

FRIDAY

ORAL PRESENTATIONS

Tutorial

SiC Processing
Session Chair: Victor Veliadis
Thursday Afternoon, September 21, 2017
Thurgood Marshall Ballroom, North Salon
4:15 pm – 5:15 pm

4:15 PM

SiC Processing—An Exercise in Si Fabrication with a High Temperature Twist

Victor Veliadis, PowerAmerica, North Carolina State University

* Invited Paper

Radiation Effects and Harsh Environment Integrated Circuits

Session Chair: Carl-Mikael Zetterling
Friday Morning, September 22, 2017
Thurgood Marshall Ballroom, North Salon
8:30 am – 10:00 am

8:30 AM *FR.D1.1

Taking SiC Power Devices to the Final Frontier—Addressing Challenges of the Space Radiation Environment

Jean-Marie Lauenstein and Megan C. Casey; NASA Goddard Space Flight Center, United States.

9:00 AM FR.D1.2

Electrical Characterization of the Operational Amplifier Consisting of 4H-SiC MOSFETs after Gamma Irradiation

Masahiro Masunaga¹, Shntaro Sato¹, Ryo Kuwana¹, Isao Hara² and Akio Shima¹; ¹Hitachi, Japan; ²Hitachi, Japan.

9:15 AM FR.D1.3

Comparison of the Effect of Electron and Proton Irradiation on 4H-SiC and Si Device Structures

Alexander A. Lebedev¹, Klavdia S. Davydovskaya¹, Anatoly M. Strel'chuk¹, Andrey N. Yakimenko² and V. Kozlovski²; ¹Ioffe Institute, Russian Federation; ²Peter the Great St. Petersburg State Polytechnic University, Russian Federation.

9:30 AM FR.D1.4

Prolonged 500 °C Operation of 100+ Transistor Silicon Carbide Integrated Circuits

David J. Spry¹, Philip G. Neudeck¹, Dorothy Lukco², Liangyu Chen³, Michael J. Krasowski¹, Norman F. Prokop¹, Carl W. Chang² and Glenn M. Beheim¹; ¹NASA Glenn Research Center, United States; ²Vantage Partners LLC, United States; ³Ohio Aerospace Institute, United States.

9:45 AM FR.D1.5

First Demonstration of Lateral MOSFETs Fabricated on Semi-Insulating 4H-SiC Substrates

Ogyun Seok¹, Hyun Soo Lee^{1,2}, Jeong Hyun Moon¹, Hyoung Woo Kim¹, In Ho Kang¹ and Wook Bahng¹; ¹Korea Electrotechnology Research Institute, Korea (the Republic of); ²Gyeongsang University, Korea (the Republic of).

10:00 AM BREAK

Interface and Lifetime Engineering
Session Chairs: Takuji Hosoi and Roland Rupp
Friday Morning, September 22, 2017
Thurgood Marshall Ballroom, North Salon
10:15 am – 11:45 am

Progress and Fundamentals in SiC Materials
Session Chairs: Francesco La Via and Bernd Thomas
Friday Morning, September 22, 2017
Thurgood Marshall Ballroom, West Salon
8:30 am – 10:00 am

10:15 AM *FR.C1.1

Status and Prospects for SiC MOS Interface Optimization
Sarit Dhar; Auburn University, United States.

10:45 AM FR.C1.2

Interface-Selective Low-Temperature Wet-O₂ Annealing to Enhance 4H-SiC (0001) MOSFET Mobility by Improving Near Interface SiO₂ Quality
Hirohisa Hirai, Kei Ishinoda and Koji Kita; The University of Tokyo, Japan.

11:00 AM FR.C1.3

In Situ Study of Stress Formation and Relaxation in SiO₂ During Thermal Oxidation of SiC
Xiuyan Li, Alexei Ermakov, Voshadhi Amarasinghe, Eric Garfunkel, Torgny Gustafsson and Leonard Feldman; Rutgers University, United States.

11:15 AM FR.C1.4

Carrier Lifetime in 4H-SiC Epitaxial Layer on C-Face Enhanced by Carbon Implantation
Mitsuhiro Kushibe^{1,2}, Johji Nishio^{1,2}, Ryosuke Iijima^{1,2}, Akira Miyasaka², Hirokuni Asamizu^{2,3}, Hidenori Kitai², Ryoji Kosugi², Shinsuke Harada² and Kazutoshi Kojima²; ¹Toshiba Corporation, Japan; ²Advanced Industrial Science and Technology, Japan; ³ROHM Co. Ltd., Japan.

11:30 AM FR.C1.5

Local Lifetime Control in 4H-SiC by Proton Irradiation
Pavel Hazdra¹, Stanislav Popelka¹ and Adolf Schöner²; ¹Czech Technical University in Prague, Czech Republic; ²Ascatron AB, Sweden.

8:30 AM *FR.A1.1

Growth of Large Diameter SiC Single Crystals
Rajan Rengarajan, Xueping Xu, Ping Wu, A. Gupta, Mark Ramm, Ilya Zwieback and Gary Ruland; II-VI Incorporated, United States.

9:00 AM FR.A1.2

Understanding the Chemistry in SiC CVD
Örjan Danielsson; Linköping University, Sweden.

9:15 AM FR.A1.3

Thermodynamics of Cr in 4H-SiC at 1873 – 2273 K
Sakiko Kawanishi¹, Hiroyuki Shibata¹ and Takeshi Yoshikawa²; ¹Tohoku University, Japan; ²The University of Tokyo, Japan.

9:30 AM FR.A1.4

On the Role of 3C-SiC Antiphase Boundaries on Silicon Heteroepitaxy on 3C-SiC(100)//Si(100) Seed
Taguhi Yeghoyan¹, Kassem Alassaad¹, Sean Robert Craig McMitchell², Véronique Souliere¹ and Gabriel Ferro¹; ¹Université Claude Bernard Lyon 1, France; ²Centre de Diffraction Institut des Sciences Analytiques, France.

9:45 AM FR.A1.5

Growth Rate Effect on 3C-SiC Homo-Epitaxial Films
Grazia Litrico¹, Ruggero Anzalone², Corrado Bongiorno³, Marco Mauceri⁴, Salvatore Coffa² and Francesco La Via³; ¹LNS Laboratori Nazionali del Sud, Italy; ²STMMicroelectronics, Italy; ³IMM-CNR, Italy; ⁴LPE, Italy.

10:00 AM BREAK

Ultra-Wide Bandgap Materials and Devices

Session Chairs: T. Chow and Robert Okojie

Friday Morning, September 22, 2017

Thurgood Marshall Ballroom, West Salon

10:15 am – 11:45 am

10:15 AM *FR.E1.1

Development of the β -(Al_xGa_{1-x})₂O₃/β-Ga₂O₃ (010) Modulation Doping Field Effect Transistors with Ge as Dopant Grown by Plasma-Assisted Molecular Beam Epitaxy

James S. Speck and Elaheh Ahmadi; University of California, Santa Barbara, United States.

10:45 AM FR.E1.2

Ultra-Wide Bandgap β-Ga₂O₃ Nanomechanical Resonators

Xuqian Zheng, Jaesung Lee, Subrina Rafique, Lu Han, Christian A. Zorman, Hongping Zhao and Philip Feng; Case Western Reserve University, United States.

11:00 AM FR.E1.3

Influence of Dialocations to the Diamond SBD Reverse Characteristics

Naoya Akashi¹, Akinori Seki², Hiroaki Saito², Fumiaki Kawai² and Shinichi Shikata¹; ¹Kwansei Gakuin University, Japan; ²Toyota Motors, Japan.

11:15 AM FR.E1.4

Rapid Solution Growth of AlN Using Cr-Ni Solvent on C, A, and R Faces of Sapphire Substrates

Shinichiro Kurosaka¹, Kanaparin Ariyawong¹, Taka Narumi¹, Sakiko Kawanishi² and Takeshi Yoshikawa¹; ¹Institute of Industrial Science, The University of Tokyo, Japan; ²Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Japan.

11:30 AM FR.E1.5

Single Crystal AlN Substrates for AlGaN-Based UV Optoelectronics and Power Electronics

Rafael Dalmau, Baxter Moody, Hughes S. Craft and Raoul Schlessler; HexaTech, Inc., United States.

Low Voltage SiC MOSFESTs II

Session Chair: James Cooper

Friday Afternoon, September 22, 2017

Thurgood Marshall Ballroom, North Salon

1:15 pm – 2:30 pm

1:15 PM FR.D2.1

Low On-Resistance SiC Trench MOSFET with Suppressed Short Channel Effect by Halo Implantation

Yusuke Kobayashi^{1,2}, Naoyuki Ohse¹, Tadao Morimoto², Takahito Kojima¹, Manabu Takei^{1,2}, Hiroshi Kimura^{1,2} and Shinsuke Harada²; ¹Fuji Electric Co., Ltd., Japan; ²National Institute of Advanced Industrial Science and Technology, Japan.

1:30 PM FR.D2.2

Role of Trench Bottom Shielding Region on Switching Characteristics in 4H-SiC Double-Trench MOSFETs

Shinya Kyogoku^{1,2}, Keiko Ariyoshi¹, Ryosuke Iijima¹, Yusuke Kobayashi^{2,3} and Shinsuke Harada²; ¹Toshiba Corporation, Japan; ²National Institute of Advanced Industrial Science and Technology, Japan; ³Fuji Electric Co., Ltd., Japan.

1:45 PM FR.D2.3

Impact of Stripe Trench-Gate Structure for 4H-SiC Trench MOSFET with Bottom Oxide Protection Layer

Yutaka Fukui, Katsutoshi Sugawara, Kohei Adachi, Hideyuki Hatta, Kazuya Konishi, Koji Sadamatsu, Nobuo Fujiwara, Shingo Tomohisa and Satoshi Yamakawa; Mitsubishi Electric Corp., Japan.

2:00 PM *FR.D2.4

Nitrogen Behavior on 4H-SiC M-Face MOS Interface During NO Oxynitridation, NO Re-Oxynitridation and Dry O₂ Re-Oxidation

Kimimori Hamada¹, Akira Mikami¹, Hideki Naruoka¹ and Kikuo Yamabe²; ¹Toyota Motor Corporation, Japan; ²University of Tsukuba, Japan.

2:30 PM BREAK

Silicon Vacancies for Quantum Technology
Session Chairs: Michael Krieger and Takeshi Ohshima
Friday Afternoon, September 22, 2017
Thurgood Marshall Ballroom, West Salon
1:15 pm – 2:30 pm

Closing Ceremony
Session Chairs: James Cooper and Peter Sandvik
Friday Afternoon, September 22, 2017
Thurgood Marshall Ballroom

1:15 PM *FR.B1.1

Identification of Si-Vacancy Related Room Temperature Qubits in 4H and 6H-SiC

Viktor Ivady^{1,2}, Joel Davidsson¹, Igor A. Abrikosov^{1,3} and Adam Galí^{2,4}; ¹Linköping University, Sweden; ²Wigner Research Centre for Physics, Hungary; ³National University of Science and Technology 'MISIS', Russian Federation; ⁴Budapest University of Technology and Economics, Hungary.

1:45 PM FR.B1.2

Optical Properties of Silicon Vacancies in 4H-SiC

Hunter B. Banks¹, Rachael L. Myers-Ward², Alex Giles², Josh Caldwell², Fritz J. Kub², Karl D. Hobart², Shojan Pavunny³, Paul Klein⁴, Brad Weaver², Evan Glaser², Kurt Gaskill² and Sam Carter²; ¹NRC Postdoc at the Naval Research Laboratory, United States; ²Naval Research Laboratory, United States; ³American Society for Engineering Education, United States; ⁴Sotera Defense Solutions, United States.

2:00 PM FR.B1.3

Engineering of Coherent Defects in Silicon Carbide with Varying Irradiation Methods

Christian Kasper¹, Dmitrij Simin¹, Hannes Kraus¹, Takeshi Ohshima², Wataru Kada³, Andreas Sperlich¹, Michael Trupke^{4,5}, Cameron Salter^{4,5}, Vladimir Dyakonov^{1,6} and Georgy Astakhov¹; ¹Julius Maximilians University of Würzburg, Germany; ²National Institutes for Quantum and Radiological Science and Technology, Japan; ³Gunma University, Japan; ⁴University of Vienna, Austria; ⁵Technical University of Vienna, Austria; ⁶ZAE Bayern, Germany.

2:15 PM FR.B1.4

Controlled 3D Placement of Vacancy Spins for Quantum Applications in Silicon Carbide

Hannes Kraus^{1,3,2}, Dmitrij Simin¹, Christian Kasper¹, Wataru Kada⁴, Yasuto Hijikata⁵, Corey J. Cochrane², Takeshi Ohshima³, Vladimir Dyakonov¹ and Georgy Astakhov¹; ¹Julius Maximilian University of Würzburg, Germany; ²California Institute of Technology, United States; ³National Institutes for Quantum and Radiological Science and Technology (QST), Japan; ⁴University of Gunma, Japan; ⁵University of Saitama, Japan.

2:30 PM BREAK

3:00 PM

Closing Ceremony

Robert Stahlbush, United States Naval Research Laboratory

3:05 PM

Poster Award Announcement

Highlights given by:

3:15 PM

Peter Wellman, University of Erlangen-Nuremberg

3:20 PM

Mikael Dudley, Stony Brook University

3:25 PM

Robert Okojie, NASA Glenn Research Center

3:30 PM

Kevin Matocha, Monolith Semiconductor Inc.

3:35 PM

Peter Losee, GE Global Research

3:40 PM

ECSCRM 2018

Philip Mawby, University of Warwick

3:50 PM

ICSCRM 2019

Tsuneobu Kimoto, Kyoto University