, Beijing, China. ²Key Laboratory of Advanced Optoelectronic Quantum Architecture and Measurement (MOE), School of Physics, Beijing Institute of Technology, Beijing, China

[\[Poster 15\] Polarized monolithic white semipolar \(20-21\) InGaN micro-light-emitting diodes for visible light communication](#)

Hongjian Li

Physics Department, Peking University, Beijing, China

[\[Poster 16\] Optimization of Quantum Well Structures for Enhanced Efficiency in Far-UVC LEDs](#)

Masafumi Jo¹, Yuri Itokazu^{1,2}, Kazuki Iimura^{1,2}

¹RIKEN, Wako, Saitama, Japan. ²BEAM Technologies, Chiyoda-ku, Tokyo, Japan

[\[Poster 17\] High-temperature operation of InGaN solar cells for optical wireless power transmission](#)

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

¹Chiba Institute of Technology, Narashino, Chiba, Japan. ²Nagoya Institute of Technology, Nagoya, Aichi, Japan. ³Ushio Inc, Chiyodaku, Tokyo, Japan. ⁴Meijyo University, Nagoya, Aichi, Japan

[\[Poster 18\] Ultra-Low Optical Absorption in Aluminum Nitride Thin Films Grown by Magnetron Sputtering](#)

Mohit Raghuwanshi¹, Balasubramanian Sundarapandian¹, Radhakant Singh², Thomas Rijil², Stephan Suckow², Max Lemme²

¹Fraunhofer IAF, Freiburg, Germany. ²AMO, Aachen, Germany

[\[Poster 19\] Predictive model for channeled-ion ranges of Mg in <0001> GaN](#)

Kazuhiro Mochizuki, Tomoaki Nishimura, Tomoyoshi Mishima

Hosei University, Tokyo, Japan

[\[Poster 20\] Modulation of dielectric properties of h-BN/c-BN nanocomposites](#)

Mingfei Xu¹, Ziyi He², Abhijit Biswas¹, Shisong Luo¹, Tao Li¹, Cheng Chang¹, Chenxi Li¹, Bing Gao¹, Robert Vajtai¹, Pengcheng Dai¹, Pulickel Ajayan¹, Yuji Zhao¹

¹Rice University, Houston, Texas, USA. ²Arizona State University, Tempe, Arizona, USA

[\[Poster 21\] 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

[\[Poster 22\] Causes of leakage current in vertical GaN pn-diode under reverse bias](#)

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



Panasonic Holdings, Kadoma, Osaka, Japan

[\[Poster 23\] Improved ohmic contacts for p-type Mg-doped Al-rich AlGa_N grown on AlN substrates](#)

Guo-Dong HAO, Washiyama Shun, Tomonori Matsushita, Shin-ichiro Inoue

Advanced ICT Research Institute, National Institute of Information and Communications Technology (NICT), Kobe, Hyogo, Japan

[\[Poster 24\] Ohmic Contact Formation to High Aluminum Content Al_xSc_{1-x}N/GaN and Al_xGa_{1-x}N/GaN Heterostructures](#)

Peter D. B. Fischer¹, Alexander Schmid¹, Ali Yassine², Isabel Streicher³, Stefano Leone³, Oliver Ambacher², Johannes Heitmann¹

¹Institute of Applied Physics, Freiberg, Germany. ²Department of Sustainable Systems Engineering, Freiburg, Germany. ³Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany

[\[Poster 25\] Optical and magnetic properties of GaN crystals varied C doping concentration](#)

Anna Honda, Hirotaka Watanabe, Takeshi Kato, Yoshio Honda, Hiroshi Amano

Nagoya university, Nagoya, Aichi, Japan

[\[Poster 26\] Determination of hole trap state and its correlation with negative polarization interface in N-polar and Ga-polar HEMTs](#)

Ravikiran Lingaparthi¹, Lili Huo², Dharmarasu Nethaji¹, Radhakrishnan K^{1,2,3}, Jiahe Zhang³

¹Temasek Laboratories, Nanyang Technological University, Singapore, Singapore. ²UMI3288 CINTRA, (CNRS/NTU/THALES), Nanyang Technological University, Singapore, Singapore. ³Centre for Micro/Nano-electronics (CMNE), Nanyang Technological University, Singapore, Singapore

[\[Poster 27\] Optical characterization of colour centres in AlN free standing wafers and layers](#)

Amy Albrecht¹, Jan Beyer¹, Christian Röder^{2,1}, Gleb Lukin², Andreas Lesnik², Sven Besendörfer², Elke Meißner², Jochen Friedrich², Franziska Beyer², Johannes Heitmann¹

¹TU Bergakademie Freiberg, Freiberg, Germany. ²Fraunhofer Institute for Integrated Systems and Device Technology IISB, Erlangen, Germany

[\[Poster 28\] Fabrication and evaluation of Mg-doped GaN sputtering target](#)

Yoshihiro Ueoka, Ko Bando, Erisa Kano, Hidehiko Misaki, Masami Mesuda

Tosoh Corporation, Ayase, Kanagawa, Japan

[\[Poster 29\] Rough Grinding Process for GaN Substrates with High Efficiency](#)

Natsuko Omiya¹, Keito Ishibashi², Shuhei Awa¹, Hidetoshi Takeda², Hideo Aida²

¹Sanoh Industrial Co. Ltd., Koga, Ibaraki, Japan. ²Nagaoka University of Technology, Nagaoka, Niigata, Japan

[\[Poster 30\] Selective Incorporation of Group-V Dopants in Gallium Nitride](#)

Yujie Liu, Ishtiaque Navid, Zetian Mi, Emmanouil Kioupakis

University of Michigan, Ann Arbor, Michigan, USA

[\[Poster 31\] Characterization of n-type layer by Si-doped GaN sputtering target](#)

Koh Bando, Yoshihiro Ueoka, Erisa Kano, Hidehiko Misaki, Junya Iihama, Masami Mesuda

Tosoh corporation, Ayase, Kanagawa, Japan



[\[Poster 32\] Effect of structural change of SiO₂/GaN interfacial oxide layer by post-deposition annealing on electrical properties](#)

Ryoya Atsumi¹, Mutsunori Uenuma², Hiroto Tomita¹, Zexu Sun¹, Shougo Yamada¹, Momoko Yoshida¹, Yuya Yamada¹, Yusuke Hashimoto¹, Tomohiro Matsushita¹, Mami N. Fujii³, Yukiharu Uraoka¹

¹Nara Institute of Science and Technology, Ikoma, Nara, Japan. ²Advanced Industrial Science and Technology, Tosu, Saga, Japan. ³Kindai University, Higashiosaka, Osaka, Japan

[\[Poster 33\] 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

¹Nagoya University, Nagoya, Aichi, Japan. ²NIMS, Tsukuba, Ibaraki, Japan. ³Toyota Central R&D Labs., Inc., Nagakute, Aichi, Japan. ⁴Institute of High Pressure Physics Polish Academy of Sciences, Sokolowska, Warsaw, Poland

[\[Poster 34\] Corrosion of ScN heated up to 900 K at ambient lab conditions](#)

Jona Grömbel, Elias Baron, Jürgen Bläsing, Florian Hörich, Anja Dempewolf, Armin Dadgar, Rüdiger Goldhahn, Martin Feneberg

Otto-von-Guericke University, Magdeburg, Germany

[\[Poster 35\] MXene/GaN Interface for Contact Engineering: Exploring Electronic Phenomena through Spectroscopic Analysis](#)

Dominika Majchrzak¹, Karol Kulinowski², Wojciech Olszewski^{1,3}, Rafał Kuna¹, Daria Hlushchenko¹, Adrianna Piejko^{1,4}, Miłosz Grodzicki^{1,2}, Detlef Hommel^{1,5}, Robert Kudrawiec^{1,2}

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⁴Department of Nanometrology, Wrocław University of Science and Technology, Wrocław, Poland.

⁵Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wrocław, Poland

[\[Poster 36\] 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

Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany

[\[Poster 37\] 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

TU Ilmenau, Ilmenau, Thuringia, Germany

[Poster 39] Optical properties of cubic $\text{In}_x\text{Ga}_{1-x}\text{N}$ ($0 \leq x \leq 1$)

Jonas Rose¹, Elias Baron¹, Mario Zscherp², Silas Jentsch², Rüdiger Goldhahn¹, Sangam Chatterjee², Jörg Schörmann², Martin Feneberg¹

¹Otto-von-Guericke University, Magdeburg, Germany. ²Justus-Liebig-University, Gießen, Germany

[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

Paderborn University, Paderborn, Germany

[Poster 41] Effect of Ag nanoparticles on the photoluminescence spectra of planar GaN nanowires

Galia Pozina¹, Natalia Abrikosova¹, Carl Hemmingsson¹, Mikhail Kaliteevski²

¹Linköping University, Linköping, Sweden. ²The University of Manchester, Manchester, United Kingdom

[Poster 42] On the integrated p-type region free of electron blocking layer for AlGaIn-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

State Key Laboratory of Artificial Microstructure and Mesoscopic Physics, School of Physics, Peking University, Beijing, China

[Poster 44] Characterization and Analysis of Porous $\text{Al}_{0.04}\text{Ga}_{0.96}\text{N}$ Distributed Bragg Reflectors with Excellent Stability at High Temperature

Yang Bao¹, Weifang Lu¹, Mengtong Wang¹, Zhaoxia Bi², Jinchai Li¹, Kai Huang¹, Rong Zhang¹

¹Xiamen University, Xiamen, Fujian Province, China. ²Lund University, Lund, Sweden

[Poster 45] Peripheral defects related to processing technique in GaN-on-GaN vertical devices

Maroun Dagher¹, Georges Brémond¹, Camille Sonnevile², Dominique Planson², Helge Haas³, Mohamed-Reda Irekti³, Julien Buckley³, Vishwajeet Maurya³, Matthew Charles³, Jean-Marie Bluet¹

¹INSA Lyon, Ecole Centrale de Lyon, CNRS, Université Claude Bernard Lyon 1, CPE Lyon, INL, UMR5270, 69621, Villeurbanne, France. ²INSA Lyon, Université Claude Bernard Lyon 1, Ecole Centrale Lyon, CNRS, Ampère, 69621, Villeurbanne, France. ³University of Grenoble-Alpes, CEA, LETI, Minatec Campus, F-38054, Grenoble, France

[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

University of Michigan, Ann Arbor, Michigan, USA

[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

1Advanced Technology R&D Center, Mitsubishi Electric Corporation, Amagasaki, Hyogo, Japan. 2Tokyo Institute of Technology, Meguro-ku, Tokyo, Japan

[\[Poster 48\] Carbon-related Trap Dynamics in Semi-insulating Buffer Layer of GaN-on-Si substrate](#)

Ryoma Kaneko¹, Jumpei Tajima¹, Akira Yoshioka², Toshiki Hikosaka¹, Shinya Nunoue¹

¹Corporate Research & Development Center, Toshiba Corporation, Kawasaki, Japan. ²Toshiba Electronic Devices & Storage Corporation, Kawasaki, Japan

[\[Poster 49\] 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

Electronics and Telecommunications Research Institute, Daejeon, Korea, Republic of

[\[Poster 50\] 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

Pohang University of Science and Technology (POSTECH), Pohang, Korea, Republic of

[\[Poster 51\] Growth and performance of n++GaN/InAlN/AlN/GaN heterostructures for E/D-mode HEMTs applications](#)

M. Blaho¹, D. Gregušová¹, O. Polhorelec¹, S. Hasenohr¹, P. Eliaš¹, F. Gucmann¹, E. Dobročka¹, Z. Zápražný¹, S. Haščík¹, M. Kayambaki², M. Androulidaki², G. Konstantinidis², J. Kuzmik¹

¹Slovak Academy of Sciences, Bratislava, Slovakia. ²FORTH, Heraklion, Greece

[\[Poster 52\] 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

¹Hosei University, Koganei, Tokyo, Japan. ²Sumitomo Chemical Co., Ltd., Hitachi, Ibaraki, Japan

[\[Poster 53\] Quaternary Barrier AlInGaN Growth on Si with Different AlGaIn Back Barrier Thickness](#)

Po-Tsung Tu^{1,2}, Chang-Yen Hsieh², Sheng-Kai Chen³, Hui-Yu Chen², Po-Chun Yeh², Jen-Inn Chyi³, Po-Tsung Lee¹, Hao-Chung Kuo¹

¹National Yang Ming Chiao Tung University, Hsinchu City, Taiwan, Taiwan. ²Industrial Technology Research Institute, Hsinchu City, Taiwan, Taiwan. ³National Central University, Taoyuan City, Taiwan, Taiwan

[\[Poster 54\] High DC and RF performance of AlGaIn/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 AlGaIn/GaN HEMT transistors for microwave power electronics](#)



Marek Ekielski¹, Karolina Olucha¹, Magdalena Zadura¹, Wioleta Słaba¹, Maciej Kamiński^{1,2}, Jarosław Tarenko^{1,2}, Oskar Sadowski^{1,2}, Justyna Wierzbicka¹, Andrzej Taube¹, Anna Szerling¹
1Lukasiewicz-IMIF, Warsaw, Poland. 2Warsaw University of Technology, Warsaw, Poland

[\[Poster 56\] Scaling Down of a Normally-OFF AlGaIn/GaN HEMT with a p-GaN Nanowire Structure for Stable VTH and Self-clamped Gate Leakage](#)

Zhongchen Ji^{1,2}, Qimeng Jiang^{1,2}, Xinyue Dai^{1,2}, Sen Huang^{1,2}, Xinyu Liu^{1,2}
1Institute of Microelectronics, Chinese Academy of Sciences, Beijing, Beijing, China. 2University of Chinese Academy of Sciences, Beijing, Beijing, China

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

Yusuke Shirayanagi^{1,2}, Shingo Tomohisa¹, Keiji Kasamura², Hiroki Toyoda², Takashi Matsumae³, Yuichi Kurashima³, Hideki Takagi³, Akihisa Kubota², Takashi Takenaga¹
1Mitsubishi Electric Corporation, Amagasaki, Hyogo, Japan. 2Kumamoto University, Kumamoto, Kumamoto, Japan. 3National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan

[\[Poster 58\] 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
1Electronics and Telecommunications Research Institute, Daejeon, Korea, Republic of. 2Pohang University of Science and Technology, Pohang, Kyungpook, Korea, Republic of

[\[Poster 59\] Characterisation of under 5nm AlGaIn barrier depths gate recessed AlGaIn/GaN MIS-HEMTs by atomic layer etch process with in-situ etch depth monitoring](#)

Sungjin Cho¹, Matthew Loveday¹, Andrew Newton¹, Jason Li², Nishad Udugampola³
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[\[Poster 60\] Threshold Voltage Engineering of Lateral Gallium Nitride Accumulation Fin Channels](#)

Tobias Claus^{1,2}, Stefan Regensburger¹, Jörg Schulze^{2,3}
1Robert Bosch GmbH, Renningen, Germany. 2University of Erlangen-Nuremberg, Erlangen, Germany. 3Fraunhofer Institute for Integrated Systems and Device Technology, Erlangen, Germany

[\[Poster 61\] The Effect of Carbon-doped GaN Layer Thickness on Dynamic RON of AlGaIn/GaN HEMTs on Si](#)

Upeksha De Silva, Kean Boon Lee
University of Sheffield, Sheffield, Sheffield, United Kingdom

[\[Poster 62\] High Breakdown Voltage and Low Current Dispersion in AlGaIn/GaN HEMTs with High Quality AlN Buffer Layer](#)

Chuyoung Cho¹, Jeong-Gil Kim², Yumin Koh¹, Dong-Hyun Kim¹, Jung-Hee Lee³
1Korea Advanced Nano fab Center, Suwon, Korea, Republic of. 2Dong-A University, Busan, Korea, Republic of. 3L&D Inc., Daegu, Korea, Republic of

[Poster 63] Fabrication of Recessed-gate AlGaIn/GaN HEMTs utilizing Contactless Photoelectrochemical (CL-PEC) Etching

Yugo Oki, Naoki Shiozawa, Taketomo Sato

Research Center for Integrated Quantum Electronics, Hokkaido University, Sapporo, Hokkaido, Japan

[Poster 64] Reduction of hole traps in SiO₂/GaN MOS structures by properly designing the oxide interlayer

H. Mizobata, M. Nozaki, T. Kobayashi, H. Watanabe

Graduate School of Engineering, Osaka University, Suita, Osaka 565-0871, Japan

[Poster 65] Evaluation of the Interface State Density of Gallium Nitride HEMTs by Analyzing the Frequency Dispersion of Capacitance-Voltage Curves

Yusuke Nakazato, Motonobu Sato, Akira Yoshioka

Toshiba Electronic Devices & Storage Corporation, Kawasaki, Kanagawa, Japan

[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

Toshiba Electronic Devices and Storage Corporation, Kawasaki, Kanagawa, Japan

[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

Toshiba Electronic Devices and Storage Corporation, Kawasaki, Kanagawa, Japan

[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

Toyota Technological Institute, Nagoya, Aichi, Japan

[Poster 69] Heterogeneous Integration CMOS Inverter with GaN n-HEMT and Si p-MOSFET

Ang Li^{1,2}, Guohao Yu^{1,2}, Yingfei Sun^{1,2}, Zhongkai Du¹, zhongming zeng^{1,2}, baoshun zhang^{1,2}

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[Poster 70] Advanced Design of III-Nitride micro-Light-emitting Diode via Machine Learning

Ying Jiang¹, Zhuoying Jiang¹, Mengyu Chen^{1,2}, Jinchai Li^{3,2,4}, Cheng Li^{1,2}, Lin Li¹, Kai Huang^{3,4,2}, Rong Zhang^{2,4,5}

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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
Osaka University, Suita, Osaka, Japan

[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
Xidian university, Xi'an, Shaanxi, China

[Poster 73] Accurate in-situ etch depth control to optimize a critical process step for pGaN HEMT structures

Matthew Loveday¹, Sung-Jin Cho¹, Andrew Newton¹, Aileen O'Mahony¹, Andrew Goss¹, David Cornwell², Marcello Binetti², Thomas Zettler²
¹Oxford Instruments Plasma Technology, Bristol, United Kingdom. ²LayTec AG, Berlin, Germany

[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
King Abdullah University of Science and Technology (KAUST), Jeddah, Makkah, Saudi Arabia

[Poster 75] AlGa_N/Ga_N 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 Li^{1,2}, 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
¹Southern University of Science and Technology, Shenzhen, Guangdong, China. ²Peking University, Beijing, China

[Poster 78] TCAD Modelling of Electron Transport Dynamics in GaN Gunn Diodes

Ernesto Momox
Tecnologico de Monterrey, Querétaro, Querétaro, Mexico

[Poster 79] Comparison of vanadium- and titanium-based metalization as an ohmic contact to n-type GaN

Oskar Sadowski^{1,2}, Maciej Kamiński^{1,2}, Jarosław Tarenko^{1,2}, Justyna Wierzbicka¹, Marek Guzewicz¹, Marek Wzorek¹, Justyna Maleszyk¹, Anna Szerling¹, Paweł Prystawko³, Izabella Grzegory³, Michał Boćkowski³, Andrzej Taube¹

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[\[Poster 80\] 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/Al_{0.8}Ga_{0.2}N 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 Cheon^{1,2}, Yu-Jeong kim¹, Young-Kyun Noh², Young-Heon Kim¹
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[\[Poster 87\] Fabrication of 4-inch AlN Single Crystal Substrates via Solid-Phase Epitaxy Assisted by Liquid Phase](#)

Kyohei Atsui¹, Yosuke Sato¹, Hiroharu Kobayashi¹, Jun Yoshikawa¹, Yoshinori Imoto², Sho Iwayama², Motoaki Iwaya²
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[\[Poster 88\] 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

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[\[Poster 90\] 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

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[\[Poster 91\] Film texture in epitaxial Al_{0.7}Sc_{0.3}N 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

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[\[Poster 92\] Characterization of AlGaIn/GaN HEMT Structures Epitaxially Grown on Bonded Semi-Insulating LPE-GaN/SiC Substrates](#)

Kentaro Nonaka, Ryozi 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 AlGaIn/GaN nanowires](#)

Rudolfo Hötzel¹, Stephan Figge¹, Lukas Lübken¹, Florian Krause¹, Andreas Rosenauer^{1,2}, Martin Eickhoff^{1,2}

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[\[Poster 96\] Fabrication of ZrN nano mask for selective growth of GaN/AlGaIn nanowires arrays for efficient UV light emitters](#)



Magdalena Zadura¹, Marta Sobanska², Marek Ekielski¹, Marek Guziewicz¹, Karol Olszewski², Zbigniew Zytkeiwicz², Anna Szerling¹

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[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 Zytkeiwicz
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
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[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, Michał Bockowski¹
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[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

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[\[Poster 104\] Fabrication of GaN Freestanding Membrane Using Solid Phase Epitaxial \$\alpha\$ -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

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

Maliha Noshin¹, Shinji Yamada², Rohith Soman¹, Jeongkyu Kim¹, Suda Jun^{2,3}, 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 Yoshimura^{1,2}

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[\[Poster 108\] Reduction of Dislocations in {20-21}-Plane GaN Crystals during Facet Growth in Na Flux Method](#)

Takumi Miyamoto¹, Masayuki Imanishi¹, Shogo Washida¹, Kosuke Murakami¹, Shigeyoshi Usami¹, Mihoko Maruyama¹, Masashi Yoshimura^{1,2}, Yusuke Mori¹

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[\[Poster 109\] 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

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[\[Poster 110\] 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, Sihung-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 Chae^{2,3}
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[Poster 114] Atomic Layer Etching of Silicon Nitride in Direct Current Superposed Dual-Frequency Capacitively Coupled Plasmas

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¹Dept. of Semiconductor and Display Engineering Sungkyunkwan University, 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 Kamiński^{1,2}, Jarosław Tarenko^{1,2}, Oskar Sadowski^{1,2}, Justyna Wierzbicka¹, Anna Szerling¹, Marek Wzorek¹, Ernest Brzozowski¹, Aneta Gołębiowska^{1,2}, Kamil Abendroth^{1,3}, Marek Ekielski¹, Magdalena Zadura¹, Paweł Prystawko⁴, Michał Boćkowski⁴, Izabella Grzegory⁴, Andrzej Taube¹
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[Poster 117] New approach to interpretation of Hall-effect measurements in highly doped p-type gallium nitride



Maciej Kamiński^{1,2}, Kamil Abendroth^{1,3}, Andrzej Taube¹

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[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, Sylwester 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 Sitar^{1,2}

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 University, 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 Hajek^{1,2}, 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 weisbuch^{1,2}, 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 Iwamoto^{1,2}, Kosaku Kato¹, Jia Wang^{3,4}, Hiroshi Amano^{3,4}, 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 Nakamura^{1,2}, Steven DenBaars^{1,2}, Jacques Peretti³, Claude Weisbuch^{1,3}, 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 Hara^{1,2}, 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 Darakchieva^{2,4}, 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, Adelphi, 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 25 \$\mu\$ m-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 Togashi^{1,2}, Katsumi Kishino^{1,2}

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 Marona^{1,4}, Szymon Grzanka^{1,4}, Piotr Perlin^{1,4}, 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 weisbuch^{1,2}, 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 Zaknoute

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 Mudiyanse, 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 Rathkathiwar¹, Seiji Mita², Pramod Reddy², James Tweedie², Ronny Kirste², Kacper Sierakowski³, Grzegorz Kamler³, Michal Bockowski³, Erhard Kohn¹, Ramón Collazo¹, Zlatko Sitar^{1,2}
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 Hayashi^{1,2}, 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 Liu^{1,2}, Yihao Zhuang², Hanchao Li¹, Qingyun Xie^{3,4}, Yue Wang⁵, Hanlin Xie^{3,4}, Kumud Ranjan^{3,4}, Geok Ing Ng^{1,2,3,4,5}

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, Jimmy 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 Suda^{1,2}



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 Schlessner
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 Sadovyi^{1,2}, 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 Ma^{1,2}, Qimeng Jiang¹, Sen Huang^{1,2}, Xinhua Wang^{1,2}, Xinyu Liu^{1,2}

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 Geng^{1,2}, Zheyang Zheng^{1,2}, Li Zhang², Yan Cheng^{1,2}, Tao Chen^{1,2}, Sirui Feng^{1,2}, Yat Hon Ng^{1,2}, Jiahui Sun², Ji Shu², Hang Liao², Han Xu², Haochen Zhang², Kevin J. Chen^{1,2}

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) AlGaIn

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 AlGaIn alloys enabling low resistance contacts to Al-rich, AlGaIn lateral transistors

Andrew Allerman¹, Andrew Armstrong¹, Brianna Klein¹, Yinxuan 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 Jacobs¹, James Lundh¹, Geoffrey Foster¹, Andrew Koehler¹, James Gallagher¹, Brendan Gunning², Robert Kaplar², Travis Anderson¹, Karl Hobart¹, Michael Mastro¹

¹US Naval Research Laboratory, Washington, DC, USA. ²Sandia 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 AlGaIn/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 Giorgino^{3,1}, 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 Sitar^{1,2}

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 Lee^{1,2}, Nick Pant^{1,3}, 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 Singiseti
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 Mudiyansele, 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, Qinchun 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 Prades^{1,2}

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, Regensburg, Germany

Growth: AlGa_N

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 Kneissl^{1,2}, 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 AlGa_N/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 AlGa_N Growth via 2D FACELO](#)

Michael Carter¹, Jack Almeter¹, Shashwat Rathkanthiwar¹, Ronny Kirste², Seiji Mita², Ramón Collazo¹, Zlatko Sitar^{1,2}

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 AlGa_N 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 AlGa_N on AlGa_N 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 Al_xGa_{1-x}N layers on bulk AlN substrates](#)

toru kinoshita, Samuel Kirby, Jeffrey Britt, Raoul Schlessler, Rafael Dalmau

HexaTech, Inc., Morrisville, North Carolina, USA

14:45 - 15:00

[Quantitative analysis of graded AlGa_N 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



Optoelectronic 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 AlGaIn 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 InGaIn-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 Akaiki¹, 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 AlGaIn-based UV-B Laser Diodes Fabricated on Lattice Relaxed AlGaIn

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 Uzuhashi^{2,3}, Jun Chen², Tadakatsu Ohkubo², Takashi Sekiguchi^{2,3}, 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/AlGaIn/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 Chandrashekar¹, 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 V_{th} 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 Suda^{1,4}

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 Kajiwar¹

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 Uzuhashi^{1,2}, Jun Chen¹, Ryo Tanaka³, Shinya Takashima³, Kacper Sierakowski⁴, Michal Bockowski⁴, Tetsu Kachi⁵, Masaharu Edo³, Takashi Sekiguchi^{1,2}, 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 Gas^{1,2}, Dariusz Sztenkiel¹, Piotr Wisniewski³, Rafal Jakiela¹, Yadhu Edathumkandy¹,

Malgorzata Iwinska⁴, Tomasz Sochacki⁴, Hanka Przybylinska¹, Michal Bockowski⁴, Maciej Sawicki^{1,5}

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 Horita^{1,3}, Tetsu Kachi^{1,3}, Jun Suda^{1,3}

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 Konczewicz^{1,2}, 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 \$\text{In}_x\text{Ga}_{1-x}\text{N}\$ \(\$x=0, 0.11, 0.22\$ \) thin films – ab initio calculations](#)

Roman Hrytsak^{1,2}, 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 AlGaIn-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
Nakamura^{1,2}, Steven DenBaars^{1,2}, 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) InGaIn LEDs with GaN nanopillar
metasurface

Yohei Taguchi¹, Kyohei Suzuki¹, Yuki Murata¹, Shintaro Toda², Shuhei Ichikawa^{1,3}, 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 & AlGaIn)

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 Honda^{2,3,4}, Hiroshi Amano^{2,3,4}

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 AlGa_N

Seiji Mita^{1,2}, Shashwat Rathkanthiwar², Pegah Bagheri², Pramod Reddy^{1,2}, Cristyan Quiñones-Garcia^{2,2}, Dolar Khachariya¹, James Loveless², Masahiro Kamiyama², Tim Eldred², Baxter Moody^{1,2}, Ronny Kirste^{1,2}, Ramón Collazo², Zlatko Sitar²

¹Adroitmaterials, Cary, NC, USA. ²North Carolina State University, Raleigh, NC, USA

16:30 - 16:45

Ultralow Resistivity Al-rich AlGa_N 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: Hirotugu 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 Amano^{2,3}, Yudai Shimizu⁴, Kazutada Ikenaga⁴, Mayank Bulsara⁴, Keitaro Ikejiri⁴, Leo J Schowalter^{1,3,5}

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 Kneissl^{2,1}, 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. Kneissl^{1,2}, G. Cardinali¹, S. Graupeter¹, M. Grigoletto¹, M. Guttman^{1,2}, 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 Neining, 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 Xie^{2,3}, Zhongzhiguang Lu¹, Hanlin Xie^{2,3}, Yihao Zhuang^{1,4}, Siyu Liu^{1,4}, Yuxuan Wang⁵, Yue Wang⁶, Kumud Ranjan^{2,3}, Xiao Gong^{5,3}, Yuanjin Zheng¹, Geok Ing Ng^{1,2,3,4,6}

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

$f_{\text{max}} > 400$ GHz Al_{0.4}Ga_{0.6}N/GaN HEMTs with Al_{0.08}Ga_{0.92}N 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 AlGaIn/GaN-on-Si HEMTs featuring Record \$f_t\$ / \$f_{max}\$ = 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 Kamiński^{1,2}
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](#)

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[\[Poster 121\] Self-alignment fabrication process for ultra-small DUV micro-LEDs](#)

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[\[Poster 122\] Fabrication of nanostructures for GaN-based lasers](#)

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

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[\[Poster 125\] New Advances in GaN-based microcavity Lasers](#)

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[\[Poster 126\] Reduced sidewall damage related external quantum efficiency \(EQE\) drop in red InGaN microLEDs \(>630 nm at 1 A/cm²\) in 2-5 \$\mu\$ m 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 Al_xIn_yGa_{1-x-y}N-Based Integrated Quantum Well Infrared Photodetector with Visible Emitter](#)

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[\[Poster 128\] 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 Song^{1,4}

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

Grzegorz Staszczak¹, Łucja Marona^{1,2}, Anna Kafar¹, Grzegorz Muzioł¹, Szymon Grzanka^{1,2}, Ewa Grzanka^{1,2}, Piotr Perlin^{1,2}, Czesław Skierbiszewski¹, Tadeusz Suski¹

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[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

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[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

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

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

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[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

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[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
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[\[Poster 138\] Monolithically-integrated GaN micro-LED array using GeTe memristor](#)

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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
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[\[Poster 140\] 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
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[\[Poster 141\] X-ray detection using a p-GaN/AlGaIn/GaN Heterostructure](#)

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[\[Poster 142\] Elimination of size effects in InGaN quantum dot cyan-green Micro-LEDs by constructing a full-M-plane hexagonal structure](#)

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[\[Poster 143\] Three-Dimensional Photonic Crystal Phosphors for Efficient Color Conversion in Micro-LED Technologies](#)

Taehun Kim, Seung-Eon Ahn, Kyungtaek Min
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[\[Poster 144\] Light extraction efficiency in AlGaIn-based UV LEDs](#)

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[\[Poster 145\] Analysis of Carrier Dynamics in InGaN-Based Hybrid-Quantum-Well Red Light-Emitting Diodes by Selective Optical Excitations](#)

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

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

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

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

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

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[Poster 151] Resonant Raman scattering of the A₁(LO) phonons in thick InGaIn layers and red InGaIn 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
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[Poster 152] Modification of electrical properties of GaIn by ion implantation and UHPA

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[Poster 153] Impact of UHPA processing on structural properties of ion-implanted GaIn: 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
Peking University, Peijing, China

[\[Poster 155\] 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](#)

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[\[Poster 157\] Study on synergistic effect of heavy-ion irradiation and operating temperature ambient on AlGaIn/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](#)

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[\[Poster 159\] Determination of deformation potentials for InGaIn 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](#)

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[\[Poster 161\] Characterization of Deep Region Trapping Effects in AlN/GaN HEMTs with an AlGaIn Back Barrier Utilizing Tri-State Pulsed IV Technique](#)

Yihao Zhuang^{1,2}, Kumud Ranjan^{3,4}, Qingyun Xie^{3,4}, Hanlin Xie^{3,4}, Hanchao Li², Yue Wang⁵, Siyu Liu^{1,2}, Geok Ing Ng^{1,2,3,4,5}

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[\[Poster 162\] How V-defect energy barriers affect carrier dynamics in InGaIn alloys](#)

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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/AlGaIn RF High Electron Mobility Transistors \(HEMT\)](#)

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[\[Poster 165\] Spontaneously Forming AlGaIn 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 AlGaIn/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 AlGa_N/AlN periodic structures

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[Poster 169] Probing the role of n-AlN SBD's Ohmic Contact Process to the Schottky Contact

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[Poster 170] Capturing the ionization energy of the Mg acceptor in AlGa_N with density functional theory

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[Poster 171] Residual Stress Analysis of Diamond-GaN Heterostructure

Mohamadali Malakoutian, Kelly Woo, Rohith Soman, Srabanti Chowdhury

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[Poster 172] Modeling and Optimization of the 2DEG Charge Density in AlScN/GaN based Ferroelectric Heterostructure

Ruilin Wang, Kexin Li

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[Poster 173] Structural and elastic properties of wurtzite Sc_xAl_{1-x}N, Sc_xGa_{1-x}N, and Sc_xIn_{1-x}N

Hang Cui, William Doolittle, Lucas Graber, Doug Yoder

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[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

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[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

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[Poster 178] Metastable Shallow Donors and Origin of n-type Doping in AlN and AlGaN

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[Poster 179] Thermal hot spot and its dissipation to substrate investigated by submicron thermal imaging in AlGaIn/GaN-on-Si power device structure

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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

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[Poster 181] TCAD Simulations to Explore Thermal Solutions for GaN-on-Silicon HEMTs

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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

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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 InGaIn Platelet Structure

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[Poster 185] High gate stress stability of P-GaN/p-AlGaIn/AlGaIn/GaN HFET

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[\[Poster 186\] A modified noise model for GaN MIS-HEMTs](#)

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[\[Poster 187\] P-type GaN Ohmic Contact Using Annealed Mg Process](#)

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[\[Poster 188\] Enabling Optical & Electrical Characterization of Al₂O₃/GaN Interfaces with Transparent Indium Tin Oxide Contacts](#)

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[\[Poster 189\] p-GaN/AlGaN/GaN HEMT with Extended MOS Gate](#)

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[\[Poster 190\] A Broadband High-Efficiency S-band Continuous Class-F-1 GaN MMIC Power Amplifiers Using Low-Pass Filtering Matching Network](#)

Xin Jiang^{1,2}, Qingyang Dong^{1,2}, Chenhao Li^{1,2}, Ke Wei^{1,2}, Xinhua Wang^{1,2}, Xinyu Liu^{1,2}, weijun luo^{1,2}
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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 partial interlayer for GaN HEMT](#)

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[\[Poster 193\] Influence of Epitaxial Layer Thickness on Dynamic Ron in AlGaN/GaN HEMTs](#)

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[\[Poster 194\] Threshold voltage instability depending on drain stress bias in p-GaN/AlGaN/GaN HEMTs](#)

Myeongsu Chae, Hyungtak Kim
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[\[Poster 195\] Exploring Dielectric Materials for Enhanced Performance of GaN MISHEMTs](#)

Kevin Limanta, Tomas Palacios
Massachusetts Institute of Technology, Cambridge, MA, USA



[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

Angela Pizzuto¹, Baljit Riar¹, Andrea Wallace², Maher Tahhan³, Brian McCabe¹, Caroline Reilly¹

¹RTX Technology Research Center, East Hartford, CT, USA. ²Raytheon, RTX, El Segundo, CA, USA.

³Raytheon, RTX, Andover, MA, USA

[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 Wang^{1,2}, Sen Huang^{1,2}, Liu Wang^{1,2}, Qimeng Jiang^{1,2}, Xinhua Wang^{1,2}, Xinguo Gao^{1,2}, Haibo Yin¹, Ke Wei¹, Xinyu Liu^{1,2}, Qian Sun³, Kevin J Chen⁴

¹Institute of Microelectronics of Chinese Academy of Sciences, Beijing, China. ²University of Chinese Academy of Sciences, Beijing, China. ³Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, Suzhou, China. ⁴Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology, Hong Kong, China

[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

King Abdullah University of Science and Technology, Jeddah, Makkah, Saudi Arabia

[Poster 202] Scaling of Vertical GaN FinFETs

Erik Lind^{1,2,3}, Alexander Simko¹, Navya Sri Garigapati⁴, Adamantia Logotheti^{3,5}, Vanya Darakchieva^{1,2,3}

¹Lund University, Lund, Sweden. ²Nano Lund, Lund, Sweden. ³Center for III-Nitride Technology, Lund, Sweden. ⁴Hexagem AB, Lund, Sweden. ⁵Volvo Cars AB, Gothenburg, Sweden

[Poster 203] 150 nm Gate-Recess E-mode AlN/GaN HEMTs on Si with $V_{th} > 1$ V and $f_T \times LG = 12$ GHz· μ m

Guangjie Gao^{1,2}, Zhihong Liu^{1,2}, Lu Hao^{1,2}, Xiaojin Chen^{1,2}, Xin Feng², Hanghai Du^{1,2}, Weichuan Xing², Hong Zhou^{1,2}, Gong Xiao³, Jincheng Zhang^{1,2}, Yue Hao^{1,2}

¹State Key Discipline Laboratory of Wide Band Gap Semiconductor Technology, Xidian University, Xi'an, Shanxi Province, China. ²Guangzhou Institute of Technology, Xidian University, Guangzhou, Guangdong Province, China. ³National University of Singapore, Singapore, Singapore

[Poster 204] Improvement of the Thermal Performance of the GaN-on-Si RF HEMTs by Introducing a Thick AlN Passivation

Lu Hao¹, Zhihong Liu^{1,2}, Hanghai Du¹, Xiaoyan Li², Weichuan Xing², Hong Zhou¹, Gong Xiao³, Jincheng Zhang^{1,2}, Yue Hao¹

¹School of microelectronics, Xidian University, Xi'an, shaanxi, China. ²Guangzhou Institute of Technology, Xidian University, Guangzhou, Guangdong, China. ³National University of Singapore, Singapore, Singapore

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

Zhaofeng Wang^{1,2}, Zhihong Liu^{1,2}, Xiaojin Chen^{1,2}, Yanyi Li², Hu Wei^{1,2}, Xing Chen³, weichuan xing², Weihang Zhang^{2,1}, Shenglei Zhao^{2,1}, Xiangdong Li², Jincheng Zhang^{2,1}, Yue Hao^{1,2}

¹National Engineering Research Center of Wide Band-gap Semiconductors, School of Microelectronics, Xidian University, Xian, Shaanxi, China. ²Guangzhou Institute of Technology, Xidian University, Guangzhou, Guangdong, China. ³Xidian-Wuhu Research Institute, Wuhu, Anhui, China

[Poster 206] Impact of low Al Concentration AlGaIn Back Barrier on Drain Lag in Thin Barrier AlGaIn RF HEMTs.

Wesley Sampson¹, Abdalla Eblabla¹, Arthur Collier¹, Richard Hammond², Sinan Goktepel², Khaled Elgaid¹

¹Cardiff University, Cardiff, United Kingdom. ²IQE, Cardiff, United Kingdom

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

Jiaqi He^{1,2}, Zhihong Liu^{1,2}, Yanyi Li², Zhaofeng Wang^{1,2}, Hu Wei^{1,2}, Hanghai Du^{1,2}, Weichuan Xing², Hong Zhou¹, Han Wang³, Jincheng Zhang^{1,2}, Yue Hao^{1,2}

¹School of Microelectronics, Xidian University, Xi'an City, Shaanxi Province, China. ²Guangzhou Institute of Technology, Xidian University, Guangzhou City, Guangdong Province, China. ³The University of Hongkong, Hong Kong, Hong Kong, China

[Poster 208] Scaled AlGaIn/GaN Metal-Semiconductor-Metal Varactor with Cutoff Frequency Up To 4.6 THz

Xiaojin Chen^{1,2}, Zhihong Liu^{1,2}, Hu Wei^{1,2}, Hanghai Du^{1,2}, Xin Feng², Weichuan Xing², Hong Zhou¹, Han Wang³, Jincheng Zhang^{1,2}, Yue Hao^{1,2}

¹School of Microelectronics, Xidian University, Xi'an, China. ²Guangzhou Institute of Technology, Xidian University, Guangzhou, China. ³The University, of Hongkong, Hongkong, China

[Poster 209] An AlN/GaN MISHEMT on Si with High Temperature Stability During 400 °C 30h Aging Test in Air

Weiran Li^{1,2}, Zhihong Liu^{1,2}, Lu Hao¹, Wei Hu², Hanghai Du¹, Weichuan Xing², Hong Zhou¹, Gong Xiao³, Jincheng Zhang¹, Yue Hao¹

¹School of Microelectronics, Xidian University, Xi'an, China. ²Guangzhou Institute of Technology, Xidian University, Guangzhou, China. ³National University of Singapore, Singapore, Singapore

[Poster 210] Ringing noise reduction method for high-speed GaN switching converter

Toshihide Ide, Takahiro Gotow, Ryouzaku Kaji, Katsumi Furuya, Hisashi Yamada

National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan



[\[Poster 211\] First-Principles Structural Analysis of Polarity Inversion Boundary in GaN](#)

Takahiro Kawamura¹, Toru Akiyama¹, Hideto Miyake¹, Yoshihiro Kangawa², Kazuhisa Ikeda³, Tomoyuki Tanikawa³

¹Graduate School of Engineering, Mie University, Tsu, Mie, Japan. ²Research Institute for Applied Mechanics, Kyushu University, Kasuga, Fukuoka, Japan. ³Graduate School of Engineering, Osaka University, Suita, Osaka, Japan

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

Seullam Kim, Hong-Kyun Noh

IVWorks Co., Ltd., Daejeon, Korea, Republic of

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

Balasubramanian Sundarapandian¹, Niclas M. Feil², Lutz Kirste¹, Patrik Straňák¹, Mario Prescher¹, Mohit Raghuwanshi¹, Oliver Ambacher²

¹Fraunhofer Institute for Applied Solid State Physics, Freiburg im Breisgau, Germany. ²Institute for Sustainable Systems Engineering (INATECH), University of Freiburg, Freiburg im Breisgau, Germany

[\[Poster 214\] 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 Fei^{1,2}, Xiangning Kang¹, Qi Wang³, Guoyi Zhang^{1,3}, Bo Shen^{1,4}

¹State Key Laboratory for Artificial Microstructure and Mesoscopic Physics, School of Physics, Peking University, Beijing, Beijing, China. ²State Key Laboratory of Nuclear Physics and Technology, School of Physics, Peking University, Beijing, Beijing, China. ³Dongguan Institute of Optoelectronics, Peking University, Dongguan, Guangdong, China. ⁴Yangtze Delta Institute of Optoelectronics, Peking University, Nantong, Jiangsu, China

[\[Poster 215\] Red InGaN LED with Low Blueshift \(<5 nm\) in Large Current Injection Range by Strain Relaxation of Trench Structures](#)

Zuojian Pan¹, Haodong Zhang¹, Zhizhong Chen^{1,2,3}, Chuhan Deng¹, Boyan Dong¹, Ling Hu¹, Fei Huang¹, Weihua Chen¹, Xiangning Kang¹, Bo Shen^{1,3}

¹Peking University, Beijing, Beijing, China. ²Dongguan Institute of Optoelectronics, Peking University, Dongguan, Guangdong, China. ³Peking University Yangtze Delta Institute of Optoelectronics, Nantong, Jiangsu, China

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

Jeongwoon Kim¹, Hyeon Woo Kim^{2,3}, 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

¹Gwangju Institute of Science and Technology, Gwangju, Korea, Republic of. ²Hanyang University, Seoul, Korea, Republic of. ³Korea Institute of Ceramic Engineering and Technology, Jinju-si, Korea, Republic of. ⁴Korea Institute of Energy Technology, Naju, Korea, Republic of. ⁵Electronics and Telecommunications

Research Institute, Daejeon, Korea, Republic of. 6Ajou University, Suwon, Korea, Republic of. 7Sejong University, Seoul, Korea, Republic of

[\[Poster 217\] Demonstration of MOCVD system with advanced mass production performance](#)

Mizuki Yamanaka, Kenichi Eriguchi, Keitaro Ikejiri, Hiroki Tokunaga
Taiyo Nippon Sanso Corp., Tsukuba city, Ibaraki 300-2611, Japan

[\[Poster 218\] From NWs to micro-domains: a novel synthesis path for GaN](#)

Arthur Sauvagnat¹, Elias Senglali¹, Geoffrey Avit¹, Yamina André¹, Evelyne Gil¹, Dyhia Tamsaout², Jean-Christophe Harmand², Maria Tchernycheva², Ludovic Largeau², Stefano Pirotta², Agnès Trassoudaine¹
¹Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal, Clermont-Ferrand, France.
²Centre de Nanosciences et de Nanotechnologies, CNRS UMR 9001, Univ. Paris-Saclay, Palaiseau, France

[\[Poster 219\] SAG of InGaN NWs for the fabrication of InGaN micro-substrates: a promising way to efficient nitride-based red emission](#)

Arthur Sauvagnat¹, Elias Senglali¹, Geoffrey Avit¹, Yamina André¹, Evelyne Gil¹, Vladimir G. Dubrovskii², Philip Shields³, Andriy Moskalenko³, Névine Rochat⁴, Eric Tournié⁵, Thierry Taliercio⁵, Agnès Trassoudaine¹
¹Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal, Clermont-Ferrand, France.
²Faculty of Physics, St. Petersburg State University, St. Petersburg, Russian Federation. ³Department of Electronic & Electrical Engineering, University of Bath, Bath, United Kingdom. ⁴Univ. Grenoble Alpes, CEA, Leti, Grenoble, France. ⁵IES, UMR CNRS 5214, CC067, Université Montpellier 2, Montpellier, France

[\[Poster 220\] 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
¹Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Germany. ²Université Côte d'Azur, CNRS CRHEA, Sophia Antipolis, France

[\[Poster 221\] The evolution of dislocations and strains in AlN grown by high temperature metal-organic-chemical-vapor-deposition](#)

Qiushuang Chen, Jichun Ye, Wei Guo
Ningbo Institute of Materials Tech. & Eng. CAS, Ningbo, China

[\[Poster 222\] 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
¹Peking University, Beijing, China. ²Beijing University of Technology, Beijing, China

[\[Poster 223\] Formation Process of AlGaIn During the Self-Assembled Growth of AlN/AlGaIn Superlattices Using Metal Modulated Epitaxy](#)

Alexander Chaney^{1,2}, Thaddeus Asel², Shin Mou²
¹Azimuth Corporation, Dayton, OH, USA. ²Materials and Manufacturing Directorate, AFRL, WPAFB, OH, USA

[\[Poster 224\] 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 \(10-11\) InGa_N/InGa_N MQW grown on underlying bulk InGa_N 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 AlGa_N 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 In_xGa_{1-x}N 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 Iso^{1,2}, 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-Rodarte^{1,2}, Katarzyna Gas^{3,4}, Manuel Herrera-Zaldívar², Detlef Hommel⁵, Maciej Sawicki^{3,6}, 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

¹Institute of High pressure Physics PAS, Warsaw, Poland. ²Institute of Physics PAS, Warsaw, Poland. ³Maria Skłodowska 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 Schöttler^{1,2}, Stefan Wolter^{1,2}, Juliane Breitsfelder^{1,2}, Rany Miranti-Augustin^{1,2}, Jana Hartmann^{1,2}, Andreas Waag^{1,2}

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 Zajac^{1,2}, 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 AlGaIn/GaN Triode Structure](#)

Douglas Yoder
Georgia Tech, Atlanta, GA, USA

08:30 - 08:45

[Proposal of AlGaIn/GaN Gated-Anode Diode Model Incorporating Internal HEMT Structure for Loss Analysis towards Efficient Microwave Rectification](#)

Tomoya Watanabe¹, Hidemasa Takahashi¹, Akio Wakejima², Yuji Ando^{1,3}, Jun Suda^{1,3}
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 Al_xGa_{1-x}N Channel](#)

Seiya Kawasaki, Masanobu Hiroki, Kazuyuki Hiram, 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 Amano^{1,2,3}

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 AlGaIn/GaN-on-Si HEMTs with p-type NiO-based gate stack](#)

Andrzej Taube¹, Wojciech Hendzelek¹, Aneta Gołębiowska^{1,2}, Oskar Sadowski^{1,2}, Jarosław Tarenko^{1,2},

Maciej Kamiński^{1,2}, 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, Shirley 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 Pant^{1,2}, Vishal Subramanian², Vikram Gavini², Emmanouil Kioupakis²
1University of Texas at Austin, 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](#)

Jimmy 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, Wenyan 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 Encabo^{2,3}, 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 Sitar^{1,2}

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 Al_xGa_{1-x}N 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 FUJIWARA^{1,2,3}, 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 AlGaIn-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°C

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 Tarenko^{1,2}, Maciej Kamiński^{1,2}, Aneta Gołębiowska¹, Oskar Sadowski^{1,2}, Anna Szerling¹,

Krystian Król², Paweł Prystawko³, Michał Boćkowski³, Izabella Grzegory³, Justyna Wierzbicka¹,

Magdalena Zadura¹, Marek Ekielski¹, Renata Kruszk¹, 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 (Linköping University)

Xuiling Li (UT Austin)

Shadi Shahedipour-Sandvik (University at Albany)

Srabanti Chowdhury (Stanford)

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](#)

Shuheichi Ichikawa^{1,2}, 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 Grigoletto^{1,2}, Gregor Hofmann³, Friedhard Römer³, Hyun Kyong Cho², Jens Rass², Sven Einfeldt², Tim Wernicke¹, Bernd Witzigmann³, Michael Kneissl^{1,2}
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 Jena^{3,4}, 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 Knezevic^{1,2}, Sanja Djurdjic Mijin^{1,3}

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 für Festkörperelektronik, Berlin, Germany

15:15 - 15:30

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



Tomasz Czystanowski¹, Dmitriy Yavorskiy², Tomasz Fąs³, Marta Sawicka², Grzegorz Muzioł², 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 Ichikawa^{2,3}, Shintaro Toda⁴, Yasufumi Fujiwara^{5,6,7}, 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 AlGaIn 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, Michał 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 Al_xGa_{1-x}N: 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

[\(INVITED\) Unleashing MicroLED Potential: Damage-free Anisotropic Etching for Enhanced Pixel Density](#)

Xiuling Li^{1,2}, 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 Schöttler^{1,2}, Steffen Higgins-Wood^{1,2}, Maximilian Vergin^{1,2}, Juliane Breitsfelder^{1,2}, Florian Meierhofer^{1,2}, Rany Miranti-Augustin^{1,2}, Jana Hartmann^{1,2}, Jan Gülink^{1,2,3}, Joan Canals⁴, Victor Moro⁴, Angel Dieguez⁴, J. Daniel Prades^{1,2,4}, Andreas Waag^{1,2}

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 Aguilera 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 Ichikawa^{1,2}, 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 Bakeroot^{1,2}, 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](#)

[Al_{0.87}Ga_{0.13}N/Al_{0.64}Ga_{0.36}N 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, Tomás 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 Lee^{1,2}, Antonios M. Alvertis^{3,4,5}, Zhenglu Li^{5,4,6}, Steven G. Louie^{4,5}, Marina R. Filip⁷, Jeffrey B. Neaton^{4,5,8}, 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 AlGaIn/GaN HEMTs grown on SiC, GaN, and AlN substrates](#)

Dat Tran¹, Minh Kim^{1,2}, Okhyun Nam³, Vanya Darakchieva^{1,2,4,5}, 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 Sangdaehak-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 Milner^{1,2}, Vitaly Z. Zubialeovich¹, Sandeep M. Singh^{1,2}, Brian Corbett¹, Peter J. Parbrook^{1,2}

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 by Hydrogen Environment Anisotropic Thermal Etching \(HEATE\)](#)

Akihiko Kikuchi

Sophia University, Sophia Semiconductor Research Institute, Tokyo, Japan

16:45 - 17:00

[AlGaIn/GaN heterostructures based on dodecagonal III-nitride microrods – a step towards UV emitters](#)

Łukasz Janicki¹, Paulina Ciechanowicz¹, Adrianna Piejko^{1,2}, Robert Kudrawiec^{1,2}, Detlef Hommel^{1,3}

¹PORT Polish Center for Technology Development, 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

Optoelectronics 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 Koizumi^{1,2}, Kei Emoto^{1,2}, 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/AlGaIn 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 Tepas¹, 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 AlGa_N 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 Ga_N Schottky Diodes Annealed at 600 °C for High Power and High Temperature RF Applications](#)

Beatriz Orfao¹, Amir Al Abdallah¹, Hugo Bouillaud¹, Mahmoud Abou Daher², Guillaume Ducournau², Yannick Roelens², Mohammed Zaknoute¹, Malek Zegaoui¹

¹CNRS-IEMN, Villeneuve d'ascq, Lille, France. ²IEMN, Villeneuve d'ascq, Lille, France

17:00 - 17:15

[Drift Velocity of 2DEG in AlGa_N/Ga_N 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 AlGa_N/Ga_N 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 AlGa_N 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 Al_N 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 AlGaIn-based UVC LEDs and lasers will focus on recent breakthroughs in the development of AlGaIn 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 AlGaIn 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 Al_{0.85}Ga_{0.15}N

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 University, 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, 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 Suda^{1,2}

¹Nagoya University, Nagoya, Aichi, Japan. ²IMaSS, Nagoya, Aichi, Japan

09:00 - 09:15

The Growth of Phase-pure cubic GaN – Towards Continuous Film

Jaekwon Lee^{1,2}, Yu-Chieh Chiu^{1,2}, Can Bayram^{1,2}

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 Olszewski^{1,2}, Jakub Ziembicki³, Dominika Majchrzak¹, Rafał Bartoszewicz³, Paweł Sacharoch³, Miłosz Grodzicki^{1,3}, Damian Pucicki^{1,4}, Jarosław Serafińczuk^{1,4}, Robert Kudrawiec^{1,3}, Detlef Hommel^{1,5}

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 \$\beta\$ -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 Nakamura^{1,3}, Umesh Mishra³, Stacia Keller³, Steven DenBaars^{1,3}

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 InGa_N and InGa_N/Ga_N 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 InGa_N/Ga_N 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, Hélène 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 Zytewicz¹, 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 Jalmoood, 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 Hamadou³, 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. ³EMN-CNRS, Lille, France. ⁴FBH, Berlin, Germany. ⁵Robert Bosch GmbH, Advanced Technologies and Micro Systems Department (Renningen, Germany), Renningen, Germany

08:30 - 08:45

[AlGaIn/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 \(64%\) AlGaIn-channel HEMT with ~2 kV Breakdown 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 Lee^{1,2}

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 Kudrawiec^{1,2}, Karol Kulinowski¹, Ewelina Zdanowicz¹, Artur Herman¹, Rafał Kuna², Wojciech Olszewski², Detlef Hommel²
¹Department of Semiconductor Materials Engineering, Wrocław 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 Sitar^{2,3}, Markus R. Wagner^{1,5}
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 AlGa_N 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 Xie^{2,3}, Yue Wang⁴, Hanlin Xie^{2,3}, Pradip Dalapati¹, Siyu Liu¹, Kumud Ranjan^{2,3}, Siewchuen Foo⁵, Subramaniam Arulkumaran⁵, Geok Ing Ng^{1,2,3,4,5}

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 Li^{1,2,3}, Lijuan Jiang^{1,2,3}, Hongling Xiao^{1,2,3}, Chun Feng^{1,2,3}, Jiankai Xu^{1,3}, Qian Wang^{1,3}, Miao Zhou^{1,2,3}

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 V_{th} 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 ($5 \times 10^{20} \text{ cm}^{-3}$) on GaN material characteristics and Ohmic contacts for GaN-HEMT applications

Ravikiran Lingaparthi¹, Dharmarasu Nethaji¹, Radhakrishnana K^{1,2}, Dinesh Mani², Rizwana Khanum², Tian Long Alex Seah¹, Geok Ing Ng^{1,2}

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 AlGa_N/Ga_N/AlN double heterostructure HEMTs on AlN substrates by hot-wall MOCVD

Minho Kim^{1,2}, Alexis Papamichail¹, Dat Q Tran¹, Plamen Paskov¹, Vanya Darakchieva^{1,2,3,4}

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, Jimmy 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 AlGa_N/Ga_N 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 Debal1, 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 Kalsounis1,2, Mohammed El Amrani2, David Plaza Arguello2, Hala El Rammouz2, Thomas Jalabert2, Denis Mariolle2, Matthieu Lafossas2, Simona Torrenco2, 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 Lee^{1,2}, Can Bayram^{1,2}

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 Weisbuch^{1,2}, 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 Kikuchi^{1,3,4}

¹Sophia University, Tokyo, Japan. ²WPI MANA, National Institute for Materials Science, Ibaraki, Japan. ³Sophia Photonics Research Center, Tokyo, Japan. ⁴Sophia Semiconductor Research Institute, 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, València, 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, Jimmy 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 Khachariya^{1,2}, Dennis Szymanski², Masahiro Kamiyama², Pramod Reddy¹, Erhard Kohn², Zlatko Sitar^{2,1}, 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 Kasai^{1,2}, 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 Honda^{2,3,4}, Hiroshi Amano^{2,3,4}

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: AlGa_N Materials

10:30 - 12:00 Friday, November 8, 2024

Location Coral 1

Chair: Ramon Collazo

10:30 - 10:45

Auger-Meitner recombination in AlGa_N quantum wells

Nick Pant^{1,2}, 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 Barbara, CA, USA

10:45 - 11:00

Nanoscale Analysis of MOCVD-grown p-Type Al_xGa_{1-x}N/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 Al_{0.8}Ga_{0.2}N 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 AlGa_N

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 Al_{0.73}Ga_{0.27}N](#)

Matthew Alessi¹, Pramod Reddy², Cristyan Quinones-Garcia¹, Seiji Mita², Erhard Kohn¹, Ramón Collazo¹, Zlatko Sitar^{1,2}, 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 côte 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

[AlGa_N/Ga_N 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 AlGa_N grown on AlN substrates](#)

Pramod Reddy¹, Dolar Khachariya¹, James Loveless², Ronny Kirste¹, Will Mecouch¹, Seiji Mita¹, Erhard Kohn², Ramon Collazo², Zlatko Sitar^{1,2}

¹Adroit Materials, Cary, NC, USA. ²NCSU, Raleigh, NC, USA

11:30 - 11:45

[Development of Top-Illuminated III-N Ultraviolet Avalanche Photodiodes with AlGa_N 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 AlGa_N](#)



Zhongtao Zhu¹, Yashas Satapathy², Lina Cao³, Juncheng Xiong¹, Mateo Gutierrez¹, Yu Duan⁴, Wesley Turner¹, Anthony Hoffman¹, Spyridon Pavlidis², Ramón Collazo², Zlatko Sitar^{2,5}, 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 AlGaIn-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 Samukawa^{4,3}

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 Honda^{2,3,4}, Hiroshi Amano^{2,3,4}

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11:15 - 11:30

[Fabrication of GaN vertical junction barrier Schottky diode using N/Mg ion-implantation](#)

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11:30 - 11:45

[Extremely selective etching of p-GaN/AlGaIn heterostructures by Cl₂/O₂-based reactive ion etching](#)

Justyna Wierzbicka¹, Maciej Kamiński^{1,2}, Jarosław Tarenko^{1,2}, Joanna Jankowska-Śliwińska¹, Renata Kruska¹, Aneta Gołębiowska^{1,2}, Oskar Sadowski^{1,2}, Marek Ekielski¹, Magdalena Zadura¹, Anna Szerling¹, Andrzej Taube¹

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11:45 - 12:00

[Effect of gate dielectrics on Current Collapse in Extreme Bandgap AlGaIn 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

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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](#)

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