

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

16:25-17:35 MBE, Polymorphism Chair: Henning Riechert

- 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. Bernhard¹, 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 Vibornis¹, 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. Kuball³ 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 Kim¹, 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. Bosi³, 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. Mezzadri^{7,2}, 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 Irmischer¹ 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*Crysatl 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

13:50-15:40 Defects and γ -Ga₂O₃ 1

Chair: Chris Van de Walle (UCSB)

- 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

16:10-17:20 Defects and γ -Ga₂O₃ 2

Chair: Matthew McCluskey (Washington SU)

- 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. Tomatzky², 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. Querada¹, 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 ³Kwangwoon 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}, Jingcheng 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, Anushkati 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 ³Department of Applied Chemistry, Tokyo University of Agriculture and Technology, Koganei, Tokyo, 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^{1,*}
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 Dimitroenco², Xavier Perpina¹, 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-CMAB, 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**