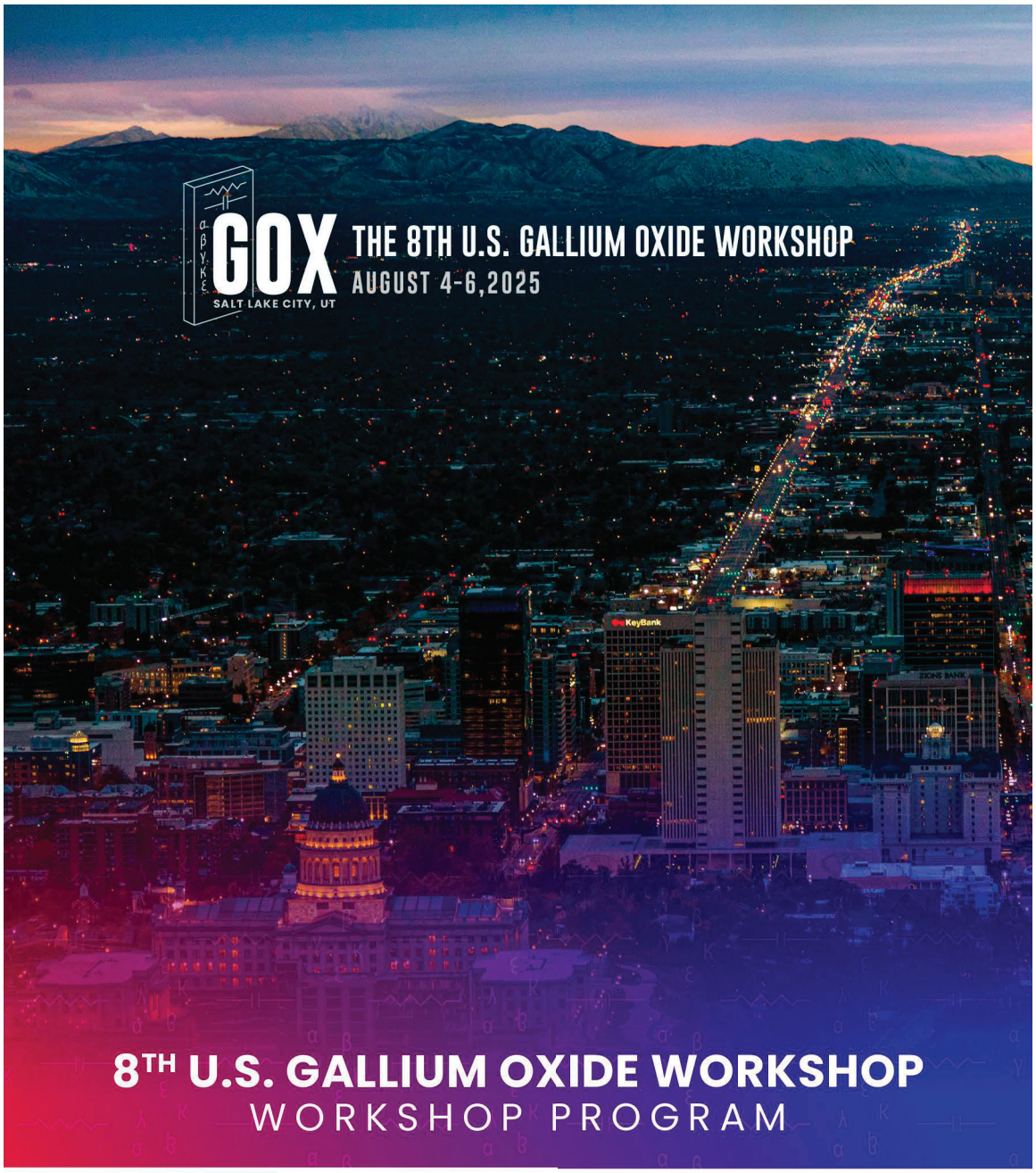

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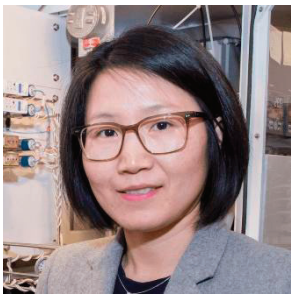
MOCVD SOLUTIONS AND SERVICES

Plenary Speakers

Monday, August 4th | 08:30 - 09:15

Ga_2O_3 Materials: Current Status and Future Prospects

Kohei Sasaki, Novel Crystal Technology, Inc.



Tuesday, August 5th | 8:30 - 9:30

Advancements in the Epitaxial Growth of Ga_2O_3 Thin Films, Alloys, and Heterostructures

Hongping Zhao, The Ohio State University

Wednesday, August 6th | 8:30 - 9:30

The Roadmap Towards Ga_2O_3 Technology Insertion

Andrew Green, Air Force Research Lab

Invited Speakers

Monday, August 4th | 09:15 – 09:45

Bulk Growth of Offcut (100) Ga_2O_3 by EFG: Establishing a Domestic Source of Gallium Oxide Substrates

Drew Haven, Luxium Solutions

Monday, August 4th | 12:00 – 12:30

Nitrogen-Doped Ga_2O_3 Thin Films Grown by Molecular Beam Epitaxy

Masataka Higashiwaki, Osaka Metropolitan University

Monday, August 4th | 14:00 – 14:30

Illuminating Features in β-Ga_2O_3 with Photoluminescence and Raman Spectroscopy

Matthew McCluskey, Washington State University

Invited Speakers

Monday, August 4th | 16:00 – 16:30

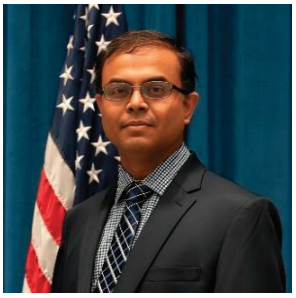
Synthesis of UWBG GeO2 and GeSnO2 semiconductors

Rebecca L (Becky) Peterson, University of Michigan

Tuesday, August 5th | 11:00 – 11:30

MOCVD Synthesis and in Situ Etching of Ga_2O_3

Hari Nair, Cornell University



Tuesday, August 5th | 14:00 – 14:30

Dielectric Integration for Ga_2O_3 MOS Devices

Ahmad Ehteshamul Islam, Air Force Research Lab

Tuesday, August 5th | 16:00 – 16:30

Atomic Structure of the Ga_2O_3-Based PN Junction Interface

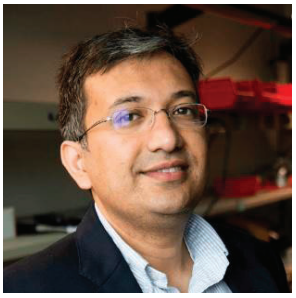
Jinwoo Hwang, The Ohio State University

Invited Speakers

Wednesday, August 6th | 14:00 – 14:30

Reaching beyond Diamond to Sapphire a 7 eV Semiconductor

Darrell Schlom, Cornell University



Wednesday, August 6th | 15:40 – 16:15

Recent advancements in Gallium Oxide based power electronics

Faisal Khan, National Renewable Energy Laboratory

Technical Program: Monday, August 4

08:00 - 08:30
Registration

08:20 – 08:30
Opening Remarks
Co-Chairs: Sriram Krishnamoorthy (University of California - Santa Barbara), Michael Scarpulla (University of Utah)

08:30 – 09:15
Plenary Talk - Advances in Ga_2O_3 Crystal Growth and Device Applications
Speaker: Kohei Sasaki (Novel Crystal Technology)

09:15 - 10:30
Technical Session 1: Bulk Crystal Growth
Session Chairs: Michael Scarpulla (University of Utah)

09:15 – 09:45
Invited Talk - Bulk Growth of Offcut (100) Ga_2O_3 by EFG: Establishing a Domestic Source of Gallium Oxide Substrates
Speaker: Drew Haven (Luxium Solutions)

09:45
Bulk Crystal Growth of β-Ga_2O_3 Crystals from the Melt Without Precious-Metal Crucible Using Oxide Crystal Growth from a Cold Crucible Method
Akira Yoshikawa (Tohoku University)

10:00

Optimization of Axial Vertical Temperature Distribution and Experimental Verification in 4-Inch β-Ga_2O_3 Crystal Growth Using the Vertical Bridgman Method

Dae-Uk Kim (DONG-EUI University, Korea (South)); Seora Son (AXEL Co, Ltd., Korea (South)); So-min Shin (Dong Eui University, Korea (South)); Yunjin Kim (DongEui University, Korea (South)); Won-Jae Lee and Junggon Kim (Dong-Eui University, Korea (South)); Su-Min Choi (AXEL, Korea (South)); Kwang-Hee Jung (Dong-Eui University, Korea (South)); Dong-Jun Lee, Hwang-Hee Lee and Jin-Ki Kang (AXEL, Korea (South)); Mi-Seon Park, Eun-Seo Lee and Eun-Jeong An (Dong-Eui University, Korea (South))

10:15

Thermal Field Engineering Using Ceramic Materials to Optimize β-Ga2O3 Crystal Quality by EFG Method 5

Tae-Hun Gu and A-Ran Shin (Pukyong National University, Korea (South)); Yun-Ji Shin and Seong-Min Jeong (Korea Institute of Ceramic Engineering and Technology, Korea (South)); Si-Young Bae (Pukyong National University, Korea (South))

10:30 – 11:00
Coffee Break

11:00 – 12:00
Technical Session 2: Substrates & Epitaxial Growth
Session Chair: Matthew McCluskey (Washington State University)

11:00
Development of a Manufacturing Process for Epi-Ready Miscut (100) β-Ga2O3 Substrates
Daniel Erdely (Penn State University, Applied Research Laboratory, USA); Robert M Lavelle (Penn State University Applied Research Laboratory, USA); William Everson (Penn State University, Applied Research Laboratory, USA); Luke Lyle (Penn State University, Applied Research, USA); Scott W Pistner, Samuel R Hallacher and Shawn L Watkins (Penn State University Applied Research Laboratory, USA); Drew Haven, David Joyce and John Frank (Luxium Solutions, Inc., USA); Joan M Redwing (The Pennsylvania State University, USA); David Snyder (Penn State University, Applied Research Laboratory, USA)

11:15
Characterization of Miscut (100) β-Ga2O3 Substrates to Enable Bulk Growth and Processing Improvements
Robert M Lavelle (Penn State University Applied Research Laboratory, USA); William Everson and Daniel Erdely (Penn State University, Applied Research Laboratory, USA); Luke Lyle (Penn State University, Applied Research, USA); Scott W Pistner, Samuel R Hallacher and Shawn L Watkins (Penn State University Applied Research Laboratory, USA); Drew Haven, David Joyce and John Frank (Luxium Solutions, Inc., USA); Joan M Redwing (The Pennsylvania State University, USA); David Snyder (Penn State University, Applied Research Laboratory, USA)

11:30
Fabrication of (010) and (001) β- Ga2O3 Thin Film Composite Wafers
Michael E Liao (Apex Microdevices, USA); Mark Goorsky (University of California, Los Angeles, USA); Piyush J. Shah (Apex Microdevices, USA)

11:45

Evaluation of the Impact of Substrate Processing on (010) β-Ga2O3 Epitaxial Growth

Robert M Lavelle (Penn State University Applied Research Laboratory, USA); William Everson and Daniel Erdely (Penn State University, Applied Research Laboratory, USA); Luke Lyle (Penn State University, Applied Research, USA); Scott W Pistner, Samuel R Hallacher and Connor M Beakes (Penn State University Applied Research Laboratory, USA); Kevin Leedy and Adam Neal (Air Force Research Laboratory, USA); Daram N Ramdin (Air Force Research Labs- Contractor & Core4ce, USA); Tom G Jacob (University of Dayton, USA); Allen Brady and Chase Scott (Northrop Grumman Corporation SYNOPTICS, USA); Joan M Redwing (The Pennsylvania State University, USA); David Snyder (Penn State University, Applied Research Laboratory, USA)

12:30 – 14:00
Lunch Break

14:00 – 15:30
Technical Session 3: Epitaxy, Material Characterization & Defects
Session Chair: Masataka Higashiwaki (Osaka Metropolitan University, Japan)

14:00 – 14:30
Invited Talk - Illuminating Features in β-Ga2O3 with Photoluminescence and Raman Spectroscopy
Speaker: Matthew McCluskey, (Washington State University)

14:30

Mitigating Unintentional Carbon Incorporation and Characterizing Associated Deep Compensating Centers

Hemant Jagannath Ghadi, Randy Carver, Lingyu Meng, Dong Su Yu, Hongping Zhao and Aaron Arehart (The Ohio State University, USA); Steven Ringel (the Ohio State University, USA)

14:45

Non-Equilibrium Defect Formation Energies-What Happens to Defect Concentrations in the Presence of Excess Carriers?

Isaac Thomas and Brian Eisner (University of Utah, USA); Arkka Bhattacharyya and Sriram Krishnamoorthy (University of California Santa Barbara, USA); Thaddeus Asel (Air Force Research Laboratory, USA); Prescott Evans (Azimuth Corporation, USA); Michael Scarpulla (University of Utah, USA)

15:00

Infrared-Active Phonon Modes, Band-to-Band Transitions, and Ultraviolet Dielectric Functions of Unintentionally-Doped (X < 0.3) and Silicon Doped (X < 0.25) Single Crystal (100) β-(AlxGa1-x)2O3

Preston R Sorensen (University of Nebraska-Lincoln)

15:15

Si-Doped β-Ga_2O_3 Films Grown by LPCVD with Controlled Doping, Promising Mobility and High Growth Rates

Saleh Ahmed Khan, Ahmed Ibreljic and A F M Anhar Uddin Bhuiyan (University of Massachusetts Lowell, USA)

15:30 – 16:00
Coffee Break

16:00 – 17:30
Technical Session 4: Epitaxial Growth
Session Chair: Anhar Bhuiyan (University of Massachusetts)

16:00 – 16:30
Invited Talk - Synthesis of UWBG GeO2 and GeSnO2 semiconductors
Speaker: Rebecca L (Becky) Peterson (University of Michigan), Ahmad Matar Abed (University of Michigan)
Session Chair: Anhar Bhuiyan

16:30

Seed-Driven Stepwise Crystallization for Phase Control in Growing Rutile GeO2 Films by MOCVD

Imteaz Rahaman, Botong Li, Hunter Ellis, Michael Scarpulla and Kai Fu (University of Utah, USA)

16:45

β-Ga2O3 Epitaxial Layer Grown by Liquid Phase Epitaxy

Zhijin Chen, Hiroaki Tadokoro and Taro Takakura (Mitsubishi Gas Chemical Company Inc., Japan); Miyuki Miyamoto, Susumu Innan and Makoto Sasaki (Mitsubishi Gas Chemical Company, Inc., Japan)

17:00

MOVPE Growth and Characterization of β -(AlxGa1-x)2O3 Thin Films on β (AlyGa1-y)2O3 Substrates

Saud Bin Anooz, Jana Rehm, Arub Akhtar and Ta-Shun Chou (Leibniz-Institut für Kristallzüchtung (IKZ), Germany); Andreas Fiedler (Leibniz Institute for Crystal Growth - IKZ, Germany); Martin Schmidbauer (Leibniz-Institut für Kristallzüchtung (IKZ), Germany); Zbigniew Galazka (Leibniz Institute for Crystal Growth - IKZ, Germany); Thilo Remmele (Leibniz-Institut für Kristallzüchtung (IKZ), Germany); Martin Albrecht (Leibniz Institute for Crystal Growth - IKZ, Germany); Andreas Popp (Leibniz-Institut Fuer Kristallzuechtung, Germany)

17:15

Epitaxial Stabilization of Monoclinic (Al, in, Ga)2O3/Ga2O3 Heterostructures

Stephen Schaefer, (National Renewable Energy Laboratory)

17:30 – 19:30

GOX Welcome Reception

Location: Cleone Peterson Eccles Alumni House

Address: 155 SOUTH CENTRAL CAMPUS DRIVE SALT LAKE CITY, UT 84112

Technical Program: Tuesday, August 5

08:00 - 08:30
Registration

08:30 - 09:30
Plenary Talk - Advancements in the Epitaxial Growth of Ga_2O_3 Thin Films, Alloys, and Heterostructures
Speaker: Hongping Zhao (The Ohio State University)

09:30 - 10:30
Technical Session 5: MOCVD Growth
Session Chair: Hari Nair (Cornell University)

09:30
Growth of >50micron Thick, <1e16 Doped Ga2O3 Layers on SnDoped (001) Substrates by Halide Vapor Phase Epitaxy
Jacob Leach, Caroline Reilly, Heather Splawn and Kevin Udwary (Kyma Technologies, USA)

09:45
Sub-Nanometer Surface Roughness of 20 µm Thick Homoepitaxial β-Ga_2O_3 on ~3.8° (100) Substrates by MOCVD
Joshua T Buontempo, Cameron A Gorsak and Hari P Nair (Cornell University, USA)

10:00
MOCVD Growth of (010) β- Ga2O3 with Fast Growth Rates (> 4.3 µm/H) and Superior Transport Properties
Dong Su Yu, Lingyu Meng and Hongping Zhao (The Ohio State University, USA)

10:15
MOCVD Epitaxy of (001) β- Ga2O3 Films with Fast Growth Rates
Lingyu Meng, Dong Su Yu, Md Mosarof Hossain Sarkar and Hongping Zhao (The Ohio State University, USA)

Technical Program: Tuesday, August 5

10:30 – 11:00
Coffee Break

11:00 – 12:00
Technical Session 6: MOCVD Growth
Session Chair: Xiuling Li (University of Texas at Austin)

11:00 – 11:30
Invited Talk - MOCVD Synthesis and in Situ Etching of Ga_2O_3
Speaker: Hari Nair, (Cornell University)
Session Chair: Xiuling Li (Osaka Metropolitan University, Japan)

11:30
Low-Background Carrier Density Intentionally and Unintentionally Doped (010) β- Ga2O3 Drift Layers and Schottky Diodes
Carl Peterson (UC Santa Barbara, USA); Chinmoy Nath Saha, Rachel Kahler, Yizheng Liu, Saurav Roy and Sriram Krishnamoorthy (University of California Santa Barbara, USA)

11:45
Novel Showerhead for Scalable β-Ga_2O_3 MOCVD
William Timothy Brand (Agnitron Technology, Inc., USA & Agnitron Technology, USA); Fikadu Alema and Andrei Osinsky (Agnitron Technology Inc, USA)

12:00
Electrical Transport in δ-Doped β- Ga2O3 Grown by MOCVD
Cameron A Gorsak, Pushpanshu Tripathi, Joshua T Buontempo, Bilal Azhar, Chuan F. C. Chang, Joseph E Dill, Salil A Paranjape, Huili Xing, Michael O Thompson, Debdeep Jena and Hari P Nair (Cornell University, USA)

12:30 – 14:00
Lunch Break

14:00 – 15:30
Technical Session 7: Dielectrics, Ion Implantation & Material Processing
Session Chair: Kai Fu (University of Utah)

14:00 – 14:30
Invited Talk - Dielectric Integration for Ga2O3 MOS Devices
Speaker: Ahmad Ehteshamul Islam (Air Force Research Lab)
Session Chair: Kai Fu (University of Utah)

14:30
Investigation of SiO2: HfO2 Composition Effects on ALD HfSiOx as Gate Dielectric on β Ga2O3 (001)
Xin Zhai and Zhuoqun Wen (University of Michigan, USA); Pengcheng Lu and Kai Sun (University of Michigan, Ann Arbor, USA); Elaheh Ahmadi (University of California, Los Angeles, USA)

14:45
Characterization of Ion-Implanted Nitrogen as a Compensating Acceptor in β-Ga2O3
Jacob S Breakfield (Air Force Research Laboratory, USA); Zachary Weber (The Ohio State University, USA); Nolan Hendricks and Joshua Piel (Air Force Research Lab, USA); Andrew Green (AFRL, USA)

15:00
High-Density Si Doping into Ga2O3 by Hot Implantation
Kotaro Yagi (Osaka Metropolitan University, Japan); Daisuke Matsuo, Shun Konno and Shinya Takemura (Nissin Ion Equipment Co., Ltd., Japan); Kosuke Usui (Nissin Ion Equipment Company Limited, Japan); Yasunori Andoh (Nissin Electric Co., Ltd., Japan); Kohei Tanaka (Nissin Ion Equipment Co., Ltd., Japan); Masataka Higashiwaki (Osaka Metropolitan University, Japan & National Institute of Information and Communications Technology, Japan)

15:15
Effect of NiOx Sputtering and ICP Dry Etching on (010) β- Ga2O3 Films Grown by MOCVD
Chinmoy Nath Saha (University of California Santa Barbara, USA); Carl Peterson (UC Santa Barbara, USA); Yizheng Liu and Sriram Krishnamoorthy (University of California Santa Barbara, USA)

15:30 – 16:00
Coffee Break

Technical Program: Tuesday, August 5

16:00 – 17:30
Technical Session 8: Heterojunctions, Epitaxy & Wet Etching
Session Chair Ahmad Ehteshamul Islam (Air Force Research Lab)

16:00 – 16:30
Invited Talk - Atomic Structure of the Ga2O3-Based PN Junction Interface
Speaker: Jinwoo Hwang (The Ohio State University)
Session Chair: Ahmad Ehteshamul Islam (Air Force Research Lab)

16:30
MOCVD-Grown n-Ga_2O_3/p-GaN Heterojunction Diodes with Atomically Sharp Interfaces
Zhongjie Ren, Sangbin Park and Xun Zhan (The University of Texas at Austin, USA); Aadil Waseem (University of Austin Texas, USA); Scott A Wicker Jr (The University of Texas at Austin, USA); Xiuling Li (University of Texas at Austin, USA)

16:45
Thermal Degradation and Performance Enhancement of βGa2O3 Diodes Using CNT/ Ga2O3 Heterojunctions
Hunter Ellis and Botong Li (University of Utah, USA); Wei Jia (The University of Utah, USA); Haoyu Xie, Jichao Fan, Apostoli Hillas and Michael Scarpulla (University of Utah, USA); Berardi Sensale Rodriguez (The University of Utah, USA); Weilu Gao and Kai Fu (University of Utah, USA)

17:00
Near-Vertical Non-Plasma HCl Gas Etching on (011) β- Ga2O3
Takayoshi Oshima and Yuichi Oshima (National Institute for Materials Science, Japan)

17:15
Dry Etch Damage Mitigation in (001) β- Ga2O3 Schottky Diodes Using Hot-H3PO4
Steve Rebollo (University of California, Santa Barbara, USA); Wolfgang Buchmaier (UCSB, USA); Sriram Krishnamoorthy (University of California Santa Barbara, USA); James Speck (UCSB, USA)

17:30 – 19:30
Poster Session
Location: Cleone Peterson Eccles Alumni House
Address: 155 SOUTH CENTRAL CAMPUS DRIVE SALT LAKE CITY, UT 84112

Crack Formation in Strained β-(AlxGa1-x)$_2$O$_3$ Films Grown on (010) β-Ga$_2$O$_3$ Substrates
Dorian P Luccioni and Kenny Huynh (University of California Los Angeles, USA); Michael E Liao (Apex Microdevices, USA); Kaicheng Pan, Brandon S. Carson and Lezli Matto (University of California Los Angeles, USA); Marko J Tadjer and James Spencer S Lundh (US Naval Research Laboratory, USA); Kohei Sasaki (Novel Crystal Technology, Inc., Japan); Hannah N. Masten and Jennifer Hite (US Naval Research Laboratory, USA); Michael Mastro (Naval Research Laboratory, USA); XianRong Huang and Michael Wojcik (Advanced Photon Source, Argonne National Laboratory, USA); Akito Kuramata (Novel Crystal Technology, Inc., Japan); Karl D Hobart (US Naval Research Laboratory, USA); Mark Goorsky (University of California, Los Angeles, USA)

Advanced MOCVD Growth and TEM Analysis of Rutile GeO$_2$
Imteaz Rahaman, Botong Li, Hunter Ellis, Michael Scarpulla and Kai Fu (University of Utah, USA)

Distinction Between (001) and (-101) Plane Orientations of β-Ga$_2$O$_3$ Crystals Grown by EFG Method
So-min Shin (Dong Eui University, Korea (South)); Yunjin Kim (DongEui University, Korea (South)); Dae-Uk Kim (DONG-EUI University, Korea (South)); Won-Jae Lee and Junggon Kim (Dong-Eui University, Korea (South))

Improving Thermal Management in β-Ga$_2$O$_3$ Power Devices Through Interface Engineering: A First-Principles Study
Sanjay Gopalan (North Carolina State University, USA); John Muth (NC State University, USA); Ki Wook Kim (North Carolina State University, USA)

Understanding Anisotropic Breakdown Behavior in β-Ga$_2$O$_3$ Through TCAD and Experimental Analysis of JTE Structures
Mohamed Torky and Shariare Hossain Rabbi (University at Albany, USA); Daehwan Chun and Youngkyun Jung (Hyundai Motor Company, Korea (South)); Bongmook Lee (SUNY Polytechnic Institute, USA); Woongje Sung (University at Albany, USA)

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Mark Goorsky (University of California, Los Angeles, USA); Michael E Liao (Apex Microdevices, USA); Brandon S. Carson (University of California Los Angeles, USA); Marko J Tadjer and Karl D Hobart (US Naval Research Laboratory, USA)

Remote Hydrogen Plasma Interplay with Ga_2O_3 Carbon, Oxygen, and Gallium Defects
Carlos R DeLeon (Ohio State University, USA); Lingyu Meng (The Ohio State University, USA); Daram N Ramdin (Air Force Research Labs- Contractor & Core4ce, USA); Jade Cowsky (Ohio State University, USA); Hongping Zhao (The Ohio State University, USA); Leonard Brillson (Ohio State University, USA)

High-Frequency Electron Paramagnetic Resonance Generalized Spectroscopic Ellipsometry Characterization of Cr-Doped Gallium Oxide
Viktor Rindert (Lund University, Sweden); Zbigniew Galazka (Leibniz Institute for Crystal Growth - IKZ, Germany); Mathias M Schubert (University of Nebraska-Lincoln & Lund University, USA); Vanya Darakchieva (Lund University, Sweden)

Mitigating Interfacial Si Conductivity in β-Ga_2O_3 Thin Films with Fe Compensation
Brenton A. Noesges (Air Force Research Laboratory, USA & Core4ce, USA); Prescott Evans (Azimuth Corporation, USA); Jian Li (Air Force Research Laboratory, USA); Mark Gordon (Air Force Research Laboratory & University of Dayton, USA); Daram N Ramdin (Air Force Research Labs- Contractor & Core4ce, USA); Shin Mou, Adam Neal and Thaddeus Asel (Air Force Research Laboratory, USA)

Nucleation and Evolution of GeO_2 Grown on Sapphire Substrates by MOCVD
Botong Li and Imteaz Rahaman (University of Utah, USA); Bobby Duersch (Electron Microscopy and Surface Analysis Laboratory, the University of Utah, USA); Hunter Ellis and Kai Fu (University of Utah, USA)

Low-Pressure CVD of Sn- and Ge-Doped β-Ga_2O_3: Tunable Doping, Promising Mobility, Schottky Diodes, and Insights from DFT
Ahmed Ibreljic, Saleh Ahmed Khan, Ibrahim Isah, Stephen Lam and A F M Anhar Uddin Bhuiyan (University of Massachusetts Lowell, USA)

Investigating the Epitaxial Growth of Hexagonal ε-$(InxGa1-x)_2O_3$ on AlN for High Power and Extreme Environment Applications
Maria Sultana and Ariful Haque (Texas State University, USA)

Effect of N_2 Atmosphere Annealing on Impurity Distribution and Crystallinity of 4N β-Ga_2O_3 Single Crystals Grown by EFG Method
A-Ran Shin and Tae-Hun Gu (Pukyong National University, Korea (South)); Yun-Ji Shin and Seong-Min Jeong (Korea Institute of Ceramic Engineering and Technology, Korea (South)); Si-Young Bae (Pukyong National University, Korea (South))

TEM Investigation of Point-Defect Formation in Beta-$(AlxGa1-x)_2O_3$ Single Crystals
Arub Akhtar, Thilo Remmele, Saud Bin Anooz and Ta-Shun Chou (Leibniz-Institut für Kristallzüchtung (IKZ), Germany); Andreas Fiedler (Leibniz Institute for Crystal Growth - IKZ, Germany); Jana Rehm, Chen-Hsun Lu and Changming Liu (Leibniz-Institut für Kristallzüchtung (IKZ), Germany); Tobias Schulz (Leibniz-Institut für Kristallzüchtung, Germany); Zbigniew Galazka and Martin Albrecht (Leibniz Institute for Crystal Growth - IKZ, Germany); Andreas Popp (Leibniz-Institut Fuer Kristallzuechtung, Germany)

Machine Learning Guided Microscopy for Vacancy Detection in β-Ga_2O_3
Shaon Das and Baishakhi Mazumder (University at Buffalo, USA)

Vertically Conducting β-Ga_2O_3 Diodes on 4H-SiC Substrate as Short Wavelength (<245 nm) Switches/Detectors
Tahir Hassan and Nifat Jahan Nipa (University of South Carolina, USA); Kai Fu and Botong Li (University of Utah, USA); Rafiqul Islam and Michel Francois (Cactus Materials Inc., USA); Iftikhar Ahmad (University of South Carolina, USA)

Nanoscale Thermal Transport in Ion-Beam-Exfoliated β-Ga_2O_3 Nanomembranes
Azat Abdullaev (Nazarbayev University, Kazakhstan & National Laboratory Astana, Kazakhstan); Lyazzat Mukhangaliyeva and Kairolla Sekerbayev (National Laboratory Astana, Kazakhstan); Duarte Esteves (Instituto Superior Técnico, University of Lisbon, Portugal); Miguel Cardoso Pedro (INESC MN, Portugal); Luís Manuel Cerqueira Lopes Alves (C2TN, Portugal); Katharina Lorenz and Marco Peres (Instituto Superior Técnico, University of Lisbon, Portugal); Zhandos Utegulov (Nazarbayev University, Kazakhstan)

Defects in Atomic Layer Deposited Polycrystalline HfO_2 on ($\bar{2}01$) β-Ga_2O_3
Khushabu Agrawal and Paolo Latorraca (Tyndall National Institute Cork, Ireland); Adam A Gruszecki, Joy Roy, Robert Wallace and Chadwin D Young (University of Texas at Dallas, USA); Paul Hurley and Karim Cherkaoui (Tyndall National Institute, Ireland)

Modulating Interface and Bulk Properties in ALD Al_2O_3 on β-Ga_2O_3 with Spatially Selective Oxidants
Adam A Gruszecki and Joy Roy (University of Texas at Dallas, USA); Khushabu Agrawal and Paolo Latorraca (Tyndall National Institute Cork, Ireland); Karim Cherkaoui and Paul Hurley (Tyndall National Institute, Ireland); Robert Wallace and Chadwin D Young (University of Texas at Dallas, USA)

In Situ Study of Crystal Quality and Phase Transition of Ga_2O_3 and GeO_2 at High Temperatures Up to 1000 ℃ by XRD
Botong Li and Imteaz Rahaman (University of Utah, USA); Bobby Duersch (Electron Microscopy and Surface Analysis Laboratory, the University of Utah, USA); Hunter Ellis and Kai Fu (University of Utah, USA)

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Khandakar Aaditta Arnab and Michael Scarpulla (University of Utah, USA)

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Marc H Weber (Washington State University, USA & Institute for Materials Research (IMR), USA)

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Chen He (University of Chinese Academy and Science)

Numerical Simulation and Optimisation of Hot-Zone Configurations for β-Ga_2O_3 Crystal Growth via the Vertical Bridgman Method
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Miguel Aguilo (Morphorm LLC, USA); Michael Scarpulla (University of Utah, USA)

The Study on Surface Properties of Various Crystal Planes Obtained from Bulk β-Ga_2O_3 Single Crystals Grown by the EFG Method
Yunjin Kim (DongEui University, Korea (South)); So-min Shin (Dong Eui University, Korea (South)); Dae-Uk Kim (DONG-EUI University, Korea (South)); Junggon Kim and Won-Jae Lee (Dong-Eui University, Korea (South))

A Surface Potential Based Analytical C-V Model of a Double-Gate Vertical Fin-Shaped Ga_2O_3 Power Transistor
Twisha Titirsha, Showmik Singha, Md Maruf Hossain and Sazia A. Eliza (University of Missouri, USA); Syed Islam (University of Missouri-Columbia, USA)

Simulation and Performance Evaluation of AlN/β-Ga_2O_3 HEMTs for Next-Generation Ultrawide Bandgap Power Devices
Md Maruf Hossain (University of Missouri, USA & University of Missouri-Columbia, USA); Showmik Singha and Twisha Titirsha (University of Missouri, USA); Sazia Eliza and Syed Islam (University of Missouri-Columbia, USA)

Crystallographic HCl Gas Etching for Fabrication of β-Ga_2O_3/Air-Gap Structures on (100) Substrates
Takayoshi Oshima and Yuichi Oshima (National Institute for Materials Science, Japan)

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Technical Program: Wednesday, August 6

08:00 - 08:30
Registration

08:30 - 09:30
Plenary Talk - The Roadmap Towards Ga2O3 Technology Insertion
Speaker: Andrew Green (Air Force Research Lab)

09:30 - 10:30
Technical Session 9: Transistors
Session Chair: Nolan Hendricks (Air Force Research Lab)

09:30
1.8 kV Multi-Fin β- Ga2O3 Vertical FinFET with Field Oxide Exhibiting a PFOM of 1 GW/cm2
Saurav Roy and Chinmoy Nath Saha (University of California Santa Barbara, USA); Carl Peterson (UC Santa Barbara, USA); James Speck (University of California, Santa Barbara, USA); Sriram Krishnamoorthy (University of California Santa Barbara, USA)

09:45
Enhancement-Mode Vertical β- Ga2O3 U-Trench MOSFETs Featuring in-Situ Mg-Doped Current Blocking Layers
Walid Amir (University at Buffalo, USA); Sudipto Saha (SUNY Buffalo, USA); Jiawei Liu (The State University of New York, USA & University at Buffalo, USA); Lingyu Meng, Dong Su Yu and Hongping Zhao (The Ohio State University, USA); Uttam Singisetti (SUNY Buffalo, USA)

10:00
β-Ga2O3 Sub-Micron FinFETs Modulating > 3 x 1E13 cm-2 Charge Density and 109 on/off Ratio
Nabasindhu Das and Advait Gilankar (Arizona State University, USA); Cameron A Gorsak, Salil A Paranjape, Pushpanshu Tripathi and Hari P Nair (Cornell University, USA); Nidhin Kurian Kalarickal (Arizona State University, USA)

10:15

High-Voltage β- Ga2O3 MOSFET with Staircase Field Plate Design and 400 V Dynamic Switching

Shivam Sharma (University of Buffalo, USA); Sudipto Saha (SUNY Buffalo, USA); Noor Jahan Nipu (The State University of New York at Buffalo, USA); Walid Amir (University at Buffalo, USA); Jiawei Liu (The State University of New York, USA & University at Buffalo, USA); Partha Chakraborty (CFD Research Corporation, USA); Uttam Singisetti (SUNY Buffalo, USA)

10:30 – 11:00

Coffee Break

11:00 – 12:00

Technical Session 10: Diodes & Thermal Management

Session Chair: Nidhin Kurian Kalarickal (Arizona State University)

11:00

Near-Ideal 1D Thermionic Field Emission Current in Vertical β- Ga2O3 Schottky Diodes via Ultra-High-κ Sputtered BaTiO3 Field Management

Kyle Liddy (AFRL, USA); Nolan Hendricks (Air Force Research Lab, USA); Weisong Wang (Wright State University Lake Campus, USA); Kevin Leedy (Air Force Research Laboratory, USA); Andrew Green (AFRL, USA)

11:15

Orientation-Dependent β- Ga2O3 Heterojunction Diode with Atomic Layer Deposition (ALD) Grown NiO

Yizheng Liu (University of California Santa Barbara, USA); Shane M.W. Witsell and John F. Conley (Oregon State University, USA); Sriram Krishnamoorthy (University of California Santa Barbara, USA)

11:30

An Aerosol Jet Printed Heat Spreader Material for Thermal Management of Gallium Oxide Devices

Laura C Davidson (KBR, USA); Nicholas Sepelak (KBR, Inc., USA); Roberto Aga (KBR, USA); Judit K Beagle, Elizabeth Sowers, Carrie Bartsch and Andrew Green (AFRL, USA)

11:45

Improved Thermal Performance of Gallium Oxide Devices Through the Metal-Embedded Chip Assembly Process

Judit K Beagle and Elizabeth Sowers (AFRL, USA); Daniel M Dryden (Air Force Research Laboratory, USA)

12:00

A Field Plate Study on Large-Area β- Ga2O3 Transistors for Field Management in Power Switching Devices

Nicholas P Sepelak (KBR, USA & Air Force Research Laboratory, USA); Nolan Hendricks (Air Force Research Lab, USA); Kyle Liddy and Elizabeth Sowers (AFRL, USA); Laura C Davidson (KBR, USA); Joshua Piel (Air Force Research Lab, USA); Weisong Wang (Wright State University Lake Campus, USA); Judit K Beagle (AFRL, USA); Joshua T Buontempo, Cameron A Gorsak, Katie Gann and Hari P Nair (Cornell University, USA); Kevin Leedy, Daniel M Dryden and Ahmad Ehteshamul Islam (Air Force Research Laboratory, USA); Andrew Green (AFRL, USA)

12:30 – 14:00

Working Lunch Break

Expert panel: Lessons learned from incumbent technologies and applications for Ga2O3

Moderator: Nolan Hendricks (Air Force Research Lab)

Panelists:

1. SiC Power Semiconductor Commercialization: Overcoming Key Barriers and Lessons Learned for Novel Material Systems

Victor Veliadis (North Carolina State University)

2. Photoconductive Power Semiconductor Devices and Potential for Gallium Oxide

Sudip Mazumder (University of Illinois)

3. Beyond the Die: Key Elements for Successful Adoption

Alan Mantooth (University of Arkansas)

14:00 – 15:30
Technical Session 11: Sapphire & Devices for extreme environment applications
Session Chair: Uttam Singisetti (University at Buffalo)

14:00 – 14:30
Invited Talk - Reaching beyond Diamond to Sapphire a 7 eV Semiconductor
Speaker: Darrell Schlom (Cornell University)
Session Chair: Uttam Singisetti (University at Buffalo)

14:30
Electrothermal Co-design of Vertical β- Ga2O3 Schottky Diodes with High Permittivity Dielectric Field Plate for High-field and Thermal Management
Emerson J. Hollar and Ahsanul M Audri (Iowa State University, USA); Chung-Ping Ho and Jingjing Shi (University of Florida, USA); Esmat Farzana (Iowa State University, USA)

14:45
Heavy Ion Single Event Effects (SEE) Testing of kV-Class Lateral Gallium Oxide MOSFETs
Shivam Sharma (University at Buffalo, USA); Andrew L Sternberg (Vanderbilt, USA); Animesh Datta (University at Buffalo, USA); Noor Jahan Nipu (The State University of New York at Buffalo, USA); Sudipto Saha (SUNY Buffalo, USA); Walid Amir (University at Buffalo, USA); Jiawei Liu (The State University of New York, USA & University at Buffalo, USA); Christina DiMarino (Virginia Tech & Center for Power Electronics Systems (CPES), USA); Partha Chakraborty (CFD Research Corporation, USA); Uttam Singisetti (SUNY Buffalo, USA)

15:00
Influence of Doping Concentration and E-Field on Radiation Response in MOCVD β- Ga2O3 Schottky Diodes
Joe McGlone, Hemant Jagannath Ghadi and Randy Carver (The Ohio State University, USA); Jonathan Heile (Sandia National Laboratory, USA); Lingyu Meng, Dong Su Yu, Hongping Zhao and Aaron Arehart (The Ohio State University, USA); Edward Bielejec (Sandia National Laboratory, USA); Steven Ringel (the Ohio State University, USA)

15:15 – 15:45
Coffee Break

15:15 – 17:30
Technical Session 12: Novel devices & dynamic performance Session Chair: Esmat Farzana (Iowa State University)

15:15 – 16:45
Invited Talk - Recent advancements in Gallium Oxide based power electronics
Speaker: Faisal Khan (National Renewable Energy Laboratory)

16:15
Effects of Spatially Resolved Heavy Ion Irradiation on Ga2O3 MOSFETs
Daram N Ramdin (Air Force Research Labs- Contractor & Core4ce, USA); Eric O' Quinn (University of Tennessee, Knoxville, USA); Adam Charnas (Air Force Research Laboratory, USA); Kay-Obbe Voss (GSI Helmholtz Center, Germany); Cameron A Gorsak and Hari P Nair (Cornell University, USA); Maik K. Lang (University of Tennessee, Knoxville, USA); Andrew Green (AFRL, USA); Thaddeus Asel, Shin Mou and Adam Neal (Air Force Research Laboratory, USA)

16:30
Evaluation of a β- Ga2O3 MSM Detectors for Proton Therapy
Hunter Ellis, Imteaz Rahaman, Jared Miller, Ajayyvarman Mallapillai, Apostoli Hillas, Vikren Sarkar and Kai Fu (University of Utah, USA)

16:45
Binary Phase-Only Gallium Oxide Diffractive Optical Element for Beam Shaping
Wei Jia (The University of Utah, USA); Steve Blair (University of Utah, USA); Berardi Sensale Rodriguez (The University of Utah, USA)

17:00
Application of α- Ga2O3-Based Schottky Barrier Diode to Microwave Rectenna
Takeru Wakamatsu, Shizuo Fujita and Hikaru Ikeda (Kyoto University, Japan); Kentaro Kaneko (Kyoto University and Ritsumeikan University, Japan); Yasuo Ohno and Tomomi Hiraoka (Laser Systems Inc., Japan); Katsuhisa Tanaka (Kyoto University, Japan)

17:15

Dynamic Breakdown Voltage and Overvoltage Margin Under Pulsed Conditions in β- Ga2O3 Based Devices

Harsh Raj (Indian Institute of Science, India); Mayank Shrivastava (Indian Institute of Science Bangalore, India)

17:30

Closing Remarks

Co-Chairs: Sriram Krishnamoorthy (University of California - Santa Barbara), Michael Scarpulla (University of Utah)