



2024
International Conference on
Compound Semiconductor
Manufacturing Technology

May 20th – 23rd, 2024
www.csmantech.org

JW Marriott Starr Pass Resort
Tucson, Arizona, USA

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CONFERENCE AT A GLANCE

SUNDAY, May 19th

6:00 PM – 8:00 PM **REGISTRATION**
Arizona Registration Desk

MONDAY, May 20th

7:00 AM – 7:00 PM **REGISTRATION**
Arizona Registration Desk

7:00 AM – 8:00 AM **BREAKFAST**
TBD

7:50 AM – 5:40 PM **CS MANTECH WORKSHOP**
Tucson Ballroom E

8:00 AM – 5:00 PM **ROCS WORKSHOP**
Tucson Ballroom F

12:20 PM – 1:20 PM **LUNCHEON FOR WORK-
SHOPS**
TBD

6:00 PM – 9:00 PM **EXHIBITOR RECEPTION**
Arizona Ballroom

TUESDAY, May 21st

7:00 AM – 8:30 AM **BREAKFAST**
Arizona Ballroom

8:00 AM – 8:15 AM **OPENING CEREMONIES**
Tucson Ballroom F

8:00 AM – 5:00 PM **EXHIBIT HOURS**
Arizona Ballroom

8:15 AM – 09:45 AM **SESSION 1: PLENARY I**
Tucson Ballroom F

09:45 AM – 10:30 AM **BREAK**

10:30 AM – 12:15 PM **SESSION 2.1: POWER I**
Tucson Ballroom E

10:30 AM – 12:15 PM **SESSION 2.2: RF DEVICES
I**
Tucson Ballroom F

12:15 PM – 1:15 PM **EXHIBITS LUNCH**
Arizona Ballroom

1:15 PM – 2:45 PM **SESSION 3.1: ADVANCED
WAFER PROCESSING**
Tucson Ballroom E

1:15 PM – 2:45 PM	SESSION 3.2: RF DEVICES II <i>Tucson Ballroom F</i>
2:45 PM – 3:30 PM	BREAK
3:20 PM – 5:00 PM	SESSION 4.1: POWER II <i>Tucson Ballroom E</i>
3:20 PM – 5:00 PM	SESSION 4.2: CS AND SI INTEGRATION <i>Tucson Ballroom F</i>
5:15 PM – 6:15 PM	STUDENT FORUM <i>Tucson Ballroom G</i>
5:15 PM – 6:30 PM	EXHIBITOR FORUM <i>Tucson Ballroom B, C, D</i>
7:00 AM – 10:00 PM	INTERNATIONAL RECEPTION <i>Details coming soon!</i>

WEDNESDAY, May 22nd

7:00 AM – 8:30 AM	BREAKFAST <i>Arizona Ballroom</i>
8:00 AM – 11:00 AM	EXHIBIT HOURS <i>Arizona Ballroom</i>
8:00 AM – 9:45 AM	SESSION 5: PLENARY II <i>Tucson Ballroom F</i>
9:45 AM – 10:30 AM	BREAK
10:15 AM – 12:10 PM	SESSION 6.1: POWER III <i>Tucson Ballroom F</i>
10:15 AM – 12:10 PM	SESSION 6.2: OPTOELEC- TRONIC MANUFACTUR- ING <i>Tucson Ballroom E</i>
12:10 PM – 1:30 PM	LUNCH BREAK
1:30 PM – 3:00 PM	SESSION 7.1: HETEROGE- NEOUS INTEGRATION <i>Tucson Ballroom F</i>
1:30 PM – 3:15 PM	SESSION 7.2: OPTOELEC- TRONIC DEVICES <i>Tucson Ballroom E</i>
3:15 PM – 3:30 PM	BREAK

3:30 PM – 5:00 PM **SESSION 8.1: GAN RF DEVICES AND CIRCUITS**
Tucson Ballroom F

3:30 PM – 5:00 PM **SESSION 8.2: VCSELS**
Tucson Ballroom E

THURSDAY, May 23rd

7:15 AM – 8:15 AM **BREAKFAST**
Tucson Ballrooms

8:15 AM – 9:45 AM **SESSION 9: PLENARY III**
Tucson Ballroom F

9:45 AM – 10:15 AM **BREAK**

10:15 AM – 12:00 PM **SESSION 10.1:
EPITAXY AND MATERIALS**
Tucson Ballroom E

10:15 AM – 12:00 PM **SESSION 10.2: INDUSTRY
AND AI**
Tucson Ballroom F

12:00 PM – 1:00 PM **CS MANTECH LUNCHEON**
TBD

1:00 PM – 2:45 PM **SESSION 11.1: METALLI-
ZATION AND LITHO**
Tucson Ballroom E

1:00 PM – 2:45 PM **SESSION 11.2: CHARAC-
TERIZATION**
Tucson Ballroom F

2:45 PM – 3:45 PM **POSTER SESSION**
Arizona Ballroom

3:45 PM – 4:30 PM **CLOSING SESSION WITH
FEATURED SPEAKER**
Arizona Ballroom

MESSAGE FROM THE CONFERENCE CHAIR

Welcome to Tucson and to CS MANTECH 2024!

David Meyer
Naval Research Laboratory
Conference Chair

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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 2024 CS MANTECH Conference Committee gratefully acknowledges the support from our sponsors.

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2024 CONFERENCE HIGHLIGHTS

Welcome to the 2024 Compound Semiconductor Manufacturing Technology International Conference! Our Executive and Technical Program Committees have done an outstanding job of soliciting and organizing a program that matches the amazing setting we have here at the JW Marriott Starr Pass in Tucson, Arizona. I know you will not only enjoy the oral and poster presentations, but I'm confident you will also leave the conference with more than you came with: A better technical understanding of key concepts that will directly impact your work, and more customer/supplier/collaborator contacts. I'm also confident that you will have a great time while gaining those concepts and contacts. Let me take a moment to describe what is in store for us for this week's conference program.

The CS MANTECH workshop kicks off the week on Monday, May 20th with our workshop. The theme for this year's workshop is "AI/ML Tools and Opportunities for CS Manufacturing". If you are curious about how AI/ML will impact our industry, or if you are deeply involved in the early stages of this hot topic, you will want to be a part of this interactive workshop discussion. In parallel, the Reliability of Compound Semiconductors (ROCS) workshop will join our conference again for attendees to discuss the latest in CS reliability, and how to overcome those barriers for wider technology adoption and application. After Monday's workshops, the Exhibitor Reception welcomes you to our annual Exhibition in the Arizona Ballroom. This is your first opportunity to interact with the majority of CS MANTECH attendees, including your customers, suppliers and collaborators, over a great selection of local snacks and drinks.

The CS MANTECH Conference begins on Tuesday with the Opening and Awards Ceremonies. We will begin each day of the conference with a single track Plenary session, fol-

lowed by parallel track technical sessions. Each day's Plenary session will have a theme based on the CS MANTECH Pillars of RF, Power and Optoelectronics. This year, for the first time, we will kick-off our conference with an Optoelectronics Plenary Session, featuring Plenary speakers Jason Hartlove from Meta and Fred Kish from NC State. The latest in consumer augmented reality displays and photonic integrated circuits (PICs) from these two speakers are sure to impress. Several Invited speakers will be featured in the remaining parallel sessions through the rest of the first day, as we pivot to RF, Power, and advanced wafer processing & integration. Invited speakers on the first day of our conference will represent Texas Instruments, Hong Kong University, Sumitomo Electric, Mitsubishi Electric, Ritsumeikan University, Purdue University, The Ohio State University, Kanazawa University, IMEC & Aeluma. Following the day's technical sessions, we will host a Student Forum before the Tuesday evening International Reception.

On Wednesday, day two of the conference, we start with the Power Plenary session, featuring Umesh Mishra from UC Santa Barbara and Transphorm, who will take on the lively discussion of GaN Power as a non-SiC solution. In response, two Invited speakers from Infineon Technologies & Wolfspeed will wrap up the single-track session with a SiC perspective. After the Power Plenary session, we will return to parallel sessions on the topics of Optoelectronics, RF, Heterogenous Integration, VCESLs, and a little more discussion on Power. Invited speakers from those parallel sessions will represent QROMIS, Cambridge GaN Devices, Yole Intelligence, Unikorn, NHanced Semiconductor, PseudolithIC, Hiroshima University, Mojo Vision, Thales Alenia Space, and Meijo University.

On Thursday, the final day of the conference, we will start with a CHIPS & RF Plenary session, featuring Plenary speakers Eric Lin from the US Department of Commerce CHIPS Research & Development Office and Roger Nichols from Keysight Technologies. We will learn about the latest updates on the CHIPS For America Program and the role of Compound Semiconductors in the transition to 6G wireless technology. After the single-track Plenary, we will again switch to parallel-track sessions, with many more invited speakers representing Georgia Tech, Element Six, SEMI and Tignis. The session topics will cover Epitaxy & material, Industry & AI, Metallization & Lithography and Characterization.

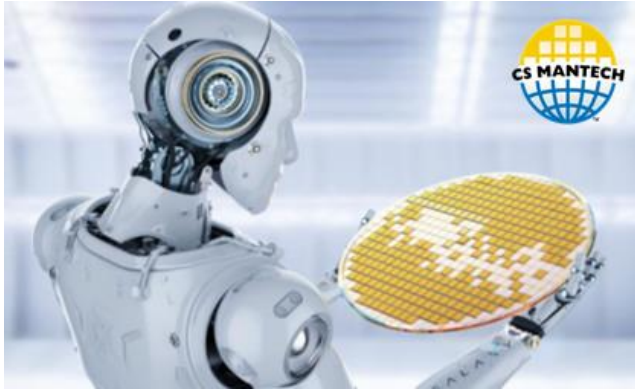
While I've highlighted our excellent Plenary and Invited speakers for this year's program above, we are also excited to have Regular and Student contributions represented in all sessions. These contributions come from academia, government and industry, and make up the roots of our CS MANTECH conference. As is the case with past 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. That is certainly true for our Poster Session, which will end the conference technical sessions, and is a great opportunity to interact with the paper authors and build collaborative relationships.

We'll wrap up the conference with a Capstone Talk from Richard Gottscho from Lam Research before our closing ceremonies, where you are sure to be inspired by his "human first, computer last" approach to big data analysis. We hope this Capstone Talk leaves you motivated to go back to your organization with fresh ideas and fresh contacts to do great work in our industry, and we are happy to have you join us during this exciting week!

Shawn Burnham
DCS Corp
Technical Program Committee Chair

CS MANTECH WORKSHOP



The theme for this year's CS MANTECH Workshop is the **"The AI Revolution: Opportunities for Compound Semiconductor Manufacturing"**. With recent advances in Artificial Intelligence (AI) and Machine Learning (ML) promising to transform many fields and industries, we are excited to offer a series of talks that highlight their potential for CS manufacturing. Talks will range from a high-level overview of AI opportunities in manufacturing, to the fundamentals of what AI/ML is, to practical use cases that may be implemented in a compound semiconductor foundry in the near-to-medium term.

The Workshop will begin with a talk by Dr. Thomas Gutt of Infineon Technologies AG. Dr. Gutt is the lead of the AIMS 5.0 European Collaboration for Artificial Intelligence in Manufacturing, and will present an overview of the exciting projects this organization is supporting across Europe to integrate AI/ML into semiconductor and other manufacturing facilities.

This will be followed by a presentation from Mohammed Shafae of the University of Arizona on artificial intelligence and machine learning fundamentals. This talk will focus on basic theory and defining the terms and methods of AI/ML.

Following this, Tignis Inc. will present two talks on the use of AI/ML for data analysis, correlation, and prediction in a semiconductor foundry. The first will focus on what data infrastructure is needed, with the second focusing on example use-cases and their benefits.

Abhi Rampal from Solid State AI will then present a talk entitled "Evolution of Fab Analytics: From Paper to AI and Beyond", which will include the application of AI to epitaxy techniques. This will be followed by a presentation from Cadence Design Systems on automation and ML opportunities for design and layout of compound circuits.

We will end the Workshop with another talk from University of Arizona, where Pratik Satam will present on the development of a Digital Twin and Virtual Reality (VR) Training Hub for Semiconductor Manufacturing.

This year's CS MANTECH Workshop, "The AI Revolution: Opportunities for Compound Semiconductor Manufacturing", is an excellent opportunity for new and experienced engineers to understand the emerging world of AI/ML and how it might be applied in their organization. Our objective is to give you the tools to understand where, and where not, this exciting new technology can be used for compound semiconductors; and for areas where it can, what are the tools and infrastructure necessary to support it. Be a part of a great learning and sharing opportunity in a workshop environment!!

2024 ROCS WORKSHOP

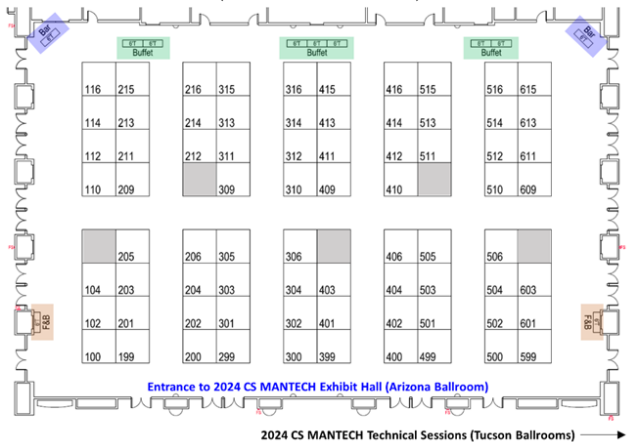
Monday, May 20, 2024
JW Marriott Starr Pass Resort, Tucson, Az
Room: Tucson Ballroom F
8:00 a.m. – 5:00 p.m.

The 38th 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..

INDUSTRY EXHIBITS

The CS MANTECH Exhibition is the premiere annual venue for key CS equipment and material manufacturers and suppliers to showcase their products and technical services. Building upon the conference technical focus on CS manufacturing and technology, the Exhibition is an excellent opportunity for participating companies and organization to meet and interact with both existing and future clients and collaborators involved in today’s state-of-the-art manufacturing and tomorrow’s innovations. This unique opportunity brings researchers, engineers, managers, and the key decision makers who shape and guide the industry all together for face-to-face interactions. Attendees will gain excellent visibility to a wide range of CS-focused participants from around the world who are critical to ensuring your success in the CS community. You are sure to see major suppliers and collaborators and leverage this unique opportunity to efficiently meet with many of your current contacts as well as engage with new contacts all in one place.

2024 CS MANTECH Exhibit Hall Floormap
(as of March 10th)



The 2024 CS MANTECH Exhibit Hall will be in the JW Marriott Starr Pass Arizona Ballroom, a short walk from the technical sessions which will be held in the Tucson Ballrooms. Exhibits will kick-off with the much-anticipated Exhibits Reception at 6:00 pm on Monday, May 20th. The Exhibits Reception will include food and drinks and is an excellent opportunity to catch-up with friends, colleagues, suppliers, and fellow competitors. This is the first evening of the conference, providing a casual social environment to network and meet the conference attendees who contribute to the advancements and continued success of the CS industry.

The Exhibit Hall will open again Tuesday morning, May 21st, with breakfast at 7:00 am. Following the Plenary Session, the Exhibit Hall will be a focal point for attendees as the location for the morning and afternoon breaks, along with our buffet-style Exhibits Lunch. Attendees will have an opportunity to walk the Exhibits floor and talk to exhibitors

throughout the day. The Exhibit Hall will open for a final time on Wednesday morning, May 22nd, at 7:00 am with breakfast, and run until 12:00 pm when the Exhibition closes. This last morning of the Exhibits provides an ideal opportunity for both conference attendees and participating Exhibitors to follow-up on interest generated during the Exhibits show, exchange business cards, and finalize those last-minute agreements! We will also host an Exhibitor Forum for registered Exhibitors which offer an opportunity for participating companies to introduce new products, highlight company strengths, and introduce themselves in a short presentation. More details on the 2024 Exhibit Forum will be forthcoming so stay tuned!

We are excited to announce all exhibit booth locations are sold with 67 companies exhibiting. We are very appreciative and thankful for all our CS MANTECH Exhibitors, who not only make our conference possible, but also make it exceptional! We know you will not only find this a very valuable return-on-investment, but a lot of fun, too! For more details, please contact the 2024 Exhibits Chair, Jansen Uyeda at exhibitor@csmantech.org with any questions or to inquire about being added to Exhibitor waiting list.

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2023 BEST PAPERS AWARDS

On Tuesday morning, CS MANTECH will formally recognize the authors of the best paper and best student paper from the 2023 conference. Both awards are based on conference attendee on-line feedback. 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 the 2023 Conference is:

TBD

The Best Student Paper for the 2023 Conference, for which the principal student author will receive a special cash award of \$1000, is:

TBD

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

INTERNATIONAL RECEPTION

Details coming soon!

One IR ticket is included in your registration. Additional tickets will be available for purchase (please see registration site for details).

CONFERENCE CLOSING RECEPTION

The Conference Closing Reception brings the 2024 CS MANTECH to an end. Immediately following the technical program, the closing reception affords attendees one last opportunity to exchange business cards, ideas, and experiences as they reflect on the week. During the reception voting for Best Poster Presentation and Picture Contest will be tallied and winners announced.

We are honored to have Richard Gottscho, Executive Vice President and Strategic Advisor to the CEO of Lam Research provide a Capstone Talk for our Conference Closing on Thursday afternoon. The title of his talk is “Accelerating process development for semiconductor device fabrication”, and the following is a short preview:

Although chips have been designed by computers for decades, the processes used to manufacture those chips have

eluded design based on physics or data. Virtually all processes used to manufacture chips have been developed, not designed, by trial and error – a costly endeavor using highly trained and experienced process engineers searching for a combination of tool parameters that produce an acceptable result on the device. Out of more than a 100 trillion possibilities! Because the solution space dimensionality is so large and because process development is time-consuming and costly, machine learning approaches have been hampered by too little data. Physics based approaches suffer from large numbers of unknown parameters and complex equations that require excessive computational time to solve.

This talk will review results and take a behind-the-scenes look at a study, which showed a “human first, computer last” approach could reach process engineering targets dramatically faster and at substantially lower cost compared to today's empirical approach. The results provide a path to leverage the strengths of human experts and their domain knowledge as well as the strengths of machine learning to deal with “little data” and accelerate the pace of innovation in semiconductor process engineering [Kanarik, et al. Nature 616, 707–711 (2023)].

With all the attention on Artificial Intelligence and Machine Learning, this Capstone Talk is sure to satisfy your curiosity of how these emerging tools can be applied in our industry. You don't want to miss this important and inspiring Capstone Talk at our Conference Closing ceremonies.



CS MANTECH Capstone Speaker Richard Gottscho, Executive Vice President and Strategic Advisor to the CEO of Lam Research

The Conference Closing Reception and Ceremonies provide attendees one last chance to make connections and exchange contact information with new colleagues within our community. It is also a fitting opportunity to reflect on what has been discussed throughout the week, and how we can all benefit our organizations and the industry.

We also ask that each attendee complete a CS MANTECH Feedback Survey to provide your input on what you enjoyed, and what might be improved for next year, so that we can continue to improve our conference. These surveys are also critical to help determine the Best Paper & Best Student Paper awards, and we plan to have a prize raffle drawing of all who have completed the survey. During the closing ceremonies, we will also announce the winners for the Best Poster and the CS MANTECH AI Picture Challenge contest. Plan to be there for the fun, excitement and important Capstone Talk!

CONFERENCE CONTEST

Last year's conference contest was for the Best AI Generated Image. This year, with a slight twist, we will continue to ride the wave of AI popularity but test your ability to determine if an image is AI generated, or not! Participants will use the CS MANTECH App to submit an image and indicate if the image was AI generated or not. Conference attendees will be able to view all submissions and guess if each one is AI generated. The submission with the most wrong votes wins! Do your best to try and trick your colleagues with interesting image submissions!



Conference contest: AI generated, or not??

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 in structuring in the conference and technical program from year to year. In addition, conference feedback is used to help select the Best Paper and Best Student Paper. Each Feedback Form submitted will be entered into a raffle for a prize. It's as simple as that! The drawing will be held during the closing reception, though the winner need not be present to win.

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Thorsten Saeger	<i>Qorvo Inc.</i>
Travis Abshire	<i>nLight</i>
Walter Wohlmuth	<i>Sino Americal Silicon Products</i>
Wei Zhang	<i>AXT, Inc.</i>
Wen Zhu	<i>BAE Systems</i>
Winston Parker	<i>Wolfspeed</i>
Yoganand Saripalli	<i>Texas Instruments</i>
Yogi Ota	<i>Duet RF Solutions</i>
Yohei Otoki	<i>Sumitomo Chemical</i>

TECHNICAL PROGRAM

Monday, May 20th

6:00 PM **EXHIBITOR RECEPTION**

Tuesday, May 21st

CONFERENCE OPENING

- 8:00 AM **Opening Ceremonies**
David Meyer, Naval Research Laboratory
Conference Chair
- 8:10 AM **2023 Conference Best Paper Awards**
David Meyer, Naval Research Laboratory
Conference Chair
- 8:35 AM **Technical Program Highlights**
Shawn Burnham, DCS Corp
Technical Program Chair

SESSION 1: PLENARY

- Chairs: Mike Krames, *Arkesso*
 Shawn Burnham, *DCS Corp*
- 8:15 AM *Plenary Presentation*
1.0.1 Bridging Realities: Compound Semiconductor Solutions for Next-Generation Augmented Reality Displays
Jason Hartlove
Meta
- 9:00 AM *Plenary Presentation*
1.0.2 Photonic Integrated Circuits (PICS): From InP to GaN-based Solutions
Fred A. Kish
North Carolina State University

09:45 AM **BREAK**

SESSION 2.1: POWER I

- Chairs: Naveen Tipirneni, *Teknismart Solutions Inc*
 Ezgi Dogmus, *Yole Group*
- 10:30 AM *Invited Presentation*
2.1.1 Key Challenges in Process Development for Future High Voltage GaN Roadmap
Jungwoo Joh, Qhalid Fareed, Yoga Saripalli,

Dong Seup Lee, Ethan Lee, Pinghai Hao,
Seetharaman Sridhar, Sameer Pendharkar
ATD, Texas Instruments

11:00 AM *Invited Presentation*

2.1.2 Expanding the Scope of GaN Power Integration

Kevin J. Chen, Sirui Feng, Tao Chen,
Zheyang Zheng, Jin Wei, Gang Lyu, Li
Zhang
*The Hong Kong University of Science and
Technology*

11:30 AM **2.1.3 Experimentally Validated Innovative
Edge Termination for Vertical GaN Diodes**

Alan G. Jacobs¹, James Spencer Lundh²,
Prakash Pandey³, Tolen Nelson³, Daniel G.
Georgiev³, Andrew D. Koehler¹, Raghav
Khanna³, Marko J. Tadjer¹, Karl D. Hobart¹,
Travis J. Anderson¹
*1 U.S. Naval Research Laboratory, Washing-
ton, DC, USA*

*2National Research Council Postdoctoral
Fellow, Residing at U.S. Naval Research La-
boratory, Washington, DC, USA*

*3Department of Electrical Engineering and
Computer Science, University of Toledo, OH,
USA*

11:50 AM **2.1.4 Overlapping source field plate pro-
cess module for high-voltage GaN HFETs
with low off state leakage currents**

Houssam Halhoul, Ralph-Stephan Unger,
Frank Brunner, Oliver Hilt
*Ferdinand-Braun-Institut (FBH), Leibniz-In-
stitut für Höchstfrequenztechnik, Berlin, Ger-
many*

SESSION 2.2: RF DEVICES I

Chairs: Peter Ersland, *MACOM*
Justin Parke, *Northrop Grumman*

10:30 AM *Invited Presentation*

**2.2.1 High Power Nitrogen-polar GaN/In-
AlN 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, Sumi-
tomo Electric Industries, Ltd., Yokohama,
Kanagawa, Japan*

11:00 AM *Invited Presentation*

**2.2.2 X-band GaN HEMT and Free-stand-
ing GaN Substrate for Marine Radar**

E. Yagyu¹, D. Tsunami^{1,2}, T. Matsuura¹, T. Furuhashi¹, M. Nakamura¹, T. Matsuda¹, K. Kuwata³, T. Kobayashi⁴

¹ *Advanced Technology R&D Center, Mitsubishi Electric Corporation, Hyogo, Japan*

² *High-frequency and Optical Device Works, Mitsubishi Electric Corporation, Hyogo*

³ *Information Technology R&D Center, Mitsubishi Electric Corporation, Kanagawa*

⁴ *Research and Innovation Center, Furuno Electric Co. Ltd., Hyogo*

11:30 AM **2.2.3 Depleted AlN/Si interfaces for minimizing RF loss in GaN-on-Si HEMTs**

H. Hahn^{1*}, C. Mauder¹, M. Marx¹, Z. Gao¹, P. Lauffer¹, O. Schön¹, P. T. John¹, S. Yadav², S. Banerjee², P. Cardinael³, J.-P. Raskin³, B. Parvais^{2,4}, D. Fahle¹

1 AIXTRON SE, Herzogenrath, Germany, 2 imec, Leuven, Belgium;

3 Université catholique de Louvain (UCLouvain), Place du Levant; Louvain-la-Neuve, Belgium,

4 Vrije Universiteit Brussels, Dep. ETRO, Brussels, Belgium

11:50 AM **2.2.4 The 50V GaN HEMT with Memory Effect Suppression**

Wayne Lin, Wen-Hsin Wu, Chien-Rong Yu, Yu-Li Ho, Edison Chou, Jia-Jyun-Guo, Che-Kai Lin, Wei-Chou Wang, Yu-Syuan Lin, Cheng-Kao Lin

WIN Semiconductors Corp., Tao-Yuan City, R.O.C.

12:15 AM **EXHIBITS LUNCH**

SESSION 3.1: ADVANCED WAFER PROCESSING

Chairs: Hermann Stieglauer, *UMS*
Lena Luu, *GCS*

1:15 PM *Invited Presentation*

3.1.1 Electrochemical Mechanical Polishing of SiC Wafer

Using Solid Polymer Electrolyte

J. Murata

Department of Mechanical Engineering, 1-1-1 Noji-higashi, Kusatsu, Shiga, Japan

1:45 PM **3.1.2 Electrochemical Additive Selection for Non-Cyanide Gold Plating Bath for Uniform Thickness Gold Layer for GaAs Backside Metallization**

Shoei Mizuhashi, Yusuke Sato, Yuichiro Shindo
Precious Metals Materials Division, Matsuda Sangyo Co., Ltd, Tokyo, Japan

2:05 PM **3.1.3 Optimization of AlScN Etch Processes Ensuring Minimum Bottom Electrode Loss**

Samira Kazemi, Janet Hopkins
KLA Corporation (SPTS Division), Newport NP18 2TA, UK

2:25 PM **3.1.4 Plasma Dicing for High Yield SiC Singulation**

A. Croot¹, B. Jones², J. Mitchell¹, H. Ashraf¹, J. Hopkins¹, M. Jennings², O.J Guy²
¹*KLA Corporation (SPTS Division), Ringland Way, NP18 2TA, Newport, UK,*
²*Swansea University, Singleton Park, SA2 8PP, Swansea, UK*

SESSION 3.2: RF DEVICES II

Chairs: Gerhard Schoenthal, *VDI*
 Keisuke Shinohara, *Teledyne*

1:15 PM *Invited Presentation*

3.2.1 Ultra-thin Indium Oxide Thin-film Transistors with Gigahertz Operation Frequency

Adam Charnas, Dongqi Zheng and Peide D. Ye
Elmore Family School of Electrical and Computer Engineering and the Birck Nanotechnology Center, Purdue University, West Lafayette, IN, USA

1:45 PM *Student Presentation*

3.2.2 InP/GaAsSb DHBT Emitter Etching Process Optimization with a Simultaneous $f_T/f_{MAX} = 451/914$ GHz and 86% Device Yield

M. Ebrahimi, S. Hamzeloui, F. Ciabattini, A. M. Arabhavi, O. Ostinelli, and C. R. Bolongnesi
Mitsuboshi Millimeter-Wave Electronics Group, ETH-Zurich, Zurich, Switzerland

2:05 PM *Student Presentation*

3.2.3 5-level stacked In_{0.53}Ga_{0.47}As Multi-Bridged Channel Field-Effect Transistors

Vikram J.-H. Yoo¹, H.-B. Jo¹, 2, I.-G. Lee¹, S.-M. Choi¹, H.-J. Kim¹, W.-S. Park¹, H. Jang³, C.-S. Shin³, K.-S. Seo³, S. H. Shin⁴,

- H.-M. Kwon⁴, SK. Kim⁵, JG. Kim⁵, J. Yun⁵, T. Kim⁵, J.-H. Lee¹, D.-H. Kim¹
1School of Electronic and Electrical Engineering, Kyungpook National University, Daegu, 41566, South Korea,
2KETI, Seongnam, Kyunggi-do, South Korea,
3KANC, Suwon, Kyunggi-do, South Korea
4Polytech, Incheon, 21417, South Korea and
5QSI, Cheon-An, Kyunggi-do, South Korea
- 2:25 PM **3.2.4 70 nm GaAs pHEMT for D-band Power Amplifier Application**
 Lung-Yi Tseng, Li-Cheng Chang, Jung-Tao Chung, Hsi-Tsung Lin, Shu-Hsiao Tsai, Cheng-Kuo Lin
WIN Semiconductors Corp., Taoyuan City 333, Taiwan

2:45 PM **BREAK**

SESSION 4.1: POWER II

Chairs: Yoganand Saripalli, *Texas Instruments*
 Martin Huber, *NexGen Wafer Systems*

- 3:20 PM *Invited Presentation*
4.1.1 Electrostatic Engineering for High-Performance Gallium Oxide Devices
 Sushovan Dhara¹, Ashok Dheenani¹, Nathan Wriedt¹, Joe McGlone¹, Jinwoo Hwang², Steven Ringel^{1,2}, Hongping Zhao^{1,2}, and Siddharth Rajan^{1,2}
1 Department of Electrical and Computer Engineering, The Ohio State University, Columbus, OH, USA
2 Department of Materials Science and Engineering, The Ohio State University, Columbus, OH, USA
- 3:50 PM *Invited Presentation*
4.1.2 Progress in Diamond MOSFET Technologies
 N. TOKUDA¹, T. MATSUMOTO¹, X. ZHANG¹, K. SATO¹, K. KOBAYASHI¹, K. ICHIKAWA¹, K. HAYASHI¹, T. INOKUMA¹, S. YAMASAKI¹, C.E. NEBEL^{1,2}, M. OGURA³, H. KATO³, T. MAKINO³, D. TAKEUCHI³
1Kanazawa University Kakuma-machi, Kanazawa 920-1192, Japan
2 Diamond and Carbon Applications, Freiburg 79102, Germany
3 National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

- 4:20 PM **4.1.3 Influence of Carbon Capping Materials during High Temperature Annealing on Surface, Defects and Dopant Profile in SiC**
 J. A. Turcaud¹, D. Lee², D. Rossman¹, J. Schuur¹ & R. Chebi¹
¹*Coherent Corp., San Jose, CA, USA*
²*Coherent Corp., Warren, NJ, USA*
- 4:40 PM **4.1.4 Wafer Bow Tuning with Stealth Laser Patterning for Vertical High Voltage Devices with Thick GaN Epitaxy on Sapphire Substrates**
 Enrico Brusaterra, Eldad Bahat Treidel, Alexander Külberg, Frank Brunner, Mihaela Wolf and Oliver Hilt
Ferdinand-Braun-Institut (FBH), Berlin, Germany

SESSION 4.2: CS AND Si INTEGRATION

Chairs: Barry Wu, *Keysight Technologies, Inc*
 David Wang, *GCS*

- 3:20 PM *Invited Presentation*
4.2.1 Silicon Meets Compound Semiconductors: Pioneering Wireless Communications
 J. N. Collaert¹, R. Alcotte, A. Alian, M. Asad, I. Bagal², S. Banerjee, G. Boccardi, P. Cardinael³, I. Comart, C. Desset, R. ElKashlan, F. Filice, G. Gramegna, H. Jafarpoorchekab, A. Khaled, A. Kumar, B. Kunert, Y. Mols, B. O'Sullivan, S. Park, U. Peralagu, N. Pinho, A. Rathi, A. Sibaja-Hernandez, S. Sinha, D. Smellie², X. Sun, A. Vais, B. Vanhouche¹, B. Vermeersch, D. Xiao, S. Yadav, D. Yan¹, H. Yu, Y. Zhang, J. Van Driessche, P. Wambacq¹, M. Peeters, B. Parvais¹
¹*Imec, Heverlee, Belgium;*
²*VUB, Belgium*
³*KU Leuven, Belgium;*
⁴*UC Louvain, Belgium*
- 3:50 PM *Invited Presentation*
4.2.2 Heterogeneously Integrated Compound Semiconductors on Large-Diameter Substrates for Scaling to Consumer Market Volumes
 Jonathan Klamkin
Aeluma
- 4:20 PM **4.2.3 A monolithic III-V on Si integration technology utilizing 300mm CMOS platform**

- G. Boccardi¹, A. Vais¹, A. Kumar¹, S. Yadav¹, Y. Mols¹, R. Alcotte¹, L. Witters¹, J. De Backer¹, A. Mingardi¹, A. Milenin¹, K. Vandersmissen¹, N. Heylen¹, K. Ceulemans¹, D. Goossens¹, F. Sebaai¹, J-P. Soulié¹, R. Langer¹, B. Kunert¹, B. Parvais^{1,2}, and N. Collaert^{1,2}
1 imec, Leuven, Belgium
2 VUB, Brussels, Belgium
- 4:40 PM **4.2.4 200-mm Enhancement-mode low-knee-voltage GaN-on-Si MISFETs for high frequency handset applications**
 Vincent Johnson, Zev Pogrebin, Mark Dipsey, Hal S. Emmer, Yuxuan Zhang, Dongfei Pei, and Bin Lu
Finwave Semiconductor Inc., Waltham, MA
- 5:15 PM **EXHIBITOR FORUM**
Tucson Ballroom B, C, D
- 5:15 PM **STUDENT FORUM**
Tucson Ballroom G
- 7:00 PM **INTERNATIONAL RECEPTION**
Details coming soon!

Wednesday, May 22nd

SESSION 5: PLENARY II

Chairs: Dilip Risbud, *Renesas Electronics*
Martin Kuball, *University of Bristol*

- 8:00 AM *Plenary Presentation*
5.0.1 GaN Power: the solution that is not SiC
Umesh Mishra
University of California, Santa Barbara, CA
- 8:45 AM *Invited Presentation*
5.0.2 SiC power devices as key enabling components for the green energy transition – how the growth journey began and will go on
Peter Friedrichs
Infineon Technologies AG
- 9:15 AM *Invited Presentation*
5.0.3 Large Scale Commercialization of Silicon Carbide for EV
Frank Ferrante
Wolfspeed
- 9:45 AM **BREAK**

SESSION 6.1: POWER III

Chairs: Andy Souzis, *Coherent*
Nicholas Dellas, *Infineon Technologies*

- 10:30 AM *Invited Presentation*
6.1.1 Taking GaN to the Next Level of 100 V to 2000 V and Beyond Scalability with the Revolutionary 200 mm and 300 mm QST® Manufacturing Platform
C. Basceri¹, V. Odnoblyudov¹, C. Kurth¹,
M. Yamada², S. Konishi², M. Kawahara²,
C.-C. Liao³, S. Shen³, J. Chiu³, K. Geens⁴,
A. Vohra⁴, H. De Pauw⁴⁻⁵, B. Bakeroort⁴⁻⁵,
S. Decoutere⁴, H. Hahn⁶, M. Heuken⁶ and
K. Tanigawa⁷
1 QROMIS, Inc., Santa Clara, CA, USA
2 SHIN-ETSU CHEMICAL Co., Ltd., Tokyo, Japan
3 VANGUARD INTERNATIONAL SEMICONDUCTOR Corp., Taiwan
4 IMEC, Leuven, Belgium
5 CMST, imec & Ghent University, Ghent, Belgium
6 AIXTRON SE, Herzogenrath, Germany
7 OKI ELECTRIC INDUSTRY Co., Ltd., Tokyo, Japan

- 11:00 AM *Invited Presentation*
6.1.2 GaN Power ICs bring highest levels of sustainability through manufacturing processes and end-equipment applications
 Peter Di Maso
Cambridge GaN Devices, Cambridge, CB4 0DS, U.K
- 11:30 AM **6.1.3 SmartSiC™ 150 & 200mm engineered substrate: increasing SiC power device current density up to 30%**
 Daniel Eric Guiot¹, Frédéric Allibert¹, Jürgen Leib², Tom Becker², Oleg Rusch², Alexis Drouin¹, Walter Schwarzenbach¹
¹SOITEC S.A., Bernin, France
²Fraunhofer IISB, Erlangen, Germany
- 11:50 AM *Student Presentation*
6.1.4 Thermally stable Normally-off 1200V Cascoded AlGaIn/GaN HEMT using buffer-free structure on 6" SiC substrate
 Chong-Rong Huang¹, Hsien-Chin Chiu¹, Chao-Wei Chiu¹, Hsuan-Ling Kao¹, Yong-Xiang Zhuang¹, Yang-Ching Ho¹, Chen-Kang Chuang¹, Chih-Tien Chen² and Kuo-Jen Chang²
¹Department of Electronics Engineering, Chang Gung University, Taiwan
²National Chung-Shan Institute of Science and Technology, Materials and Electro-Optics Research Division, Taiwan

SESSION 6.2: OPTOELECTRONIC MANUFACTURING

- Chairs: Travis Abshire, *nLight*
 Shiva Rai, *Applied Materials*
- 10:30 AM *Invited Presentation*
6.2.1 Will microLED succeed in high volume consumer applications?
 Eric Virey, Raphael Mermet-Lyaudoz, Zine Bouhamri, Ali Jaffal
Yole group, Le Quartz, 75 cours Emile Zola, 69100 Lyon Villeurbanne, France
- 11:00 AM *Invited Presentation*
6.2.2 Micro LED Technology and Platform Trend
 Sam Chen, HaoMin_Ku, Chingen_Huang, TzuLing_Yang, Jimmy_Shen
Unikorn Semiconductor, Li-hsin 5th Rd., Hsinchu Science Park, Hsinchu 300, Taiwan
- 11:30 AM **6.2.3 Plasma-Etch End-Pointing in InP-Based Laser Device Structures**

J. Decobert¹, N. Vaissiere¹, D. Micha¹, D. Néel¹, M. Binetti², A. Adrian², C. Lörchner-Gerdaus², D. Cornwell², N. Rezaei-Hartmann², T. Brand², A. Martinez², K. Haberland², J.-T. Zettler²

¹*III-V Lab, a joint lab of Nokia, Thales and CEA-Leti, 1, Avenue Augustin Fresnel 91767 Palaiseau Cedex, France.*

²*LayTec AG Seesener Str. 10-13, 10709 Berlin, Germany DC*

11:50 AM *Student Presentation*

6.2.4 Develop Automated Oxide-Aperture Size Measurement for GaAs VCSELs

Zetai Liu, Haonan Wu, Derek Chaw, Milton Feng

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

Nick Holonyak Micro and Nanotechnology Laboratory, 208 N Wright St, Urbana, IL,

12:10 PM **LUNCH BREAK**

SESSION 7.1: HETEROGENEOUS INTEGRATION

Chairs: Alex Smith, *Brewer Science*
Andy Carter, *Northrop Grumman*

1:30 PM *Invited Presentation*

7.1.1 Implementing 2.5D and 3D Heterogeneous Integrate Systems in Package

Robert Patti

NHanced Semiconductors

2:00 PM *Invited Presentation*

7.1.2 The Accelerating Future of Heterogeneous Integration

D.S. Green, J.J. Kim, M.D. Hodge, M.R.

Soler, F. Herrault, J.F. Buckwalter

PseudolithIC Inc., Santa Barbara, CA

2:30 PM *Invited Presentation*

7.1.3 Recovery of Constituent Elements and Crystal Growth of Compound Semiconductors using Marine Bacteria

Yoriko Tominaga

Hiroshima University, Japan

SESSION 7.2: OPTOELECTRONIC DEVICES

Chairs: John Carlson, *HRL*
Winston Parker, *Wolfspeed*

1:30 PM *Invited Presentation*

- 7.2.1 Mass transfer of Efficient <5µm MicroLED Chips For Efficient and High Performance SmartWatch Displays**
Philippe Gilet, Markus Broell, Mickael Mairy, Pierre Tchoufian, Clément Talagrand, Willy Ludurczak, Thomas Lacave, Ivan-Christophe Robin, Xavier Hugon
ALEDIA SAS, Parc Sud Galaxie, 10 rue des Méridiens, 38130 ECHIROLLES FRANCE
- 2:00 PM *Invited Presentation*
7.2.2 Micro-LED Maturation from beach-head in AR/VR to entire Display Market
Paul Martin
Mojo Vision, USA
- 2:30 PM *Student Presentation*
7.2.3 1.6 µm Lasing and Mid-Wave Infrared Detection in InP-Based Transistor-Injected Quantum Cascade Structures
Robert B. Kaufman¹, Raman Kumar², Fu-Chen Hsiao³, and John M. Dallesasse¹
1 University of Illinois at Urbana-Champaign, Department of Electrical and Computer Engineering, Urbana, IL, USA
2 City College of New York, Department of Physics, New York, NY, USA
3 Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC, USA
- 2:50 PM *Student Presentation*
7.2.4 Edge Termination Engineering with Shallow Bevel Mesas for Low-Leakage Vertical GaN-based p-i-n Avalanche Photodiode
Zhiyu Xu¹, Theeradetch Detchprohm¹, Shyh-Chiang Shen¹, A. Nepomuk Otte², and Russell D. Dupuis¹
1 School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA, USA
2 School of Physics, Georgia Institute of Technology, Atlanta, GA, USA, WA
- 3:10 PM **BREAK**

SESSION 8.1: GaN RF DEVICES AND CIRCUITS

Chairs: Haldane Henry, *Qorvo*
Kyle Bothe, *MACOM*

- 3:30 PM *Invited Presentation*
8.1.1 RF packaging challenges for high efficiency, space compliant RF power Amplifier

Olivier Vendier
Thales Alenia Space

- 4:00 PM *Student Presentation*
8.1.2 Design, Fabrication, and Characterization of GaN-Based Single Drift Region IMPATT Diodes
Zhongtao Zhu¹, Lina Cao², Yu Duan¹, Wesley Turner¹, Jinqiao Xie³, and Patrick Fay¹
¹ *University of Notre Dame, Notre Dame, IN, USA*
² *Keysight Technologies, Pasadena, CA, USA*
³ *Qorvo, Richardson, TX, USA*
- 4:20 PM **8.1.3 High Temperature Operation of GaN High Electron Mobility Transistors on Large-Area Engineered Substrates for Extreme Environments**
James Spencer Lundh¹, Alan G. Jacobs², Michael E. Liao¹, Joseph A. Spencer^{2,3}, Geoffrey M. Foster², Andrew D. Koehler², Vladimir Odnoblyudov⁴, Marko J. Tadjer², Karl D. Hobart², Travis J. Anderson²
¹ *National Research Council Postdoctoral Fellow, Residing at NRL, Washington DC, USA*
² *U.S. Naval Research Laboratory, Washington, DC, USA*
³ *Center for Power Electronics Systems, Virginia Polytechnic Institute and State University, Blacksburg, VA, USA*
⁴ *Qromis, Inc., Santa Clara, CA, USA*
- 4:50 PM **8.1.4 i-line Lithography Technology for 0.25 μ m GaN-HEMTs for Future Base Station**
T. Yoshida, Y. Mekata, S. Nishizawa, and F. Yamaki²
Sumitomo Electric Devices Innovations, Inc., Nakakoma-gun, Yamanashi, JAPAN

SESSION 8.2: VCSELs

Chairs: Wei Zhang, *AXT*
Paul Pinsukanjana, *Intelliepi*

- 3:30 PM *Invited Presentation*
8.2.1 In-situ epitaxial growth control of GaN-based vertical-cavity surface-emitting lasers
T. Takeuchi, S. Kamiyama, and M. Iwaya
Department of Materials and Science and Engineering, Meijo University, Tempaku-ku, Nagoya, Japan

- 4:00 PM **8.2.2 QuickSELS Enabling Rapid Feed-back to Epitaxy**
 J. Baker¹, S. Gillgrass¹, C. P. Allford¹, J. I. Davies², S. Shutts¹, P. M. Smowton^{1,3}
¹*School of Physics and Astronomy, Cardiff University, UK*
²*IQE plc, Cardiff UK*
³*Institute for Compound Semiconductors, Cardiff University, UK*
- 4:20 PM *Student Presentation*
8.2.3 Polarization Control in Vertical-Cavity Surface-Emitting Lasers via Elliptical Aperture Definition in Optical Coatings
 Kevin Pikul¹, Leah Espenhahn, Patrick Su, Mark Kraman, John M. Dallesasse
University of Illinois at Urbana-Champaign, Department of Electrical and Computer Engineering, Urbana, IL, USA
- 4:40 PM *Student Presentation*
8.2.4 Thermal Stability Enhancement of P-Metals Ohmic Contact in Oxide-VCSELs
 Derek Chaw, Haonan Wu, Zetai Liu, and Milton Feng
Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Holonyak Micro & Nanotechnology Lab, 208 North Wright Street, Urbana, IL, USA

Thursday, May 23rd

SESSION 9.0: PLENARY III

Chairs: David Via, *AFRL*
Andrew Green, *AFRL*

8:15 AM *Plenary Presentation*
9.0.1 Updates on CHIPS for America
Eric Lin
*CHIPS Research & Development Office at
the U.S. Department of Commerce, USA*

9:00 AM *Plenary Presentation*
9.0.2 The Essential Role of Compound Semiconductors in the Transition to 6G Wireless
Roger Nichols
Keysight Technologies, USA

9:45 AM **BREAK**

SESSION 10.1: EPITAXY & MATERIALS

Chairs: Drew Hanser, *Veeco*
Andrew Wibowo, *MicroLink Devices*

10:15 AM *Invited Presentation*
10.1.1 Semiconducting AlN: A New Rapidly Emerging III-Nitride Market
W. Alan Doolittle
Georgia Tech, GA, USA

10:45 AM *Invited Presentation*
10.1.2 A review of key developments and challenges in CVD diamond substrates for electronic device applications
Daniel Twitchen
Element Six

11:15 AM **10.1.3 3D diamond growth for GaN cooling and TBR reduction**
Daniel Francis
Akash Systems, USA

11:35 AM **10.1.4 Thermal dissipation enhancement using a metal-diamond composite heat spreaders in high power RF MMICs**
Zeina Abdallah¹, James W. Pomeroy^{1,2}, and Martin Kuball^{1,2}
¹*Center for Device Thermography and Reliability (CDTR), University of Bristol, Bristol BS8 1TL, UK*
²*TherMap Solutions, 1 Victoria St, Redcliffe, Bristol BS1 6AA, UK*

SESSION 10.2: INDUSTRY & AI

Chairs: Thorsten Saeger, *Qorvo*
Celicia Della-Morrow, *Qorvo*

10:15 AM *Invited Presentation*

10.2.1 CHIPS Act and its Impact on the Compound Semiconductor Industry

Melissa Grupen-Shemansky
CTO and VP of Technology Communities,
SEMI, USA

10:45 AM *Invited Presentation*

10.2.2 Why Every Fab Should be Using AI

Jonathan L. Herlocker
Tignis, Inc, WA, USA

11:15 AM **10.2.3 Leveraging Smart Factory Principles for Chemical Usage and Cost**

Mark J. Miller, Joaquin Currier Cubero, M.
Arif Zeeshan
Skyworks Solutions Inc., Woburn, MA, USA

11:35 AM **10.2.4 Benefits of Implementing AI/ML Controllers for Semiconductor Manufacturing, Including Multi-Tool Co-Optimization**

M. Eric Holzer, Mario Faria
Tignis, Inc, WA, USA

11:55 AM **CS MANTECH LUNCHEON**

SESSION 11.1: METALLIZATION & LITHO

Chairs: Dwaraka Geerapuram, *Plasma-Therm*
Wen Zhu, *BAE*

1:00 PM **11.1.1 Developments in GaAs Photolithography Processing for Improved HBT Base Metal Patterning and Reduced Photoresist Popping and Tearing**

A. Molina, B. Grisafe, M. Broda, H. K.
Nguyen, J. S. Mason
Northrop Grumman Mission Systems,
Advanced Technology Laboratory,
Linthicum, MD, USA

1:20 PM **11.1.2 Optimization of Photolithography Process for BiHEMT Gate Layer with High Critical Dimension Uniformity**

Stephanie Y. Chang, Tom Brown, Randy
Bryie, Rainier Lee
Skyworks Solutions, Inc., Newbury Park, CA,
USA

- 1:40 PM **11.1.3 Novel Nichrome Thin Film Resistor Fabrication Approach in E-Beam Evaporation for High Volume Semiconductor Manufacturing**
 Sheikh Pradeep Waduge*, Debdas Pal, Peter Ersland, Sam June, Chris Samson, Vince Hoang, Shanali Weerasinghe
MACOM Technology, Lowell, MA, USA
- 2:00 PM *Student Presentation*
11.1.4 Subtractive WSiN thin film resistors for RF GaN and InP MMICs
 Hossein Yazdani, Hady Yacoub, Amer Bassal, Taylor Moule, Joost Wartena, Oliver Hilt
Ferdinand-Braun-Institut für Höchstfrequenztechnik (FBH), Berlin, Germany
- 2:20 PM **11.1.5 Electron-beam Deposition with Low- Spitting Platinum Source Material-Improved by New Impurity Removal Processes**
 Atsushi Kawashimo¹, Takahiro Kobayashi¹, Masatoshi Koyama², Yuichiro Shindo¹
¹*Technical Development Division, Matsuda Sangyo Co Ltd, Shinjuku-ku, Tokyo, Japan*
²*Nanomaterials Microdevices Research Center, Osaka Institute of Technology, Osaka, Japan*

SESSION 11.2: CHARACTERIZATION

- Chairs: Marty Brophy
 Anita Pacheco, *Allegro MicroSystems*
- 1:00 PM **11.2.1 Defect Reduction and Yield Improvement of MIM Capacitors**
 S.A. Chevtchenko, I. Ostermay, S. Troppenz, J. Würfl, and O. Hilt
Ferdinand-Braun-Institut gGmbH, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany
- 1:20 PM *Student Presentation*
11.2.2 Mapping of Local Threshold Voltage in AlGaIn/GaN HEMTs
 Anjali Anjali¹, James Pomeroy¹, Jr-Tai Chen², Martin Kuball¹
¹*Center for Device Thermography and Reliability, H.H. Wills Physics Laboratory, University of Bristol, Tyndall Avenue, Bristol BS8 1TL, UK.*
²*SweGaN AB, Pursergatan 1, 582 78 Linköping, Sweden*
- 1:40 PM *Student Presentation*

11.2.3 Time-Dependent Conduction Mechanisms in Superlattice Layers on 200 mm Engineered Substrates

Zequan Chen¹, Peng Huang¹, Indraneel Sanyal¹, Matthew D. Smith¹, Michael J Uren¹, Anurag Vohra², Benoit Bakeroort^{2,3}, and Martin Kuball¹

¹Center for Device Thermography and Reliability (CDTR), University of Bristol, Bristol BS8 1TL, UK

²Imec vzw, Kapeldreef 75, B-3001 Leuven, Belgium

³CMST, imec and Ghent University, Technologiepark 126, Ghent, Belgium

2:00 PM **11.2.4 High Throughput Wafer Characterization for Manufacturing Needs of SiC and Other WBG Technologies**

M. Wilson, C. Almeida, I. Shekerov, B. Schraye, A. Savtchouk, B. Wilson and J. Lagowski

Semilab SDI, Tampa, FL, USA

2:20 PM *Student Presentation*

11.2.5 Characterization of 1.2 kV SiC Trench MOSFETs with Buried p+ Layers Using a Double-Pulse Circuit

Yeongeun Park¹, Gyuhyeok Kang¹, Sangyeob Kim¹, Hyowon Yoon¹, Soontak Kwon², and Ogyun Seok¹

¹Kumoh National Institute of Technology, Republic of Korea

²KEC, Republic of Korea

SESSION 12.0: POSTER SESSION

Chairs: Keith Wieber, Qorvo
Patrick Holly, Northrop Grumman
Kevin Stevens, IQE
Jim Crites

2:40 PM **12.0.1 Student Presentation**
Gold-free Tantalum and Titanium-based Ohmic Contacts for Gallium Nitride HEMT Devices

Gareth Davies¹, Andrew Withey², O. J Guy³, Jon E. Evans³, Mike Jennings³
¹Swansea University, Bay Campus, Crymlyn Burrows, Skewen, Swansea SA18EN,
²Vishay Ltd, Tower House, St Catherine's Court, Sunderland, SR53XJ
³Centre for Integrative Semiconductor Materials (CISM), Bay Campus, Crymlyn Burrows, Skewen, Swansea SA18EN

12.0.2 Enhanced Dielectric Performance of HfO₂ Thin Films Via Novel Atomic Layer Deposition Conversion at Production Speed and Efficiency

D. Lindblad, S. Harris, A. Wang, L. Mueller,
A. Dameron, M. Weimer
Forge Nano, Thornton, CO, USA

12.0.3 3D Visualization and Characterization of SiC MOSFET Junctions Using EBIC and FIB-SEM Tomography

Heiko Stegmann¹, Greg Johnson², David Taraci², Andreas Rummel³
¹*Carl Zeiss Microscopy, Oberkochen, DE*
²*White Plains, NY, USA*,
³*Kleindiek Nanotechnik, Reutlingen, DE*

12.0.4 Sonic Lift-off (SLO) to Enable Substrate Reuse of Bulk GaN and SiC Substrates

P. Guimera Coll, T. Black, J. Abraham, S. Kamishetty, A.P. Merkle, L. Bathurst, M. Bertoni
Crystal Sonic Inc, Phoenix, AZ, USA

**12.0.5 Student Presentation
Junction termination extensions using P-type epitaxial growth layers for 3.3 kV SiC PiN diodes**

Sangyeob Kim, Hyowon Yoon, Chaeyun Kim, Yeongeun Park, Gyuhyeok Kang, and Ogyun Seok
Kumoh National Institute of Technology, Republic of Korea

**12.0.6 Student Presentation
Improving the Surge Characteristics of SiC MOSFETs by Using Poly-Si SBDs**

Gyuhyeok Kang, Yeongeun Park, Hyowon Yoon, Chaeyun Kim, Sangyeob Kim and Ogyun Seok
Kumoh National Institute of Technology, Republic of Korea

**12.0.7 Student Presentation
Lapping and Chemical Mechanical Polishing of wide and ultrawide bandgap semiconductors**

Kaicheng Pan
University of California, Los Angeles, CA, USA

12.0.8 Improved thermal reliability in base contact of full 3-inch InP Double-HBTs with f_T and f_{max} in excess of 300 GHz

In-Geun Lee

Kyungpook National University

12.0.9 Student Presentation

Characterization of AlGaIn/GaN HEMTs on 4-inch SiC substrate at Cryogenic temperature

Wan-Soo Park¹, Hyeok-Jun Lee¹, Hyo-Jin Kim¹, Jae-Hak Lee¹, Kyounghoon Yang² and Dae-Hyun Kim¹

¹ School of Electronic and Electrical Engineering, Kyungpook National University (KNU), Daegu, Republic of Korea

² School of Electrical Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea,

12.0.10 Large-Scale Thin-Film 128° Y-cut LiNbO₃ on Sapphire via Wafer Bonding

M. E. Liao¹, L. Matto², K. Huynh², N. Ravi², Y. Long², P. J. Shah¹, M. S. Goorsky²

¹ Apex Microdevices OH, USA

² University of California Los Angeles, Los Angeles, CA, USA

12.0.11 Student Presentation

Pre-warning recognition, protective circuit, and failure analysis of red AlGaInP light emitting diodes in salty water vapor
Chun-Yen Yang¹, You-Li Lin², Chun-Han Chen², Mao-Tung Han², Dong-sing Wu², Yao-Wen Kuo¹, Yung-Hui Li³, Chia-Feng Lin⁴, Hsiang Chen²

¹ Department of Electrical Engineering, National Chi Nan University, Nantou 54561, Taiwan.

² Department of Applied Materials and Optoelectronic Engineering, National Chi Nan University, Nantou 54561, Taiwan.

³ AI Research Center, Hon Hai Research Institute, Taipei 11494, Taiwan.

⁴ Department of Materials Science and Engineering, National Chung Hsing University, Taichung 40227, Taiwan

12.0.12 Towards Realization of Large-Scale β -Ga₂O₃ Composite Wafers

M. E. Liao¹, K. Huynh², N. Ravi², K. Pan², B. S. Carson², L. Matto², P. J. Shah¹, M. S. Goorsky²

¹Apex Microdevices, West Chester, OH, USA

²University of California Los Angeles, Los Angeles, CA, USA

12.0.13 Plug-n-Play SECS/GEM for Legacy Equipment

Nirav Thakkar

Einnosys Technologies LLP, USA

12.0.14 Pyramidal μ LEDs – a novel bottom-up concept for small, bright and efficient light emitters

Per Olof Holzer

Polar Light Technologies

12.0.15 Student Presentation

Deterioration of ZnO Nanorod Photodetectors in Saline Vapor

Geoffrey Deng-Yi Wang¹, Yi-Shiang Chiu²,
Sang-Hao Lin², YewChung Sermon Wu¹,
Hsiang Chen², Chao-Sung Lai^{3,4}

¹*Department of Materials and Engineering
Science, National Yang Ming Chiao Tung
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²*Department of Applied Materials and Opto-
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Chang Gung University, Taoyuan 33302,
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⁴*Department of Nephrology, Chang Gung
Memorial Hospital, Linkou 33305, Taiwan.*

⁵*Department of Materials Engineering,
Ming Chi University of Technology, New Tai-
pei City 24301, Taiwan.*

CONFERENCE CLOSING

3:45 PM Accelerating process development for semiconductor device fabrication

Richard Gottscho, *Executive Vice President
and Strategic Advisor to the CEO of Lam Re-
search, USA*

4:15 PM Closing Reception

David Meyer, *NRL
Conference Chair*

HOTEL INFORMATION

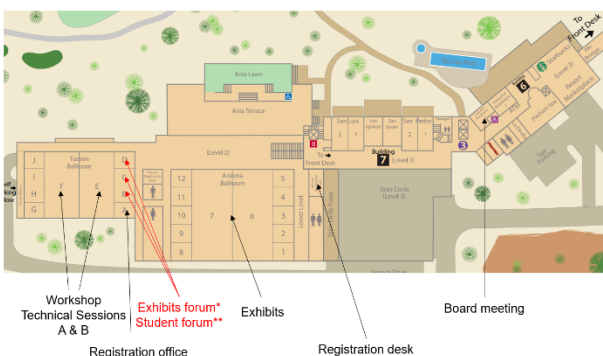
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