



International Workshop on Gallium Oxide and Related Materials

IWGO 2024

26 - 31 May, 2024
KulturBrauerei
Berlin, Germany



<https://grafox2022.pdi-berlin.de/iwgo-2024>

Welcome

Dear [IWGO 2024](#) participants,

We are delighted to welcome you to the 5th edition of the International Workshop on Gallium Oxide and Related Materials (IWGO 2024) in Berlin, Germany, the foremost global platform for Ga₂O₃.

What started in 2015 with approximately 100 contributions at the inaugural IWGO-1 in Kyoto, Japan, has now grown in less than 10 years to over 240 contributions consisting of 3 keynote lectures, 19 invited talks, 64 contributed talks, and 155 posters at IWGO 2024. This increase reflects the growing global interest in the research topic of gallium oxide and related materials, and signifies an expanding community dedicated to exploring the fundamental science, driving technological advancements in devices, and refining the scaling of materials and processes to propel the advancement towards higher technology readiness levels.

In times of global conflict and polarization, we view this workshop as a vital contribution to scientific exchange free from political consideration, bringing together researchers from all over the world in unity and shared purpose. At the heart of this workshop is our commitment to fostering community building, facilitating informal exchange of ideas among colleagues, and promoting collaboration to propel forward the exciting field of gallium oxide and related materials.

We sincerely thank our sponsors and exhibitors for their support as well as the numerous members of the workshop committees for their hard work and dedication that has helped tremendously to bring this workshop to life.

We wish us all a fruitful workshop, meeting old friends and making new ones, the initiation of new scientific collaborations, and an enjoyable time in Berlin!

Sincerely,

May 23, 2024

Oliver Bierwagen

*IWGO 2024 co-chair, Scientific coordinator GraFOx,
Paul-Drude-Institut für Festkörperelektronik (PDI)*



Martin Albrecht

*IWGO 2024 co-chair, Scientific coordinator GraFOx,
Leibniz-Institut für Kristallzüchtung (IKZ)*



Roman Engel-Herbert

*Speaker GraFOx, Director Paul-Drude-Institut für
Festkörperelektronik (PDI)*



IWGO 2024 Sponsors

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Martin Albrecht, Leibniz-Institut für Kristallzüchtung, Germany

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- **Arnab Bhattacharya**, Tata Institute Mumbai, India
- **Claudia Draxl**, Humboldt University, Germany
- **Andreas Fiedler**, Leibniz Institute for Crystal Growth, Germany
- **Zbigniew Galazka**, Leibniz Institute for Crystal Growth, Germany
- **Samuel Graham**, Georgia Institute of Technology, USA
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- **Kornelius Tetzner**, Ferdinand Braun Institut, Germany
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- **Lasse Vines**, University of Oslo, Norway
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- **Martin Albrecht**, Leibniz-Institut für Kristallzüchtung, Germany
- **Kerstin Arnhold**, Paul-Drude-Institut für Festkörperelektronik, Germany
- **Oliver Bierwagen**, Paul-Drude-Institut für Festkörperelektronik, Germany
- **Eimear Bruen**, Paul-Drude-Institut für Festkörperelektronik, Germany
- **Roman Engel-Herbert**, Paul-Drude-Institut für Festkörperelektronik, Germany
- **Henning Riechert** (advisor)
- **Ekaterina Suchilina**, Paul-Drude-Institut für Festkörperelektronik, Germany
- **Markus R. Wagner**, Paul-Drude-Institut für Festkörperelektronik, Germany

Venue

Experience the 5th IWGO in the vibrant city of Berlin, Germany.

Berlin has been the stage for a host of significant moments in world history, signaled by the city's many UNESCO World Heritage Sites. This ever-changing metropolis embraces modernity alongside its past, blending its vibrant culture and thriving scientific scene into a rich tapestry of exploration.

The conference venue will bring you close to what this city is really about.

A former brewery, the [KulturBrauerei](#) is not only a 19th century industrial and architectural monument, but also a versatile event location home to multicultural institutions, and known as one of Berlin's largest alternative hubs.



[KulturBrauerei, Schönhauser Allee 36,
10435 Berlin](#)

The multicultural district of Prenzlauer Berg offers a rich variety of culinary treats ranging from cozy cafés and traditional Berliner meals to international restaurants with dishes from around the globe. It has plenty of sights and hidden corners filled with history, providing ample opportunities for exploration and discovery during breaks or after a long conference day.

How to get there

The venue is best reached by public transport.

Tip: make sure to purchase an ABC ticket from one of the vending machines near the exit of BER airport or an AB ticket when starting your trip within the city of Berlin.

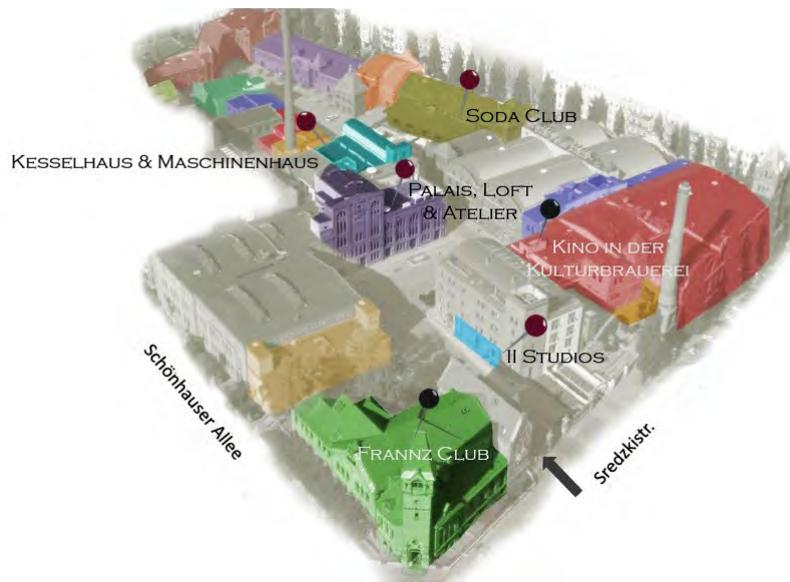
Step 1: From the airport you can take the following routes:

FEX **RB23** **S8** **S42** **U2** **M10**

- **RB23 or FEX to Alexanderplatz**, change to the U2 (underground) heading to S+U Pankow and exit at Eberswalder Straße
- **RB23 until and from Hauptbahnhof** (Central Train Station), change to tram M10 heading to S+U Warschauer Str. and exit at Eberswalder Straße
- **S8 to Ostkreuz**, change to S42 and ride until Schönhauser Allee. Here you have the option to take the U2 for one stop to Eberswalder Straße or walk to the venue.



Map of area around Kulturbrauerei and nearest public transport stations



Step 2: Enter the KulturBrauerei complex from Sredzkistrasse (bottom right on the image above).

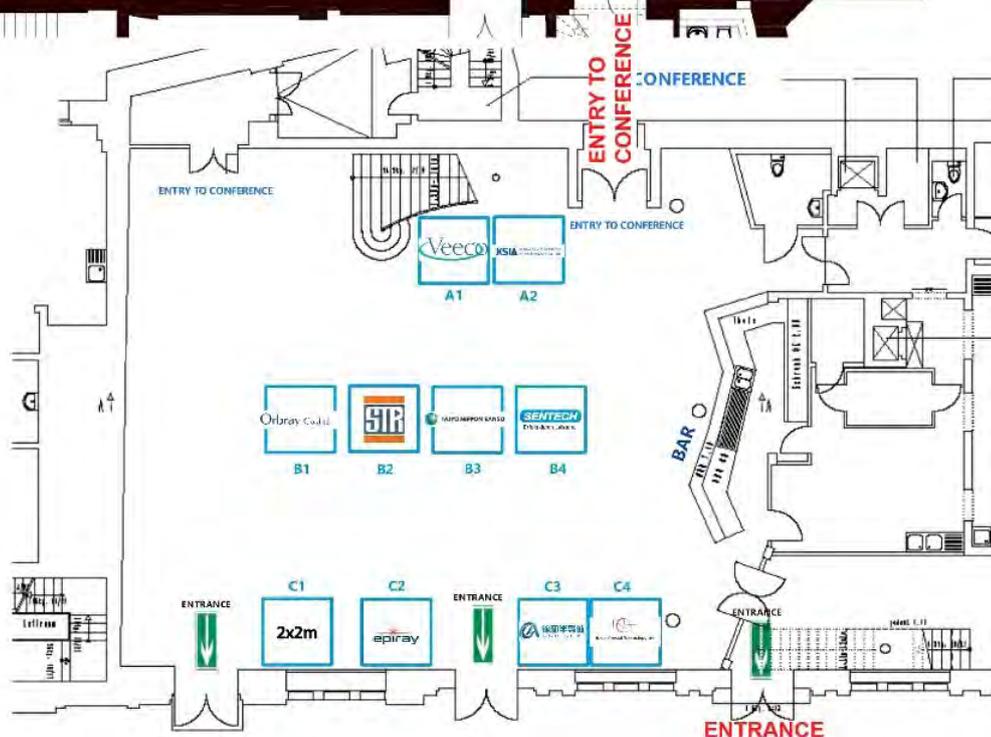
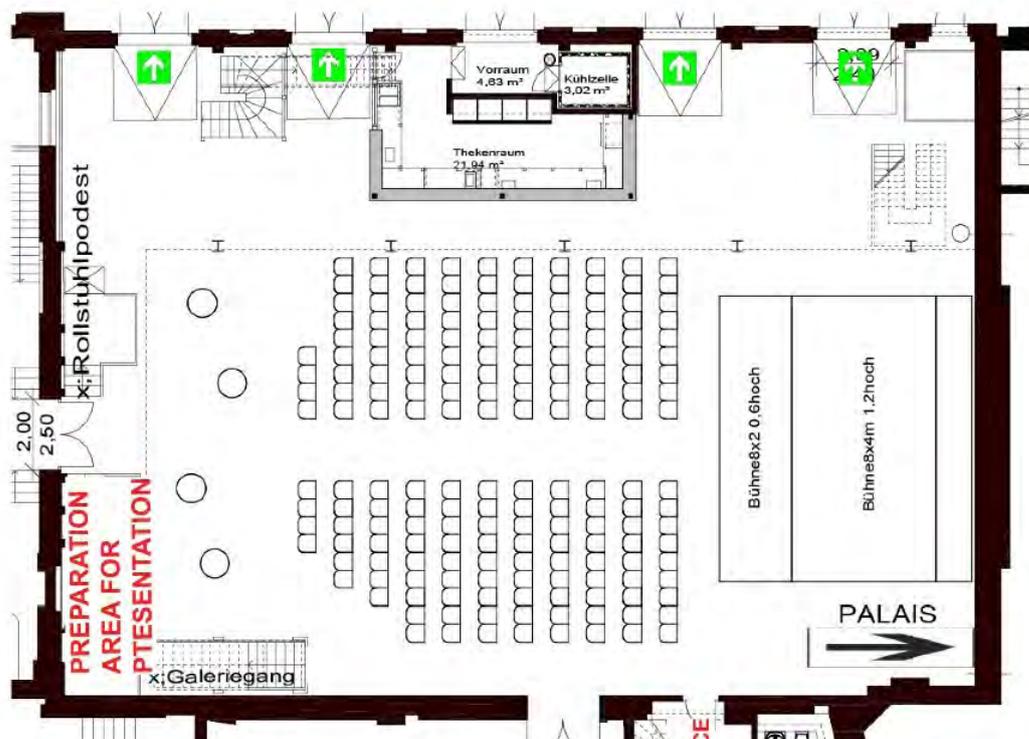


3. Step 3: Look for the building marked with the sign 'Palais' inside the KulturBrauerei complex. This is where the workshop is taking place.

Inside the Venue

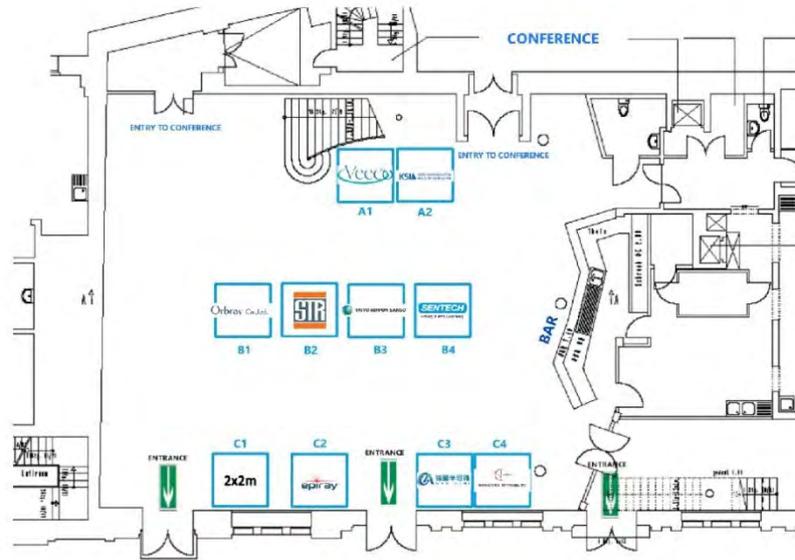
WiFi network: IWGO2024
Password: Oxide1Gallium2

Kesselhaus (Oral Sessions)



Palais (Exhibition, Conference breaks, Poster Session)

IWGO 2024 Exhibitors



Novel Crystal Technology, Inc.

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Erfolg durch Leistung



Presentation Guidelines

A limited number of **Young Researcher Paper Awards** will be granted to students of outstanding presentations (oral or poster) of their work. Late news are not eligible. Papers are judged on both scientific content as well as the quality of presentation at the conference.

Oral Presentation

- Keynote Lecture: 35 minutes, plus 10 minutes Q&A (total 45 min)
- Invited talk: 20 minutes, plus 5 minutes for Q&A (total 25 min)
- Contributed talk: 12 minutes plus 3 minutes for Q&A (total 15 min)

All presenters will be utilizing standard audio-visual equipment including a projection system, a laptop, a laser pointer with clicker, and microphones. Presentation slides should preferably be prepared in Windows-compatible PowerPoint format or Adobe PDF. Speakers are advised to bring their presentations ready on a USB drive and upload the file to the conference laptop. We will ensure that they are deleted directly after the session and will not be distributed.

The conference laptop, controlled by our technicians, is situated in the preparation area at the back of the lecture hall in the Kesselhaus. **Please pick up a microphone from the technicians prior to your talk and return it directly afterwards.**

Poster Session

Poster panels are provided to fit standard A0 in portrait orientation (W 841 x H 1189 mm). The panels will have an identification number matching those in the program. The presenters are requested to set up their posters beforehand, stand next to their panels during the 120-minute session to be available for discourse, and remove their posters at the end of the session.

IWGO 2024 Code of Conduct

It is the policy of the International Workshop on Gallium Oxide and Related Materials that all participants, including attendees, vendors, IWGO 2024 staff, volunteers, and all other stakeholders at the meeting will conduct themselves in a professional manner that is welcoming to all participants and free from any form of discrimination, harassment, or retaliation. Participants will treat each other with respect and consideration to create a collegial, inclusive, and professional environment at IWGO 2024.

Creating a supportive environment to enable scientific disclosure is the responsibility of all participants. Participants will avoid any inappropriate actions or statements based on individual characteristics such as race, color, national origin, religion, sex, disability, age, citizenship status, genetic information, sexual orientation, gender identity or expression, or any other characteristic protected by law. Disruptive or harassing behavior of any kind will not be tolerated. Harassment includes but is not limited to inappropriate or

intimidating behavior and language, unwelcome jokes or comments, unwanted touching or attention, offensive images, photography, and stalking.

Photography, audio and video recordings of oral and poster presentations without the explicit consent of presenting persons are not allowed. Violations of this code of conduct policy should be reported to Erika Szegedy (szegedy@pdi-berlin.de) or email iwgo2024@pdi-berlin.de.

Following an investigation, if appropriate, sanctions may range from verbal warning to ejection from the meeting without refund, to notifying appropriate authorities. Retaliation for complaints of inappropriate conduct will not be tolerated. If a participant observes inappropriate comments or actions and personal intervention seems appropriate and safe, they should be considerate of all parties before intervening.

Call for Papers

Special Issue in *physica status solidi (b)* *Gallium Oxide and Related Materials*

Guest Editors

**Martin Albrecht, Oliver Bierwagen, Claudia Draxl,
Kornelius Tetzner, and Holger von Wenckstern**

Manuscripts due

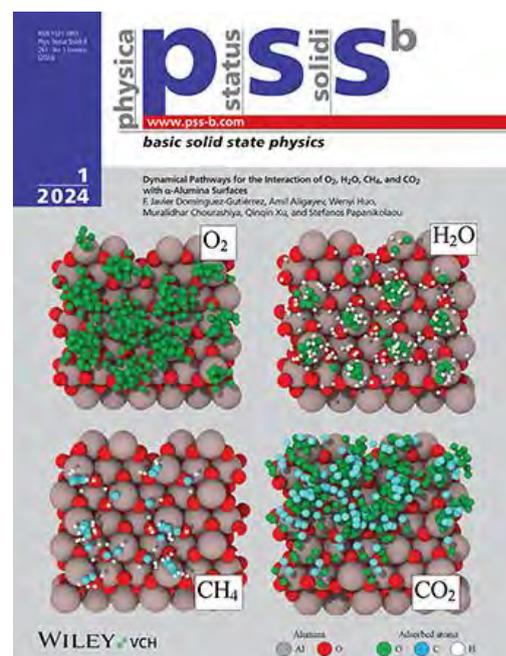
Friday August 30th, 2024

Submission at

www.editorialmanager.com/pssb-journal

Select Section/Category

IWGO2024: Gallium Oxide and Related Materials



Dear Participants,

We cordially invite you to contribute to a **Special Issue** related to the *International Workshop on Gallium Oxide and Related Materials (IWGO 2024, May 26 -31, 2024, Berlin)*. It will be published in the prestigious and established journal *physica status solidi (b)* (regular, no conference proceedings). Let us encourage you and your collaborators to contribute a **Research Article** on previously unpublished results, or a **Review**.

The *physica status solidi* journals are designed to reach a broad audience in the field of condensed matter and materials physics. *pss* is one of the largest and well-established publication platforms in solid state physics – now over 60 years in business – and is widely accessible as part of many institutional site licenses, evidenced by close to one million article downloads annually. *pss* also offers optional Open Access and participates in many funder agreements.

All submitted manuscripts will undergo **peer review**. According to the editorial policy of *pss*, two positive recommendations by independent referees are a prerequisite of acceptance. Peer review and publication occur on individual manuscript basis. Published in Wiley Online Library **Early View** a few weeks after acceptance, your article is citable immediately; hence there is **no waiting for the remainder of the contributions**. When all articles are complete, they will be assigned to the next available monthly issue of *pss (b)*.

Please discuss review-type articles with the guest editors prior to compilation. We refer to more information on the next page, and to the author instructions available on our homepage www.pssb.com → **Author Guidelines** and the link to [online submission](#) through Editorial Manager – please **mention the Topical Section** in your cover letter and select the appropriate **section/category** to expedite handling.

From previous experience we are confident that this will become a top publication with excellent international visibility, reflected by high article download and citation numbers.

Looking forward to receiving your contributions,
Sabine Bahrs, on behalf of the Guest Editors

Editors *pss*
Editorial Office:

Dr Stefan Hildebrandt, Dr Sabine Bahrs
pssb@wiley-vch.de www.pssb.com

Further information

Please refer to www.pss-journals.com → **Author Guidelines**.

The *physica status solidi (pss)* journal group is dedicated to the thorough peer review and the rapid publication of new and important results in all fields of solid state and materials physics, from basic science to applications and devices.

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Research Articles are unsolicited, peer-reviewed reports of original research results. The essential findings presented in a Research Article should be novel and should not have been published previously. The conclusions must be clearly supported by the data. Whilst a typical Research Article is around 3000–8000 words (in its entirety) including 3–8 display items (figures, schemes, or tables), submitted manuscripts can be any length, provided that the scientific contents justifies it. Manuscripts should include 1) an introduction, summarizing the objectives and main conclusions of the work, 2) the main text of the article, 3) a conclusion, summarizing the conclusions that can be drawn, and 4) an experimental or methods section. In addition, a short abstract (200 words maximum) should be included along with 3–7 keywords. Supporting Information in the form of additional experimental details, display items, movies, etc. may accompany the main article. The main article must stand on its own in the absence of the Supporting Information.

Reviews are peer-reviewed and give an overview of recent progress in important fields of research, providing the readers with a guide to the relevant literature, an appreciation of the significance of the work, and an outlook into potential future directions. It is not intended that Reviews are necessarily comprehensive, but rather insightful, selective, critical, opinionated, and even visionary. The reference list should be well-balanced. Unpublished results should not be included. Whilst a typical Review is 10 000–20 000 words (in its entirety) including 5–15 display items (figures, schemes, or tables), submitted manuscripts can be any length. However, the scientific contents should justify the length and manuscripts should be divided into appropriate sections. In addition, a short abstract (200 words maximum) should be included along with 3–7 keywords.



Other *pss* content

Special Issue

[Hybrid Inorganic/Organic Systems for Opto-Electronics](#)

physica status solidi (a) Volume 221, Issue 1

January 2024

Guest Edited by: Oliver Benson, Norbert Koch



IWGO 2024 Program

Check-in and on-site registration will start on 26th May at 15:30 in the Palais-Kulturbrauerei and be available 27. – 31. May from 8:15 –17:30.

Welcome reception in the Palais is scheduled for the opening evening of the conference: 26th May from 17:30-19:30.

The following **Excursion** can be booked for the 29th May:

- Humboldtforum: In the Footsteps of history 15:00-16:00
- Berliner Unterwelten Wedding: Bunkers, Subways and the Cold War 15:00-16:30
- Berliner Unterwelten Kreuzberg: Time Capsule 15:30-17:00

A **Conference Dinner** in the Palais/Atelier can be booked for the 29th May, 17:30 - 20:00.

Technical program

Opening Speakers

- **Roman Engel-Herbert, Oliver Bierwagen, Martin Albrecht**

Keynote Lecturers

- **Masataka Higashiwaki**, Osaka Metropolitan University/National Institute of Information and Communications Tech, JP: Ga₂O₃ device technologies for power and harsh environment
- **Andreas Popp**, Institute for Crystal Growth, DE: Advances of Homoepitaxial growth of β-Ga₂O₃ by MOVPE
- **Chris G. Van de Walle**, University of California, Santa Barbara, USA: Controlling doping in Ga₂O₃ and related alloys

Invited Speakers

- **Elaheh Ahmadi**, University of California, USA: Hybrid MBE for epitaxial growth of Si-doped ((Al)Ga)₂O₃ films
- **Wenshan Chen**, Paul Drude-Institut für Festkörperelektronik, DE: Cation incorporation and reaction kinetics for the MBE growth and Ge-based etching of (Sn_xGe_{1-x})O₂ for 0 ≤ x ≤ 1
- **Esmat Farzana**, Iowa State University, USA: Vertical β-Ga₂O₃ Diodes for High-voltage and Extreme Radiation Application
- **Roberto Fornari**, University of Parma, IT: MOVPE growth and properties of orthorhombic β-Ga₂O₃
- **Zbigniew Galazka**, Institute for Crystal Growth, DE: Bulk rutile-GeO₂ single crystals and wafers with extraordinary physical properties
- **Katie Gann**, Cornell University, USA: Understanding Deactivation of Si Dopants in Implanted β-Ga₂O₃
- **Riena Jinno**, University of Tokyo, JP: Selective Area Growth of β-Ga₂O₃ on Sapphire Substrates by Mist-CVD and its Thermal Stability
- **Emmanouil Kioupakis**, University of Michigan, USA: Rutile GeO₂ and (Ge,Sn)O₂ Alloys: A New Family of Ultra-Wide-Band Semiconductors

- **Yoshinao Kumagai**, Tokyo University of Agriculture and Technology, JP: Vapor-phase epitaxial growth of gallium oxide using Ga halides as source gases
- **Akito Kuramata**, Novel Crystal Technology Inc., JP: Recent Status of Ga₂O₃ Crystal Growth Development
- **Andrej Kuznetsov**, University of Oslo, NOR: Disorder-induced ordering in gallium oxide polymorphs
- **Matthew D. McCluskey**, Washington State University, USA: Photoluminescence and Raman Mapping of Defects in β-Ga₂O₃
- **Laura Ratcliff**, University of Bristol, UK: Tackling Disorder in γ-Ga₂O₃
- **Darrell Schlom**, Cornell University, USA: Growth of β-Ga₂O₃ and α-(Al_xGa_{1-x})₂O₃ by Suboxide MBE at 1 μm/hr
- **Uttam Singiseti**, University of Buffalo, USA: Electron transport studies in gallium oxide and aluminum-gallium-oxide alloys
- **Kornelius Tetzner**, Ferdinand Braun Institute, DE: Recent advances in the process development of Gallium Oxide power transistors for high-voltage applications
- **Amanda Wang**, University of Michigan, USA: Mobility in SnO₂, GeO₂, and Ge_xSn_{1-x}O₂ from first principles
- **Jiandong Ye**, Nanjing University, CN: Enhanced Avalanche in NiO/Ga₂O₃ Heterojunction by Edge Termination Optimization
- **Iuliia Zhelezova**, University of Helsinki, FI: Vacancy defects in Si doped β-(Al,Ga)₂O₃

Program at a glance



SUNDAY 26 MAY

15:30

Registration of
Participants

17:30-19:30

Welcome Reception

View full Program online



MONDAY 27 MAY

08:15 Admissions

08:45 Opening Notes
MoM1: Bulk Growth

Ch: Galazka (IKZ)
Kuramata (NCT), Liao (UCLA), Taishi (Shinshu U), Igarashi (NCT)
Hangzhou Fujia

10:15 Refreshments

10:45 *MoM2 Vapor Phase Epitaxy*

Ch: Fujita (Kyoto U)
Popp* (IKZ), Chou (IKZ), Brand (Agnitron)
Kumagai (TUAT), LayTec

12:30 Lunch break

14:15 *MoA1 kappa-Ga₂O₃, Ga₂O₃/III-N, MBE*

Ch: Mazzolini (Parma U)
Fornari (Parma U), Sacchi (U Parma), Karg (U Bremen), McCandless (Cornell U), Raghuvansy (U Bremen), Monroy (U Grenoble)

15:55 Refreshments

16:25 *MoA2 MBE, Polymorphism*

Ch: Riechert
Schlom (Cornell U), Bertoni (U Milano), Galeckas (U Oslo), Janzen (TU Berlin)

17:35-19:35

MoP 1-53: Monday Poster Session

Bulk β -Ga₂O₃, Polymorphs and κ -Ga₂O₃, Growth mechanisms, & Ga₂O₃/III-N

TUESDAY 28 MAY

08:15 Admissions

08:45 *TuM1: Doping & Vacancies 1*

Ch:
Van de Walle* (UCSB)
Zhelezova (U Helsinki)
Noseges (AFRL)

10:10 Refreshments

10:40 *TuM2 Doping & Vacancies 2*

Ch: Kuball (U Bristol)
Seyidov (IKZ), Vines (U Oslo), Moorthy Babu (Anna U), **Ahmadi** (U California), Yoshinaga (TUAT)

12:05 Lunch break

13:50 *TuA1 Defects and γ -Ga₂O₃ 1*

Ch: Van de Walle (UCSB)
Gann (Cornell U), Demchenko (IPP Warsaw), **Kuznetsov** (U Oslo), Hwang (OSU), Albrecht (IKZ), Martin (U Aachen)

15:40 Refreshments

16:10 *TuA2 Defects and γ -Ga₂O₃ 2*

Ch: McCluskey (Wash. SU)
Ratcliff (U Bristol), Albrecht (IKZ), Pieczulewski (Cornell U), Frodason (U Oslo)

17:30-19:30

TuP 1-54: Tuesday Poster Session

Doping, γ -Ga₂O₃, Characterization, Detectors, & Thermal properties

WEDNESDAY 29 MAY

08:15 **Admissions**

08:45 *WeM1 β -Ga₂O₃ alloys*

Ch: Jinnō (U Tokyo), Mazzolini (U Parma), Koreishi (TIT), Togashi (Sophia U), Rehm (IKZ), Fiedler (IKZ)

10:00 **Refreshments**

10:30 *WeM2 From α -Ga₂O₃ to α -Al₂O₃*

Ch: Fornari (Parma U), Jinnō (U Tokyo), Maruzane (U Strathclyde), Dang (U Canterbury), Vogt (U Leipzig), Schubert (U Lincoln-N.), Okumura (U Tsukuba)

12:10 **Lunch break & WeP 1-54: Wednesday Poster Session**

(Al,Ga)₂O₃, Alloys, α -phase, Diodes, NiO/Ga₂O₃, MOSFETs

14:30

Excursions

17:30-20:00

Banquet

THURSDAY 30 MAY

08:15 **Admissions**

08:45 *ThM1 Power Devices & Diodes*

Ch: Tetzner (FBH), Higashiwaki (Osaka MU), Piel (AFRL), Farzana (Iowa SU)*

10:10 **Refreshments**

10:40 *ThM2 Diodes and High Voltage*

Ch: Speck (California U), Han (USTC), Dang (U Canterbury), Cromer (U Stanford), Masten (NRL), Smith (Cornell U), Arima (TDK)

12:10 **Lunch break**

14:00 *ThA1 NiO/Ga₂O₃ heterojunctions for Diodes*

Ch: von Wenckstern (Leipzig), Ye (Nanjing U), Hao (USTC), Gilankar (Arizona SU), Qiuyan (USTC), Spencer (NRL)

15:25 **Refreshments**

16:00 *ThA2 MOSFETs & NiO/Ga₂O₃ heterojunctions*

Ch: Higashiwaki (Osaka MU), Zhou (USTC), Oshima (NIMS), Tetzner (FBH), Dryden (Cornell U), Wang (NICT), Piel (AFRL)

17:40 **Break**

18:00-19:30 **Rump Session:**

Ch: Schröder (IKZ), Industry Perspective on Ga₂O₃

FRIDAY 31 MAY

08:15 **Admissions**

08:45 *FrM1 Advanced Device Characterization / Thermal Properties*

Ch: Singiseti (U Buffalo), McCluskey (Washington SU), Fregolent (U Padova), Ishikawa (JFCC), Lundh (NRL), Liao (NRL), Wagner (PDI), Nandi (U Bristol)

10:40 **Refreshments**

11:10 *FrM2 Detectors*

Ch: Onuma (Tokyo U), Shimazoe (Kyoto IT), Huang (USTC), Zou (USTC), Hou (USTC), Zhou (Xiangtan U)

12:25 **Lunch break**

14:15 *FrA1 Rutile GeO₂ as novel ultrawide bandgap semiconductor*

Ch: Schlom (Cornell U), Kioupakis (U Michigan), Wang (U Michigan), Galazka (IKZ), Chen (PDI), Tornatzky (PDI)

16:10 **Refreshments**

16:30 *FrA2 Late News*

Ch: Albrecht (IKZ), Singiseti (U Buffalo), Miyamoto (NCT), Li (KAUST)

17:25 **Award Ceremony**

17:40-17:55 **Closing**

Bold*: Keynote Speaker

Bold: Invited Speaker

IWGO 2024 Detailed Program

May 26, Sunday

15:30-19:30 Registration of Participants

15:30-17:15 Registration Process

17:30-19:30 Welcome Reception

May 27, Monday

08:15-08:45 Admissions

08:45-09:00 MoM1_1 IWGO 2024 Opening Notes Roman Engel-Herbert, Oliver Bierwagen, Martin Albrecht

09:00-10:15 Bulk Growth Chair: Zbigniew Galazka (IKZ)

09:00-09:25 MoM1_2 (Invited)

Recent Status of Ga₂O₃ Crystal Growth Development

Akito Kuramata

Novel Crystal Technology, Inc., Sayama, Saitama, Japan

09:25-09:40 MoM1_3 (Oral)

X-ray Topography Imaging of Defects in β -Ga₂O₃ and Their Correlation to Laboratory X-ray Rocking Curves

M. E. Liao^{1,*}, K. Huynh¹, Y. Wang¹ and M. S. Goorsky¹

¹*University of California Los Angeles, Los Angeles, California, USA*

09:40-09:55 MoM1_4 (Oral)

Growth of β -Ga₂O₃ single crystals 2-4 inches in diameters by the vertical Bridgman (VB) technique

T. Taishi[†] and K. Hoshikawa

Faculty of Engineering, Shinshu University, Nagano, Japan

09:55-10:10 MoM1_5 (Oral)

Growth of 6-inch bulk β -Ga₂O₃ single crystal by vertical Bridgman method

T. Igarashi^{1,*}, Y. Ueda, H. Yamaguchi¹, K. Koshi², R. Sakaguchi¹, S. Watanabe¹, S. Yamakoshi¹ and A. Kuramata¹

¹*Novel Crystal Technology, Inc., Japan*

²*National Institute of Advanced Industrial Science and Technology, Japan*

10:10-10:15 MoM1_6 Company Pitch by: Hangzhou Fujia Gallium technology Co. Ltd.

10:15-10:45 Break with Refreshments

10:45-12:20 Vapor Phase Epitaxy Chair: Shizuo Fujita (Kyoto University)

10:45-11:30 MoM2_1 (Keynote lecture)

Advances of Homoepitaxial growth of β -Ga₂O₃ by MOVPE

Andreas Popp*, Ta-Shun Chou, Saud Bin Anooz, Jana Rehm, Arub Akhtar, Zbigniew Galazka, Andreas Fiedler, Palvan Seyidov, Klaus Irmscher, Martin Albrecht

Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

11:30-11:45 MoM2_2 (Oral)

Mitigating Step Flow Instabilities in MOVPE-Grown β -Ga₂O₃ Films

Ta-Shun Chou*, Saud Bin Anooz, Jana Rehm, Arub Akhtar, Owen Ernst, Zbigniew Galazka, Palvan Seyidov, Wolfram Miller, Martin Albrecht, Andreas Fiedler and Andreas Popp

Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

11:45-12:00 MoM2_3 (Late News)
Advancements in MOCVD Growth of High-Quality β -Ga₂O₃ Films with Innovative Showerhead Technology
Andrei Osinsky, William Brand*, and Fikadu Alema
Agnitron Technology, Inc, Chanhassen, MN 55317, U.S.A

12:00:12:25 MoM2_4 (Invited)
Vapor-phase epitaxial growth of gallium-oxide using Ga halides as source gases
Y. Kumagai^{1,*}, H. Murakami¹, K. Sasaki¹, A. Kuramata² and M. Higashiwaki^{3,4}
¹Department of Applied Chemistry, Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan ²Novel Crystal Technology Inc., Japan ³National Institute of Information and Communications Technology, Japan ⁴Department of Physics and Electronics, Osaka Metropolitan University, Sakai, Osaka, Japan

12:25-12:30 MoM2_4 Company Pitch by: LayTec

12:30-14:15 Lunch Break

14:15-15:55 κ -Ga₂O₃, Ga₂O₃/III-N, MBE Chair: Piero Mazzolini (Parma University)

14:15-14:40 MoA1_1 (Invited)
MOVPE growth and properties of orthorhombic κ -Ga₂O₃
Roberto Fornari
Dept. of Mathematical, Physical and Computer Sciences, University of Parma, Italy and CNR - Institute of Materials for Electronics and Magnetism, Parma, Italy

14:40-14:55 MoA1_2 (Oral)
(Student) **Molecular beam epitaxy of (001) κ -Ga₂O₃ thin films on ϵ -GaFeO₃ substrates**
A.Sacchi^{1,*}, F. Mezzadri^{2,3}, A. Ardenghi⁴, O. Bierwagen⁴, J. Lähnemann⁴, H. Tornatzky⁴, M. R. Wagner^{4,5}, H. Nishinaka⁶, R. Fornari^{1,3}, P. Mazzolini^{1,3}
¹Department of Mathematical, Physical and Computer Sciences, University of Parma, Italy ²Department of Chemistry, Life Sciences and Environmental Sustainability, University of Parma, Italy ³IMEM-CNR, Parma, Italy ⁴Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany ⁵Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany and ⁶Faculty of Electrical Engineering and Electronics, Kyoto Institute of Technology, Japan

14:55-15:10 MoA1_3 (Oral)
Molecular beam epitaxy of ϵ/κ -Ga₂O₃ using In as a surfactant
A.Karg^{1,*}, A. Hinz¹, M. Schowalter¹, P. Vogt¹, S.Figge¹, A. Rosenauer^{1,2}, M. Eickhoff^{1,2}
¹Institute of Solid State Physics, University of Bremen, Germany and ²MAPEX Center for Materials and Processes, University of Bremen, Germany

15:10-15:25 MoA1_4 (Oral)
The Growth of Ga₂O₃-III-Nitrides by Molecular Beam Epitaxy
J. P. McCandless^{1,2,*}, S. Raghuvansy², M. Schowalter², N. Krantz², A. Karg², D. G. Schlom¹, H. G. Xing¹, A. Rosenauer², M. Eickhoff², P. Vogt^{1,2}, D. Jena¹
¹Cornell University, Ithaca, NY, USA and ²University of Bremen, Bremen, Germany

15:25-15:40 MoA1_5 (Oral)
(Student) **Heteroepitaxial growth of β -Ga₂O₃(-201)/AlN(0001) and ϵ/κ -Ga₂O₃(001)/AlN(0001) structures by molecular-beam epitaxy**
S. Raghuvansy^{1,*}, J. P. McCandless^{1,2}, M. Schowalter¹, A. Karg¹, M. Alonso-Orts³, M. S. Williams¹, D. G. Schlom^{4,5,6}, A. Rosenauer^{1,3}, D. Jena^{2,4,5}, M. Eickhoff^{1,3} and P. Vogt^{1,4}
¹Institute of Solid-State Physics, Bremen University, Bremen, Germany ²School of Electrical and Computer Engineering, Cornell University, Ithaca, New York, USA ³MAPEX Center for Materials and Processes, University of Bremen, Bremen, Germany ⁴Department of Material Science and Engineering, Cornell University, Ithaca, New York, USA ⁵Kavli Institute at Cornell for Nanoscale Science, Cornell University, Ithaca, New York, USA and ⁶Leibniz-Institut für Kristallzüchtung, Berlin, Germany

15:40-15:55 MoA1_6 (Oral)
Molecular beam epitaxy of Al-Polar AlN(0001) on β -Ga₂O₃(-201)
E. Monroy^{1,*}, H. Okuno², H. Roussel³, J.-L. Rouvière², A. Bujak³, A. Seguret^{1,3}, P. Ferrandis⁴, and V. Consonni³
¹Univ. Grenoble-Alpes, CEA, Grenoble INP, IRIG, PHELIQS, Grenoble, France ²Univ. Grenoble-Alpes, CEA, IRIG, MEM, Grenoble, France ³Univ. Grenoble-Alpes, CNRS, Grenoble INP, LMGP, Grenoble, France and ⁴Univ. Grenoble-Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France

15:55-16:25 Break with Refreshments

- 16:25-16:50 MoA2_1 (Invited)
Growth of β -Ga₂O₃ and α -(Al_xGa_{1-x})₂O₃ by Suboxide MBE at 1 μ m/hr
 D.G. Schlom^{1,2,3,*}
¹Department of Materials Science & Engineering, Cornell University, Ithaca, New York, USA ²Kavli Institute at Cornell for Nanoscale Science, Ithaca, New York, USA and ³Leibniz-Institut für Kristallzüchtung, Berlin, Germany
- 16:50-17:05 MoA2_2 (Oral)
 (Student) **Surface and interface energies of α -, β -, and κ -Ga₂O₃ under epitaxial strain induced by a sapphire substrate**
 I. Bertoni^{1,*}, A. Ugolotti¹, E. Scalise¹ and L. Miglio¹
¹Department of Materials Science, Università degli Studi di Milano-Bicocca, Milano, Italy
- 17:05-17:20 MoA2_3 (Oral)
Optical library of α -, β -, γ - and κ -Ga₂O₃ polymorphs: comparative study of emission and absorption properties
 Augustinas Galeckas^{1,*}, Ji-Hyeon Park², Dae-Woo Jeon², Halin Lee³, Won-Jae Lee³, Rui Zhu^{4,5}, Zengxia Mei^{4,5}, Alexander Azarov¹ and Andrej Kuznetsov¹
¹University of Oslo, Department of Physics, Centre for Materials Science and Nanotechnology, Oslo, Norway ²Korea Institute of Ceramic Engineering & Technology, Republic of Korea ³Dong-Eui University, Department of Advanced Materials Engineering, Republic of Korea ⁴Songshan Lake Materials Laboratory, Guangdong, P. R. China and ⁵Institute of Physics, Chinese Academy of Sciences, Beijing, P. R. China
- 17:20-17:35 MoA2_4 (Oral)
 (Student) **Comparative Study of Temperature-Dependent Bandgap Transitions in Ga₂O₃ Polymorphs**
 B. M. Janzen^{1,*}, N. Hajizadeh¹, M. Meißner¹, M. N. Marggraf¹, C. V. Hartung¹, A. Wüthrich¹, N. Bernhardt¹, F. Nippert¹, Z. Galazka², P. Mazzolini^{3,4}, A. Sacchi³, Matteo Bosi⁴, Luca Seravalli⁴, R. Fornari^{3,4}, C. Petersen⁵, H. von Wenckstern⁵, M. Grundmann⁵, A. Ardenghi⁶, O. Bierwagen⁶, T. Oshima⁷, T. Kato⁸, H. Nishinaka⁸ and M. R. Wagner^{6,1}
¹Technische Universität Berlin, Institute of Solid State Physics, Germany ²Leibniz-Institut für Kristallzüchtung, Berlin, Germany ³Department of Mathematical, Physical and Computer Sciences, University of Parma, Italy ⁴Universität Leipzig, Felix-Bloch-Institut für Festkörperphysik, Germany ⁵Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany ⁶Department of Electrical and Electronic Engineering, Saga University, Japan ⁷Faculty of Electrical Engineering and Electronics, Kyoto Institute of Technology, Japan

17:35-19:30 Poster 1: bulk β -Ga₂O₃, Polymorphs and κ -Ga₂O₃, Growth mechanisms, Ga₂O₃/III-N

- MoP_1 **Temperature Gradient control of Gallium Oxide Crystal Growth via Edge-Defined Film-Fed Growing Method**
 Seong-Min Jeong^{1,*}, Woon-Hyeon Jeong^{1,2}, Su-Min Choi³, Yun-Ji Shin¹, Si-Young Bae¹, Jin-Ki Kang⁴, Won-Jae Lee³ and Se-Hun Kwon²
¹Semiconductor Materials Center, Korea Institute of Ceramic Engineering and Technology, Jinju, Gyeongsangnam-do, Republic of Korea ²Department of Materials Science and Engineering, Pusan National University, Busan, Republic of Korea ³Department of Advanced Materials Engineering, Dong-Eui University, Busan, Republic of Korea
- MoP_2 (Student) **Theoretical Consideration of Load Cell Weight Variation at Different Steps for Ga₂O₃ Crystal Growth by EFG Method**
 Yun-Jin Kim^{1,2}, Dong-Gu Kang¹, Dong-hee Cho¹, Min-ji Chae², Sun-Yeong Seo², Won-Jae Lee², Jin-Ki Kang^{1*}
¹AXEL, Jinju-si, Korea ²Department of Advanced Materials Engineering, Dong-Eui University, Busan, Korea
- MoP_3 (Student) **Characteristics of substrates with various crystal orientations obtained from a β -Ga₂O₃ single crystal grown by the EFG method**
 Min-Ji Chae¹, Sun-Yeong Seo¹, Hui-Yeon Jang¹, Mi-Seon Park¹, Kwang-Hee Jung¹, Won-Jae Lee^{1,*}, Su-Min Choi², Hyun-Woo Park², Jin-Ki Kang², Yun-Ji Shin³, Si-Young Bae³, Hae-Yong Lee⁴, Tae-Kyung Lee⁵ and Hyoung-Jae Kim⁵
¹Department of Advanced Materials Engineering, Dong-Eui University, Busan, Korea ²AXEL, Jinju-si, Korea ³Korea Institute of Ceramic Engineering and Technology, Jinju-si, Korea ⁴LumiGNtech Co, Ltd, Gwangmyeong-si, Gyeonggi-do, Korea and ⁵Korea Institute of Industrial Technology, Sasang-gu, Busan, Korea
- MoP_4 (Student) **Sn/Fe-doped β -Ga₂O₃ single crystals growth by controlling temperature gradient in growth zone**
 Min-Ji Chae¹, Sun-Yeong Seo¹, Hui-Yeon Jang¹, Mi-Seon Park¹, Kwang-Hee Jung¹, Won-Jae Lee^{1,*}, Su-Min Choi², Hyun-Woo Park², Jin-Ki Kang², Yun-Ji Shin³, Si-Young Bae³, Hae-Yong Lee⁴, Tae-Kyung Lee⁵ and Hyoung-Jae Kim⁵
¹Department of Advanced Materials Engineering, Dong-Eui University, Busan, Korea ²AXEL, Jinju-si, Korea and ³KITECH, Korea Institute of Industrial Technology, Busan, Korea

- MoP_5 (Student) **Modulating the bandgap of β -Ga₂O₃ via alloying with In₂O₃ in melt-grown crystals**
Benjamin L. Dutton*, John S. McCloy
Institute of Materials Research, Washington State University, Pullman WA, USA
- MoP_6 (Student) **Studies on structural and optical properties of (100) orientation growth of cerium doped β -Ga₂O₃ single crystals**
K.V. Akshita, S. Moorthy Babu*
Crystal Growth Centre, Anna University, Chennai, INDIA
- MoP_7 **Study of impurity contamination in gallium oxide crystal grown by floating zone method**
Coralie Perrier^{1,3}, Aboulaye Traoré^{2,3}, Toshimitsu Ito⁴, Hitoshi Umezawa⁵, Etienne Gheeraert^{1,2,3} and Philippe Ferrandis^{1,3,*}
¹Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France ²Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Japan ³Japanese-French Laboratory for Semiconductor Physics and Technology J-F AST, CNRS, University Grenoble Alpes, Grenoble INP, University of Tsukuba, Japan ⁴Electronics and Photonics Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan and ⁵Advanced Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Osaka, Japan
- MoP_8 **Comprehensive Investigation of Structural Defects in Ga₂O₃ Single Crystals Grown by EFG Method**
Yun-Ji Shin¹, Mee-Hi Choi^{1,2}, Soon-Ku Hong³, Seong-Min Jeong¹, and Si-Young Bae^{1,*}
¹Semiconductor Materials Center, Korea Institute of Ceramic Engineering and Technology, Jinju-si, Gyeongsangnam-do, Republic of Korea, ²Department of Materials Science and Engineering Pusan National University, Busan, Republic of Korea and ³Department of Materials Science and Engineering Chungnam National University, Daejeon, Republic of Korea
- MoP_9 **Poster withdrawn**
- MoP_10 (Student) **Simulation of multi-component target ablation: a novel combinatorial pulsed laser deposition technique**
A.Jörns^{1*}, H. von Wenckstern¹ and M. Grundmann¹
¹Leipzig University, Felix Bloch Institute for Solid State Physics, Leipzig, Germany
- MoP_11 **N₂-diluted H₂ gas etching of (-102) β -Ga₂O₃ under atmospheric pressure**
T. Oshima^{1,*}, Y. Oshima¹ and S. Nakagomi², Liga Ignatane¹, Boris Polyakov¹, Sergei Vlassov², Juris Purans¹
¹National Institute for Materials Science, Tsukuba, Ibaraki, Japan and ²Sophia University, Chiyoda, Tokyo, Japan
- MoP_12 **Influence of geometrical selection on the orientation of Ga₂O₃ nanorod arrays grown by chemical bath deposition on SnO₂ layers**
N. Bašinová¹, R. Yatskiv¹, J. Grym¹
¹Institute of Photonics and Electronics of the CAS, Prague, Czech Republic
- MoP_13 (Student) **In-situ etching of Ga, Ge, and In layers in oxide MBE by O₂-induced formation and evaporation of their volatile suboxide**
Wenshan Chen*, Kingsley Egbo, and Oliver Bierwagen
Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin, Germany
- MoP_14 **Impact of temperature and film thickness on α - and β -phase formation in Ga₂O₃ thin films on a-plane sapphire**
Edgars Butanovs^{1,*}, Martins Zubkins¹, Edvards Strods¹, Viktors Vibornijs¹, Kevon Kadiwala¹
¹Institute of Solid State Physics, University of Latvia, Riga, Latvia and ²Institute of Physics, University of Tartu, Tartu, Estonia
- MoP_15 **Thermodynamics of Ga₂O₃ heteroepitaxy and MOCVD growth of β -Ga₂O₃ on 4H-SiC**
Indraneel Sanyal*, Arpit Nandi, David Cherns and Martin Kuball
Center of Device and Thermographic Reliability, University of Bristol, United Kingdom
- MoP_16 **Real-time Monitoring of Homo- and Heteroepitaxial Process for MOVPE-grown β -Ga₂O₃ Films**
Ta-Shun Chou¹, Saud Bin Anooz¹, Jana Rehm¹, Arub Ahktar¹, Deshabrato Mukherjee², Peter Petrik², Zbigniew Galazka¹, Marcello Binetti³, Christian Camus³ and Andreas Popp¹
¹Leibniz-Institut für Kristallzüchtung Berlin, Germany ²Institute for Technical Physics and Materials Science, Centre for Energy Research, Budapest, Hungary and ³LayTec AG, Berlin, Germany
- MoP_17 (Student) **(-201) homoepitaxial β -Ga₂O₃ thin films grown by metal organic chemical vapor deposition**
Yifan Li¹, Rujun Sun¹, Yachao Zhang¹, Jing Ning¹, Hong Zhou¹, Qian Feng¹, Chunfu Zhang¹, Jincheng Zhang^{1,*} and Yue Hao¹
¹State Key Discipline Laboratory of Wide Band Gap Semiconductor Technology, School of Microelectronics, Xidian University, Xi'an, China
- MoP_18 **Towards synthesis of compositionally graded multi-component oxide thin films by CCS-PLD using multi-segmented targets**
J. M. Bredow^{1,*}, S. Vogt¹, M. Grundmann¹ and H. von Wenckstern¹
¹University of Leipzig, Leipzig, Germany

- MoP_19 Transport and thermal properties of β -Ga₂O₃ films grown by liquid-injection MOCVD on sapphire and SiC substrates**
M. Ťapajna^{1,*}, F. Egyenes¹, F. Hrubíšák¹, K. Hušeková¹, E. Dobročka¹, P. Nádaždy¹, A. Rosová¹, Z. Chi², E. Chikoidze², X. Zheng³, J. W. Pomeroy³, M. Kubal³ and F. Guemann¹
¹Institute of Electrical Engineering SAS, Bratislava, Slovakia ²GEMaC, Université Paris-Saclay, UVSQ-CNRS, Versailles, France and ³CDTR, University of Bristol, Bristol, UK
- MoP_20 Deposition of Ga₂O₃ and ZnGa₂O₄ thin films by liquid metal target sputtering**
M. Zubkins^{1,*}, V. Vibornijs¹, E. Strods¹, E. Butanovs¹, L. Bikse¹, M. Ottosson², A. Hallén³, J. Purans¹, A. Azens⁴
¹Institute of Solid State Physics, Riga, Latvia ²Angstrom Laboratory, Uppsala, Sweden ³KTH Royal Institute of Technology, Kista-Stockholm, Sweden and ⁴AgI Technologies Ltd, Riga, Latvia
- MoP_21 Homoepitaxial HVPE layers on (100) and (-201) β -Ga₂O₃ substrates**
P. Butenko^{1,*}, M. Boiko¹, L. Guzilova¹, B. Obidov¹, A. Pechnikov^{1,2}, M. Sharkov¹, A. Zarichny¹ and V. Nikolaev^{1,2}
¹Ioffe Institute, St Petersburg, Russia ²Perfect Crystals LLC, St Petersburg, Russia
- MoP_22 Innovative growth of doped β -gallium oxide thin-films by Pulsed Electron Deposition**
F. Pattini¹, F. Stancari^{2,*}, G. Spaggiari^{1,2}, F. Mezzadri³, S. Rampino¹, A. Parisini², A. Baraldi², M. Pavesi², G. Trevisi¹, A. Bosio² and R. Fornari²
¹Institute of Materials for Electronics and Magnetism, CNR, Parma, Italy ²Dept. of Mathematical, Physical and Computer Sciences, University of Parma, Parma, Italy ³Dept. of Chemistry, Life Sciences and Environmental Sustainability, University of Parma, Parma, Italy
- MoP_23 (Student) Epitaxial growth of Ga₂O₃ thin films using pulsed-liquid injection MOCVD**
Marielena Velasco-Enriquez^{1,2*}, Isabelle Gelard¹, Carmen Jimenez¹, Herve Roussel¹, Philippe Ferrandis², Eirini Sarigiannidou¹ and Vincent Consonni¹
¹Univ. Grenoble Alpes, CNRS, Grenoble INP, LMGP, Grenoble, France and ²Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France
- MoP_24 (Student) Plasma assisted molecular beam epitaxial growth of β -Ga₂O₃ (100) thin films on MgO(100) Substrates**
S.F. Hibbert^{1,3*}, M.W. Allen^{2,3} and R.J. Reeves^{1,3}
¹Department of Physical and Chemical Sciences, University of Canterbury, Christchurch, Canterbury, New Zealand ²Department of Electrical and Computer Engineering, University of Canterbury, Christchurch, Canterbury, New Zealand ³MacDiarmid Institute for Advanced Materials and Nanotechnology, University of Canterbury, Christchurch, New Zealand
- MoP_25 Change of as-grown Surface morphology of β -Ga₂O₃ epilayers on (001) β -Ga₂O₃ substrates by HVPE**
Hae-Yong Lee^{1,*}, Tae-Won Seo¹, Young Jun Choi¹, Hae-Gon Oh¹, Yoonsu Kim², and Min Suk Oh²
¹LumiGNtech Co., Ltd., Gwangmyeong, Gyeonggi-Do, Korea ²Korea Electronics Technology Institute, Sengman, Gyeonggi-Do, Korea
- MoP_26 Chemical Solution Deposition of Gallium Oxide Single Layer with High Thickness and Silver-Enhanced Crystal Quality**
X. Tang and X. Li
Advanced Semiconductor Laboratory, Electrical, and Computer Engineering Program, CEMSE Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia
- MoP_27 (Student) Electronic and Thermal Advantages of Lattice Matched Nitride-Oxide HEMTs**
Modassir Anwer^{1,*} and Amit Verma¹
¹Department of Electrical Engineering, Indian Institute of Technology Kanpur, India
- MoP_28 poster withdrawn**
- MoP_29 (Student) Investigation of β -Ga₂O₃/III-N(III =Ga, Al) heterostructures grown by metal organic chemical vapor deposition**
Yifan Li¹, Rujun Sun¹, Yachao Zhang¹, Jing Ning¹, Hong Zhou¹, Qian Feng¹, Chunfu Zhang¹, Jincheng Zhang^{1,*} and Yue Hao¹
¹State Key Discipline Laboratory of Wide Band Gap Semiconductor Technology, School of Microelectronics, Xidian University, Xi'an, China
- MoP_30 (Student) Interface Engineering of Gallium Oxide Polymorphs**
Chan Woong Kim^{1,†}, Ha Young Kang¹, Yoonho Choi¹ and Roy Byung Kyu Chung^{1,*}
¹Kyungpook National University, Daegu, South Korea
- MoP_31 (Student) Comparative study of the optical properties of α -, β -, and κ -Ga₂O₃**
L. Penman^{1,*}, Z. Johnston¹, Y. Oshima², C. McAleese³, P. Mazzolini^{4,5}, M. Bosi⁵, L. Seravalli⁵, R. Fornari^{4,5} and F. Massabuau¹
¹Department of Physics, University of Strathclyde, Glasgow, UK ²National Institute for Materials Science, Tsukuba, Japan ³AIXTRON Ltd., Cambridge, UK ⁴Department of Mathematical, Physical and Computer Sciences, University of Parma, Parma, Italy and ⁵IMEM-CNR, Parma, Italy
- MoP_32 Detailed investigations on the orientation-dependent optical properties of β -Ga₂O₃ films**
Kishor Upadhyaya¹, Hadeel Alamoudi¹, Vijay Kumar Gudelli¹, Fatimah Alreshidi¹, Wojciech Ogieglo² and Iman Roqan^{1*}
¹Physical Science and Engineering divisions, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia ²Advanced Membranes and Porous Materials Center, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

- MoP_33 **Growth of Amorphous Ga₂O₃ on Quartz Substrates by Mist Chemical Vapor Deposition**
Kazuyuki Uno
Department of Systems Engineering, Wakayama University, Wakayama, Japan
- MoP_34 **Computation of the concentration dependent structural properties of ϵ/κ -(In,Ga)₂O₃ and its application to the measurement of strain in heterostructures**
M. Schowalter^{1,*}, A. Karg¹, C. Mahr¹, M. Eickhoff^{1,2} and A. Rosenauer^{1,2}
¹*Institut für Festkörperphysik, Universität Bremen, Germany* ²*MAPEX Center for Materials and Processes, Universität Bremen, Germany*
- MoP_35 (Student) **Crystal Growth Dynamics of κ -Ga₂O₃ Thin Films on ϵ -GaFeO₃ Substrates by Mist CVD**
M. Sugimoto^{1,*}, T. Ogawa¹, O. Ueda², H. Nishinaka³, and M. Yoshimoto³
¹*Department of Electronics, Kyoto Institute of Technology, Kyoto, Japan* ²*Meiji Renewable Energy Laboratory, Meiji University, Kawasaki, Kanagawa, Japan* and ³*Faculty of Electrical Engineering and Electronics, Kyoto Institute of Technology, Kyoto, Japan*
- MoP_36 (Student) **Single-Phase and Single-Domain Formation of Orthorhombic Ga₂O₃: Influence of Dopants and Substrates**
Ha Young Kang¹, Chan Woong Kim¹, Yoonho Choi¹ and Roy Byung Kyu Chung^{1,*}
¹*School of Materials Science and Engineering, Kyungpook National University, Daegu, South Korea – Authors with equal contribution*
- MoP_37 (Student) **Surface Acoustic Wave UVC Photodetectors based on ϵ -phase Gallium Oxide**
Jiahong Luo, Chenhong Huang, Yujia Tu, Zimin Chen, Yanli Pei, Xing Lu*, and Gang Wang
State Key Laboratory of Optoelectronic Materials and Technologies, School of Electronics and Information Technology, Sun Yat-sen University, Guangzhou, China
- MoP_38 **A combined EPR and electrical transport study of Si doped κ -Ga₂O₃/Al₂O₃ thin films**
H.J.von Bardeleben¹, A.Parisini², P.Mazzolini², A.Bosio², M.Bosi³, L.Seravalli³, R.Fornari²
¹*Institut des Nanosciences de Paris (INSP), Sorbonne Université, Paris, France* ²*University of Parma, Dept. of Mathematical, Physical and Computer Sciences, Parma, Italy* and ³*IMEM-CNR, Institute of Materials for Electronics and Magnetism, Parma, Italy*
- MoP_39 (Student) **Red shift of the absorption onset in orthorhombic κ -(In_xGa_{1-x})₂O₃ alloys**
E. Kluth,^{1,*} A. Karg², M. Eickhoff², R. Goldhahn¹ and M. Feneberg¹
¹*Institut für Physik, Otto-von-Guericke-Universität Magdeburg, Germany* and ²*Institut für Festkörperphysik, Universität Bremen, Germany*
- MoP_40 **Defect structure and luminescence of micro-monocrystals κ -Ga₂O₃**
O.F. Vyvenko¹, S. V. Shapenkov^{1,2}, E. V. Ubyivovk¹, A. S. Bondarenko¹, A.I. Pechnikov², V. I. Nikolaev²
¹*St.Petersburg State University, St. Petersburg, Russia* and ²*Ioffe Institute, St. Petersburg, Russia*
- MoP_41 **Annealing effect on shallow and deep level defects in κ -Ga₂O₃ thin films**
P. Mazzolini^{1,2,*}, J.B. Varley³, A. Parisini¹, A. Sacchi¹, M. Pavesi¹, A. Bosio¹, M. Bosi², L. Seravalli², B.M. Janzen⁵, M.R. Wagner^{6,5}, A. Ardenghi⁶, O. Bierwagen⁶, A. Falkenstein⁴, J. Kler⁴, R. A. De Souza⁴, M. Martin⁴, F. Mezzadri⁷, C. Borelli¹ and R. Fornari^{1,2}
¹*Department of Mathematical, Physical and Computer Sciences, University of Parma, Italy* ²*IMEM-CNR, Parma, Italy* ³*Lawrence Livermore National Laboratory, Livermore, United States* ⁴*Institute of Physical Chemistry, RWTH Aachen University, Germany* ⁵*Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany* ⁶*Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany* and ⁷*Department of Chemistry, Life Sciences and Environmental Sustainability, University of Parma, Italy*
- MoP_42 (Late News, Student) **Thermal stability of α -Ga₂O₃ grown on c-plane sapphire by mist-chemical-vapor-deposition**
Hongliang Chang¹, Seong-Ho Cho², Yanqing Jia¹, Bambar Davaasuren³, Abdullah Alquwayzani^{1,*}, Si-Young Bae^{2,a}, Tien Khee Ng^{1,b} and Boon S. Ooi^{1,c}
¹*Photonics Laboratory, Electrical and Computer Engineering, Division of Computer, Electrical and Mathematical Sciences and Engineering, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia* ²*Imaging and Characterization Core Lab, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia* and ³*Department of Physics, Khalifa University, Abu Dhabi, United Arab Emirates*
- MoP_43 (Late News, Student) **The growth of κ -Ga₂O₃ by oxide-molecular-beam-epitaxy for high-responsivity UVC Photodetector**
Yanqing Jia¹, Hongliang Chang¹, Tae-Yong Park¹, Yara Banda¹, Bassam AlQahtani¹, Qingxiao Wang¹, Tien Khee Ng¹ and Boon S. Ooi^{1,b} and Abdullah A. Aiquwayzani^{1,*}
¹*King Abdullah University of Science and Technology, Thuwal, Saudi Arabia*
- MoP_44 (Late News, Student) **2-inch Bulk β -Ga₂O₃ Single Crystals Grown by EFG Method with High Wafer Scale Quality**
Ganrong Feng^{1,2}, Shan Li^{1,2,*} and Weihua Tang^{1,2,*}
¹*College of Integrated Circuit Science and Engineering, Nanjing University of Posts and Telecommunications, Nanjing, China*, ²*Beijing GAO Semiconductor Co. Ltd., Beijing, China*
- MoP_45 (Late News, Student) **Polarization Induced Electron Confinement by Dilute Boron Alloying in ϵ -Ga₂O₃ for High Electron Mobility Transistor**
Yan Wang^{1,*}, Chuang Zhang¹ and Chee Keong Tan^{1,*}

¹Advanced Materials Thrust, Function Hub, The Hong Kong University of Science and Technology (Guangzhou), Guangzhou, Guangdong, China

MoP_46 (Late News, Student) **NiO β -Ga₂O₃ p-n Heterojunctions Grown by the Low-cost, Vacuum-free Mist-CVD for Device Applications**

Zeyulin Zhang, Dinghe Liu, Yiru Yan, Qingwen Song*, Dazheng Chen, Chunfu Zhang*, Yuming Zhang, and Yue Ha
National Key Laboratory of Wide Bandgap Semiconductor Devices and Integrated Technology Xidian University, Xi'an, China

MoP_47 (Late News, Student) **Crystal growth of gallium indium sesquioxide by using the MIST-CVD technique**

Carolina Fernández-Saiz^{1,*}, Carmen Martínez-Tomás¹, Hiroyuki Nishinaka², Vicente Muñoz-Sanjosé¹
¹Department of Applied Physics and Electromagnetism, University of Valencia, Burjassot, Spain and ²Faculty of Electrical Engineering and Electronics, Kyoto Institute of Technology, Matsugasaki Sakyo-ku, Kyoto, Japan

MoP_48 (Late News, Student) **Growth of Amorphous to Crystalline Gallium Oxide Thin Films Controlled by Suboxide Formation Using MOCVD**

Chuang Zhang^{1,*}, Jierui Xue¹, Jiahe Cao¹, Zhigao Xie¹, Yimin Liao¹, Yan Wang¹, Hanzhao Song¹, Andeng Qu¹, Weihua Tang² and Chee-keong Tan^{1,2,*}

¹Advanced Materials Thrust, Function Hub, Hong Kong University of Science and Technology (Guangzhou), Nansha, Guangzhou, China and ²Innovation Center for Gallium Oxide Semiconductor (IC-GAO), College of Integrated Circuit Science and Engineering, Nanjing University of Posts and Telecommunications, Nanjing, China

MoP_49 (Late News, Student) **Growth and characterization of period-4 transition metal doped single crystal β -Ga₂O₃**

Maneesha Narayanan, Arumugam Thamizhavel, Arnab Bhattacharya*
Tata Institute of Fundamental Research, Mumbai, India

MoP_50 (Late News, Student) **Excellent Control over Si Doping in β -Ga₂O₃ (010) Films by Pulsed Laser Deposition**

Vishal Khandelwal, Yi Lu, Shibin Chandroth, Haicheng Cao, Xiao Tang, Xiaohang Li*
Advanced Semiconductor Laboratory (ASL), Electrical and Computer Engineering Program, CEMSE Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Kingdom of Saudi Arabia

MoP_51 (Late News) **Controllable nitrogen doping in MOCVD Ga₂O₃**

Andrei Osinsky, William Brand*, Fikadu Alema
Agnitron Technology Incorporated, Chanhassen, MN, USA

MoP_52 (Late News) **First-principles approach to Ga₂O₃/Si and Ga₂O₃/3C-SiC interfaces**

A. Ugolotti^{1,*}, E. Scalise¹ and L. Miglio¹
¹Department of Materials Science, Università degli Studi di Milano-Bicocca, Milano, Italy

MoP_53 (Late News) **3D modeling of EFG β -Ga₂O₃ crystal growth**

A. Smirnov,* K. Nikiforova, and Y. Shustrov
Semiconductor Technology Research d.o.o. Beograd, Belgrade, Serbia

May 28, Tuesday

08:15-08:45 Admissions

08:45-10:10 Doping and Vacancies 1

Chair: Lasse Vines (University of Oslo)

08:45-09:30 TuM1_1 (Keynote lecture)

Controlling doping in Ga₂O₃ and related alloys

Chris G. Van de Walle

University of California, Santa Barbara, California, USA

09:30-09:55 TuM1_2 (Invited Talk)

(Student) **Vacancy defects in Si doped β -(Al,Ga)₂O₃**

Iuliia Zhelezova^{1,*}, Ilja Makkonen¹, Zbigniew Galazka² and Filip Tuomisto¹

¹*Department of Physics and Helsinki Institute of Physics, University of Helsinki, Finland and* ²*Leibniz-Institut für Kristallzüchtung, Berlin, Germany*

09:55-10:10 TuM1_3 (Oral)

Impact of Growth Conditions on Electronic Properties in Plasma-assisted MBE-grown β -Ga₂O₃

Brenton A. Noesges^{1,2,*}, Jian Li^{1,2}, Yunjo Kim², Adam T. Neal², Shin Mou², Thaddeus J. Asel²

¹*Azimuth Corporation, Beavercreek, OH, USA* ²*Air Force Research Laboratory, Materials and Manufacturing Directorate, WPAFB, OH, USA*

10:10-10:40 Break with Refreshments

10:40-12:30 Doping and Vacancies 2

Chair: Martin Kuball (University of Bristol)

10:40-10:55 TuM2_1 (Oral)

3d-Transition metals Co and Ni in β -Ga₂O₃

Palvan Seyidov^{1,*}, Joel B. Varley², Zbigniew Galazka¹, Ta-Shun Chou¹, Andreas Popp¹, Martin Albrecht¹, Klaus Irmscher¹ and Andreas Fiedler¹

¹*Leibniz-Institut für Kristallzüchtung, Berlin, Germany and* ²*Lawrence Livermore National Laboratory, Livermore, California, USA*

10:55-11:10 TuM2_2 (Oral)

Zn diffusion and luminescence from Zn acceptors in Zn doped β -Ga₂O₃

Y.K. Hommedal¹, Y.K. Frodason¹, Augustinas Galeckas¹, L. Vines^{1,*}, K.M. Johansen¹

¹*Centre for Materials Science and Nanotechnology/Dep. of Physics, University of Oslo, Oslo, Norway*

11:10-11:25 TuM2_3 (Oral)

(Student) **Comprehensive Study of Ta Doped Gallium Oxide Single Crystals Grown by OFZ**

Technique: Crystal Quality Control and Electrical Characterization

Sridharan Moorthy Babu^{1,*} and V L Ananthu Vijayan,¹

¹*CrysatI Growth Centre, Anna University, Chennai, India*

11:25-11:50 TuM2_4 (Invited Talk)

Hybrid MBE for epitaxial growth of Si-doped (Al,Ga)₂O₃ film

Zhuoqun Wen¹, Kamruzzaman Khan¹, Elaheh Ahmadi^{*}

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

²*Department of Electrical and Computer Engineering, University of California Los Angeles, USA*

11:50-12:05 TuM2_5 (Oral)

(Student) **Growth of Si-doped β -Ga₂O₃ thick layers by low-pressure hot-wall MOVPE using tetramethylsilane as a doping gas**

J. Yoshinaga^{1,2,*}, H. Tozato¹, T. Okuyama¹, S. Sasaki³, G. Piao², K. Ikenaga², K. Shiina⁴, S. Koseki², Y. Ban⁴ and Y. Kumagai^{1,3}

¹*Department of Applied Chemistry, Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan* ²*TAIYO NIPPON*

SANSO CORPORATION, Minato-ku, Tokyo, Japan ³*FLOuRISH Institute, Tokyo University of Agriculture and Technology,*

Koganei, Tokyo, Japan and ⁴*TAIYO NIPPON SANSO CSE LTD., Kawasaki, Kanagawa, Japan*

12:05-13:50 Lunch Break

- 13:50-14:15 TuA1_1 (Invited)
(Student) Understanding Deactivation of Si Dopants in Implanted β -Ga₂O₃
 Katie Gann^{1,*}, Cameron Gorsak¹, Thaddeus Asel², Brent Noesges^{2,3}, Hari Nair¹ and Michael O. Thompson¹
¹Department of Materials Science and Engineering, Cornell University, Ithaca, New York, USA ²Air Force Research Laboratory, Wright-Patterson AFB, Ohio, USA ³Azimuth Corporation, Beavercreek, Ohio, USA
- 14:15-14:30 TuA1_2 (Oral)
Silicon location after its implantation into Ga₂O₃ polymorphs studied by x-ray absorption spectroscopy
 I.N. Demchenko^{1,*}, Y. Syryanyy^{1,2}, A. Shokri¹, Y. Melikhov³, A. Azarov⁴ and A. Kuznetsov⁴
¹Institute of Plasma Physics and Laser Microfusion, Warsaw, Poland ²Institute of Microelectronics and Optoelectronics, Warsaw University of Technology, Warsaw, Poland ³Institute of Fundamental Technological Research Polish Academy of Sciences, Warsaw, Poland ⁴University of Oslo, Department of Physics, Centre for Materials Science and Nanotechnology, Oslo, Norway
- 14:30-14:55 TuA1_3 (Invited)
Disorder-induced ordering in gallium oxide polymorphs
 Andrej Kuznetsov
 University of Oslo, Department of Physics, Oslo, Norway
- 14:55-15:10 TuA1_4 (Oral)
Real Time In-Situ Observation of Vacancy Diffusion and Defect Evolution in Gallium Oxide Using Atomic Resolution Electron Microscopy
 C. Chae¹, K. Zhang², V. Vangipuram², H. Zhao² and J. Hwang^{1,*}
¹Department of Materials Science and Engineering, The Ohio State University, Columbus, OH, USA and ²Department of Electrical and Computer Engineering, The Ohio State University, Columbus, OH, USA
- 15:10-15:25 TuA1_5 (Oral)
Quantitative Study of Ga Interstitial Diffusion in β -Ga₂O₃: Insights from In Situ Transmission Electron Microscopy and First-Principles Calculations
 Ming-Hsun Lee¹, Robert Schewski², Joel B. Varley³, Thilo Remmele², Rebecca L. Peterson¹, Martin Albrecht^{2,*}
¹Department of Materials Science and Engineering, University of Michigan, Ann Arbor, Michigan, United States ²Leibniz-Institut für Kristallzüchtung, Berlin, Germany ³Lawrence Livermore National Laboratory, Livermore, California, United States
- 15:25-15:40 TuA1_6 (Late News)
Anisotropic Anion and Cation Diffusion in β -Ga₂O₃
 A. Falkenstein¹, J. Kler¹, P. Mazzolini², A. Ardenghi³, O. Bierwagen³, B. Janzen⁴, M. Wagner⁴, N. Möller¹, J. Arnold¹ and M. Martin^{1,*}
¹Institute of Physical Chemistry, RWTH Aachen University, Aachen, Germany ²Department of Mathematical, Physical and Computer Sciences, University of Parma, Italy ³Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Germany and ⁴Institute of Solid State Physics, Technische Universität Berlin, Berlin, Germany

15:40-16:10 Break with Refreshments

- 16:10-16:35 TuA2_1 (Invited)
Tackling Disorder in γ -Ga₂O₃
 L. E. Ratcliff^{1,2,*}, T. Oshima³, F. Nippert⁴, B. M. Janzen⁴, E. Kluth⁵, R. Goldhahn⁵, M. Feneberg⁵, P. Mazzolini⁶, O. Bierwagen⁶, C. Wouters⁷, M. Nofal⁷, M. Albrecht⁷, J. E. N. Swallow⁸, L. A. H. Jones⁹, P. K. Thakar¹⁰, T. L. Lee¹⁰, C. Kalha¹¹, C. Schlueter¹², T. D. Veal⁹, J. B. Varley¹³, M. R. Wagner⁴ and A. Regoutz^{11,*}
¹University of Bristol, Bristol, UK ²UiT The Arctic University of Norway, Tromsø, Norway ³Saga University, Saga, Japan ⁴Technische Universität Berlin, Berlin, Germany ⁵Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany ⁶Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany ⁷Leibniz-Institut für Kristallzüchtung, Berlin, Germany ⁸University of Oxford, Oxford, UK ⁹University of Liverpool, Liverpool, UK ¹⁰Diamond Light Source Ltd., Didcot, UK ¹¹University College London, London, UK ¹²Deutsches Elektronen-Synchrotron DESY, Hamburg, German and ¹³Lawrence Livermore National Laboratory, Livermore, USA

- 16:35-16:50 TuA2_2 (Oral)
Unraveling the Atomic Mechanism of the Disorder- Order Phase transition from γ -Ga₂O₃ to β -Ga₂O₃
 Charlotte Wouters¹, Musbah Nofal¹, Piero Mazzolini², Jijun Zhang¹, Thilo Remmele¹, Albert Kwasniewski¹, Oliver Bierwagen² and Martin Albrecht^{1,*}
¹Leibniz-Institut für Kristallzüchtung, Berlin, Germany ²Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Germany
- 16:50-17:05 TuA2_3 (Oral)
 (Student) **Atomic-resolution Imaging and Electron Energy Loss Spectroscopy of Ti/Au Ohmic Contacts to β -Ga₂O₃**
 N. Pieczulewski^{1,*}, K. Smith², C. Gorsak¹, A. Kalra³, H. Nair¹, D. Jena^{1,4,5}, H.G. Xing^{1,4,5}, D. A. Muller^{2,5}
¹Department of Materials Science and Engineering, Cornell University, New York, USA ²School of Applied and Engineering Physics, Cornell University, New York, USA ³School of Chemical and Biomolecular Engineering, Cornell University, New York, USA ⁴Department of Electrical and Computer Engineering, Cornell University, New York, USA ⁵Kavli Institute at Cornell for Nanoscale Science, Cornell University, New York, USA
- 17:05-17:20 TuA2_4 (Oral)
Broad luminescence in single-crystalline ZnGa₂O₄
 Y. K. Frodason^{1,*}, A. Galeckas¹, Z. Galazka², L. Vines¹ and C. G. Van de Walle³
¹Centre for Materials Science and Nanotechnology, University of Oslo, Oslo, Norway ²Leibniz Institute for Crystal Growth, Berlin, Germany and ³Materials Department, University of California, Santa Barbara, California, USA

17:30-19:30 Poster 2: Doping, γ -Ga₂O₃, Characterization, Detectors, and Thermal properties

- TuP_1 **Perspectives of enhancing hole conductivity in GaAlO₃/Ga₂O₃ quantum wells**
 T. Tchelidze^{1,*}, T. Gagnidze¹, N. Basharuli¹ and L. Basharuli¹
¹Ivane Javakishvili Tbilisi State University, Tbilisi, Georgia
- TuP_2 (Student) **LPCVD Grown n-type Gallium Oxide films on c-plane Sapphire with tunable electron concentration using TEOS Precursor**
 Modassir Anwer^{1,*} and Amit Verma¹
¹Department of Electrical Engineering, Indian Institute of Technology Kanpur, India
- TuP_3 (Student) **Carrier density control of Sb-doped rutile-type SnO₂ thin films and fabrication of a vertical Schottky barrier diode**
 Y. Takahashi^{1,*}, H. Takane¹, H. Izumi², T. Wakamatsu¹, Y. Isobe¹, K. Kaneko³ and K. Tanaka¹
¹Kyoto University, Kyoto, Kyoto, Japan ²Hyogo Prefectural Institute of Technology, Kobe, Hyogo, Japan and ³Ritsumeikan University, Kusatsu, Shiga, Japan
- TuP_4 (Student) **Investigation of structural and electrical properties of F-doped α -Ga₂O₃**
 Yoonho Choi¹, Chan Woong Kim¹, Ha Young Kang¹ and Roy Byung Kyu Chung^{1,*}
¹Kyungpook National University, Daegu, South Korea
- TuP_5 **240GHz High Frequency EPR and ENDOR Studies of the VGa defect in β -Ga₂O₃**
 H.J.von Bardeleben
 Institut des NanoSciences de Paris (INSP), Sorbonne Université, Paris (France)
- TuP_6 **Structural Transformation in Ge Implanted β -Ga₂O₃: Functionalization with Ge Nanoparticles leading to 'Emmental-type' Nano-architecture**
 J. García-Fernández^{1,*}, S. B. Kjeldby¹, L. J. Zeng², E. Olsson², L. Vines¹, Ø. Prytz¹
¹Department of Physics/Centre for Materials Science and Nanotechnology, University of Oslo, Oslo, Norway and ²Department of Physics, Chalmers University of Technology, Gothenburg, Sweden
- TuP_7 **Poster withdrawn**
- TuP_8 (Student) **Doping Studies of Ga₂O₃ Thin Films Produced Using Sol-Gel Techniques**
 K.M. Wislang^{1,2,*}, R.J. Reeves^{2,3}, R.M. Gazoni^{2,3} and M.W. Allen^{1,2}
¹Electrical and Computer Engineering, University of Canterbury, Christchurch, New Zealand ²The MacDiarmid Institute for Advanced Materials and Nanotechnology, New Zealand and ³School of Physical and Chemical Sciences, University of Canterbury, Christchurch, Canterbury, New Zealand
- TuP_9 **Zirconium Doping of α -Ga₂O₃ for device applications**
 S. Vogt^{1,*}, C. Petersen¹, T. Schultz^{2,3}, H. von Wenckstern¹, N. Koch^{2,3} and M. Grundmann¹
¹Universität Leipzig, Felix Bloch Institute for Solid State Physics, Semiconductor Physics Group, Leipzig, Germany ²Humboldt Universität zu Berlin, Department of Physics, Supermolecular Systems, Berlin, Germany and ³Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Solar Energy, Berlin, Germany

- TuP_10 Positron annihilation spectroscopy of vacancy type defects in Ga₂O₃**
 Marc H. Weber^{1,2,*}, Corey Halverson^{1,2} and John McCloy¹
¹Institute of Materials Research, Washington State University, Pullman, WA, USA and ²Dept. of Physics and Astronomy, Washington State University, Pullman WA, USA
- TuP_11 Two-dimensional electron (2DEG) and hole (2DHG) gases onto β-Ga₂O₃**
 Ekaterine Chikoidze¹, David J Rogers², Jacob Leach³, Zeyu Chi¹, Hans Jürgen Von Bardeleben⁴, Anne-Marie Gonçalves⁵, Féréchtch Teherani², Tamar Tchelidze⁶, Yves Dumont¹, Amador Perez-Tomas⁷
¹GEMaC, UVSQ – CNRS, Cedex, Versailles, France ²Nanovation, Châteaufort, France ³Kyma Technologies, Inc., Raleigh, USA ⁴INSP, CNRS UMR, Sorbonne Université, Paris, France ⁵ILV, UVSQ – CNRS, Cedex Versailles, France ⁶Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia and ⁷ICN2, CSIC BIST, Campus UAB, Bellaterra, Barcelona, Spain
- TuP_12 Depth-dependent luminescence from implanted and annealed gallium oxide investigated by cross-sectional cathodoluminescence**
 S. B. Kjeldby^{1,*}, J. García-Fernández¹, A. Galeckas¹, Ø. Prytz¹, L. Vines¹
¹Department of Physics and Centre for Materials Science and Nanotechnology, University of Oslo, Oslo, Norway
- TuP_13 (Student) Effect of lithium diffusion in Ga₂O₃ epitaxial thin films**
 A. Sacchi^{1,*}, M. Sidoli¹, A. Ardenghi², O. Bierwagen², J. Kler³, A. Falkenstein³, R. De Souza³, M. Martin³, D. Spallek², J. Lähnemann², H. Tornatzky², M. R. Wagner^{2,4}, A. Parisini¹, M. Pavesi¹, M. Bosi⁵, L. Seravalli⁶, G. Spaggiari^{1,5}, D. Bersani¹, K. Mizohata⁶, F. Tuomisto⁶, G. Magnani¹, D. Pontiroli¹, M. Riccò¹, F. Mezzadri^{7,5}, S. Pasini¹, A. Bosio¹, R. Fornari^{1,5}, P. Mazzolini^{1,5}
¹Department of Mathematical, Physical and Computer Sciences, University of Parma, Italy ²Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany ³Institute of Physical Chemistry, RWTH Aachen University, Germany ⁴Technische Universität Berlin, Institute of Solid State Physics, Berlin, Germany ⁵IMEM-CNR, Parma, Italy ⁶Department of Physics, University of Helsinki, Finland ⁷Department of Chemistry, Life Sciences and Environmental Sustainability, University of Parma, Italy
- TuP_14 (Student) Cr-implanted β-Ga₂O₃: luminescence and nanomembrane fabrication**
 D. M. Esteves^{1,2,*}, M. C. Pedro^{1,2}, D. R. Pereira^{1,2}, A. L. Rodrigues^{3,4}, S. Magalhães², L. C. Alves^{3,4}, L. F. Santos⁵, Z. Jia⁶, W. Mu⁶, M. I. Dias^{3,4}, K. Lorenz^{1,2,4} and M. Peres^{1,2,4}
¹INESC MN, Lisbon, Portugal ²IFPN, Lisbon, Portugal ³C2TN, Lisbon, Portugal ⁴DECN, Instituto Superior Técnico, University of Lisbon, Lisbon, Portugal ⁵CQE and DEQ, Instituto Superior Técnico, University of Lisbon, Lisbon, Portugal and ⁶State Key Laboratory of Crystal Materials, Shandong University, Jinan, China
- TuP_15 (Student) Probing Li-diffusion into Ga₂O₃-polymorphs by depth-resolved cathodoluminescence spectroscopy**
 D. Spallek^{1,*}, A. Sacchi², A. Ardenghi¹, P. Mazzolini², O. Bierwagen¹, M. R. Wagner¹ and J. Lähnemann¹
¹Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Germany ²Department of Mathematical, Physical and Computer Sciences, Università di Parma, Parma, Italy
- TuP_16 Tin Doping Induced High-Performance Ga₂O₃ Photosensor Towards Neuromorphic Visual System**
 P. Li^{1,*}, X. Shan¹, J. G. Ma¹, Y. Lin¹, H. Y. Xu¹ and Y. C. Liu¹
¹Key Laboratory for UV Light-Emitting Materials and Technology of Ministry of Education, Northeast Normal University, Changchun 130024, China
- TuP_17 (Student) Focused Ion Beam Induced Polymorph Conversion and Defect Analysis in Gallium Oxide**
 Umutcan Bektas and Gregor Hlawacek
 Helmholtz-Zentrum Dresden-Rossendorf, Dresden-Germany
- TuP_18 Constant photocurrent method to probe the sub-bandgap absorption in wide bandgap semiconductor films: the case of α-Ga₂O₃**
 D. Nicol¹, S. Reynolds², J. Roberts³, J. Jarman⁴, P. Chalker³ and F. Massabuau^{1,*}
¹University of Strathclyde, Glasgow, UK ²University of Dundee, Dundee, UK ³University of Liverpool, Liverpool, UK and ⁴University of Cambridge, Cambridge, UK
- TuP_19 Surface photovoltage spectroscopy on β-Ga₂O₃ epitaxial layers**
 Th. Dittrich^{1,*}, A. Parisini², M. Pavesi², A. Baraldi², A. Sacchi², F. Mezzadri³, P. Mazzolini², M. Bosi⁴, L. Seravalli⁴, A. Bosio², R. Fornari²
¹Helmholtz Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany ²University of Parma, Dept. SMFI, Parma, Italy ³University of Parma, Dept. SCVSA, Parma, Italy and ⁴IMEM-CNR, IMEM, Parma, Italy
- TuP_20 (Student) Optical properties of Ga₂O₃ free-standing nanomembranes**
 P. Pérez-Peinado^{1,*}, D. Carrasco¹, P. Alcázar¹, J. Dolado², G. Martínez-Criado², F. Domínguez-Adame¹, J. Quereda¹, E. Nogales¹ and B. Méndez¹
¹Universidad Complutense de Madrid, Departamento de Física de Materiales, Madrid, Spain and ²European Synchrotron Radiation Facility - ESRF, Grenoble, France
- TuP_21 Identification of Defects in β-Ga₂O₃ through Microscopy**
 M.-Y. Kim^{1,2,3,*}, A. J. Winchester¹, O. Maimon^{1,2}, D. Yang¹, S.-M. Koo³, Q. Li^{1,2}, S. Pookpanratana^{1,*}
¹National Institute of Standards and Technology, Gaithersburg, MD, USA ²George Mason University, Fairfax, VA, USA and ³Kwangjuon University, Seoul, Republic of Korea
- TuP_22** Poster withdrawn

- TuP_23 Origin of Surface Defects in Homoepitaxially Grown (010) β -Ga₂O₃ films**
 K. Huynh¹, M. E. Liao², M. J. Tadjer³, F. Alema⁴, J. Culbertson³, A. Jacobs¹, J. S. Lundh², H. Masten⁴, J. Gaskins⁵, J. Hite³, M. Mastro³, P. Hopkins⁵, A. Osinsky⁴, K. Hobart³ and M. S. Goorsky¹
¹Department Materials Science and Engineering, University of California Los Angeles, Los Angeles, California, USA ²National Research Council Postdoctoral Fellow at U.S. Naval Research Laboratory ³U.S. Naval Research Laboratory, SW, Washington, DC, USA ⁴Agnitron Technology, Chanhassen, MN, USA ⁵LaserThermal Inc., Charlottesville VA, USA
- TuP_24 Low-temperature gas sensing mechanism in β -Ga₂O₃ nanostructures revealed by near-ambient pressure XPS**
 R. Yatskiv¹, M. Vorokhta², N. Bašinová¹, J. Grym¹, T. N. Dinhova², J. Maixner³
¹Institute of Photonics and Electronics of the CAS, Prague, Czech Republic
- TuP_25 Cr-doped Ga₂O₃ luminescent microcavities with thermometric application: Study of ALD Bragg reflectors with respect to FIB DBR cavities**
 M. Alonso-Orts^{1,2,*}, R. J. T. Neelissen¹, D. Carrasco^{1,3}, M. Schowalter¹, A. Rosenauer^{1,2}, E. Nogales³, B. Méndez³ and M. Eickhoff^{1,2}
¹Institute of Solid State Physics, University of Bremen, Bremen, Germany, ²MAPEX Center for Materials and Processes, Universität Bremen, Bremen, Germany and ³Departamento de Física de Materiales, Universidad Complutense de Madrid, Madrid, Spain
- TuP_26 Quasi van der Waals epitaxial Ga₂O₃ based optoelectronic memristor for a deep ultraviolet optical pulse filtering system**
 Jing Ning^{1,2,*}, Jingjing Huang^{1,2}, Xinmeng Dong^{1,2}, Tiantian Ma^{1,2}, Jincheng Zhang^{1,2} and Yue Hao^{1,2}
¹The State Key Discipline Laboratory of Wide Band Gap Semiconductor Technology, Xidian University, Xi'an, Shaanxi China and ²Shaanxi Joint Key Laboratory of Graphene, Xidian University, Xi'an, Shaanxi, China
- TuP_27 Optical and electrical analyses of self-powered solar blind photodetector based on Solution Processed amorphous core-shell gallium oxide nanoparticles**
 Iman S Roqan*, and Somak Mitra
 Physical Sciences and Engineering Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia
- TuP_28 Significantly enhanced DUV self-powered photodetector based on Sn+ ion implanted β -Ga₂O₃ with suppressed dark current via implantation process**
 Kishor Upadhyaya, Fatimah Alreshidia, Hadeel Alamoudia, D.M. Estevesb, M. Peresb, Katharina Lorenzb, Iman S. Roqana,*
¹Semiconductor and Material Spectroscopy (SMS) Group, King Abdullah University of Science and Technology (KAUST), Saudi Arabia and ²Instituto Superior Técnico, Campus Tecnológico e Nuclear, Lisbon, Portugal
- TuP_29 Study of optical cavities based on β -Ga₂O₃:Cr nanowires with synchrotron radiation**
 Daniel Carrasco¹, Jaime Dolado², Paula Pérez-Peinado¹, Manuel Alonso-Orts^{1,3}, G. Martínez-Criado², José María San Juan⁴, María Luisa Nó⁴, Emilio Nogales^{1,*} and Bianchi Méndez¹
¹Dpt. of Materials Physics, Faculty of Physics, Complutense University, Madrid, Spain ²European Synchrotron Radiation Facility - ESRF, Grenoble, France ³Institute of Solid State Physics, University of Bremen, Bremen, Germany and ⁴Dpt. of Physics, Faculty of Science and Technology, Univ. Basque Country, Bilbao, Spain
- TuP_30 Solar-Blind Ultraviolet Detection Properties of Ga₂O₃/ZnO Heterojunctions**
 J. G. Ma^{1,*}, H. B. Wang¹, P. Li¹ and Y. C. Liu¹
¹Key Laboratory for UV Light-Emitting Materials and Technology of Ministry of Education, Northeast Normal University, Changchun, China
- TuP_31 Assessing the impact of defects on performances of Ga₂O₃ photodetector via photoinduced current transient spectroscopy**
 Rujun Sun^{1,2,*}, Yifan Li^{1,2}, Ce Wang^{1,2}, Hong Zhou^{1,2}, Jincheng Zhang^{1,2}, Yue Hao^{1,2}
¹School of Microelectronics, Xidian University, Xi'an, Shaanxi, China and ²National Key Laboratory of Wide Bandgap Semiconductor Devices and Integrated Technology, Xidian University, Xi'an, Shaanxi, China
- TuP_32 (Student) (Ga, Fe)₂O₃ alloy thin films grown on rh-ITO electrodes by mist CVD**
 R. Kondo^{1,*}, K. Shimazoe¹, H. Nishinaka² and M. Yoshimoto²
¹Department of Electronics, Kyoto Institute of Technology, Matsugasaki, Sakyo-ku, Kyoto, Japan and ²Faculty of Electrical Engineering and Electronics, Kyoto Institute of Technology, Matsugasaki, Sakyo-ku, Kyoto, Japan
- TuP_33 (Student) Visible Light Driven Catalytic properties of Mesoporous β -Ga₂O₃/g-C₃N₄ Hybrid Nanostructures**
 Raja Sakthivel, Sai Prasanna Meenakshisundaram and Moorthy Babu Sridharan*
 Crystal Growth Centre, Anna University, Chennai, Tamil Nadu, India
- TuP_34 Self-powered photodetector based on the PEDOT:PSS/Ga₂O₃ organic-inorganic hybrid heterojunction**
 F. Mattei¹, A. Parisini^{1,*}, D. Spoltore¹, G. Tarabella², D. Vurro², P. D'Angelo², M. Pavesi¹, A. Bosio¹, P. Mazzolini¹, M. Bosi², L. Seravalli², R. Fornari¹
¹University of Parma, Dept. of Mathematical, Physical and Computer Sciences, Parma, Italy and ²IMEM-CNR, Institute of Materials for Electronics and Magnetism, Parma, Italy

- TuP_35 Ag and Au plasmonic nanoparticles formed in β -Ga₂O₃ thin films by ion implantation**
I. S. Gonçalves⁵, I. Freitas⁵, A.S. Sousa^{1,2,5}, D. M. Esteves^{1,2,5}, B. Ferreira¹, R. Meirinho¹, K. Lorenz^{1,2,4} and M. Peres^{1,2,4*}
¹INESC MN, Lisbon, Portugal ²IFPN, Lisbon, Portugal ³C2TN, Lisbon, Portugal ⁴DECN, Instituto Superior Técnico, University of Lisbon, Lisbon, Portugal ⁵Instituto Superior Técnico, University of Lisbon, Lisbon, Portugal
- TuP_36 Graphene monolayer interlayer for ultrahigh Photoresponsivity of β -Ga₂O₃ Schottky Barrier Deep Ultraviolet Photodiodes**
Madani Labeled^{1,2,*}, Bo-In Park^{3,4}, Jekyung Kim^{3,4}, Jang Hyeok Park^{1,2}, Ji Young Min^{1,2}, Hee Jae Hwang⁵, Jeehwan Kim^{3,4,*} and You Seung Rim^{1,2,*}
¹Department of Semiconductor Systems Engineering and Convergence Engineering for Intelligent Drone, Sejong University, Seoul, Republic of Korea ²Institute of Semiconductor and System IC, Sejong University Seoul, Republic of Korea ³Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, USA ⁴Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA, USA and ⁵Biomaterials Research Center, Korea Institution of Science and Technology, Seoul, Republic of Korea
- TuP_37 β -Ga₂O₃ Based Solar-Blind Schottky diode Alpha Particle Detector**
Jing Di¹, Hezhi Zhang^{1,*}, Man Hoi Wong², Song Zhang³, Zengyin Dong³, Xiaochuan Xia¹, Zhenzhong Zhang¹, Hongwei Liang¹
¹School of Microelectronics, Dalian University of Technology, Dalian, People's Republic of China ²Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology, Hong Kong ³The 46th Research Institute, China Electronics Technology Group Corporation, Tianjin, People's Republic of China
- TuP_38 Non-volatile optoelectronic memory and image-memory array based on amorphous Ga₂O₃**
Rui Zhu^{1,2} and Huili Liang^{1,2}, Shangfeng Liu^{1,3}, Ye Yuan¹, Augustinas Galeckas⁴, Xinqiang Wang^{1,4}, Francis Chi-Chung Ling⁵, Andrej Kuznetsov⁴, Guangyu Zhang^{1,2}, Zengxia Mei^{1,2*}
¹Songshan Lake Materials Laboratory, Dongguan, Guangdong, China ²Institute of Physics, Chinese Academy of Sciences, Beijing, China ³School of Physics, Peking University, Beijing, China ⁴Department of Physics, University of Oslo, Oslo, Norway ⁵Department of Physics, The University of Hong Kong, Hong Kong, China
- TuP_39 Investigation of the Prospects of Ga₂O₃ based UVC Photodetectors for Remote Optical Fire Sensing and Localisation**
D. J. Rogers^{1,*}, V. E. Sandana¹, P. Bove, F. H. Teherani and M. Razeghi²
¹Nanovation, Chateaufort, France ²Center for Quantum Devices, ECE Department, Evanston, IL, USA
- TuP_40 Towards Realization of Large-Scale β -Ga₂O₃ Composite Wafers**
M. E. Liao^{1,*}, K. Huynh², N. Ravi², K. Pan², B. S. Carson², L. Matto², P. J. Shah¹ and M. S. Goorsky²
¹Apex Microdevices, West Chester, Ohio, USA and ²University of California Los Angeles, Los Angeles, California, USA
- TuP_41 (Student) Demonstration of a p-Diamond/Ga₂O₃ Heterojunction PN Diode**
Aditya K Bhat¹, Mohamadali Malakoutian², Kelly Woo², Vanjari Sai Charan¹, Matthew D Smith¹, Srabanti Chowdhury² and Martin Kuball^{1,*}
¹HH Wills Physics Laboratory, University of Bristol, United Kingdom and ²Department of Electrical Engineering, Stanford University, Stanford, CA, USA
- TuP_42 Progress towards cold ion-splitting of (010) β -Ga₂O₃ using implanted Helium**
H. Masten^{1,*}, M. Liao¹, J. S. Lundh¹, A. Jacobs², S. Mack², K. Hobart² and M. Tadjer²
¹NRC Fellow residing at U.S Naval Research Laboratory, Washington, DC, USA and ²U.S Naval Research Laboratory, Washington, DC, USA
- TuP_43 (Student) Anisotropic Charge, Thermal and Thermoelectric Transport in β -Ga₂O₃ from First Principles**
S. Tillack^{1,*}, N. H. Protik¹, and C. Draxl¹
¹Humboldt-Universität zu Berlin and IRIS Adlershof, Berlin, Germany
- TuP_44 (Late News) Strategies of Enhancing Self-powered Photodetection Performances in Ga₂O₃-based Heterojunction Photodetectors**
Shan Li^{1,*} and Weihua Tang^{1,*}
¹College of Integrated Circuit Science and Engineering, University of Posts and Telecommunications, Nanjing, China
- TuP_45 (Late News) A metastable deep defect in β - Ga₂O₃**
Amanda Langørgen^{1,*}, Ymir K. Frødason¹, Ingvild J. T. Jensen² and Lasse Vines¹
¹Centre for Materials Science and Nanotechnology, University of Oslo, Oslo, Norway ²SINTEF, Forskningsveien 1, Oslo, Norway
- TuP_46 (Late News) Impact of ZnO alloying on electrical and optical properties of MgNiZnO alloy films prepared by RF magnetron sputtering**
T. Onuma^{1,*}, A. Ishikawa¹, M. Murayama¹, T. Akiba¹, T. Yamaguchi¹, K. Sasaki², A. Kuramata² and T. Honda¹
¹Department of Electrical Engineering and Electronics, Graduate School of Engineering, Kogakuin University, Hachioji, Tokyo, Japan ²Novel Crystal Technology, Inc., Sayama, Saitama, Japan
- TuP_47 (Late News) On determination of temperature dependent capture coefficient of main deep-levels in β -Ga₂O₃**
A.A. Vasilev^{1,*}, A.I. Kochkova¹, A.Y. Polyakov¹, A.A. Romano¹, N.R. Matros¹, L.A. Alexanyan¹, I.V. Shchemerov¹ and S.J. Pearton²
¹National University of Science and Technology MISIS, Moscow, Russia ²University of Florida, Gainesville, Florida, USA

TuP_48 Poster Withdrawn

TuP_49 (Late News, Student) **Effect of Al substitution on the electron-phonon interaction of β -Ga₂O₃**

Jayanta Bhattacharjee^{1,2,*} and S. D. Singh^{1,2}

¹Accelerator Physics & Synchrotrons Utilization Division, Raja Ramanna Centre for Advanced Technology, Indore, Madhya Pradesh, India and ²Homi Bhabha National Institute, Anushakti Nagar, Mumbai, Maharashtra, India

TuP_50 (Late News, Student) **Incorporating Ba as compensating acceptor into β -Ga₂O₃ by molecular beam epitaxy**

A. Ardenghi^{1,*}, P. Mazzolini², J.B. Varley³, L. Vines⁴, J. Lähnemann¹ and O. Bierwagen¹

¹Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany ²Department of Mathematical, Physical and Computer Sciences, University of Parma, Italy ³Lawrence Livermore National Laboratory, Livermore, United States and ⁴Department of Physics, Oslo University, Oslo, Norway

TuP_51 **Poster withdrawn**

TuP_52 (Late News, Student) **No electron freezing out” in Si-doped β -Ga₂O₃ (010) Films down to 2 K**

Vishal Khandelwal, Francesco Blanda, Manoj Kumar Rajbhar, Yi Lu, Xiao Tang, Xiaohang Li*

Advanced Semiconductor Laboratory (ASL), Electrical and Computer Engineering Program, CEMSE Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Kingdom of Saudi Arabia

TuP_53 (Late News) **Ballistic phonon transport in β -Ga₂O₃**

Rüdiger Mitdank¹, Robin Ahrling¹, Andreas Popp³, Jana Rehm³, Arub Akhtar³, Zbigniew Galazka³, Saskia F. Fischer^{1,2}

¹Novel Materials Group, Humboldt-Universität zu Berlin, Berlin, Germany ²CSMB, Humboldt-Universität zu Berlin, Berlin, Germany

³Leibniz Institut für Kristallzüchtung, Berlin, Germany

TuP_54 (Late News) **Resolving a new excitation channel in β -Ga₂O₃**

M. Meißner^{1,2,*}, N. Bernhardt², F. Nippert², B. M. Janzen², Z. Galazka³ and M. R. Wagner^{1,2}

¹Paul-Drude-Institut, Berlin, Germany ²Technische Universität Berlin, Berlin, Germany and ³Leibniz-Institut für Kristallzüchtung Berlin, Germany

May 29, Wednesday

08:15-08:45 Admissions

08:45-10:25 β -Ga₂O₃ alloys

Chair: Riena Jinno (Tokyo University)

08:45-09:00 WeM1_1 (Oral)

Molecular beam epitaxy of β -(In_xGa_{1-x})₂O₃ on β -Ga₂O₃ (010): compositional control, layer quality, anisotropic strain relaxation, and prospects for two-dimensional electron gas confinement

P. Mazzolini^{1,(a,*)}, C. Wouters², M. Albrecht², A. Falkenstein³, M. Martin³, P. Vogt⁴, O. Bierwagen¹

¹Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany ²Leibniz-Institut für Kristallzüchtung, Berlin, Germany ³Institute of Physical Chemistry, RWTH Aachen University, Germany and ⁴Materials Department, University of California Santa Barbara, USA ^(a)Currently at: Department of Mathematical Physical and Computer Sciences, University of Parma, Italy

09:00-09:15 WeM1_2 (Oral)

(Student) **Characterization of (100) β -(Sc_xGa_{1-x})₂O₃/ β -Ga₂O₃ heterostructures grown by pulsed-laser deposition**

K. Koreishi^{1,*}, T. Soma¹, H. Kumigashira^{2,3} and A. Ohtomo¹

¹Dept. Chem. Sci. Eng., Tokyo Institute of Technology, Meguro, Tokyo, Japan and ²IMRAM, Tohoku University, Sendai, Miyagi, Japan, ³KEK-IMSS, Tsukuba, Ibaraki, Japan

09:15-09:30 WeM1_3 (Oral)

Thermodynamic analysis of (Al_xGa_{1-x})₂O₃ growth by molecular beam epitaxy

R. Togashi^{1,*}, M. Higashiwaki^{2,3} and Y. Kumagai⁴

¹Sophia University, Chiyoda, Tokyo, Japan ²Osaka Metropolitan University, Sakai, Osaka, Japan ³National Institute of Information and Communications Technology, Koganei, Tokyo, Japan and ⁴Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan

09:30-09:45 WeM1_4 (Student)

The challenge to grow β -(Al_xGa_{1-x})₂O₃ on off-oriented (100) β -Ga₂O₃ and β -(Al_yGa_{1-y})₂O₃ with y=0.1 - 0.2 by MOVPE

Jana Rehm^{1,*}, Ta-Shun Chou¹, Arub Akhtar¹, Saud Bin-Anooz¹, Andreas Fiedler¹, Martin Schmidbauer¹, Zbigniew Galazka¹ and Andreas Popp¹

¹Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

09:45-10:00 WeM1_5 (Oral)

Physical properties of β -(Al_xGa_{1-x})₂O₃ (x = 0 – 0.35) bulk single crystals grown by the Czochralski method

Palvan Seyidov¹, Zbigniew Galazka¹, Jana Rehm¹, Ta-Shun Chou¹, Saud Bin Anooz¹, Andreas Popp¹ and Andreas Fiedler^{1,*}

¹Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

10:00-10:30 Break with Refreshments

10:30-12:25 From α -Ga₂O₃ to α -Al₂O₃

Chair: Roberto Fornari (Parma University)

10:30-10:55 WeM2_1 (Invited)

Selective Area Growth of α -Ga₂O₃ on Sapphire Substrates by mist-CVD and its Thermal Stability

R. Jinno*

The University of Tokyo, Meguro-ku, Tokyo, Japan

10:55-11:10 WeM2_2 (Oral)

(Student) **Cathodoluminescence study of dislocations in ELOG α -Ga₂O₃**

M. Maruzane¹, Y. Oshima², O. Makydonska¹, P. Edwards¹, R. Martin¹ and F. Massabuau¹

¹University of Strathclyde, Glasgow, UK. And ²National Institute for Material Science, Tsukuba, Japan

- 11:10-11:25 WeM2_3 (Oral)
Detection of dislocations in images of α -Ga₂O₃-based corundum oxides using the computer vision YOLO algorithm
 G. T. Dang^{1,*}, T. Kawaharamura² and M. W. Allen¹
¹MacDiarmid Institute for Advanced Materials and Nanotechnology, University of Canterbury, Christchurch, New Zealand and
²School of Systems Engineering, Kochi University of Technology, Tosayamada, Kami, Kochi, Japan
- 11:25-11:40 WeM2_4 (Late News)
Highly rectifying metal-semiconductor field-effect transistors on α -Ga₂O₃ with breakdown field of 1.36 MV/cm
 S. Vogt^{*}, D. Splith, P. Schlupp, C. Petersen, H. von Wenckstern, and M. Grundmann
¹Felix Bloch Institute for solid state physics, Leipzig, Saxony, Germany
- 11:40-11:55 WeM2_5 (Oral)
The epitaxial strain and stress relationships in the α and β phases of (Al,Ga)₂O₃ and their effects onto phonon and electronic properties
 Mathias Schubert^{1,2}, Rafal Korlacki¹, Megan Stokey², Alyssa Mock^{1,2}, Vanya Darakchieva^{1,2}
¹Department of Electrical and Computer Engineering, University of Nebraska-Lincoln, Lincoln, USA ²Department of Electrical Engineering and Computer Science, Milwaukee School of Engineering, Milwaukee, USA ³Department of Electrical and Computer Engineering, College of Engineering, Applied Science and Technology, Weber State University, Ogden, USA and
⁴Solid State Physics and NanoLund, Lund University, Lund, Sweden
- 11:55-12:10 WeM2_6 (oral)
Si doping of α -Al₂O₃ grown by molecular beam epitaxy
 Hironori Okumura
 Faculty of Pure and Applied Sciences, Tsukuba, Ibaraki, Japan

12:10-14:10 Lunch & Poster 3: (Al,Ga)₂O₃, Alloys, α -phase, Diodes, NiO/Ga₂O₃, MOSFETs

- WeP_1 **XPS study on composition and band structure of aluminum alloyed β -gallium oxide bulk crystals and thin films**
 L. Schewe^{1,*}, J. Rehm², M. C. Kao³, V. Vonk³, Z. Galazka², S. B. Anooz², A. Popp² and J. I. Flege¹
¹Chair of Applied Physics and Semiconductor Spectroscopy, Brandenburgische Technische Universität Cottbus-Senftenberg, Cottbus, Brandenburg, Germany ²Leibnitz-Institut für Kristallzüchtung, Berlin, Germany ³CXNS-Center for X-Ray and Nano Science, Deutsches Elektronen-Synchrotron, Hamburg, Germany
- WeP_2 (Student) **Synthesis & electrical characterization of Al-doped β -Ga₂O₃**
 Valentine W. Muramba^{1,2,*}, Abdulraoof I. Ali¹, Jacqueline M. Nel¹
¹Department of Physics, University of Pretoria, Hatfield, South Africa and ²Department of Mathematics & Physics, Technical University of Mombasa, Mombasa, Kenya
- WeP_3 **Crack formation in strained β -(Al_xGa_{1-x})₂O₃ films grown on (010) β -Ga₂O₃ substrates**
 K. Huynh¹, M. E. Liao², M. J. Tadjer³, J. S. Lundh², K. Sasaki⁴, K. Konishi⁴, H. N. Masten², J. K. Hite³, M. A. Mastro³, A. Kuramata⁴, K. D. Hobart³ and M. S. Goorsky¹
¹Department Materials Science and Engineering, University of California Los Angeles, Los Angeles, California, USA ²National Research Council Postdoctoral Fellow at U.S. Naval Research Laboratory ³Novel Crystal Technology, Inc., Saitama, Japan ⁴U.S. Naval Research Laboratory, Washington, DC, USA
- WeP_4 (Student) **Copper-tin-oxide: an amorphous, bipolar ternary oxide system with tunable optical and electrical properties**
 A. Jörns^{1,*}, H. von Wenckstern¹ and M. Grundmann¹
¹Leipzig University, Felix Bloch Institute for Solid State Physics, Leipzig, Sachsen, Germany
- WeP_5 **Combinatorial PLD Synthesis of (In_{1-x}Ga_x)₂O₃ Thin Films: Structural, Morphological, and Optical Analysis for Transparent Conducting Oxides**
 J. García-Fernández^{1,*}, S. Montag², D. Splith², M. Kneiß², M. Grundmann², Ø. Prytz¹, H. von Wenckstern^{1,2}
¹Department of Physics/Centre for Materials Science and Nanotechnology, University of Oslo, Oslo, Norway and ²Felix-Bloch-Institut für Festkörperphysik, Fakultät für Physik und Geowissenschaften, Universität Leipzig, Leipzig, Germany
- WeP_6 (Student) **Growth, faceting and thickness effects of MBE-grown α -Ga₂O₃ and α -(In_xGa_{1-x})₂O₃ on m-plane α -Al₂O₃**
 Martin S. Williams^{1,*}, Manuel Alonso-Orts^{1,2}, Marco Schowalter¹, Alexander Karg¹, Sushma Raghuvansy¹, Jon P. McCandless³, Debdeep Jena^{3,4,5}, Andreas Rosenauer^{1,2}, Martin Eickhoff^{1,2} and Patrick Vogt¹
¹Institute of Solid State Physics, University of Bremen, Bremen, Germany ²MAPEX Center for Materials and Processes, University of Bremen, Bremen, Germany ³School of Electrical and Computer Engineering, Cornell University, New York, United States of America
⁴Department of Material Science and Engineering, Cornell University, New York, United States of America and ⁵Kavli Institute at Cornell for Nanoscale Science, Cornell University, Ithaca, New York, United States of America

- WeP_7 (Student) **Growth and structural properties of PLD-grown ternary alloys of rhombohedral transition metal sesquioxides and α -Ga₂O₃**
 C. Petersen^{1,*}, S. Vogt¹, L. Köhnlein¹, H. von Wenckstern¹, and M. Grundmann¹
¹Universität Leipzig, Felix Bloch Institute for Solid State Physics, Semiconductor Physics Group, Leipzig, Germany
- WeP_8 **α -Ga₂O₃ and step-graded α -Ga₂O₃/(Al_xGa_{1-x})₂O₃ on m-plane sapphire grown by oxide-molecular-beam-epitaxy**
 Hongliang Chang¹, Yanqing Jia¹, Xu Zhang¹, Mohamed Ben Hassine², Dalaver H. Anjum³, Qingxiao Wang², Abdullah Alquwayzani^{1,*}, Tien Khee Ng¹ and Boon S. Ooi^{1,b}
¹Photonics Laboratory, Electrical and Computer Engineering, Division of Computer, Electrical and Mathematical Sciences and Engineering, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia ²Imaging and Characterization Core Lab, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia and ³Department of Physics, Khalifa University, Abu Dhabi, United Arab Emirates
- WeP_9 **Growth of α -(Al,Ga)₂O₃ films lattice-matched to α -Cr₂O₃ by mist-CVD**
 R. Jinno^{1,*}, T. Oshima², Y. Oshima² and S. Fukatsu¹
¹The University of Tokyo, Meguro-ku, Tokyo, Japan ²National Institute for Materials Science, Tsukuba, Ibaraki, Japan
- WeP_10 (Student) **Structural characterization of threading dislocation in α Ga₂O₃ on sapphire**
 H. Takane^{1,1,*}, S. Konishi¹, Y. Hayasaka², R. Ota³, T. Wakamatsu¹, and Y. Isobe¹, K. Kaneko⁴ and K. Tanaka¹
¹Kyoto University, Kyoto, Kyoto Japan ²Tohoku University, Sendai, Miyagi, Japan ³Hokkaido University, Sapporo, Hokkaido, Japan ⁴Ritsumeikan University, Kusatsu, Shiga, Japan
- WeP_11 **Atomic scale observation of threading dislocations in α -Ga₂O₃**
 R. Mullen¹, G. Divitini², J. Roberts³, P. Chalker³, R. Oliver², B. Hourahine¹ and F. Massabuau^{1,*}
¹Department of Physics, University of Strathclyde, Glasgow, UK ²Department of Material Science and Metallurgy, University of Cambridge, Cambridge, UK and ³School of Engineering, University of Liverpool, Liverpool, UK
- WeP_12 **Composition and strain of the α -phase intermediate layer at the Ga₂O₃/Al₂O₃ interface**
 M. Schowalter^{1,*}, S. Raghuvansy¹, A. Karg¹, P. Vogt¹, A. Rosenauer^{1,2} and M. Eickhoff^{1,2}
¹Institut für Festkörperphysik, Universität Bremen, Bremen, Germany AND ²MAPEX Center for Materials and Processes, Universität Bremen, Bremen, Germany
- WeP_13 (Student) **Ge-doped α -Ga₂O₃ film with electron mobility of 99 cm²V⁻¹s⁻¹**
 T. Wakamatsu^{1,*}, H. Takane¹, Y. Isobe¹, K. Kaneko^{1,2} and K. Tanaka¹
¹Kyoto University, Kyoto, Kyoto, Japan and ²Ritsumeikan University, Kusatsu, Shiga, Japan
- WeP_14 (Student) **Red shift and amplitude increase in the dielectric function of corundum-like α -(Ti_xGa_{1-x})₂O₃**
 E. Kluth^{1,*}, M. Fay², C. Parmenter², J. Roberts³, E. Smith², C. Stoppiello², F. Massabuau⁴, R. Goldhahn¹ and M. Feneberg¹
¹Institut für Physik, Otto-von-Guericke-Universität Magdeburg, Germany ²Nanoscale and Microscale Research Centre (nmRC), University of Nottingham, UK ³School of Engineering, The University of Liverpool, UK and ⁴Department of Physics, SUPA, University of Strathclyde, Glasgow, UK
- WeP_15 Poster Withdrawn
- WeP_16 Poster Withdrawn
- WeP_17 Poster Withdrawn
- WeP_17 (Student) **Simulation of Single-Event Burnout in Gallium Oxide Schottky Diodes Effected by Hole Self-trapping**
 Song He, Jinyang Liu, Yuanjie Ding, Guangwei Xu* and Shibing Long
 University of Science and Technology of China, Hefei, Anhui, China
- WeP_18 (Student) **2.3kV High voltage β -Ga₂O₃ hetero-junction barrier Schottky diode with Von < 0.65V**
 A. Hong Zhou^{1,*}, B. Chunxu Su¹, C. Jincheng Zhang¹, and D. Yue Hao¹
¹State Key Discipline Laboratory of Wide Band Gap Semiconductor Technology, School of Microelectronics, Xidian University, Xi'an, China
- WeP_19 (Student) **High Temperature Performance and Defects of Ga₂O₃ Schottky Barrier Diodes with Mesa Structure**
 M.-Y. Kim^{1,2}, N. Hendricks⁴, N. Moser⁴, D. Yang³, S. Pookpanratana³, Q. Li^{2,3,*}, S.-M. Koo^{1,*}
¹Kwangwoon University, Seoul, Republic of Korea ²George Mason University, Fairfax, VA, USA ³National Institute of Standards and Technology, Gaithersburg, MD, USA and ⁴Air Force Research Laboratory, Sensors Directorate, Wright Patterson AFB, OH 45433
- WeP_20 (Student) **The Mo/Au anode β -Ga₂O₃ Junction Barrier Schottky diode with a high P-FOM of 1.32GW/cm²**
 Hong Zhou^{1,*}, Chunxu Su¹, Jincheng Zhang¹ and Yue Hao¹

¹National Key Laboratory of Wide Bandgap Semiconductor Devices and Integrated Technology, School of Microelectronics, Xidian University, Xi'an, Shaanxi, China

WeP_21 (Student) **Performance comparison of high-k bismuth zinc niobium oxide field plated and metal-insulator-semiconductor β -Ga₂O₃ vertical Schottky barrier diodes**

Pooja Sharma, and Saurabh Lodha*
Department of Electrical Engineering, IIT Bombay, Mumbai, India

WeP_22 (Student) **8.7 A/704 V β -Ga₂O₃ Schottky Barrier Diode Demonstrated by Low-Temperature O₂ Annealing and Mesa Termination**

Feihong Wu¹, Zhao Han¹, Weibing Hao¹, Junpeng Wen¹, Guangwei Xu^{1,*} and Shibing Long¹
¹School of Microelectronics, University of Science and Technology of China, Hefei, China

WeP_23 **Realization of highly rectifying pn-heterojunctions on pulsed laser deposited α -Ga₂O₃ thin films**

P. Brokemeyer¹, S. Vogt^{1,*}, C. Petersen¹, H. von Wenckstern¹ and M. Grundmann¹
¹Universität Leipzig, Felix Bloch Institute for Solid State Physics, Semiconductor Physics Group, Leipzig, Germany

WeP_24 (Student) **Investigation into the degradation mechanism of β -Ga₂O₃ HVPE epitaxial layer induced by neutron irradiation and a recovery methodology**

Jinyang Liu, Guangwei Xu* Xuanze Zhou, and Shibing Long
University of Science and Technology of China, Hefei, Anhui, China

WeP_25 (Student) **High performance PtO_x-IGZO thin film Schottky barrier diodes with good negative bias stress stability**

Haoxin Li, Zhao Han, Guangwei Xu* and Shibing Long
University of Science and Technology of China, Hefei, China

WeP_26 (Student) **Investigation of electrical properties of unintentionally doped Ga₂O₃ thin films grown by low-pressure hot-wall MOCVD**

J. Morihara^{1,*}, Z. Wang², J. Yoshinaga^{3,4}, S. Sato¹, K. Eguchi¹, Y. Kumagai³ and M. Higashiwaki^{1,2,*}
¹Department of Physics and Electronics, Osaka Metropolitan University, Sakai, Osaka, Japan ²National Institute of Information and Communications Technology, Koganei, Tokyo, Japan ³Advanced Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Osaka, Japan and ⁴TAIYO NIPPON SANSO CORPORATION, Minato-ku, Tokyo, Japan

WeP_27 (Student) **Characterization of hole trapping in β -Ga₂O₃ Schottky diode by electron beam induced current**

C. Perrier^{1,*}, H. Umezawa³, A. Traoré^{2,4}, E. Gherraert^{1,2,4} and P. Ferrandis^{1,4}
¹Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France, ²Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan ³Advanced Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Osaka, Japan and ⁴Japanese-French Laboratory for Semiconductor Physics and Technology J-F AST, CNRS, University Grenoble Alpes, Grenoble INP, University of Tsukuba, Japan

WeP_28 (Student) **Screening of contact metals for optimized performance of α -Ga₂O₃ based Schottky Barrier Diodes**

Clemens Petersen^{1,*}, Sebastian Köpp¹, Daniel Splith¹, Holger von Wenckstern¹ and Marius Grundmann¹
¹University Leipzig, Felix-Bloch-Institute for Solid State Physics, Semiconductor Physics Group, Leipzig, Germany

WeP_29 (Student) **Assessment of trapping phenomena in SnO/k-Ga₂O₃ p/n heterojunction by photocurrent measurements**

P. Rajabi Kalvani^{1,*}, A. Parisini^{1,*}, M. Pavesi¹, O. Bierwagen³, K. Egbo³, P. Mazzolini^{1,2}, S. Vantaggio¹, F. Mattei¹, M. Bosi², L. Seravalli² and R. Fornari^{1,2}
¹Department of Mathematical, Physical and Computer Sciences, University of Parma, Parma, Italy ²IMEM-CNR, Institute of Materials for Electronics and Magnetism, Parma, Italy and ³Paul-Drude-Institut für Festkörperelektronik, Leibniz-Institut im Forschungsverbund Berlin e.V., Berlin, Germany

WeP_30 (Student) **Characteristics of Ga₂O₃/4H-SiC Heterojunction Diodes Fabricated by Aerosol Deposition**

Hyun-Woo Lee¹, Ji-Soo Choi¹, Min-Yeong Kim¹, Soo-Young Moon¹, Geon-Hee Lee¹ and Sang-Mo Koo^{1,*}
¹Department of Electronic Materials Engineering, Kwangwoon University, Seoul, Korea

WeP_31 **Electrical Properties β -Ga₂O₃ Based on Hetero-Junction Barrier Schottky Diode**

HanBit Kim*, SangHun Kim, YuSup Jung, ByoungSup Ahn, TaeJun Park, JoonHui Park, TaiYoung Kang, SinSu Kyoung
Powercubesemi Inc., Seongnam-si, Gyeonggi-do, Korea

WeP_32 (Student) **Schottky barrier height enhancement using non-stoichiometric ultrathin interlayer of AlO_x in β -Ga₂O₃ Schottky barrier diodes**

Prabhat Prajapati¹, Siddhartha Suman¹ and Saurabh Lodha*
¹Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai, India

WeP_33 **Effect of Si Implantation and RIE Etching on the Surface Band-bending, Barrier Potential and Contact Resistance to Ga₂O₃**

Miquel Vellvehi¹, Edgars Butanovs², Ekaterine Chikoidze³, Lauris Dimitrocenko², Xavier Perpiña¹, Xavier Jorda¹, Yves Dumont³, Juris Purans², Jose Rebollo¹, Amador Perez-Tomas⁴

¹Power Electronics Group, The Institute of Microelectronics of Barcelona (IMB-CNM-CSIC), Campus UAB, Bellaterra, Barcelona, Spain

²Institute of Solid State Physics UL, Kengaraga, Riga, Latvia ³Groupe d'Etude de la Matière Condensée, Université Paris-Saclay GEMaC, UVSQ – CNRS, Cedex Versailles, France and ⁴Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and the Barcelona Institute of Science and Technology, ICN2, CSIC BIST, Campus UAB, Bellaterra, Barcelona, Spain

WeP_34 (Student) **Effects of oxygen reactive ion etching and nitrogen radical irradiation on temperature-dependent electrical properties of Ga₂O₃ (010) Schottky barrier diodes**

S. Sato^{1,*}, A. Mineyama¹, Z. Wang² and M. Higashiwaki^{1,2,*}

¹Department of Physics and Electronics, Osaka Metropolitan University, Sakai, Osaka, Japan and ²National Institute of Information and Communications Technology, Koganei, Tokyo, Japan

WeP_35 (Student) **Fabrication of mesa-shaped high-aspect Ga₂O₃/Air DBR structures for optical integrated platform by HEATE method**

S. Sato¹, T. Momma¹, T. Aikawa¹ and A. Kikuchi^{1,2,3,*}

¹Sophia University, ²Sophia Photonics Research Center and ³Sophia Semiconductor Research Institute, Chiyoda-ku, Tokyo, Japan

WeP_36 **A staggered-gap band-alignment of p-CuAlO₂/β-Ga₂O₃ Heterojunction Diode for Low Leakage and High Breakdown Voltage**

Chowdam Venkata Prasad, Madani Labeled, Jang Hyeok Park, You Seung Rim*

Department of Semiconductor Systems Engineering and Convergence Engineering for Intelligent Drone, Sejong University, Seoul, Republic of Korea

WeP_37 (Student) **Demonstration of β-Ga₂O₃ Junction Terminal Extension Diode with a Low Von of 0.61V and a 12A/550 V Handling Capabilities**

Yitao Feng, Hong Zhou^{1,*}, Jincheng Zhang^{1,*}, Chunxu Su¹ and Yue Hao¹

¹National Key Laboratory of Wide Bandgap Semiconductor Devices and Integrated Technology, School of Microelectronics, Xidian University, Xi'an, Shaanxi, China

WeP_38 (Student) **Device engineering and parameter optimization for simulation of β-Ga₂O₃-/NiO_x super junction devices for ultrawide bandgap electronics**

Jose Manuel Taboada Vasquez¹, Glen Isaac Maciel Garcia¹, Mritunjay Kumar¹, Md. Hasan Raza Ansari³, Nazek El-Atab³, Biplab Sarkar² and Xiaohang Li^{1,*}

¹Advanced Semiconductor Laboratory, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia ²Department of Electronics and Communication Engineering, Indian Institute of Technology Roorkee, Uttarakhand, India and ³SAMA Labs, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

WeP_39 (Student) **Heteroepitaxial Growth of NiO thin films on (-201) β-Ga₂O₃ by mist CVD**

G. Yasui^{1,*}, H. Nishinaka², H. Miyake^{3,4} and M. Yoshimoto²

¹Department of Electronics, Kyoto Institute of Technology, Matsugasaki, Sakyo-ku, Kyoto, Japan ²Faculty of Electrical Engineering and Electronics, Kyoto Institute of Technology Matsugasaki, Sakyo-ku, Kyoto, Japan ³Power Electronics R & D Div. 2, MIRISE Technologies Corporation, Aichi, Japan and ⁴Kyoto Lab for a Greener Future, Kyoto Institute of Technology, Matsugasaki, Sakyo-ku, Kyoto, Japan

WeP_40 **Investigation of Post-Annealing on Self-Powered UV-C Photodetector Based on High-Performance p-NiO/β-Ga₂O₃ Heterojunction**

Taejun Park, Yusup Jung, Byoung Sup Ahn, Hanbit Kim, Sanghun Kim, Joon Hui Park, TaiYoung Kang, SinSu Kyoung*
Powercubesemi Inc., Seongnam-si, Gyeonggi-do, Korea

WeP_41 **Enhancing β-Ga₂O₃ Heterojunction Field-Effect Transistors with p-NiO Integration for Efficient Normally-Off Operation**

Hanbit Kim*, Joon Hui Park, Sanghun Kim, Tajun Park, Byoung Sup Ahn, Yusup Jung, Taiyoung Kang, Sinsu Kyoung
Powercubesemi Inc., Seongnam-si, Gyeonggi-do, Korea

WeP_42 **Growth, characterization, and reliability of NiO thin films for Ga₂O₃ heterojunction devices**

Aaron Adams^{1,2,*}, Nolan Hendricks¹, Weisong Wang^{1,3}, Piyush Shah^{1,2}, Adam Geiger^{1,2}, Kevin Leedy¹, Andrew Green¹

¹Air Force Research Laboratory, Sensors Directorate, Wright-Patterson AFB, OH, USA ²Apex Microdevices, West Chester OH, USA
³Wright State University Electrical Engineering Department, Dayton, OH, USA

WeP_43 **Investigation of the Prospects of n-Ga₂O₃/p-NiO Heterojunctions for Use in Power Electronics**

D. J. Rogers^{1,*}, V. E. Sandana¹, P. Bove, F. H. Teherani and M. Razeghi²

¹Nanovation, Chateaufort, France ²Center for Quantum Devices, ECE Department, Evanston, IL, USA

WeP_44 (Student) **Field Management strategies to minimize the BTBT assisted leakage current in NiO_x/β-Ga₂O₃ PN junction and PiN diodes**

Jose Manuel Taboada Vasquez¹, Ankita Mukherjee², Aasim Ashai², Saravanan Yuvaraja¹, Manoj Rajbhar¹, Biplab Sarkar² and Xiaohang Li¹

¹Advanced Semiconductor Laboratory, Electrical and Computer Engineering program, CEMSE Division, King Abdullah University of Science and Technology, Thuwal Saudi Arabia and ²Department of Electronics and Communication Engineering, Indian Institute of Technology Roorkee, Uttarakhand, India

WeP_45 (Student) Energy-Level Model for Designing Vertical β -Ga₂O₃ Transistors with Quasi-Inversion Channel

Jingbo Zhou, Xuanze Zhou, Qi Liu, Guangwei Xu* and Shibing Long
University of Science and Technology of China, Hefei, Anhui, China

WeP_46 (Student) Fixing Al₂O₃/ β -Ga₂O₃ interface states with low-temperature supercritical N₂O fluid treatment

Zhang Wen^{1,*}, Leidang Zhou¹ and Xiaoping Ouyang²
¹*Xi'an Jiaotong University, Xi'an, Shaanxi, China* and ²*Northwest Institute of Nuclear Technology, Xi'an, Shaanxi, China*

WeP_47 β -Ga₂O₃ UMOSFET with Nitrogen-Ion Implantatio

Xuanze Zhou¹, Yongjian Ma^{1,2}, Guangwei Xu^{1,*}, Xiaodong Zhang^{1,2} and Shibing Long¹
¹*University of Science and Technology of China, Hefei, Anhui, China* and ²*Suzhou Institute of Nano-Tech and Nano-Bionics, CAS, Suzhou, Jiangsu, China*

WeP_48 (Student) Resistive Switching Performance of Epitaxial and Sputter-Deposited β -Ga₂O₃ Films on Ru(0001)

A. Baunthiyal¹, A. Karg¹, M. Williams¹, J.-O. Krisponeit^{1,2}, N. Braud¹, M. Schowalter^{1,2}, T. Mehrtens^{1,2}, M. Eickhoff^{1,2}, A. Rosenauer^{1,2} and J. Falta^{1,2}
¹*Institute of Solid State Physics, University of Bremen, Bremen, Germany* and ²*MAPEX Center of Material and Processes, University of Bremen, Bremen, Germany*

WeP_49 (Student) MESFET based on Ge-doped α -Ga₂O₃ film grown by mist-CVD

T. Wakamatsu^{1,*}, H. Takane¹, Y. Isobe¹, K. Kaneko^{1,2} and K. Tanaka¹
¹*Kyoto University, Kyoto, Kyoto, Japan* and ²*Ritsumeikan University, Kusatsu, Shiga, Japan*

WeP_50 Oxygen Flow Rates Impacted on Al₂O₃ Gate Insulator for β -Ga₂O₃ MOSCAPs

Hua-Mao Chen^{1,*}, Ka Hou Lam², Chih-Hung Yen¹, Sandy Huang¹, Chih-Ming Lai¹, Chin-Ya Tsai¹, Shih-Chiang Shen¹, Tian-Li Wu²
¹*Electronic and Optoelectronic System Research Laboratories, Industrial Technology Research Institute* and ²*International College of Semiconductor Technology, National Yang Ming Chiao Tung University, Taiwan*

WeP_51 Comparison of PECVD grown SiO₂ and SiN_x passivation on β -Ga₂O₃: Formation of a GaN interlayer impairing device performance

Palvan Seyidov¹, Carl Peterson², Owen Ernst¹, Saurav Roy², Arkka Bhattacharyya², Zbigniew Galazka¹, Sriram Krishnamoorthy² and Andreas Fiedler^{1,*}
¹*Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany* and ²*University of California, Santa Barbara, California, USA*

WeP_52 A Schottky Source Approach for Normally-Off β -Ga₂O₃ Transistors

J. Yang¹ and M. H. Wong^{1,*}
¹*Electronic and Computer Engineering, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong*

WeP_53 (Student) Heteroepitaxial β -Ga₂O₃ Monolithic Bidirectional Switch

Dhanu Chettri, Ganesh Mainali, Mritunjay Kumar, Xiao Tang and Xiaohang Li*
Advanced Semiconductor Laboratory, Electrical and Computer Engineering Program, CEMSE Division, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Kingdom of Saudi Arabia

WeP_54 Band gap measurements of aluminum and indium doped Ga₂O₃ multilayers

Annett Thøgersen^{1,*}, Lasse Vines², Øystein Prytz², Holger von Wenckstern³, and Ingvild Thue Jensen¹
¹*SINTEF Industry, P.O.Box 124 Blindern, 0314 Oslo, Norway*, ²*Department of Physics, Centre for Materials Science and Nanotechnology, University of Oslo, Oslo, Norway*, ³*University of Leipzig, Fakultät für Physik und Geowissenschaften, Leipzig, Germany*

14:10-17:30 Excursions

17:30-20:00 Banquet

May 30, Thursday – Device day

08:15-08:45 **Admissions**

08:45-10:10 Power Devices and Diodes

Chair: Kornelius Tetzner (FBH)

- 08:45-09:30 ThuM1_1 (Keynote lecture)
Progress in Ga₂O₃ material and device technologies towards next-generation power and harsh-environment electronics
M. Higashiwaki^{1,2,*}
¹Department of Physics and Electronics, Osaka Metropolitan University, Sakai, Osaka, Japan and ²National Institute of Information and Communications Technology (NICT), Koganei, Tokyo, Japan
- 09:30-09:45 ThuM1_2 (Oral)
(Student) **Analytical Determination of Unipolar Diode Losses in Power Switching and Perspective for Ultra-Wide Bandgap Semiconductors**
Nolan Hendricks*, Joshua Piel, Ahmad Islam, and Andrew Green
Air Force Research Laboratory, Sensors Directorate, WPAFB, OH, USA
- 09:45-10:10 ThuM1_3 (Invited)
Vertical β -Ga₂O₃ Diodes for High-voltage and Harsh Radiation Application
E. Farzana^{1,*}, N. Hendricks², S. Roy², A. Bhattacharyya², S. Islam⁴, R. Cadena³, A. Senarath⁴, A. Sengupta³, E. Zhang³, D. Fleetwood³, R. Schrimpf³, S. Krishnamoorthy² and J. Speck²
¹Department of Electrical and Computer Engineering, Iowa State University, Ames, IA, USA ²Materials Department, University of California, Santa Barbara, Santa Barbara, CA, USA ³Dept of ECE, ⁴Interdisciplinary Material Science, Vanderbilt University, Nashville, TN, USA

10:10-10:40 Break with Refreshments

10:40-12:10 Diodes and High Voltage

Chair: James S. Speck (UCSB)

- 10:40-10:55 ThuM2_1 (Oral)
(Student) **Toward high blocking voltage β -Ga₂O₃ Schottky barrier diodes implementing self-aligned mesa termination and PtO_x anode**
Zhao Han, Guangwei Xu*, Xuanze Zhou, and Shibing Lon
University of Science and Technology of China, Hefei, China
- 10:55-11:10 ThuM2_2 (Oral)
High Voltage Breakdown Performance of IrO_x/b-Ga₂O₃ Schottky Contacts
G.T. Dang*, R.J. Reeves, and M.W. Allen
MacDiarmid Institute for Advanced Materials and Nanotechnology, University of Canterbury, Christchurch, New Zealand
- 11:10-11:25 ThuM2_3 (Oral)
(Student) **Over 6 MV/cm and 60 A/cm² reverse current up to 200°C in ozone MBE IrO₂ and RuO₂ Schottky Diodes**
D. Saraswat¹, B. Cromer^{2,*}, W. Li³, K. Nomoto², F. VE Hensling², K. Azizie², H. P. Nair², D. G. Schlom², D. Jena², H. G. Xing²
¹Stanford University, Stanford, California, United States of America ²Cornell University, Ithaca, New York, United States of America ³Intel Corporation, San Francisco, California, United States of America
- 11:25-11:40 ThuM2_4 (Oral)
Vertical β -Ga₂O₃ Schottky barrier diodes with in situ Nitrogen co-doped epitaxial layer
Hannah N. Masten^{1,*}, Joseph A. Spencer^{2,3}, James Spencer Lundh¹, Michael Liao¹, Alan G. Jacobs², Kohei Sasaki⁴, Akito Kuramata⁴, Karl D. Hobart², Marko J. Tadjer²
¹National Research Council Postdoctoral Fellow at U.S. Naval Research Laboratory, ²U.S. Naval Research Laboratory, Washington, DC, USA, ³Virginia Tech, Blacksburg, VA, USA and ⁴Novel Crystal Technology, Inc., Japan

11:40-11:55 ThuM2_5 (Oral)
(Student) Metal-First Non-Alloyed Schottky Contacts to N+(010) β -Ga₂O₃ for Interface Quality and Minimal Surface Modification
K. T. Smith^{1,*}, C. A. Gorsak², D. Jena^{2,3,4}, H. P. Nair² and H. G. Xing^{2,3,4}
¹School of Applied and Engineering Physics, Cornell University, Ithaca, NY, USA ²Department of Materials Science and Engineering, Cornell University, Ithaca, NY, USA ³School of Electrical and Computer Engineering, Cornell University, Ithaca, NY, USA ⁴Kavli Institute at Cornell for Nanoscale Physics, Cornell University, Ithaca, NY, USA

11:55-12:10 ThuM2_6 (Oral)
Over 1700V breakdown voltage β -type gallium oxide Schottky barrier diode
Jun Arima^{1,*}, Minoru Fujita¹, Katsumi Kawasaki¹, Jun Hirabayashi¹
¹TDK Corporation, 2-15-7, Higashi-Ohwada, Ichikawa-shi, Chiba, Japan

12:10-14:00 Lunch Break

14:00-15:25 NiO/Ga₂O₃ heterojunctions for Diodes Chair: Holger v. Wenckstern (Leipzig U)

14:00-14:25 ThuA1_1 (Invited)
Pairing Ga₂O₃ with p-NiO produces robust power diodes for harsh environment
Feng Zhou¹, Hehe Gong¹, Ming Xiao², Hai Lu¹, Yuhao Zhang^{2,*} and Jiandong Ye^{1,*}
¹School of Electronic Science and Engineering, Nanjing University, Nanjing, China and ²Center for Power Electronics Systems, Virginia Polytechnic Institute and State University, Blacksburg, VA, USA

14:25-14:40 ThuA1_2 (Oral)
(Student) Surge Current Capability of Vertical β -Ga₂O₃ Heterojunction Barrier Schottky Diode
Weibing Hao¹, Feihong Wu¹, Guangwei Xu^{*}, Xuanze Zhou, and Shibing Long
University of Science and Technology of China, Hefei, Anhui, China

14:40-14:55 ThuA1_3 (Oral)
(Student) Kilo Volt-class NiO/ β -Ga₂O₃ Diodes with Sub-1 V Turn-On and Near-Unity Ideality Factor
Advait Gilankar^{1,*}, Ahmad Islam², Abishek Katta¹, Nidhin Kurian Kalarickal¹
¹School of Electrical, Computer and Energy Engineering, Arizona State University, Tempe, AZ, USA and ²Air Force Research Laboratory, Sensors Directorate, Wright-Patterson Air Force Base, Dayton, Ohio, USA

14:55-15:10 ThuA1_4 (Oral)
(Student) Low Von of 0.46 V Vertical W/ β -Ga₂O₃ Schottky Barrier Diodes Featuring Heterojunction Termination Extension with 1.2 kV Reverse Blocking
Qiuyan Li, Junpeng Wen, Weibing Hao, Guangwei Xu^{*}, Shibing Long
University of Science and Technology of China, Hefei, China

15:10-15:25 ThuA1_5 (Oral)
(Student) Stability testing of β -Ga₂O₃ NiO Merged PiN Schottky diodes fabricated with plasma free Ga-flux etching and PtOx contacts
Joseph A. Spencer^{1,2}, Yuan Qin², Alan G. Jacobs¹, Neeraj Nepal¹, Matthew Porter², Boyan Wang², Bixuan Wang², Hannah M. Masten¹, Karl D. Hobart¹, Travis J. Anderson¹, Akito Kuramata³, Yuhao Zhang² and Marko J. Tadjer^{1,*}
¹Naval Research Laboratory, Washington, DC, USA ²Virginia Tech – Center for Power Electronics Systems, Blacksburg, Virginia, USA and ³Novel Crystal Technology, Inc., Sayama-shi, Saitama, Japan

15:25-16:00 Break with Refreshments

16:00-17:40 MOSFETs and NiO/Ga₂O₃ heterojunctions Chair: Masataka Higashiwaki (Osaka MU)

16:00-16:15 ThuA2_1 (Oral)
(Student) β -Ga₂O₃ Field-Effect Rectifier with Low Turn-on Voltage
Qi Liu¹, Xuanze Zhou^{1,*}, Mengyuan Hua², Guangwei Xu¹ and Shibing Long¹
¹University of Science and Technology of China, Hefei, Anhui, China and ²Southern University of Science and Technology, Shenzhen, Guangdong, China

- 16:15-16:30 ThuA2_2 (Oral)
Structural characterization of homoepitaxial and NiO heteroepitaxial films, and selective-area-grown/-etched structures on (-102) β -Ga₂O₃ substrates
 T. Oshima^{1,*}, Y. Oshima¹ and S. Nakagomi², Liga Ignatane¹, Boris Polyakov¹, Sergei Vlassov², Juris Purans¹
¹National Institute for Materials Science, Tsukuba, Ibaraki, Japan and ²Ishinomaki Senshu University, Ishinomaki, Miyagi, Japan
- 16:30-16:55 ThuA2_3 (Invited)
Recent advances in the process development of Gallium Oxide power transistors for high-voltage applications
 K. Tetzner^{1,*}, Z. Galazka², A. Popp², J. Würfl¹ and O. Hilt¹
¹Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (FBH), Berlin, Germany and ²Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany
- 16:55-17:10 ThuA2_4 (Oral)
Low-Resistance, Scaled Ga₂O₃ MOSFETs with Regrown Ohmic Contacts
 D. M. Dryden^{1,*}, C. Gorsak², D. Walker, Jr.¹, N. Sepelak³, G. Hughes¹, H. Nair², A.J. Green¹
¹Air Force Research Laboratory, Sensors Directorate, Wright-Patterson AFB, OH, USA ²Cornell University, Department of Materials Science and Engineering, Ithaca, NY, USA and ³KBR, Inc. Beavercreek, OH, USA
- 17:10-17:25 ThuA2_5 (Oral)
Ga₂O₃ FinFETs with on-axis (100)-plane Gate Sidewalls Fabricated on β -Ga₂O₃ (010) Substrates
 Z. Wang^{1,*}, S. Kumar¹, T. Kamimura¹, H. Murakami², Y. Kumagai² and M. Higashiwaki^{1,3}
¹National Institute of Information and Communications Technology, Koganei, Tokyo, Japan ²Department of Applied Chemistry, Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan and ³Department of Physics and Electronics, Osaka Metropolitan University, Sakai, Osaka, Japan
- 17:25-17:40 ThuA2_6 (Oral)
 β -Ga₂O₃ MOSFETs on Highly Uniform 2" Vertical Bridgman Substrates
 Kyle J. Liddy^{1,*}, Arkka Bhattacharyya², Yuki Ueda³, Ahmad Islam¹, Joshua J. Piel¹, Kelson D. Chabak¹, Takuya Igarashi³, Kimiyoshi Koshi³, Shigenobu Yamakoshi³, Kohei Sasaki³, Akito Kuramata³, Sriram Krishnamoorthy², Andrew J. Green¹
¹Air Force Research Laboratory, Sensors Directorate, WPAFB, OH, USA ²University of California Santa Barbara, Materials Department, Santa Barbara, CA, USA and ³Novel Crystal Technologies, Inc., 2-3-2 Hirose-dai, Syama-shi, Saitama, Japan

18:00-19:30 Rump Session

Chair: Thomas Schröder (IKZ)

18:00-19:30 Industry perspective on Ga₂O₃

May 31, Friday – last day

08:15-08:45 Admissions

08:45-10:40 Advanced Device Characterization / Thermal Properties Chair: Uttam Singiseti (UB)

08:45-09:10 FrM1_1 (Invited)

Photoluminescence Mapping of Defects in β -Ga₂O₃

M.D. McCluskey^{1,2,*}, J. Huso², C. Remple¹, B.L. Dutton¹, J.S. McCloy¹, S. Rebollo³, S. Krishnamoorthy³ and J.S. Speck³

¹Washington State University, Pullman, WA, USA ²Klar Scientific, Pullman, WA, USA AND ³University of California, Santa Barbara, CA, USA

09:10-09:25 FrM1_2 (Oral)

Threshold Voltage Instability in Vertical β -Ga₂O₃ finFETs Investigated by Combined Electrical and Optical Techniques

M. Fregolent^{1,*}, C. De Santi¹, F. Piva¹, W. Li², K. Nomoto², Z. Hu², D. Jena^{2,3}, H. G. Xing^{2,3}, G. Meneghesso¹, E. Zanoni¹ and M. Meneghini¹

¹Department of Information Engineering, University of Padova, Padova, Italy ²School of Electrical and Computer Engineering, Cornell University, Ithaca, NY, USA and ³Department of Materials Science and Engineering, Cornell University, Ithaca, NY, USA

09:25-09:40 FrM1_3 (Oral)

Application of synchrotron-radiation and laboratory X-ray imaging techniques for defect analysis of β -Ga₂O₃ single crystals and power devices

Y. Yao¹, Y. Sugawara¹, K. Sato¹, Y. Ishikawa¹, K. Sasaki², Y. Yamashita², D. Wakimoto², H. Miyamoto² and A. Kuramata²

¹Japan Fine Ceramics Center, 2-4-1 Mutsuno, Atsuta, Nagoya, Japan ²Novel Crystal Technology, Inc., 2-3-1 Hirose-dai, Sayama, Saitama, Japan

09:40-09:55 FrM1_4 (Oral)

Thermoreflectance imaging of operating temperature rise in β -Ga₂O₃ devices using sub-bandgap illumination

James Spencer Lundh^{1,*}, Georges Pavlidis², Kohei Sasaki³, Andrea Centrone⁴, Joseph A. Spencer^{5,6}, Hannah N. Masten¹, Marc Currie⁶, Alan G. Jacobs⁶, Keita Konishi³, Akito Kuramata³, Karl D. Hobart⁶, Travis J. Anderson⁶, and Marko J. Tadjer⁶

¹National Research Council Postdoctoral Fellow, residing at U.S. Naval Research Laboratory ²Department of Mechanical Engineering, University of Connecticut, Storrs, CT, USA ³Novel Crystal Technology, Inc., 2-3-1, Hirose-dai, Sayama-Shi, Saitama, Japan ⁴National Institute for Standards and Technology, 100 Bureau Dr, Gaithersburg, MD, USA ⁵Center for Power Electronics Systems, Virginia Tech, Blacksburg, VA, USA and ⁶U.S. Naval Research Laboratory, Overlook Ave. SW, Washington, DC, USA

09:55-10:10 FrM1_5 (Oral)

Method for Eliminating Thermal Expansion Anisotropy in β -Ga₂O₃

M. E. Liao^{1,*}, M. J. Tadjer², K. D. Hobart², A. G. Jacobs², and T. J. Anderson²

¹National Research Council Postdoctoral Fellow at U.S. Naval Research Laboratory, Washington, DC, USA ²U.S. Naval Research Laboratory, Washington, DC, USA

10:10-10:25 FrM1_6 (Oral)

Nanoscale origin of thermal conductivity anisotropy in β -Ga₂O₃

M. R. Wagner^{1,2,*}, K. Xu³, S. Zhao^{4,5}, Z. Galazka⁶, L. Sun-Min Choi², M. Meißner^{1,2}, A. Wüthrich², R. Mincigrucci⁷, L. Foglia⁷, D.

Fainozzi⁷, F. Bencivenga⁷, P. Mazzolini⁸, K. Egbo¹, A. Ardenghi¹, Bierwagen¹, R. Rurali³, M. Scheffler^{4,5}, C. Carbogno^{4,5}, B. Graczykowski^{9,10}, J. S. Reparaz³

¹Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany ²Technische Universität Berlin, Institut für Festkörperphysik, Berlin, Germany ³Institut de Ciència de Materials de Barcelona, ICMA-B-CSIC, Bellaterra, Spain ⁴The NOMAD Laboratory at the FHI of the Max-Planck-Gesellschaft, Germany ⁵IRIS-Adlershof of the Humboldt-Universität Berlin, Germany ⁶Leibniz Institute for Crystal Growth, Berlin, Germany ⁷Elettra Sincrotrone Trieste S.C.p.A., Basovizza (TS), Italy ⁸Department of Mathematical, Physical and Computer Sciences, University of Parma, Italy ⁹Max Planck Institute for Polymer Research, Mainz, Germany ¹⁰Faculty of Physics, Adam Mickiewicz University, Poznan, Poland

10:25-10:40 FrM1_7 (Oral)

(Student) MOCVD-grown epitaxial thin films of β -Ga₂O₃ on diamond

Arpit Nandi¹, Indraneel Sanyal¹, David Cherns¹, Ramandeep Mandia², David J. Smith² and Martin Kuball¹

¹Center of Device and Thermographic Reliability, University of Bristol, United Kingdom, ²Department of Physics, Arizona State University, Tempe, Arizona, United States of America

10:40-11:10 Break with Refreshments

11:10-12:25 Detectors**Chair: Takeyoshi Onuma (Tokyo U)**

- 11:10-11:25 FrM2_1 (Oral)
Heteroepitaxial Growth of α -Ga₂O₃ on Various Planes of Corundum Structured Indium Tin Oxide for Vertical UV-C Photodetectors
K. Shimazoe^{1,*}, H. Nishinaka² and M. Yoshimoto²
¹Department of Electronics, Kyoto Institute of Technology, Kyoto, Japan ²Faculty of Electrical Engineering and Electronics, Kyoto Institute of Technology, Kyoto
- 11:25-11:40 FrM2_2 (Oral)
(Student) **Robust Deep Ultraviolet Photodetectors based on Polycrystalline β -Ga₂O₃ Film towards Wide Temperature Range Applicatio**
Hong Huang¹, Haoran Yin¹, Zhiwei Wang¹, Yilin Wang¹, Haoyan Zhan¹, Xiaolong Zhao^{1,*}, Xiaohu Hou¹ and Shibing Long^{1,*}
¹School of Microelectronics, USTC, Hefei, China
- 11:40-11:55 FrM2_3 (Oral)
(Student) **Polarity-reversible multi-band detector based on Ga₂O₃ phototransistor**
Yanni Zou, Ziyuan Fu, Xiaolong Zhao*, Xiaohu Hou, Xiao Feng, and Shibing Long*
School of Microelectronics, USTC, Hefei, China
- 11:55-12:10 FrM2_4 (Oral)
(Student) **Ultrasensitive and Stable X-ray Detector Based on High-Quality Ga₂O₃ Film Grown by MOCVD**
Shunjie Yu, Mengfan Ding, Yan Liu, Xiaohu Hou*, Xiaolong Zhao*, Shibing Long*
School of Microelectronics, USTC, Hefei, China
- 12:10-12:25 FrM2_5 (Oral)
(Student) **Nano-second response Ga₂O₃ HJD radiation detector and its single particle detection proper**
Silong Zhang¹, Leidang Zhou^{2,a}, Xing Lu^{3,b}, Yuxin Deng³, Liang Chen⁴, Fangbao Wang⁴ and Xiaoping Ouyang⁴
¹School of Materials Science and Engineering, Xiangtan University, Xiangtan, China ²School of Microelectronics, and State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Xi'an, China ³State Key Laboratory of Optoelectronic Materials and Technologies, School of Electronics and Information Technology, Sun Yat-sen University, Guangzhou, China and ⁴Northwest Institute of Nuclear Technology, Xi'an, China

12:25-14:15 Lunch Break**14:15-16:10 Rutile GeO₂ as novel ultrawide bandgap semiconductor Chair: Darrell Schlom (CU)**

- 14:15-14:40 FrA1_1 (Invited)
Rutile GeO₂ and GeSnO₂ Alloys: A New Family of UWBG Semiconductors
Sieun Chae¹, Hanjong Paik², Kelsey Mengle¹, Kyle Bushick¹, Tiernan Baucom¹, Amanda Wang¹, Lucas Pressley³, Tyrel McQueen³, John Heron¹ and Emmanouil (Manos) Kioupakis^{1,*}
¹Materials Science and Engineering, University of Michigan, Ann Arbor, Michigan, USA ²Electrical and Computer Engineering, University of Oklahoma, Tulsa, Oklahoma, USA and ³Chemistry, The Johns Hopkins University, Baltimore, Maryland, USA
- 14:40-15:05 FrA1_2 (Invited)
(Student) **Mobility in SnO₂, GeO₂, and Ge_xSn_{1-x}O₂ from first principles**
Amanda Wang^{1,*}, Tiernan Baucom¹, Kyle Bushick¹, Kelsey Mengle¹, Sieun Chae¹, Nick Pant¹, Woncheol Lee¹, Xiao Zhang¹, Samuel Poncé², Joshua Leveille³, Feliciano Giustino³ and Emmanouil Kioupakis¹
¹University of Michigan, Ann Arbor, MI, USA ²Université catholique de Louvain, Louvain-la-Neuve, Belgium and ³The University of Texas at Austin, Austin, TX, USA
- 15:05-15:30 FrA1_3 (Invited)
Bulk rutile-GeO₂ single crystals with extraordinary physical properties
Z. Galazka^{1,*}, A. Fiedler¹, M. Albrecht¹, S. Ganschow¹, S. Bin Anooz¹, J. Zhang¹, R. Blukis¹, T. Schulz¹, M. Pietsch¹, K. Tetzner², O. Bierwagen³, A. Kwasniewski¹, A. Dittmar¹, M. Suendermann¹, T. Schroeder^{1,4} and M. Bickermann^{1,5}
¹Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany ²Ferdinand-Braun-Institut für Höchstfrequenztechnologie (FBH), Berlin, Germany ³Paul-Drude-Institut für Festkörperelektronik (PDI), Berlin, Germany ⁴Humboldt-Universität zu Berlin, Institut für Physik, Berlin, Germany and ⁵Technische Universität Berlin, Institut für Chemie, Berlin, Germany

- 15:30-15:55 FrA1_4 (Invited)
(Student) **Cation incorporation and reaction kinetics for the MBE growth and Ge-based etching of $(\text{Sn}_x\text{Ge}_{1-x})\text{O}_2$ for $0 \leq x \leq 1$**
Wenshan Chen^{1,*}, Kingsley Egbo¹, Joe Kler², Roger A. de Souza² and Oliver Bierwagen¹
¹Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany and ²Institute of Physical Chemistry, RWTH Aachen University, Aachen, Germany
- 15:55-16:10 FrA1_5 (Late News)
Lattice dynamics in rutile GeO_2
H. Tornatzky,^{1,*} Z. Galazka,² O. Brandt¹, O. Bierwagen¹, M.E. Ramsteiner¹ and M.R.Wagner^{1,3}
¹Paul-Drude-Institut, Berlin, Germany ²Leibniz-Institut für Kristallzüchtung, Berlin, Germany and ³Technische Universität Berlin, Berlin, Germany

16:10-16:30 Break (last chance for refreshments)

16:30-17:25 Late News

Chair: Martin Albrecht (IKZ)

- 16:30-16:55 FrA2_1 (Invited)
Electron transport studies in gallium oxide and aluminum-gallium-oxide alloys
Uttam Singiseti*, Ankit Sharma, Animesh Datta, Avinash Kumar
Electrical Engineering, University at Buffalo, Buffalo, NY, USA
- 16:55-17:10 FrA2_2 (Late News)
Fast-switching $\beta\text{-Ga}_2\text{O}_3$ double-implanted MOSFET fabricated on a 100-mm $\beta\text{-Ga}_2\text{O}_3$ epitaxial wafer
H. Miyamoto*, D. Wakimoto, Y. Koishikawa, T. Kase, S. Kunori, K. Sasaki, and A. Kuramata
Novel Crystal Technology, Inc., Sayama, Saitama, Japan
- 17:10-17:25 FrA2_3 (Late News)
(Student) **2 K Operation of Enhancement Mode $\beta\text{-Ga}_2\text{O}_3$ Transistor and Logic Inverter**
Vishal Khandelwal, Glen Isaac Maciel Garcia, Mritunjay Kumar, Na Xiao, Francesco Blanda, Ganesh Mainali, Xiao Tang, Xiaohang Li*
Advanced Semiconductor Laboratory (ASL), Electrical and Computer Engineering Program, CEMSE Division, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Kingdom of Saudi Arabia

17:25-17:55 Awards and Closing

- 17:25-17:40 **Award ceremony**
- 17:40-17:55 **Closing**