



2025
International Conference on
Compound Semiconductor
Manufacturing Technology

May 19th – 22nd, 2025
www.csmantech.org

Hilton New Orleans Riverside
New Orleans, Louisiana, USA

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CONFERENCE AT A GLANCE

SUNDAY, May 18th

6:00 PM – 8:00 PM **REGISTRATION**
Registration Desk (Level 1)

MONDAY, May 19th

7:00 AM – 7:00 PM **REGISTRATION**
Registration Desk (Level 1)

7:00 AM – 8:00 AM **BREAKFAST**
Grand Ballroom C (Level 1)

7:50 AM – 5:40 PM **CS MANTECH WORKSHOP**
Grand Ballroom A (Level 1)

8:00 AM – 5:00 PM **ROCS WORKSHOP**
Grand Ballroom B (Level 1)

12:20 PM – 1:20 PM **LUNCHEON FOR WORK-
SHOPS**
Grand Ballroom C (Level 1)

6:00 PM – 9:00 PM **EXHIBITOR RECEPTION**
Churchill (Level 2)

TUESDAY, May 20th

7:00 AM – 7:00 PM **REGISTRATION**
Registration Desk (Level 1)

7:00 AM – 8:00 AM **BREAKFAST**
Churchill (Level 2)

8:00 AM – 5:00 PM **EXHIBIT HOURS**
Churchill (Level 2)

8:00 AM – 8:30 AM **OPENING CEREMONIES**
*Grand Ballroom A & B
(Level 1)*

8:30 AM – 10:00 AM **SESSION 1: PLENARY I**
*Grand Ballroom A & B
(Level 1)*

10:00 AM – 10:30 AM **BREAK**
Churchill (Level 2)

10:30 AM – 12:00 PM **SESSION 2A: POWER
DEVICES I**
Grand Ballroom A (Level 1)

10:30 AM – 12:00 PM **SESSION 2B: LASERS**
Grand Ballroom B (Level 1)

12:00 PM – 1:10 PM	EXHIBITS LUNCH <i>Churchill (Level 2)</i>
12:20 PM – 1:10 PM	EXHIBITOR FORUM <i>Location TBD</i>
1:10 PM – 3:00 PM	SESSION 3A: POWER DEVICES II <i>Grand Ballroom A (Level 1)</i>
1:10 PM – 3:00 PM	SESSION 3B: MANUFACTURING CHALLENGES & INNOVATIONS <i>Grand Ballroom B (Level 1)</i>
3:00 PM – 3:30 PM	BREAK <i>Churchill (Level 2)</i>
3:30 PM – 5:00 PM	SESSION 4A: RF DEVICES <i>Grand Ballroom A (Level 1)</i>
3:30 PM – 5:00 PM	SESSION 4B: ADVANCED PACKAGING & INTEGRATION <i>Grand Ballroom B (Level 1)</i>
5:00 PM – 6:00 PM	STUDENT FORUM <i>Chequers (Level 2)</i>
5:00 PM – 6:00 PM	EXHIBITOR FORUM <i>Location TBD</i>
6:00 PM – 10:00 PM	INTERNATIONAL RECEPTION <i>Location TBA</i>

WEDNESDAY, May 21st

7:00 AM – 7:00 PM	REGISTRATION <i>Registration Desk (Level 1)</i>
7:00 AM – 8:30 AM	BREAKFAST <i>Churchill (Level 2)</i>
7:00 AM – 8:30 AM	WoMANTECH Connect <i>Prince of Wales (Level 2)</i>
8:00 AM – 11:00 AM	EXHIBIT HOURS <i>Churchill (Level 2)</i>
8:30 AM – 10:00 AM	SESSION 5: PLENARY II <i>Grand Ballroom A & B (Level 1)</i>
10:00 AM – 10:30 AM	BREAK <i>Churchill (Level 2)</i>

10:30 AM – 12:00 PM **SESSION 6A: HETEROGENEOUS INTEGRATION**
Grand Ballroom A (Level 1)

10:30 AM – 12:00 PM **SESSION 6B: OPTOELECTRONICS I**
Grand Ballroom B (Level 1)

12:00 PM – 1:20 PM **LUNCH BREAK**

1:20 PM – 3:00 PM **SESSION 7A: SUBSTRATES & MATERIALS**
Grand Ballroom A (Level 1)

1:20 PM – 3:00 PM **SESSION 7B: U.S. MICROELECTRONICS COMMONS HUB SESSION 1**
Grand Ballroom B (Level 1)

3:00 PM – 3:20 PM **BREAK**
Outside Grand Ballroom A & B (Level 1)

3:20 PM – 4:50 PM **SESSION 8A: GALLIUM OXIDE**
Grand Ballroom A (Level 1)

3:20 PM – 4:50 PM **SESSION 8B: U.S. MICROELECTRONICS COMMONS HUB SESSION 2**
Grand Ballroom B (Level 1)

5:00 PM – 6:00 PM **CSM MICROELECTRONICS COMMONS HUB PANEL DISCUSSION**
Jefferson Ballroom (Level 3)

6:00 PM – 7:00 PM **CSM MICROELECTRONICS COMMONS HUB NETWORKING**
Jefferson Ballroom (Level 3)

THURSDAY, May 22nd

7:00 AM – 11:00 AM **REGISTRATION**
Registration Desk (Level 1)

7:00 AM – 9:30 AM **BREAKFAST**
Churchill B (Level 2)

8:20 AM – 9:50 AM **SESSION 9: PLENARY III**
Grand Ballroom A & B (Level 1)

9:50 AM – 10:20 AM **BREAK**
Outside Grand Ballroom A & B (Level 1)

10:20 AM – 12:00 PM **SESSION 10A: OPTOELECTRONICS II**
Grand Ballroom A (Level 1)

10:20 AM – 12:00 PM **SESSION 10B: YIELD IMPROVEMENTS IN CS MANUFACTURING**
Grand Ballroom B (Level 1)

12:00 PM – 1:20 PM **LUNCH ON YOUR OWN**
Lunch not provided

1:20 PM – 3:00 PM **SESSION 11A: OPTOELECTRONICS III**
Grand Ballroom A (Level 1)

1:20 PM – 3:00 PM **SESSION 11B: WAFER PROCESSING**
Grand Ballroom B (Level 1)

3:00 PM – 4:00 PM **POSTER SESSION**
Churchill B (Level 2)

4:00 PM – 4:30 PM **CAPSTONE TALK**
Churchill B (Level 2)

4:30 PM – 5:30 PM **CONFERENCE CLOSING**
Churchill B (Level 2)

MESSAGE FROM THE CONFERENCE CHAIR

The 2025 Technical Program and Executive Committees for the International Conference on Compound Semiconductor Manufacturing Technology (CS MANTECH) welcome you to New Orleans, Louisiana! The “Crescent City”, as it is known from the mighty Mississippi River that shapes the shores just outside our conference site, is also known as the “Big Easy” because of the non-stop leisurely and festive atmosphere that we hope you will enjoy during your visit.

Even though we are in the “Big Easy,” the hard work and dedication that has gone into building our industry and community has been anything but “Easy.” While it might be tempting to look back and imagine it was “Easy” to get here, we are standing on the shoulders of giants that came before us, pioneering and plowing the technical and programmatic way for us to be where we are today. From our roots of standing up the RF communication industry in the 1980’s, resulting in the multiple phones we carry with us everywhere we go, we have grown together and expanded from our GaAs-only focus to include all Compound Semiconductors and their applications in Optoelectronics and Power Electronics, without losing our RF roots.

In one sense, this year and moment in time is no different from where this community started, but **we** are now those blazing new trails, overcoming new technical and programmatic challenges. With the addition of new large scale market dynamics through acquisitions, mergers and legal hurdles, this work isn’t “Easy,” but we have a strong and growing community because it is rewarding work, and you will see the fruits of that work throughout all we have planned at this year’s conference. I encourage you to take advantage of this unique opportunity, getting the most out of this conference by visiting our exhibitors, attending the excellent workshop & technical program talks, joining the ME Hub events Wednesday night, and our many excellent social events.

A very special thank you to all who made this conference possible, especially our CS MANTECH Executive Committee member volunteers who put in countless hours of hard work so that we could enjoy this time together in the “Big Easy”!

Shawn Burnham
DCS Corp.
2025 CS MANTECH Conference Chair

2025 CONFERENCE SPONSORS

CS MANTECH is an independent not-for-profit organization whose mission is to promote technical discussion and scientific education in the compound semiconductor manufacturing industry. The continued success of the conference is enabled by donations from corporate sponsors. The 2025 CS MANTECH Conference Committee gratefully acknowledges the support from our sponsors.

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2025 CONFERENCE HIGHLIGHTS

Welcome to the **2025 Compound Semiconductor Manufacturing Technology (CS MANTECH) International Conference!** This year marks the third time we are holding our conference in New Orleans, Louisiana (NOLA), a historic city internationally recognized for its vibrant and colorful culture and un-matched rich musical and culinary scene. We are excited to be back in NOLA and harness the energy of the ‘Big Easy’ to continue the long CS MANTECH tradition of providing you with an exceptional technical and social networking experience. Our Executive and Technical Program Committees have done an outstanding job over the past year to solicit and organize a program that addresses the latest developments in CS manufacturing and technologies. Let me take a moment to describe what is in store for you at the 2025 CS MANTECH conference.

CS MANTECH 2025 kicks off with the **CS MANTECH Workshop on Monday, May 19th**. The theme for this year’s workshop is “Characterization and Measurement for Success in Compound Semiconductors”, providing fundamental understanding of the characterization and measurement techniques critical for high yield CS manufacturing. Please see the CS MANTECH WORKSHOP section for additional details. In parallel, the **Reliability of Compound Semiconductors (ROCS) Workshop**, will be held to offer attendees a forum to present the latest results on CS reliability. A unique aspect of ROCS is the collaborative discussions on the latest in CS reliability and how to overcome barriers for wider technology adoption and application. After Monday’s workshops, we kick-off the first social and networking event with the **Exhibitor Reception** at 6:00 PM in the Hilton New Orleans Riverside Churchill ballroom. This is your first opportunity to interact and network with other CS MANTECH attendees, including your customers, suppliers, and collaborators, all while enjoying a great selection of New Orleans’ inspired hors d’oeuvres and drinks.

The CS MANTECH technical conference starts on **Tuesday, May 20th**, beginning with the **Opening and Awards Ceremonies**, that will include the 2024 Best Paper awards, Sponsorship Recognition, and a Conference Overview. We will begin each day of the conference with a single-track Plenary session, followed by parallel track technical sessions. Our **first Plenary Session** to kick-off the conference features speakers **Professor Grace Xing** from **Cornell University** and **Professor Steven DenBaars** from the **University of California Santa Barbara**. Professor Xing will speak on “AlN and Ga₂O₃: Materials of the Future or Reality?” and Professor DenBaars will speak on “Recent Advances in III-Nitrides for MicroLED and Visible Laser Materials & Devices”. Following the first plenary session, we

will transition to parallel technical sessions on Power Devices, Lasers, Manufacturing Challenges & Innovations, RF Devices, and Advance Packaging & Integration. These sessions are composed of both invited and regular and student contributed talks. Invited speakers featured during the first day of technical sessions represent leaders and technologists from **North Carolina State University, Kyocera LSD, Renesas, Fujitsu, and Nexperia**. Lunch will be provided in the Exhibits Hall (Churchill Ballroom), offering attendees additional opportunities to connect with existing and new suppliers. Following Tuesday's technical sessions, we will hold the **Student Forum** to provide an opportunity for students to explore career opportunities through networking with members of the CS community from industry, academia, and government. Finally, the much-anticipated **CS MANTECH International Reception** will be held to close the first day of conference.

On **Wednesday, May 21st**, day two of the conference starts with a second Plenary session, featuring **Mr. Mike Holmes** from the U.S. Defense Advanced Research Projects Agency (**DARPA**) Next Generation Microelectronics Manufacturing (**NGMM**) project and **Dr. Bertrand Parvais** from **IMEC**. Mr. Holmes will speak on the overview of the DARPA NGMM project and Dr. Parvais will speak on an overview of compound semiconductor work in Europe. After the second plenary session, we will return to parallel technical sessions on Heterogeneous Integration, Optoelectronics, Substrates and Materials, and Gallium Oxide; featuring invited talks from the **University of Arizona, Mojo Vision, and IKE-Berlin**. New for this year is the extension of the final day of the Industry Exhibits through lunch and another opportunity to connect with existing and new suppliers. **CS MANTECH is also excited to offer our attendees two special topic sessions focused on the U.S. Microelectronics Commons (MEC)**. The MEC sessions will be in the afternoon and will kick-off with an invited talk from **Dr. Tim Morgan, MEC Technical Director**. Following Dr. Morgan's talk, the eight regional MEC hubs (**NEMC, CLAWS, SCMC, NORDTECH, MMEC, SWAP, Northeast AI, and California DREAMS**) will provide overviews of their hub model and activities. The MEC special topic sessions will conclude with an invited talk from **Ms. Susan Feindt, Senior Vice President of Ecosystem Development at Natcast**. The second day of conference events will conclude with a **CS MANTECH MEC Hub Panel session** at 5:00 PM in the Jefferson Ballroom followed by a **CS MANTECH MEC hub networking event** at 6:00 PM.

On **Thursday, May 22nd**, the final day of the conference, we will start with the final plenary session, featuring **Dr. Hui-Hsin (Anna) Tseng** from **TSMC**. Dr. Tseng will be speaking on an "Overview of TSMC's Green Manufacturing Initiative". The second plenary speaker will be announced

soon. Following the final plenary session of the conference, we will transition to parallel-track technical sessions on Optoelectronics, Yield Improvement, and Wafer Processing. These sessions will feature invited speakers from **Avicena, Nagoya University, Infinera, and IQE**. There will be no lunch provided to give attendees an opportunity to explore New Orleans, however, the conference will continue with a great line-up of technical talks in the afternoon. While I've highlighted our distinguished Plenary and Invited speakers for this year's program, we also have Regular and Student contributed papers and talks in all sessions. These contributions are from academia, government, and industry, and make up the foundation of our CS MANTECH conference. Like previous CS MANTECH conferences, these papers bring cutting-edge concepts that are often our first look at things that will change our industry for years to come. This extends to our **Poster Session**, which will end the technical portion of the conference, and is a great opportunity to interact with the authors to gain valuable insights and build new relationships.

We will wrap up the 2025 CS MANTECH Conference with a **Capstone Talk** from **Dr. Gregg Harry** from **American University and the LIGO Scientific Collaboration** headquartered at CalTech and MIT. Dr. Harry will provide a unique talk on "Development of large area substrate transferred aluminum gallium arsenide coated mirrors for future gravitational wave detectors". This capstone talk will be followed by our Closing Ceremony, featuring award announcements for Best Poser, Conference Feedback Drawing, and Conference Contest.

We hope this year's conference will motivate you to return to your organizations with fresh ideas and fresh contacts to continue doing great work and excel in our industry. **On behalf of the 2025 Technical Program Committee, we welcome you to New Orleans and we are happy to have you join us for CS MANTECH 2025!**

Jansen Uyeda
Northrop Grumman Corporation
Technical Program Committee Chair

2025 CS MANTECH WORKSHOP

Monday, May 19th, 2025

Hilton New Orleans Riverside, New Orleans, Louisiana

Room: Grand Salon A (Level 1)

8:00 a.m. – 5:00 p.m.

The theme of this year’s workshop is “Characterization and Measurement for Success in Compound Semiconductors”

Characterization and measurement are critical to achieving success in manufacturing; without a solid understanding of the materials, processes, and devices being produced, delivering the performance and quality our customers expect is impossible. In the spirit of CS-MANTECH being held in New Orleans, this year our workshop goes on parade, with discussions of metrology and characterization ranging from starting material through devices and final product.

Our parade starts in the morning, with a discussion of physical-level characterization of materials and devices that are essential to CS manufacturing. Led by Mike Salmon and Jeff Serfass from Eurofins/EAG, in-depth discussion of destructive and non-destructive approaches to characterizing materials, impurities, as well as identification of failure modes will be presented. This will be followed by a session on process control monitor (PCM) testing, led by Alan Howsare from MACOM. Including a discussion of PCM test structures, testing methodologies, and the key considerations for implementing a PCM test program including statistical analysis and screening, as well as how PCM meshes with statistical process control (SPC) approaches. The parade continues after lunch with a session, led by William Vilchez of Qorvo on high-volume DC die sort. This includes a description of the key test building blocks of a die sort program, as well as operational considerations critical to high-volume throughput. From die sort, we move to production on-wafer RF testing, with a session led by Eric Tangen of Qorvo. This session focuses on strategies for high-volume testing of RF devices and die using modern vector network analyzer capabilities. Calibration assurance and monitoring, as well as going beyond s-parameter characterization to more advanced measurements will also be discussed. Our tour concludes with a discussion of precision measurements and techniques needed to obtain accurate process design kit (PDK) models, with a focus on challenges associated with GaN HEMTs. Led by Larry Dunleavy of Modelithics, the diverse measurements, fixtures, calibration structures, and testing conditions needed for accurate model development will be described and discussed.

2025 ROCS WORKSHOP

Monday, May 19th, 2025
Hilton New Orleans Riverside, New Orleans, Louisiana
Room: Grand Salon B (Level 1)
8:00 a.m. – 5:00 p.m.

The 39th annual Reliability of Compound Semiconductors (ROCS) Workshop will be held on the first day of the CS MANTECH conference. The objective is to bring together researchers, manufacturers, and users of compound devices with an emphasis on device reliability, test, failure mechanisms, thermal analysis, radiation effects, and environmental effects, to name just a few areas of interest. This year's agenda features an impressive lineup of Subject Matter Experts from industry and academia sharing their expertise. Papers and tutorials showing the latest results and new developments in all phases of Compound Semiconductor Reliability will be presented and discussed. A full day of Compound Semiconductor Reliability Presentations is being offered, along with a luncheon and two breaks.

NEW TO CS MANTECH

2025 WoMANTECH Connect

Wednesday, May 21st, 2025
Hilton New Orleans Riverside, New Orleans, Louisiana
Room: Prince of Wales (Level 2)
7:00 a.m. – 8:30 a.m.

CS MANTECH invites you to a special breakfast event designed to foster a supportive environment for women to connect and network. The event aims to:

- **Build community** and mutual support.
- **Foster networking** and professional relationships.
- **Facilitate peer connections** through shared activities.
- **Promote collaboration** and idea sharing.
- **Enhance community spirit** by gathering together.
- **Support growth** by creating a space for women to help each other.

Join us to share, learn, and grow together, both personally and professionally. **Bring your breakfast** to the room and enjoy connecting with others.

SPECIAL TOPIC SESSIONS - U.S. CHIPS AND SCIENCE ACT MICROELECTRON- ICS COMMONS

The Compound Semiconductor Manufacturing Technology Conference (CS MANTECH) is excited to partner with the CHIPS and Science Act for a special topic session at the 2025 CS MANTECH Conference (May 19 - May 22, 2025, New Orleans, Louisiana, USA) to provide attendees an overview of the Microelectronics Commons (MEC) and National Center for the Advancement of Semiconductor Technology (Natcast) missions. The session starts with an invited talk by **Dr. Tim Morgan, MEC Technical Director** followed by overview talks from each of the Commons Hubs. The special topic session will end with an invited talk by **Ms. Susan Feindt, Senior Vice President of Ecosystem Development at Natcast**. This CS MANTECH Special Session on CHIPS and Science Act programs will be held on the afternoon of Wednesday, May 21, 2025. A CS MANTECH MEC Hub Panel Session and Hub Networking event will follow (see the detailed schedule in this Advance Program for more details).

INDUSTRY EXHIBITS

Details and list of Exhibitors to be announced soon.

2024 BEST PAPERS AWARDS

On Tuesday morning, CS MANTECH will formally recognize the authors of the best paper and best student paper from the 2024 conference. Both awards are based on conference attendee online feedback and ratings. The Best Paper Award is named in honor of Dr. He Bong Kim, the founder of the International Conference on Compound Semiconductor Manufacturing Technology.

The He Bong Kim Award winner for 2024 Conference is:

Paper 2.2.1

High Power Nitrogen-polar GaN/InAlN HEMT with Record Power Density of 12.8 W/mm at 28 GHz

S. Yoshida, K. Makiyama, A. Hayasaka, A., Mukai, I. Makabe, and K. Nakata

Transmission Devices Laboratory, Sumitomo Electric Industries, Ltd., Yokohama, Kanagawa, Japan

Best Paper Honorable Mention:

Paper 6.1.3

SmartSiC™ 150 & 200mm engineered substrate: increasing SiC device current density up to 30%

Daniel Eric Guiot¹, F. Allibert¹, J. Leib², T. Becker², O. Rutsch², A. Drouin¹, and W. Schwarzenbach¹

¹*SOITEC S.A., Bernin, France*

²*Fraunhofer IISB, Erlangen, Germany*

The Best Student Paper for the 2024 Conference is:

Paper 8.1.2

Design, Fabrication, and Characterization of GaN-Based Single Drift Region IMPATT Diodes

Zhongtao. Zhu¹, L. Cao², Y. Duan¹, W. Turner¹, J. Xie³, and P. Fay¹,

¹*University of Notre Dame, Notre Dame, IN, USA*

²*Keysight Technologies, Pasadena, CA, USA*

³*Qorvo, Richardson, TX, USA*

Congratulations to these award-winning teams for their excellent presentation and technical contribution to our field.

INTERNATIONAL RECEPTION

Location will be announced soon.

CONFERENCE CLOSING RECEPTION

The Conference Closing Reception draws the 2025 CS MANTECH to an end. Immediately following the technical program, the closing reception allows attendees one last opportunity to make new connections and exchange experiences. It is also an opportunity to reflect on how we can learn from discussions, presentations, and activities which took place during the conference to benefit our organizations and industry. During the reception, winners for Best Poster Presentation, Conference Feedback Form Raffle, and Conference Contest will be announced.

We are honored to have Gregory Harry, Physics Professor at American University in Washington DC, provide a Capstone Talk for our Conference Closing on Thursday afternoon. The title of his talk is “Development of Large Area Substrate Transferred Aluminum Gallium Arsenide Coated Mirrors for Future Gravitational Wave Detectors.”



CS MANTECH Capstone Speaker, Gregory Harry, Professor at American University

Abstract: The Laser Interferometer Gravitational-wave Observatories (LIGO) ushered in the era of gravitational astronomy with the first detection of a gravitational wave, GW150914, in September 2015. These waves were predicted by Einstein's theory of general relativity, a result of the motion of astronomically large masses. They are now observed about twice a week by the Advanced LIGO detectors in Louisiana and Washington State, in collaboration

with LIGO's sister project, Virgo, in Pisa, Italy. Future observatories, including upgrades to the existing LIGO and Virgo detectors, as well as new detectors in additional locations with upgraded technology, are now under consideration. A key noise source that has plagued these detectors is Brownian thermal noise from the optical coatings that form the mirrors of the interferometers. One upgrade under development is the use of substrate-transferred compound semiconductor Bragg mirrors, specifically epitaxial gallium arsenide/aluminum gallium arsenide (AlGaAs) multilayers for use as the high-reflectivity mirror stack. Such single-crystal coatings exhibit significantly reduced Brownian thermal noise while also realizing comparable optical performance to the current sputtered mirrors.

The primary challenge lies in scaling up the manufacturing process for these “crystalline coatings” to a diameter of ≥ 30 cm, entailing high-uniformity and low background molecular beam epitaxy of the semiconductor heterostructure, low-defect direct (fusion) bonding, and selective wet-chemical substrate removal. Given the lack of sufficiently large GaAs base wafers, we are considering heteroepitaxy of AlGaAs on germanium base wafers. Additional areas of exploration include alloying the GaAs/AlGaAs DBR with dilute nitrogen to reduce the slight lattice mismatch (and thus strain-driven birefringence), as well as developing a large custom bonding system to transfer AlGaAs coatings onto the requisite 100 kg fused silica substrates.

CONFERENCE CONTEST

CS MANTECH aims to bring the compound semiconductor community together to collectively exchange and discuss new ideas to benefit our industry. To encourage attendees to share their fun experiences and learnings throughout the conference, we are hosting a contest: “A Prompt-a-Day: Sparking Ideas the CS MANTECH Way!”

A prompt will be posted daily on CS MANTECH’s CVENT app and LinkedIn. Answer the prompt in a social media post (e.g., LinkedIn, X, Facebook, etc.) and fill out the Microsoft form with a link to your social media post to enter the raffle for a prize. Submit a completed form each day throughout the conference to receive up to 4 raffle entries.

As in previous years, our conference will hold a Feedback Form Raffle. Conference feedback on technical content and venue is valuable to the CS MANTECH committees for structuring the conference and technical program. In addition, conference feedback is used in the selection of the Best Paper and Best Student Paper. Each submitted Feedback Form will be entered into a raffle for a prize. It’s as simple as that!

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Marty Brophy	<i>Retired</i>
Matt King	<i>MACOM</i>
Matthew Tyhach	<i>Raytheon</i>
Michael Krames	<i>Arkesso, LLC</i>
Michelle Bourke	<i>Lam Research</i>
Mitsuhiro Nakamura	<i>Murata manufacturing company</i>
Naveen Tipirneni	<i>Teknismart Solutions Inc</i>
Nicholas Dellas	<i>Infineon Technologies</i>
Nitin Kalra	<i>BAE Systems</i>
Patrick Fay	<i>Univ. of Notre Dame</i>
Patrick Holly	<i>Northrop Grumman</i>
Paul Pinsukanjana	<i>IntelliEPI</i>
Peter Ersland	<i>MACOM</i>
Rathnait Long	<i>MACOM</i>
Robert Sadler	<i>MACOM</i>
Sarang Kulkarni	<i>Raxium, Google</i>
Scott Sheppard	<i>MACOM</i>
Shawn Burnham	<i>JPO/DCS Corp</i>
Shiva Rai	<i>Applied Materials</i>
Staci Moulton	<i>ForgeNano</i>
Stephanie Chang	<i>Skyworks</i>
Steve Mahon	<i>Feldman Engineering</i>
Takuji Yamamura	<i>Sumitomo Electric Industries, Ltd.</i>
Temel Buyuklimanli	<i>Eurofins EAG Laboratories</i>
Thomas Roedle	<i>Infineon Technologies AG</i>
Thorsten Saeger	<i>Qorvo</i>
Travis Abshere	<i>nLight</i>
Wei Zhang	<i>AXT, Inc.</i>
Wen Zhu	<i>BAE Systems</i>
Winston Parker	<i>Wolfspeed</i>
Yoganand Saripalli	<i>Texas Instruments</i>
Yohei Otoki	<i>Nagoya University</i>
Zeina Abdallah	<i>University of Bristol</i>

TECHNICAL PROGRAM

Monday, May 19th

6:00 PM **EXHIBITOR RECEPTION**

Tuesday, May 20th

CONFERENCE OPENING

- 8:00 AM **Opening Ceremonies**
Shawn Burnham, *DCS Corp*
Conference Chair
- 8:05 AM **2024 Conference Best Paper Awards**
Shawn Burnham, *DCS Corp*
Conference Chair
- 8:15 AM **Technical Program Highlights**
Jansen Uyeda, *Northrop Grumman*
Technical Program Chair

SESSION 1: PLENARY I

- Chairs: Travis Abshere, *nLight*
Mike Krames, *Arkesso, LLC*
- 8:30 AM *Plenary Presentation*
1.1 AlN and Ga₂O₃: Materials of the Future or Reality?
Grace Xing
Cornell University, Ithaca, New York, USA
- 9:15 AM *Plenary Presentation*
1.2 Development of GaN Based MicroLED Devices for Full Color Projection Displays and High Speed Visible Light Communication
Steve DenBaars
University of California, Santa Barbara, Santa Barbara, California, USA

10:00 AM **BREAK**

SESSION 2A: POWER DEVICES I

- Chairs: Yoganand Saripalli, *Texas Instruments*
Dilip Risbud, *Renesas Electronics*
- 10:30 AM *Invited Presentation*
2A.1 Realizing Practical Doping in AlN for Power Electronics
Roman Collazo

North Carolina State University, Raleigh,
North Carolina, USA

- 11:00 AM *Student Presentation*
2A.2 Vertical GaN Trench MOSFETs with HfO₂/Al₂O₃ Layered Gate Dielectric
E. Brusaterra, E. Bahat Treidel, P. Paul, I. Ostermay, F. Brunner, and O. Hilt
Ferdinand-Braun-Institut (FBH), Berlin, Germany
- 11:20 AM **2A.3 1700 V Breakdown Monolithic Bidirectional GaN/AlGaN MISHEMTs with a Thin Buffer Grown on SiC Substrate**
F. Benkhelifa¹, S. Leone¹, R. Reiner¹, M. Basler¹, H. Czap¹, D. Grieshaber¹, L. Kirste¹, Frank Bernhard¹, S. Moench^{1,2} and R. Quay^{1,3}
¹*Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany*
²*Institute of Electrical Energy Conversion IEW, University of Stuttgart, Stuttgart, Germany*
³*Department for Sustainable Systems Engineering INATECH, University of Freiburg, Freiburg, Germany*
- 11:40 AM *Student Presentation*
2A.4 The Effect of Operating Temperature on the On-State Performance of Quasi-Vertical Gallium Nitride MOSFETs
J. Evans¹, F. Monaghan¹, R. Harper², A. Withey³, C. Colombier⁴, M. Elwin¹, and M. Jennings¹
¹*CISM, Swansea University, Swansea, United Kingdom*
²*CSC, Pascal Ct, St. Mellons, Cardiff, United Kingdom*
³*Vishay Newport, Newport, United Kingdom*
⁴*CSconnected, Cardiff, United Kingdom*

SESSION 2B: LASERS

Chairs: Paul Pinsukanjana, *IntelliEPI*
Nitin Kalra, *BAE Systems*

- 10:30 AM *Invited Presentation*
2B.1 Highly Manufacturable Epitaxial Transfer Process for Novel InGaN Laser Diodes
Philip Chan
Kyocera SLD Laser, Inc., Santa Barbara, California, USA

- 11:00 AM *Student Presentation*

2B.2 Impurity-Induced Disorder of In-GaAs/InAlAs Superlattices by Zinc Diffusion for Electrical Confinement in Quantum Cascade Lasers

R. Kaufman, A. Mazumder, and J. M. Dallesasse

*University of Illinois at Urbana-Champaign,
Grainger College of Engineering,
Department of Electrical and Computer Engineering,
Urbana, Illinois, USA*

11:20 AM **2B.3 The Oxide Layers Effects on GaAs-Based Multi-Junction Vertical-Cavity Surface-Emitting Lasers**

W. H. Huang^{1,2}, Z. T. Huang¹, K. L. Chi¹, C. T. Chang¹, T. C. Lu², and H. P. Xiao¹

¹*Department of Opto-Electronic Development Center, WIN Semiconductor Corporation, Taiwan*

²*Department of Photonics, College of Electrical and Computer Engineering, National Yang Ming Chiao Tung University, Hsinchu City, Taiwan*

11:40 AM *Student Presentation*

2B.4 Monolithic Dual-Wavelength DFB Laser with Over 140 mW Optical Power and Frequency Noise Floor Below 2.15×10^4 Hz²/Hz for High-Precision THz Systems

T.-H. Liu^{1,2}, Y.-Y. Tu³, Y.-H. Lu⁴, and C.-H. Wu^{1,2,3,4}

¹*Graduate School of Advanced Technology, National Taiwan University, Taipei, Taiwan*

²*Center for Quantum Science and Engineering, National Taiwan University, Taipei, Taiwan*

³*Graduate Institute of Electronics Engineering, National Taiwan University, Taipei, Taiwan*

⁴*Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei, Taiwan*

12:00 PM **EXHIBITS LUNCH**

12:20 PM **EXHIBITOR FORUM**

Location TBD

SESSION 3A: POWER DEVICES II

Chairs: Shiva Rai, *Applied Materials*
Martin Huber, *NexGen Wafer Systems*

1:10PM *Invited Presentation*

3A.1 GaN HEMT and SiC Power MOSFETs for Hard Switching applications, a Long-Term Perspective

Marco Zuniga

Renesas Electronics, San Francisco, California, USA

1:40 PM

Student Presentation

3A.2 Normally-Off N-Polar GaN/AlN Transistors with p-NiO Gate Stacks

C. Zhang¹, Y. Yin¹, I. Furuhashi², M.

Pristovsek², M. Kuball¹, and M. D. Smith¹

¹*Center for Device Thermography and Reliability, University of Bristol, Bristol, United Kingdom*

²*Center for Innovative Research of Future Electronics, Institute for Material Science and Systems for Sustainability, Nagoya University, Nagoya, Japan*

2:00 PM

3A.3 Vertical GaN-on-Tungsten High Voltage pn-Diodes

E. Bahat Treidel¹, E. Brusaterra¹, L. Deriks²

, S. Danylyuk², E. Brandl³, J. Bravin³, F.

Brunner¹, and O. Hilt¹

¹*Ferdinand-Braun-Institut (FBH), Berlin, Germany*

²*Fraunhofer Institute for Laser Technology, Aachen, Germany*

³*EV Group, St. Florian am Inn, Austria*

2:20 PM

Student Presentation

3A.4 High Voltage Design Strategies for Gallium Oxide Power Devices

N. Edwards¹, A. M. Muniz¹, J. Evans¹, J.

Mitchell², D. Goodwin¹, E. Chikoidze³, A.

Perez-Tomas⁴, M. Vellvehi⁴, F. Monaghan¹,

Owen Guy¹, C. Fisher¹, A. Huma², C. Co-

lombier⁵, and Mike Jennings¹

¹*Swansea University, Swansea, United Kingdom*

²*KLA Corporation (SPTS Division), Newport, United Kingdom*

³*GeMAC, Versailles, France*

⁴*IMB-CNM, Barcelona, Spain*

⁵*CSconnected, Cardiff, United Kingdom*

2:40 PM

3A.5 1000-Hour HTRB Test on 1200 V Lateral HEMTs with Engineered P-GaN Gate

S. Kumar¹, M. Borga¹, D. Cingu¹, K. Geens¹,

A. Vohra¹, B. Bakeroot^{1,2}, N. Posthuma¹, and

S. Decoutere¹

¹*imec, Leuven, Belgium*

²*CMST, imec & Ghent University, Gent, Belgium*

**SESSION 3B: MANUFACTURING CHALLENGES
& INNOVATIONS**

Chairs: Eric Stewart, *Northrop Grumman*
Keisuke Shinohara, *Teledyne*

- 1:10 PM *Invited Presentation*
3B.1 The Next Global GaN Patent Wars
David Radulescu
Radulescu LLP, New York, New York, USA
- 1:40 PM **3B.2 A Fabrication Process for Airbox Encapsulation of T-gates**
G. Siddiqi, D. Berkoh, L. Cazares, and A. Chao
HRL Laboratories, Malibu, California, USA
- 2:00 PM *Student Presentation*
3B.3 Metal Additive Micro-Manufacturing to Achieve Enhanced Air-Bridge Geometry for Coplanar Waveguide mm-wave GaN-on-SiC Integrated Circuits
A. Collier¹, A. Eblabla¹, W. Sampson¹, E. Yadollahifarsi¹, E. Hepp², R. Conte², and K. Elgaid¹
¹*Cardiff University, Cardiff, United Kingdom*
²*Exaddon AG, Glattbrugg, Switzerland*
- 2:20 PM **3B.4 A New Approach to Gold Electron-Beam Evaporation with Improved Process Quality and Throughput**
P. Waduge and P. Vall
MACOM Technology Solutions, Lowell, MA, USA
- 2:40 PM **3B.5 Stability of 3.3 kV Planar GaN Diodes with Nitrogen Implanted Termination under High Temperature Reverse Bias Stressing**
A. G. Jacobs¹, J. S. Lundh¹, T. J. Anderson², G. M. Foster³, A. D. Koehler¹, J. C. Gallagher¹, B. P. Gunning⁴, R. J. Kaplar⁴, K. D. Hobart¹, M. A. Mastro¹
¹*U.S. Naval Research Laboratory, Washington, D.C., USA*
²*University of Florida, Gainesville, Florida, USA*
³*Amentum Inc., Residing at U.S. Naval Research Laboratory, Washington, D.C., USA*
⁴*Sandia National Laboratories, Albuquerque, New Mexico, USA*

3:00 PM **BREAK**

SESSION 4A: RF DEVICES

Chairs: Mitsuhiro Nakamura, *Murata manufacturing company*
Justin Parke, *Northrop Grumman*

- 3:30 PM *Invited Presentation*
4A.1 X-band InAlGaN/GaN HEMT with High-Power and High-Reliability
Atsushi Yamada, Yoichi Kamada, Yuichi Minoura, Toshihiro Ohki, and Masaru Sato
Fujitsu Limited, Atsugi, Kanagawa, Japan
- 4:00 PM **4A.2 Temperature Effects on DC and RF Characteristics of 140 nm AlGaIn/GaN HEMTs with Regrown Contacts**
B. K. Sarker¹, N. P. Sepelak¹, D. E. Walker Jr.², K. Nishimura¹, A. Crespo², G. Hughes², A. J. Green², and A. E. Islam²
¹*KBR, Inc., Beavercreek, Ohio, USA*
²*Air Force Research Laboratory, Sensors Directorate, Wright-Patterson AFB, Dayton, Ohio, USA*
- 4:20 PM **4A.3 Dual-gate RF HEMT based on P-GaN/AlGaIn on Si Technology for Future X-band On-chip RF and Power Electronics**
A. Eblabla, W. Sampson, A. M. Bhat, A. Collier, E. Yadollahifarsi, and K. Elgaid
Centre for High Frequency Engineering, Cardiff University, Cardiff, United Kingdom
- 4:40 PM **4A.4 High Power Added Efficiency Enhancement-Mode Gamma-Gate RF HEMT with Engineered Mg Doping Profile in p-GaN Layer**
H.-C. Chiu^{1,2}, C.-R. Huang¹, C.-W. Chiu¹, C.-H. Lin¹, C.-H. Yu¹, H.-L. Kao¹, B. Lin³
¹*Department of Electronics Engineering, Chang Gung University, Taoyuan, Taiwan*
²*Department of Radiation Oncology, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
³*Wavetek Microelectronics Corporation, Hsinchu, Taiwan*

SESSION 4B: ADVANCED PACKAGING & INTEGRATION

Chairs: Zeina Abdallah, *University of Bristol*
Shiva Rai, *Applied Materials*

- 3:30 PM *Invited Presentation*
4B.1 TBD
TBD
TBD
- 4:00 PM **4B.2 Cu Bumps with Ni Barrier and On-Wafer Reflow for Improved Reliability &**

Manufacturability

S. Pilla, Z. Zhang, Y.-R. Kim, G. Drandova,
and V. Li

Qorvo, Inc., Richardson, Texas, USA

4:20 PM **4B.3 Heat Resistance Improvement of
Palladium Pre Plated Frames of
Semiconductor Packaging with a New
Additive for Nickel Plating**
S. Sekiguchi, S. Mizuhashi, Y. Sato, and Y.
Shindo
*Precious Metals Materials Division, Matsuda
Sangyo Co., Ltd., Shinjuku-ku. Tokyo, Japan*

4:40 PM **4B.4 Double-Side Diamond Cooling of
GaN HEMTs and Progress Towards Fur-
ther Reductions in Junction to Package
Thermal Resistance**
J. S. Lundh¹, F. Vasquez², A. J. Cruz Arzón²,
T. Feygelson¹, A. G. Jacobs¹, A. D. Koehler¹,
B. Pate¹, K. D. Hobart¹, T. J. Anderson³, M.
A. Mastro¹, G. Pavlidis², D. Francis⁴, and M.
J. Tadjer¹
¹*U.S. Naval Research Laboratory, Washing-
ton, D.C., USA*
²*Department of Mechanical Engineering,
University of Connecticut, Storrs, Connecti-
cut, USA*
³*Department of Chemical Engineering, Uni-
versity of Florida, Gainesville, Florida, USA*
⁴*Akash Systems, Inc., San Francisco, Califor-
nia, USA*

5:15 PM **EXHIBITOR FORUM**
TBD

5:15 PM **STUDENT FORUM**
TBD

6:15 PM **BUSSES DEPART FOR IR**
Designated departure location

7:00 PM **INTERNATIONAL RECEPTION**
TBD

Wednesday, May 21st

SESSION 5: PLENARY II

Chairs: David Via, *MMEC*
Shawn Burnham, *DCS Corp*

- 8:00 AM *Plenary Presentation*
5.1 The Defense Advanced Research Agency's (DARPA) Next Generation Microelectronics Manufacturing (NGMM) Program
Michael Holmes
DARPA Microsystems Technology Office (MTO), Arlington, Virginia, USA
- 8:45 AM *Plenary Presentation*
5.2 Overview of IMEC and Compound Semiconductor Work in Europe
Bertrand Parvais
IMEC, Leuven, Belgium

9:30 AM **BREAK**

SESSION 6A: HETEROGENEOUS INTEGRATION

Chairs: Alex Smith
Lena Luu, *GCS*

- 10:30 AM *Invited Presentation*
6A.1 Packaging of Compound Semiconductors - Current Status and Future Trends
Christopher Bailey
University of Arizona, Phoenix, Arizona, USA
- 11:00 AM **6A.2 Heterogeneous Integration of Large-Area InGaAs SWIR Photodetectors on 300 mm CMOS-Compatible Si Substrates**
B. Shi, M. Dummer, M. McGivney, S. S. Brunelli, D. Oakley, and J. Klamkin
Aeluma, Inc., Goleta, California, USA
- 11:20 AM **6A.3 Heterogeneous AIP/SIP for Satcom**
E. Lourandakis, P. Fioravanti, G. Kontogiannopoulos, and C. McMahan
Circuits Integrated Hellas IKE, Attica, Greece
- 11:50 AM **6A.4 Quantifying Thermal Benefits of Metal Embedded Chip Assembly as a Heterogeneous Integration Approach**
J. Beagle¹, K. DeVore², J. Pastrana¹, J. Figueroa¹, G. Morales³, L. Colón-Santiago³, F. Ouchen⁴, E. Kreit¹, and D. T. Reyes¹
¹*Air Force Research Laboratory, Sensors Directorate, Wright Patterson-AFB, Ohio, USA*

²*SOCHE, Dayton, Ohio, USA*

³*Michigan State University, East Lansing,
Michigan, USA*

⁴*KBR Inc., Beavercreek, Ohio, USA*

SESSION 6B: OPTOELECTRONICS I

Chairs: Michelle Bourke, *LAM Research*
Andrea Corrion, *HRL Laboratories*

10:30 AM *Invited Presentation*

6B.1 Micro-LED Maturation from Beach-head in AR to TAM of Entire Display Market

Paul S. Martin
Mojo Vision, Saratoga, California, USA

11:00 AM *Student Presentation*

6B.2 Design of Novel Long-Wavelength VCSEL Structure with Voltage-Controllable Phase-Matching Layer for Standing Wave Tuning

K. Pikul, L. Espenhahn, J. Flanagan, E. Becher, and J. M. Dallesasse
University of Illinois at Urbana-Champaign, Grainger College of Engineering, Department of Electrical and Computer Engineering, Holonyak Micro and Nanotechnology Laboratory, Urbana, Illinois, USA

11:20 AM **6B.3 Pyramidal MicroLEDs Delivering RGB in Single Materials Systems**

L. Rullik¹, I. Martinovic^{1,2}, S.P. Le^{1,2}, A. Vorobiev^{1,3}, C.W. Hsu^{1,2} and P.O. Holtz^{1,2}

¹*Polar Light Technologies AB, Linköping, Sweden*

²*Semiconductor Physics Division, IFM, Linköping University, Linköping, Sweden*

³*Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden*

11:40 AM *Student Presentation*

6B.4 Advanced Process Development for Microcavity VCSELs

D. Chaw, H. Wu, Z. Liu, and M. Feng
Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Holonyak Micro & Nanotechnology Lab, Urbana, Illinois, USA

12:00 PM **LUNCH BREAK**

SESSION 7A: SUBSTRATES & MATERIALS

Chairs: Wei Zhang, *AXT*

Yohei Otoki, *Nagoya University*

- 1:20 PM **7A.1 First Demonstration of InP HBTs on InP-on-Si (InPOSi) Substrate: A Cost-Effective and Sustainable III/V-on-Si Technology for Advanced RF Applications**
A. Vais¹, A. Kumar^{1,a}, S. Yadav¹, G. Boccardi¹, Y. Mols¹, R. Alcotte¹, B. Vermeersch¹, U. Peralagu¹, C. Roda Neve², B. Ghyselen², B. Parvais^{1,3}, B. Kunert¹, and N. Collaert^{1,3}
¹IMEC, Leuven, Belgium
²SOITEC, Iserre, France
³Vrije Universiteit Brussels, Brussels, Belgium
^aNow with NUS, Singapore
- 1:40 PM **7A.2 Development of 6-inch Indium Phosphide Substrates**
Y. Oeki¹, K. Aoyama¹, K. Hashio¹, M. Adachi¹, Y. Yoshizumi¹, Y. Hagi^{1,2} and T. Morishita^{1,2}
¹Sumiden Semiconductor Materials Co., Ltd., Itami, Hyogo, Japan
²Sumitomo Electric Industries, Ltd., Itami, Hyogo, Japan
- 2:00 PM *Student Presentation*
7A.3 Heteroepitaxial Growth of α -Ga₂O₃ by MOCVD on a, m, r and c-Plane Sapphire
K. D. Ngo, I. Sanyal, M. D. Smith, and M. Kuball
Center for Device Thermography and Reliability (CDTR), University of Bristol, Bristol, United Kingdom
- 2:20 PM **7A.4 SmartSiC™ 150 & 200mm Engineered substrate: Solving SiC Power Devices Bipolar Degradation**
E. Guiot¹, F. Allibert¹, J. Leib², T. Becker², R. Bagchi², G. Gelineau³, S. Barbet³, R. Laviéville³, P. Godignon³, W. Schwarzenbach¹
¹SOITEC S.A., Bernin, France
²Fraunhofer IISB, Erlangen, Germany
³Univ. Grenoble Alpes, CEA, Leti, Grenoble, France
- 2:40 PM *Student Presentation*
7A.5 Crack-Free AlN Thin Films on Si Substrates for Large-Area Ultrawide-Bandgap Semiconductor Template
M. Aqib^{1,2}, M. Moradnia^{1,2}, M. Ji³, V. S. Parameshwaran³, W. L. Sarney³, S. Pouladi^{1,2}, N.-I. Kim^{1,2}, G. A. Garrett³, A. V. Sampath³, R. Forrest⁵, and J.-H. Ryou^{1,2,4,6}

¹*Department of Mechanical Engineering,
University of Houston, Houston, Texas, USA*

²*Texas Center for Superconductivity at UH
(TcSUH) and Advanced Manufacturing
Institute (AMI), University of Houston,
Houston, Texas, USA*

³*DEVCOM Army Research Laboratory,
Adelphi, Maryland, USA*

⁴*Materials Science and Engineering
Program, University of Houston, Houston,
Texas, USA*

⁵*Department of Physics, University of
Houston, Houston, Texas, USA*

⁶*Department of Electrical & Computer
Engineering, University of Houston, Houston,
Texas, USA*

SESSION 7B: U.S. MICROELECTRONICS

COMMONS HUB SESSION 1

Chairs: Andy Souzis, *Coherent*
Dennis Szymanski, *IQE*

1:20 PM **7B.0 Hub Session Introduction**
Jansen Uyeda
Northrop Grumman

1:30 PM *Invited Presentation*
**7B.1 Overview of U.S. DoD Microelectron-
ics Commons**
Tim Morgan
Microelectronics Commons, USA

2:00 PM **7B.2 Northeast Microelectronics Coalition
(NEMC) Hub Overview & Capabilities**
Mark Halfman
*NHEMC Hub at Massachusetts Technology
Collaborative, USA*

2:15 PM **7B.3 Commercial Leap Ahead for Wide
Bandgap (CLAWS) Hub Overview & Ca-
pabilities**
John Muth
*North Carolina State University, Raleigh,
North Carolina, USA*

2:30 PM **7B.4 Silicon Crossroads Microelectronics
Commons (SCMC) Hub Overview & Ca-
pabilities**
Brett Hamilton
Microelectronics, USA

2:45 PM **7B.5 Northeast Regional Defense Technol-
ogy (NORDTECH) Hub Overview & Ca-
pabilities**
Grace Xing
Cornell University, Ithica, New York, USA

3:00 PM **BREAK**

SESSION 8A: GALLIUM OXIDE

Chairs: James Spencer Lundh, *U.S. Naval Research Lab*
Peter Ersland, *MACOM*

3:20 PM *Invited Presentation*

8A.1 Current Status of Bulk Ga₂O₃ and (Al,Ga)₂O₃ Crystals

Zbigniew Galazka
IKE-Berlin, Berlin, Germany

3:50 PM **8A.2 kV-Class β -Ga₂O₃ Trench Schottky Barrier Diodes: Double Drift Layer Design and Breakdown Analysis**

V. S. Charan, A. K. Bhat, H. Huang, M. D. Smith, J. W. Pomeroy, and M. Kuball
Center for Device Thermography and Reliability, HH Wills Physics Laboratory, University of Bristol, Bristol, United Kingdom

4:10 PM *Student Presentation*

8A.3 Vertical Schottky Barrier Diodes with Optical Floating Zone Growth of β -Ga₂O₃ Single Crystals and Electrical Defect Study

V.L. Ananthu Vijayan^{1,2}, V. S. Charan², C. A. Dawe³, V. P. Markevich³, M. P. Halsall³, A. R. Peaker³, S. M. Babu¹, and M. Kuball²
¹*Crystal Growth Centre, Anna University, Chennai, India*
²*Center for Device Thermography and Reliability, HH Wills Physics Laboratory, University of Bristol, Bristol, United Kingdom*
³*Photon Science Institute and Department of Electrical and Electronic Engineering, The University of Manchester, Manchester, United Kingdom*

4:30 PM *Student Presentation*

8A.4 Gallium Oxide Trench Schottky Barrier Diodes with Field Plate Edge-Termination

A. K. Bhat, V. S. Charan, M. Smith, and M. Kuball
University of Bristol, Bristol, United Kingdom

SESSION 8B: U.S. MICROELECTRONICS COMMONS HUB SESSION 2

Chairs: Marty Brophy, *Consultant*
Greg Mills, *ANNEALSYS AXR*

- 3:20 PM **8B.1 Midwest Microelectronics Consortium (MMEC) Hub Overview & Capabilities**
David Via
MMEC, USA
- 3:35 PM **8B.2 Southwest Advanced Prototyping (SWAP) Hub Overview & Capabilities**
Jason Conrad
SWAP, USA
- 3:50 PM **8B.3 Northwest AI Hub Overview & Capabilities**
TBD
TBD
- 4:05 PM **8B.4 California Defense Ready Electronics and Microdevices Superhub (CA DREAMS) Hub Overview & Capabilities**
Steve Crago
University of Southern California, Los Angeles, California, USA
- 4:20 PM *Invited Presentation*
8B.5 Compounding Success: Leveraging Semiconductor Collaboration and Innovation to Advance the Technologies of Tomorrow
Susan Feindt
Natcast, USA
- 5:00 PM **CSM MICROELECTRONICS COMMONS HUB PANEL DISCUSSION**
Moderator: Tim Morgan
- 6:00 PM **CSM MICROELECTRONICS COMMONS HUB NETWORKING**

Thursday, May 22nd

SESSION 9: PLENARY III

Chairs: Jansen Uyeda, *Northrop Grumman*
Yohei Otoki, *Nagoya University*

- 8:20 AM *Plenary Presentation*
9.1 Overview of TSMC's Green Manufacturing Initiative
Hui-Hsin Tseng
TSMC, Hsin-Chu, Taiwan
- 9:05 AM *Plenary Presentation*
9.2 TBD
TBD
TBD
- 9:50 AM **BREAK**

SESSION 10A: OPTOELECTRONICS II

Chairs: Sarang Kulkarni, *Google*
Keith Wieber, *Qorvo*

- 10:20 AM *Invited Presentation*
10A.1 GaN MicroLEDs for Chip-to-Chip Interconnects
Bardia Pezeshki
Avicena, Sunnyvale, California, USA
- 10:50 AM *Invited Presentation*
10A.2 Technological Advancements in AlGaIn-Based Deep Ultraviolet Laser Diodes
Maki Kushimoto
Nagoya University, Nagoya, Japan
- 11:20 AM **10A.3 Efficient Front-End Manufacturing of High-Quality VCSEL – Enabled by In-Situ and Ex-Situ Optical Metrology During Epi Growth and Processing**
A. Maaßdorf¹, J. K. Zettler², M. Brendel¹, A. Renkewitz¹, R.-S. Unger¹, K. Haberland², and M. Weyers¹
¹*Ferdinand-Braun-Institut (FBH), Berlin, Germany*
²*LayTec AG, Berlin, Germany*
- 11:40 AM *Student Presentation*
10A.4 Single-Mode, Polarization Stable 2D-VCSEL Arrays via Elliptical Disorder-Defined Apertures
K. Pikul, L. Espenhahn, P. Su, M. Kraman, and J. M. Dallesasse
University of Illinois at Urbana-Champaign, Grainger College of Engineering, Department

*of Electrical and Computer Engineering,
Holonyak Micro and Nanotechnology Labor-
atory, Urbana, Illinois, USA*

**SESSION 10B: YIELD IMPROVEMENT IN CS
MANUFACTURING**

Chairs: Mario Faria, *Tignis*
Steve Mahon, *Feldman Engineering*

10:20 AM **10B.1 Mapping Defects in SiC Wafers Us-
ing a Multi-Channel Convolutional Neural
Network**

J. C. Gallagher, N. A. Mahadik, R. E. Stahl-
bush, K. D. Hobart, and M. A. Mastro
*U.S. Naval Research Laboratory, Washing-
ton, D.C., USA*

10:40 AM **10B.2 Macro and Micro-Scale Non-Con-
tact Imaging of Electrically Active Ex-
tended Defects in Merged PiN Schottky Di-
ode Devices**

F. Faisal¹, N. Steller¹, R. Karhu², B.
Kallinger², G. Polisski³, M. Wilson⁴, A.
Savtchouk⁴, L. Gutierrez⁴, C. Almeida⁴, C.
Soto⁴, B. Wilson⁴, D. Marinsky⁴, A.
Wincukiewicz⁴, and J. Lagowski⁴
¹*Nexperia, Hamburg, Germany*
²*Fraunhofer IISB, Department Materials, Er-
langen, Germany*
³*Semilab Germany GmbH, Freital, Germany*
⁴*Semilab SDI, Tampa, Florida, USA*

11:00 AM **10B.3 Determination of 4H-SiC Drift
Layer Quality with Mercury Probe Capac-
itance-Voltage (CV) and Current-Voltage
(IV) Measurements**

M. G. Coco Jr.¹, F. Ramos¹, B. Kim¹, S. M.
Lee¹, D. Hanser¹, R. J. Hillard², S. Frey², T.
MacRae², B. Vigh³, A. Marton³, G. Zsakai³,
J. Janicsko-Csathy³, and P. Horvath³
¹*Veeco Instruments Inc., Somerset, New Jer-
sey, USA*
²*Semilab USA, Billerica, Massachusetts, USA*
³*Semilab, Budapest, Hungary*

11:20 AM **10B.4 Characterizing Capacitor Top Plate
Bias for More Accurate Electromagnetic
Simulations**

P. J. Zampardi¹, Q. Davenport², and L. Hay-
den²
¹*Qorvo Inc., Newbury Park, California, USA*
²*Qorvo Inc., Hillsboro, Oregon, USA*

11:40 AM **10B.5 End-to-End Yield Management for
Compound Semiconductors Manufactur-
ing**

S. Zamek, D. Huntley, and J. Holt
*PDF Solutions Inc, Santa Clara, California,
USA*

12:00 PM **LUNCH ON YOUR OWN**
Lunch not provided

SESSION 11A: OPTOELECTRONICS III

Chairs: John Carlson, *Uviquity*
Herbert Zull, *ams OSRAM Group*

1:20 PM **11A.1 A Hybrid Electron Beam Lithography Technique for 150 mm Wafer-Scale Indium Phosphide Ridge Lasers**
T. Peach¹, T. Jones¹, B. Salmond², S. Thomas¹, E. Beaumont¹, A. Sobiesierski¹, and S. Shutts²
¹*Institute for Compound Semiconductors, School of Physics and Astronomy, Cardiff University, Cardiff, United Kingdom*
²*School of Physics and Astronomy, Cardiff University, Cardiff, United Kingdom*

1:40 PM *Invited Presentation*
11A.2 Recent Trends in the Manufacturing of InP Photonic Integrated Circuits
Peter Debackere, S. Stockman, D. Casado, V. Lal, P. Evans, S. Maranowski, M. Ziari, J. Zhang, and F. Steranka
Infinera Optical Modules Group, Infinera Corporation, Sunnyvale, California, USA

2:10 PM *Invited Presentation*
11A.3 Datacom Photonics
Andrew Clark
IQE, Palo Alto, California, USA

2:40 PM **11A.4 Vertically Integrated Development of AlGaIn Based UV Detectors**
R. Kirste¹, P. Reddy¹, W. Mecouch¹, R. Collazo², Z. Sitar^{1,2}
¹*Adroit Materials Inc., Cary, North Carolina, USA*
²*North Carolina State University, Department of Materials Science & Engineering, Raleigh, North Carolina, USA*

SESSION 11B: WAFER PROCESS

Chairs: Dwarka Geerapuram, *Plasma-Therm*
Rathnait Long, *MACOM*

1:20 PM **11B.1 Use of E-beam Lithography to Optimize Lithography Patterning and Alignment Across 6-inch and 8-inch SiC Wafers**

K. Chen¹, Z. Feng¹, S. Williams², R. Van Art², A. Ceballos², T. Prescop², K. MacWilliams², Z. Chen¹
¹University of Arkansas
²Multibeam Corp

1:40 PM **11B.2 Optimized Resistor Layer Photolithography Scheme with Dose Compensation for High Resistance Uniformity of Reactively Sputtered TaN Thin Film**
S. Y. Chang, T. Brown, R. Bryie, R. Lee, and N. Ebrahimi
Skyworks Solutions, Inc., Newbury Park, California, USA

2:00 PM **11B.3 Evaluation and Modeling of Low Value Comb Resistors**
P. J. Zampardi¹, Q. Davenport², and L. Hayden²
¹*Qorvo Inc., Newbury Park, California, USA*
²*Qorvo Inc., Hillsboro, Oregon, USA*

2:20 PM **11B.4 Towards Determining the Optimal Ion Implantation Temperature & Beam Current, Annealing Temperature & Time, in SiC Device Manufacturing**
V. Boldrini¹, M. Canino¹, M. Pieruccini¹, R. Chebi², and J. A. Turcaud²
¹*CNR Institute for Microelectronics and Microsystems, Bologna, Italy*
²*Coherent Corp., San Jose, California, USA*

2:40 PM *Student Presentation*
11B.5 Emitter Ledge Effect on Current Gain of Sub-Micron Type-II InP DHBT
Z. Liu¹, Y. He¹, H. Wu¹, H. Xu², and M. Feng¹
¹*Department of Electrical and Computer Engineering & Nick Holonyak Micro and Nanotechnology Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois USA*
²*Skyworks Solutions, Newbury Park, California, USA*

SESSION 12: POSTER SESSION

Chairs: Patrick Holly, *Northrop Grumman*
Marty Brophy, *Consultant*
Chuanxin Lian, *Qorvo*
Winston Parker, *Wolfspeed*
Andy Carter, *Northrop Grumman*

3:00 PM *Student Presentation*
12.1 Effect of P Doping in ZnCdTe Thin Films Grown by Molecular Beam Epitaxy on GaAs(100) Substrates for Solar Cells

E. V. Sule, M. Mustofa, K. Saito, Q. Guo,
and T. Tanaka.
Saga University, Saga, Japan

Student Presentation

12.2 Crystallographic Dependency of β -Gallium Oxide Nitridation via RF Nitrogen Plasma for GaN Heteroepitaxy

J. I. Stavehaug^{1,2}, G. R. Czajkowski², M. M. Landi¹, F. P. Kelly¹, and K. Kim^{1,2}

¹*Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA*

²*Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA*

Student Presentation

12.3 Silicon Nitride Shadowed Selective Area Growth as a Device Processing Method for heteroepitaxy of GaN on β -Ga₂O₃

G. R. Czajkowski¹, J. I. Stavehaug^{1,2}, F. P. Kelly², M. M. Landi², K. Kim^{1,2}

¹*Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA*

²*Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA*

12.4 EPD Is More than a Number – Tackling Dislocation Density Assessment in Low Defect, Large Diameter GaAs and InP Wafers

S. Eichler, T. Milek, U. Kretzer, F. Börner, and D. Deutsch

Freiberger Compound Materials GmbH, Freiberg, Germany

Student Presentation

12.5 Low Ohmic Contact Resistances for RF GaN HEMTs with Al_{0.36}Ga_{0.64}N Barrier

H. Yazdani, H.-J. Würfl, F. Brunner, and O. Hilt

Ferdinand-Braun-Institut für Höchstfrequenztechnik (FBH), Berlin, Germany

12.6 Off-Axis Sputtering Fabrication of ITO Contact Layers for pGaN

L. E. Nistor¹, N. Coudurier², A. Lardeau-Falcy², J. Simon², S. Altazin², S. Poncet², V. Chambinaud², B. Dey², J. Machillot³, H. Boukhalfa¹, and G. Rodriguez²

¹*Applied Materials, Bernin, France*

²CEA LETI, Minatec, Univ. Grenoble Alpes,
Grenoble, France

³Applied Materials, Leuven, Belgium

Student Presentation

12.7 Regrowth-Free 1st-order Gratings for Photonic Integrated Circuits using Focused Ion Beam Nanofabrication and Electron Beam Lithography

B. Salmond¹, T. Peach², S. Thomas², S-J. Gillgrass¹, D. D. John³, W. J. Mitchell³, B. J. Thibeault³, M. J. Wale⁴, W. Meredith⁵, P. M. Smowton^{1,2}, D. Read^{1,3} and S. Shutts^{1,2}

¹*School of Physics and Astronomy, Cardiff University, Cardiff, United Kingdom*

²*Institute for Compound Semiconductors, Cardiff University, Cardiff, United Kingdom*

³*Department of Electrical and Computer Engineering, University of California Santa Barbara, Santa Barbara, California, USA*

⁴*Department of Electronic and Electrical Engineering, University College London, London, United Kingdom*

⁵*Compound Semiconductor Centre Ltd, Cardiff, United Kingdom*

12.8 Reducing Fluorocarbon Usage in Resistor Layer SiN_x Etch

M. J. Miller and A. Zeeshan

Skyworks Solutions Inc., Woburn, Massachusetts, USA

Student Presentation

12.9 Low Damage Chlorine-Based Dry Etch for Fabrication of Ga₂O₃ FinFETs and Trench Diodes

X. Zhai¹, Z. Wen², J. Burnett⁴, J. Mitchell⁴, C. Bolton⁴, K. Roberts⁴, E. Walsby⁴, H. Ashraf⁴, R. L. Peterson^{1,2} and E. Ahmadi³

¹*Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan, USA*

²*Department of Material Science and Engineering, University of Michigan, Ann Arbor, Michigan, USA*

³*Department of Electrical and Computer Engineering, University of California, Los Angeles, Los Angeles, California, USA*

⁴*KLA Corporation (SPTS Division), Newport, United Kingdom*

12.10 Improvements in Photoresist Strip Process in L-Band Power Transistors

D. Lee, T. N. Walter, G. Castejon Cruz, J. Wu, A. Frimel, S. Harrell, E. Woodard, and P. A. Potyraj

*Advanced Technology Laboratory (ATL),
Northrop Grumman Mission Systems – Mi-
croelectronics Center, Linthicum, Maryland,
USA*

**12.11 Reconfiguration of CMP Tools for
BEOL Processing Of Compound Semicon-
ductor (III-V Microsystems) Devices**

J. Zabasajja¹, G. Candia¹, E. Osuna¹, K.
Miles¹, L. Borucki², Y. Sampurno², and
A. Philipossian²

¹*HRL Microelectronics Laboratory, Malibu,
California, USA*

²*Araca Incorporated, Tucson, Arizona, USA*

**12.12 Low Resistivity Cu Seed Applied to
High Aspect Ratio Si Vias Enabled by
Atomic Layer Deposition for Advanced
Packaging**

S. Harris¹, D. Lindblad¹, M. Guilmain², X.
Gaudreau-Miron², A. Wang¹, A. Dameron¹, I.
Stateikina², and M. Weimer¹

¹*Forge Nano, Thornton, Colorado, USA*

²*C2MI, Bromont, QC, Canada*

**12.13 GaN Epi Dislocation Identification
by Molten KOH Etching**

Y.-S. Chen, B.-T. Lu, Y.-C. Yeh, C.-J. Lin,
and K.-S. Cho

*WIN SEMICONDUCTORS, Taoyuan City,
Taiwan*

**12.14 Root-Cause Analysis and Reduction
of Crater Defect Formation for GaAs Wa-
fers**

R. Newman, T. Hossain, F. Narcia, T. Ma,
and A. Zeeshan

*Skyworks Solutions Inc., Woburn, Massachu-
settes, USA*

**12.15 Improving Wafer Breakage Through
Peak Cooling Rate Reduction on Lithium
Niobate Substrates**

D. Allen and A. Bharathi

*Qorvo US Inc., Greensboro, North Carolina,
USA*

**12.16 Electron-Beam Deposition with Low
Spitting Silver Source Material Improved
by New Impurity Removal Processes**

Y. Fujimoto¹, T. Kobayashi¹, M. Koyama²,
and Y. Shindo¹

¹*Technical Development Division, Matsuda
Sangyo Co., Ltd., Shinjuku-ku, Tokyo, Japan*

²*Nanomaterials Microdevices Research Cen-
ter, Osaka Institute of Technology, Asahi-ku,
Osaka, Japan*

12.17 Development of Cap Layers for High Temperature Pulse Annealing of GaN

I. Ostermay, N. Thiele, A. Koyucuoglu, P. Paul, A. Thies, F. Brunner and O. Krueger
Ferdinand-Braun-Institut (FBH), Berlin, Germany

12.18 0.25um GaN on Silicon HEMT Technology for RF Application

H.-C. Lin, T.-P. Chen, K.-Y. Chen, K.-H. Wang, G.-Y. Lee, A. C.-L. Hou, H.-C. Chiu, and B. J. F. Lin
Wavetek Microelectronics Corp., Hsinchu, Taiwan

Student Presentation

12.19 kV-class Vertical p-n Heterojunction Rectifier Based on ITO/Diamond

H.-H. Wan¹, C.-C. Chiang¹, J.-S. Li¹, F. Ren¹, and S. J. Pearton²

¹*Department of Chemical Engineering, University of Florida, Gainesville, Florida, USA*

²*Department of Materials Science and Engineering, University of Florida, Gainesville, Florida, USA*

CONFERENCE CLOSING

Chairs: Jansen Uyeda, *Northrop Grumman*
Shawn Burnham, *DCS Corp*

4:00 PM **Development of Large Area Substrate Transferred Aluminum Gallium Arsenide Coated Mirrors for Future Gravitational Wave Detectors**

Gregg Harry
LIGO Scientific Collaboration
American University, Washington DC, USA

4:30 PM **Closing Reception**
Shawn Burnham, *DCS Corp*
Conference Chair

HOTEL INFORMATION

The 2025 conference will be located at the Hilton New Orleans Riverside from Monday, May 19th to Thursday, May 22nd, 2025. The hotel is easily accessible from the Louis Armstrong New Orleans International Airport (MSY), which is about 15 miles or 20 to 30 minutes away.

The hotel offers self- and valet parking for guests and visitors in dedicated lots. Handicap parking is available at the front entrance of the hotel. EV charging is available nearby.

The fitness center at the hotel is called the HealthClub by Hilton. There is a daily fee associated with the HealthClub.

Uber and Lyft pickup and drop off are located right outside the hotel front door.

The CS MANTECH hotel registration website is at [The Hilton New Orleans Riverside Welcomes CS MANTECH](#)

FINANCIAL ASSISTANCE

CS MANTECH encourages presentations and participation by academic delegates. To support this participation, limited funding is available to support travel and conference attendance by student presenters. Requests will be considered on a first-come, first-served basis. Please contact the CS MANTECH University Liaison at student.aid@csmantech.org for details regarding the guidelines and requirements for applying for financial assistance.

Hotel floor plans for the three levels:



