SUNDAY

ORAL PRESENTATIONS

* Invited Paper

Tutorials

Session Chair: Victor Veliadis
Sunday Morning, September 17, 2017
Thurgood Marshall Ballroom, North Salon
9:45 am – 5:30 pm

Moving from Silicon to SiC: Learning to Think Differently!

SiC technology advancements show increasing commercial viability and SiC power devices are replacing a growing number of Si devices in power electronics systems. The tutorials will provide an overview of the state of SiC technology today and how advances in the various capabilities, ranging from growth to applications, are interrelated.

9:45 AM
Introduction
Victor Veliadis, PowerAmerica, North Carolina State University

Victor Veliadis received a PhD degree in electrical and computer engineering from Johns Hopkins University in 1995. From 1996 to 2000, he was with start-up Nanocrystals Imaging Corporation, where he developed quantum-dot phosphors for imaging applications. From 2000 to 2003, he was with Lucent Technologies, where he designed InP-based tunable photonic integrated circuits for telecommunication applications. In 2003, Veliadis served as adjunct physics professor at Ursinus College and St. Joseph's University. Veliadis joined Northrop Grumman Electronic Systems in 2004 where he designed, fabricated and tested SiC SITS, JFETs, MOSFETs, thyristors, and JBS, Schottky and PiN diodes in the 1-12kV range. In 2016, he was appointed chief technology officer (CTO), and in 2017, CTO/deputy director of PowerAmerica, a U.S Department of Energy wide bandgap device manufacturing institute managed by North Caroline State University (NCSU). At the time, Veliadis also became an electrical and computer engineering professor at NCSU. Veliadis has given over 60 invited talks and tutorials, authored and co-authored 106 peer-reviewed technical articles, authored three book chapters and has 24 issued patents to his credit.

SiC Material Properties—Advantages, Challenges and Solutions

10:00 AM
SiC Bulksubstrates
Elif Balkas, Wolfspeed, A Cree Company

Elif Balkas received her BS degree from the Department of Metallurgical and Materials Engineering at the Middle East Technical University of Turkey in 1999, followed by her MS degree in materials science from the same university in 2001. During her Master's studies, she designed and built a research laboratory to develop and test material systems for hydrogen sorption for energy-storage purposes. For her PhD degree, she studied GaN growth via physical vapor transport techniques in the Department of Materials Science and Engineering at North Carolina State University and received her degree in early 2005. Balkas joined Intrinsic Semiconductor in 2005, where she worked as an epitaxy scientist specializing in GaN and SiC epitaxy platforms. She joined Wolfspeed, A Cree Company, through acquisition in 2006. At Wolfspeed, she dedicated much of her time to developing SiC crystal growth and surrounding technologies that are scalable for manufacturing purposes. Balkas is currently driving the development efforts as the director of materials R&D at Wolfspeed, to create SiC substrates that enable power and radio frequency devices on wide bandgap materials.

10:30 AM
SiC Epitaxy
Al Burk, Wolfspeed, A Cree Company

Al Burk currently manages SiC and GaN-HEMT epitaxial growth R&D for electronic devices at Wolfspeed, A Cree Company. He received his BA degree from Western Maryland College, majoring in chemistry and physics. In 1985, he received a PhD degree from the University of Wisconsin–Madison in physical chemistry. Since graduation, Burk has accumulated over 30 years of experience in microelectronics materials, characterization and processing—focusing primarily on epitaxial growth. As an engineer and program manager at Westinghouse/Northrop Grumman Corporation, he developed chloride-VPE and MOCVD growth reactors and processes for GaAs MMIC production. Al began his research into high-temperature SiC epitaxy in 1992, leading to the development of 7×2-inch warm-wall planetary reactors for SiC MESFET and SIT device production. Since 1999, Burk has been at Wolfspeed, where he continues to develop epitaxial processes, most recently 8×150mm warm-wall planetary-VPE, 3×150mm hot-wall SiC reactors and 8×150mm MOCVD nitride epitaxial layers for both internal and external advanced wide bandgap electronic devices. Burk has authored numerous technical papers and presented contributed, invited and plenary ICSCRM conference presentations on the topic of SiC epitaxy.

SiC MOSFET Design

11:00 AM
SiC MOSFET Design—Advantages, Challenges and Strategies
B. Jayant Baliga, North Carolina State University

B. Jayant Baliga is a distinguished professor in electrical and computer engineering at North Carolina State University. He is an internationally renowned scientist, author of 20 books, nearly 600 publications and 120 U.S. patents. His most widely commercialized invention is the Insulated Gate Bipolar Transistor (IGBT), extensively used for lighting (CFLs), air -conditioning, home appliance controls, robotics, automobile ignition systems, electric -cars and bullet -trains. In 2016, he was inducted into the National Inventors Hall of Fame as the sole inventor of the IGBT. He is regarded as the father of wide bandgap semiconductor-based power devices, having derived the Baliga high-frequency figure of merit in 1979. He received the National Medal of Technology and Innovation from President Obama in 2011 and the North Carolina Award for Science from Governor Beverly Eaves Perdue in 2012. He was awarded the highest IEEE recognition, the IEEE Medal of Honor, in 2014, and the 2015 Global Energy Prize in St. Petersburg, Russian Federation.

SiC Processing

1:00 PM
SiC Processing—It's Not the Same as Silicon!
Woongje Sung, SUNY Polytechnic Institute

Woongje Sung received his BS and MS degrees in electrical engineering from Korea University in 2000 and 2002, respectively. Sung received his PhD degree in electrical and computer engineering from North Carolina State University in 2011. His experience spans a number of industrial settings including a start-up company, a semiconductor foundry, Dongbu HiTek, and a mature multinational company, Samsung Advanced Institute of Technology (South Korea). He is a founding member of the U.S. Department of Energy (DOE)-funded PowerAmerica Institute, where he has been contributing to establishing the baseline process of SiC MOSFETs and diodes. In 2016, Sung joined the State University of New York Polytechnic Institute also known as Colleges of Nanoscale Science and Engineering (CNSE), as an associate professor. He is an author of 20 peer-reviewed publications and 12 U.S. patents.

SiC Power Electronic Applications

2:00 PM
15 kV IGBT Converters and High Voltage Circuit Topologies
Subhashish Bhattacharya, North Carolina State University

Subhashish Bhattacharya received his BE, ME and PhD degrees in electrical engineering from the Indian Institute of Technology, Roorkee, in 1986, Indian Institute of Science (IISc) in 1988, and from the University of Wisconsin-Madison in 2003, respectively. He worked in the Flexible AC Transmission Systems (FACTS) group at Westinghouse R&D, which later became part of Siemens Power Transmission & Distribution, from 1998 to 2005. Bhattacharya joined the Department of Electrical and Computer Engineering at North Carolina State University in August 2005, where he is the ABB Term Professor and also a founding faculty member and co-PI of the National Science Foundation (NSF) Future Renewable Electric Energy Delivery and Management (FREEDM) Systems Engineering Research Center and the U.S. Department of Energy (DOE) initiative on WBG-based Manufacturing Innovation Institute–PowerAmerica. Bhattacharya has authored over 350 peer-reviewed technical articles, two book chapters, and has four issued patents. A part of his PhD research on active power filters was commercialized by York Corporation for its air-conditioner chiller application. His research interests include solid-state transformers, MV power converters, FACTS, utility applications of power electronics and power quality issues, high-frequency magnetics, active filters, and the application of new power semiconductor devices such as SiC for converter topologies.

2:30 PM
High-Performance MVA Magnetic Resonance Imaging Gradient Drivers with SiC
Juan Sabaté, GE Global Research Center

Juan A. Sabaté is a senior principal engineer at the GE Global Research Center. He joined GE in 2000 and has contributed to new concepts for power supplies and high-power switching amplifiers for energy and medical applications. From 1997 to 2000, Sabaté worked for Philips Electronics Research, where he conducted research and advanced development of high-power density power supplies for commercial and lighting applications. From 1994 to 1997, he worked for Hewlett-Packard R&D center in Barcelona, Spain, where he designed high-power density dc-dc converters and special purpose sensors. Additionally, from 1994 to 1997, Sabaté was a lecturer and adjunct professor at the Ramon Llull University, Spain. Sabaté holds 26 patents, has more than 65 peer-reviewed publications, and has presented four invited tutorials at conferences of the International Society for Magnetic Resonance in Medicine. He holds an electrical engineering diploma from the Polytechnic University of Catalunya in Barcelona, Spain, and MS and PhD degrees in electrical engineering from Virginia Polytechnic Institute and State University.

3:00 PM BREAK

3:30 PM
Heavy-Duty Vehicle Inverter
Brij Singh, John Deere Electronic Solutions

Brij N. Singh is a senior staff engineer at John Deere Electronic Solutions. He is leading the U.S. Department of Energy (DOE) PowerAmerica-funded project at John Deere to develop a 200kW SiC inverter for heavy-duty vehicle applications. Singh earned a BE degree in electrical engineering from the Madan Mohan Malaviya University of Technology in 1989, an ME degree in electrical engineering from the Indian Institute of Technology, Roorkee, in 1991, and in 1996, a PhD degree in electrical engineering from the Indian Institute of Technology, New Delhi. After earning his PhD, Singh joined the School of Advanced Technology, University of Quebec, Montreal, as a postdoctoral fellow. In 1999, he joined Concordia University, Montreal, as a research fellow, and in 2000, he joined the Department of Electrical Engineering and Computer Science, Tulane University, New Orleans, as an assistant professor. Singh joined John Deere Electronic Solutions in 2007. Singh has published over 90 research papers in various journals, such as IEEE Transactions and IET Journals. He has 12 U.S. patents and over 25 U.S. pending patents.

SiC Commercialization

4:00 PM
Strategies for Commercialization and Market Insertion
Anant Agarwal, The Ohio State University

Anant Agarwal joined the Electrical and Computer Engineering Department at The Ohio State University in August 2017. Previously, he was senior advisor for wide bandgap (WBG) semiconductors at the U.S. Department of Energy (DOE), where he helped create and manage four programs related to WBG technology and their applications including PowerAmerica, Next Generation of Electric Machines (I and II) and graduate traineeships.
From 1999 to 2013, Agarwal was R&D manager for silicon carbide power devices at Wolfspeed, A Cree Company. From 1990 to 1999, he was a fellow at Northrop Grumman Science and Technology Center, Pittsburgh, Pennsylvania, where he led research activities on SiC power devices.

During 1984 and 1985, he was a member of the technical staff at AT&T Bell Laboratories, Murray Hill, New Jersey, where he was involved in the development of GaAs digital circuits.
Agarwal received his PhD degree in electrical engineering from Lehigh University in 1984. He jointly holds more than 60 patents, has co-authored more than 300 research papers and was elected an IEEE Fellow in January 2012 for his lifetime contributions to WBG technologies.

4:30 PM
Student Q & A Session—Ask the Experts!

Sunday Program Reviews

Session Chair: Al Hefner
Sunday Afternoon, September 17, 2017
Thurgood Marshall Ballroom, West Salon
1:00 pm – 5:30 pm

1:00 PM *SU.PR.1.1
National Programs on SiC Power Devices in China—From Research to Applications
Fei Yang; State Grid Corporation of China, China.

1:45 PM *SU.PR.1.2
SiC Power Electronics Technology for Energy Efficient Devices (SPEED)—Introduction Overview; High Quality Substrate Material for High Power Application; High Voltage SiC Devices for Power Transmission Application; Solid State Transformers with Increased Functionalities and SiC in Future Wind Power Applications
Anton J. Bauer[1], Peter Friedrichs[2], Peder Bergman[3], Adolf Schöner[4], Andrei Mihaila[5], Philippe Godignon[6], Antonio de la Cruz[7], Christian Sommer[8], Itziar Kortazar[9] and Jose Maria Cuartas Alonso[10]; [1]Frauhofer IISB, Germany; [2]Infineon Technologies, Germany; [3]Norstel AB, Sweden; [4]Ascatron, Sweden; [5]ABB Corporate Research, Switzerland; [6]CNM-CSIC, Spain; [7]INAEL, Spain; [8]University of Hannover, Germany; [9]Ingeteam, Spain; [10]University of Oviedo, Spain.

2:45 PM *SU.PR.1.3
Manufacturing Job Creation through Accelerated Large-Scale Adoption of SiC Semiconductor Devices
Victor Veliadis; PowerAmerica, United States.

3:30 PM BREAK

3:45 PM *SU.PR.1.4
Genealogy of National Projects on SiC Power Electronics and Related Current Research and Development Activities in Japan
Hajime Okumura[1] and Tsunenobu Kimoto[2]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Kyoto University, Japan.

4:45 PM *SU.PR.1.5
The New York Power Electronics Manufacturing Consortium—Enabling the Power Electronics Revolution
Brian Sapp, Jeffrey C. Hedrick, Lindsay M. Bessette, Alexander Bialy, Matthew Bosco, Michael Bryant, Wenli Collison, Shannon Dunn, Daniel Franca, Thomas Gorczyca, Pui Yee Hung, Anne-Sophie Larrea, Vincent Pedone, Joseph Piccirillo, Jamie Prudhomme, Susan Rogers, Gerard Stapf, Vlad Stolkarts, Sean Valente and Paul Woodin; SUNY Polytechnic Institute, United States.

MONDAY

ORAL PRESENTATIONS

* Invited Paper

Plenary Session

Session Chairs: James Cooper and Peter Sandvik
Monday Morning, September 18, 2017
Thurgood Marshall Ballroom
8:30 am – 10:15 am

8:30 AM
Welcome / Opening Ceremony
Robert Stahlbush, United States Naval Research Laboratory

8:45 AM *MO.PL.1
Advancing 4H-SiC Crystal Technology to the Next Stage
Hidekazu Tsuchida; Central Research Institute of Electric Power Industry (CRIEPI), Japan.

9:30 AM *MO.PL.2
Recent Developments Accelerating SiC Adoption
Anup Bhalla; United Silicon Carbon, Inc., United States.

Invited Poster Announcement

Session Chairs: James Cooper and Peter Sandvik
Monday Morning, September 18, 2017
Thurgood Marshall Ballroom
10:15 am – 10:30 am

10:15 AM *MO.AIP.1
SEMI Standards for SiC
James D. Oliver[1, 2], Russ Kremer[3, 2] and Arnd-Dietrich Weber[4, 2]; [1]Northrop Grumman, United States; [2]SEMI, United States; [3]Freiberger Compound Materials, United States; [4]SiCrystal AG, Germany.

10:18 AM *MO.BIP.2
Electrostatic-Energy Model for Single Shockley Stacking Fault Formation in 4H-SiC Crystals
Akifumi Iijima, Jun Suda and Tsunenobu Kimoto; Kyoto University, Japan.

10:21 AM *MO.CIP.3
About the Electrical Activation of 1×10^{20} cm^{-3} Ion Implanted Al in 4H-SiC at Temperatures in the Range 1500 - 1950°C
Roberta Nipoti[1], Alberto Carnera[2], Giovanni Alfieri[3] and Lukas Kranz[3]; [1]CNR, Italy; [2]Univ.y of Padova, Italy; [3]ABB, Switzerland.

10:24 AM *MO.DIP.4
Reliability and Ruggedness of 1200V SiC Planar Gate MOSFETs Fabricated in a High Volume CMOS Foundry
Sauvik Chowdhury, Levi Gant, Blake Powell, Kasturirangan Rangaswamy and Kevin Matocha; Monolith Semiconductor, United States.

10:27 AM *MO.EIP.5
Piezoresistive Characteristics of NMOS FET Technology on 4H-SiC
Richard C. Jaeger[1], Jeffrey C. Suhling[2], Leonid Fursin[3] and William Simon[3]; [1]Auburn Univ., United States; [2]Auburn Univ., United States; [3]United Silicon Carbide Inc., United States.

10:30 AM BREAK

Diodes and Bipolar Devices I

Session Chairs: Leonid Fursin and Alexander Lebedev
Monday Morning, September 18, 2017
Thurgood Marshall Ballroom, North Salon
11:00 am – 12:45 pm

11:00 AM *MO.KN.D1.1 (Keynote)
Progress and Challenge in High to Ultra-High Voltage SiC Power Device Technology
Yoshiyuki Yonezawa; National Institute of Advanced Industrial Science and Technology (AIST), Japan.

11:45 AM MO.D1.1
Blocking Performance Improvements for 4H-SiC P-GTO Thyristors with Carrier Lifetime Enhancement Processes
Sei-Hyung Ryu[1], Daniel J. Lichtenwalner[1], Michael O'Loughlin[1], Edward R. Van Brunt[1], Craig Capell[1], Charlotte Jonas[1], Yemane Lemma[1], Qingchun J. Zhang[1], Jim Richmond[1], Al Burk[1], Brett Hull[1], Matthew McCain[1], Shadi Sabri[1], Heather O'Brien[2], Aderinto Ogunniyi[2], Aivars Lelis[2], Jeff Casady[1], Dave Grider[1], Scott Allen[1] and Palmour W. John[1]; [1]Wolfspeed, A Cree Company, United States; [2]U.S. Army Research Laboratory, United States.

12:00 PM MO.D1.2
Experimental Demonstration on Ultra High Voltage and High Speed 4H-SiC DSRD with Smaller Numbers of Die Stacks for Pulse Power Applications
Taiga Goto; University of Tsukuba, Japan.

12:15 PM MO.D1.3
Fabrication of 2.5kV 4H-SiC PiN Diodes with High Energy Implantation (>12MeV) of Al^+ and B^+
Reza Ghandi, Peter Losee, Alexander Bolotnikov and David Lilienfeld; GE Global Research, United States.

12:30 PM MO.D1.4
Conductivity Modulated Ultra-High Voltage Implantation-Free 4H-SiC PiN Diodes
Arash Salemi, Hossein Elahipanah, Carl-Mikael Zetterling and Mikael Östling; KTH Royal Institute of Technology, Sweden.

State of the Art and New Approaches in SiC Materials

Session Chairs: Noboru Ohtani and Peter Wellmann
Monday Morning, September 18, 2017
Thurgood Marshall Ballroom, West Salon
11:00 am – 12:45 pm

11:00 AM MO.A1.1
Growth Conditions and *In Situ* Computed Tomography Analysis of Facetted Bulk Growth of SiC Boules
Matthias Arzig[1], Michael Salamon[2], Norman Uhlmann[2], Bertil Johansen[3] and Peter J. Wellmann[1]; [1]FAU, Germany; [2]FHG IIS, Germany; [3]SG, Norway.

11:15 AM MO.A1.2
X-Ray Topography Analysis of 4H-SiC Crystals Grown by High-Temperature Gas Source Method
Isaho Kamata[1], Norihiro Hoshino[1], Yuichiro Tokuda[2], Emi Makino[2], Takahiro Kanda[2], Naohiro Sugiyama[2, 3], Hironari Kuno[2], Jun Kojima[2] and Hidekazu Tsuchida[1]; [1]CRIEPI (Central Research Institute of Electric Power Industry), Japan; [2]Denso Corporation, Japan; [3]National Institute of Advanced Industrial and Technology (AIST), Japan.

11:30 AM MO.A1.3
High-Quality SiC Solution Growth Using Dislocation Conversion on C Face
Shiyu Xiao[1], Shunta Harada[2, 1], Xinbo Liu[1], Kenta Murayama[2], Ryota Murai[3], Miho Tagawa[2, 1] and Toru Ujihara[2, 1, 4]; [1]Nagoya University, Japan; [2]Nagoya University, Japan; [3]Nagoya University, Japan; [4]National Institute of Advanced Industrial Science and Technology, Japan.

11:45 AM MO.A1.4
Homoepitaxial Growth of Isotopically Enriched 3C- 6H- and 4H-$^{28}Si^{12}C$
Jawad Ul Hassan[1], Robin Karhu[1], Björn Lundqvist[1], Ivan G. Ivanov[1], Björn Magnusson[2], Örjan Danielsson[1], Olof Kordina[1] and Erik Janzén[1]; [1]Linköping University, Sweden; [2]Norstel AB, Sweden.

12:00 PM *MO.KN.A2.1 (Keynote)
Status and Challenges for Large-Diameter SiC Substrates
Yuri Khlebnikov[1], Robert Leonard[1], S. Bubel[1], J. Ambati[1], Adrian Powell[2], A. R. Paisley[1], E. Deyneka[1], I. Currier[1], V. Tsvetkov[1], J. Seaman[1], Michael O'Loughlin[1], Edward R. Van Brunt[1], Al Burk[1] and E. Balkas[1]; [1]Wolfspeed, United States; [2]Cree, Inc., United States.

MOS Processing

Session Chairs: Philippe Godignon and Aivars Lelis
Monday Afternoon, September 18, 2017
Thurgood Marshall Ballroom, North Salon
2:15 pm – 4:15 pm

2:15 PM MO.C2.1
Novel Gate Insulator Process by Nitrogen Annealing for Si-face SiC MOSFET with High-Mobility and High-Reliability
Shunsuke Asaba, Tatsuo Shimizu, Yukio Nakabayashi, Shigeto Fukatsu, Toshihide Ito and Ryosuke Iijima; Toshiba Corporation, Japan.

2:30 PM MO.C2.2
Unraveling the Oxidation Mechanisms Taking Place in Early Steps of 4H-SiC Dry Thermal Oxidation
Gustavo Dartora[2], Eduardo Pitthan[2] and Fernanda Stedile[2, 1]; [1]Universidade Federal do Rio Grande do Sul, Brazil; [2]Universidade Federal do Rio Grande do Sul, Brazil.

2:45 PM MO.C2.3
Isotropic Oxidation of SiC by Atomic Oxygen and Investigation of RIE Induced Effects for Development of 4H-SiC Trench MOSFETs
Asanka Jayawardena[1], Ayayi C. Ahyi[1], Tamara Isaacs-Smith[1], Gang Liu[2], Robert G. Shaw[2] and Sarit Dhar[1]; [1]Auburn University, United States; [2]Texas Instruments Incorporated, United States.

3:00 PM MO.C2.4
Effect of High Temperature Forming Gas Annealing on Electrical Properties of 4H-SiC Lateral MOSFETs with Lanthanum Silicate and ALD SiO_2 Gate Dielectric
Minseok Kang, Kevin Lawless, Bongmook Lee and Veena Misra; North Carolina State University, United States.

3:15 PM MO.C2.5
Interface Property of SiO_2/4H-SiC(0001) Structures Formed by Ultrahigh-Temperature Oxidation under Low Oxygen Partial Pressure
Takuji Hosoi[1], Yoshihito Katsu[1], Daisuke Nagai[1], Hidenori Tsuji[1, 2], Mitsuru Sometani[3], Takayoshi Shimura[1] and Heiji Watanabe[1]; [1]Osaka University, Japan; [2]Fuji Electric Co., Ltd, Japan; [3]National Institute of Advanced Industrial Science and Technology, Japan.

3:30 PM *MO.KN.C2.1 (Keynote)
Processing Comparison of SiC Planar and Trench MOSFETs—The Case for Trenches
Dethard Peters[1] and Wolfgang Bergner[2]; [1]Infineon Technologies AG, Germany; [2]Infineon Technologies Austria, AG, Austria.

Lifetime and Optical Characterization

Session Chair: Peder Bergman and Marko Tadjer
Monday Afternoon, September 18, 2017
Thurgood Marshall Ballroom, West Salon
2:15 pm – 4:15 pm

2:15 PM *MO.KN.B2.1 (Keynote)
Epitaxial Material Challenges for High-Voltage SiC Devices
Tsunenobu Kimoto; Kyoto University, Japan.

3:00 PM MO.B2.1
Microscopic FCA System for Depth-Resolved Carrier Lifetime Measurement
Shinichi Mae[1], Takeshi Tawara[2, 3], Hidekazu Tsuchida[4] and Masashi Kato[1]; [1]Nagoya Institute of Technology, Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan; [3]Fuji Electric Co., Ltd., Japan; [4]Central Research Institute of Electric Power Industry, Japan.

3:15 PM MO.B2.2
Depth Profiling of Carrier Lifetime in Thick 4H-SiC Epilayers Via TPA
Nadeemullah A. Mahadik[1], Robert Stahlbush[1], Paul Klein[2], Ani Khachatrian[2] and Stephen Buchner[1]; [1]Naval Research Laboratory, United States; [2]Sotera Defense, United States.

3:30 PM MO.B2.3
Short Minority Carrier Lifetimes in Al- and (Al+B)-Doped P-Type Epilayers
Koichi Murata[1], Takeshi Tawara[2, 3], Anli Yang[1] and Hidekazu Tsuchida[1]; [1]Central Research Institute of Electric Power Industry (CRIEPI), Japan; [2]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [3]Fuji Electric Co., Ltd., Japan.

3:45 PM MO.B2.4
Analysis of Carrier Capture and Recombination Processes in Intentionally N+B Doped *N*-Type 4H-SiC Epilayers
Anli Yang[1], Tetsuya Miyazawa[1], Takeshi Tawara[2], Koichi Murata[1] and Hidekazu Tsuchida[1]; [1]Central Research Institute of Electric Power Industry (CRIEPI), Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan.

4:00 PM MO.B2.5
Aluminum Doping Concentration Calibration by Photoluminescence in High-Quality Uncompensated P-Type 4H-SiC
Satoshi Asada[2], Tsunenobu Kimoto[2] and Ivan G. Ivanov[1]; [1]Linköping University, Sweden; [2]Kyoto University, Japan.

Tutorial

SiC MOSFET Design II

Session Chair: Victor Veliadis
Monday Afternoon, September 18, 2017
Thurgood Marshall Ballroom, North Salon
5:15 pm – 6:15 pm

5:15 PM
SiC MOSFET Design—Advantages, Challenges and Strategies
B. Jayant Baliga, North Carolina State University

TUESDAY

ORAL PRESENTATIONS

* Invited Paper

Reliability and Ruggedness I

Session Chairs: Alberto Castellazzi and Peter Losee
Tuesday Morning, September 19, 2017
Thurgood Marshall Ballroom, North Salon
8:30 am – 10:00 am

8:30 AM TU.D1.1
Reliability of SiC Power Devices against Terrestrial Neutron Single-Event Burnout
Daniel J. Lichtenwalner[1], Akin Akturk[2], James McGarrity[2], Jim Richmond[1], Thomas Barbieri[3], Brett Hull[1], Dave Grider[1], Scott Allen[1] and Palmour W. John[1]; [1]Wolfspeed, A Cree Company, United States; [2]CoolCAD Electronics LLC, United States; [3]Wolfspeed, A Cree Company, United States.

8:45 AM TU.D1.2
Switching Reliability of SiC-MOSFETs Containing Expanded Stacking Faults
Ryusei Fujita, Kazuki Tani, Kumiko Konishi and Akio Shima; Hitachi, Japan.

9:00 AM *TU.D1.3
Reliability Challenges for SiC Power Devices in Systems and the Impact on Reliability Testing
Nando Kaminski; University of Bremen, Germany.

9:30 AM *TU.D1.4
Extreme Environment SiC Integrated Circuits
Carl-Mikael Zetterling; Royal Institute of Technology (KTH), Sweden.

10:00 AM BREAK

Manufacturing Innovations

Session Chairs: Anant Agarwal and Kimimori Hamada
Tuesday Morning, September 19, 2017
Thurgood Marshall Ballroom, North Salon
10:30 am – 12:00 pm

10:30 AM TU.C1.1
Investigation of Forward Voltage Degradation Due to Process-Induced Defects in 4H-SiC MOSFET
Kumiko Konishi, Ryusei Fujita, Yuki Mori and Akio Shima; Hitachi, Japan.

10:45 AM TU.C1.2
TLS-Dicing(TM) for SiC – Latest Assessment Results
Dirk Lewke[2, 1], Mercedes Maria Barreto[1], Karl O. Dohnke[3], Hans-Ulrich Zuehlke[2], Martin Schellenberger[1] and Christian Belgardt[2]; [1]Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany; [2]3D-Micromac AG, Germany; [3]Infineon Technologies AG, Germany.

11:00 AM TU.C1.3
In-Coming and In-Line Defectivity Control Solutions for Silicon Carbide Manufacturing
Daniel Arias[1], Mario Coppola[2], Nicolò Piluso[2], Simona Lorenti[2], Marcello Coco[2], Giovanni Franco[2], Antonella Di Salvo[2], Somanchi Anoop[1] and Paolo Parisi[1]; [1]KLA-Tencor, France; [2]STMicroelectronics, Italy.

11:15 AM TU.C1.4
Characterization of pn-Diode Fabricated from Surface Damage-Free 4H-SiC Wafer Using Si-Vapor Etching Process
Satoshi Torimi[1], Norihito Yabuki[1], Takuya Sakaguchi[1], Masato Shinohara[1], Youji Teramoto[1], Satoru Nogami[1], Makoto Kitabatake[1] and Junji Senzaki[2]; [1]Toyo Tanso Co., Ltd., Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan.

11:30 AM *TU.C1.5
History, Status and Prospects of Packaging Technology for SiC MOSFETS
David Levett; Infineon Technologies, Germany.

Focused Topics in SiC Epitaxy

Session Chairs: Al Burk and Hidekazu Tsuchida
Tuesday Morning, September 19, 2017
Thurgood Marshall Ballroom, West Salon
8:30 am – 10:00 am

8:30 AM *TU.A1.1
Status and Trends in Epitaxy and Defects
Hiroshi Osawa; Showa Denko K.K., Japan.

9:00 AM TU.A1.2
CVD Filling of Narrow Deep 4H-SiC Trenches in a Quasi-Selective Epitaxial Growth Mode
Shiyang Ji[1], Ryoji Kosugi[1], Kazutoshi Kojima[1], Kazuhiro Mochizuki[1], Yasuyuki Kawada[1, 2], Kohei Adachi[1], Yoshiyuki Yonezawa[1], Sadafumi Yoshida[1] and Hajime Okumura[1]; [1]National Institute of Advanced Industrial Science and Technology, Japan; [2]Fuji Electric Co., Ltd, Japan.

9:15 AM TU.A1.3
99.9% BPD Free 4H-SiC Epitaxial Layer with Precisely Controlled Doping upon 3 x 150 mm Hot-Wall CVD
Keiji Wada, Takemi Terao, Hironori Itoh, Takaya Miyase, Tsutomu Hori, Hideyuki Doi, Masaki Furumai and Tatsuya Tanabe; Sumitomo Electric Industries, Ltd., Japan.

9:30 AM TU.A1.4
Triangular Defects Reduction of 4H-SiC Epitaxial Growth in a Planetary Reactor
Weili Lu, Jia Li, Yulong Fang, Jiayun Yin and Zhihong Feng; Hebei Semiconductor Research Institute, China.

9:45 AM TU.A1.5
Wide-Range Control of Carrier Lifetimes in 4H-SiC Epilayer by V Doping
Koichi Murata[1], Takeshi Tawara[2, 3], Anli Yang[1], Tetsuya Miyazawa[1] and Hidekazu Tsuchida[1]; [1] Central Research Institute of Electric Power Industry, Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan; [3]Fuji Electric Co., Ltd., Japan.

10:00 AM BREAK

Defects in MOS Devices

Session Chairs: Sarit Dhar and Tsunenobu Kimoto
Tuesday Morning, September 19, 2017
Thurgood Marshall Ballroom, West Salon
10:30 am – 12:00 pm

10:30 AM *TU.B1.1
Performance and Reliability Impacts of Extended Epitaxial Defects on 4H-SiC Power Devices
Edward R. Van Brunt, Al Burk, Daniel J. Lichtenwalner, Robert Leonard, Shadi Sabri, Donald A. Gajewski, A. Mackenzie, Brett Hull, Scott Allen and Palmour W. John; Wolfspeed, A Cree Company, United States.

11:00 AM TU.B1.2
Characterization of Traps at SiO_2/ SiC (000-1) near the Conduction Band Edge by Using Hall Effect Measurements
Tetsuo Hatakeyama[1], Yuji Kiuchi[1], Mitsuru Sometani[1], Dai Okamoto[2], Shinsuke Harada[1], Hiroshi Yano[2], Yoshiyuki Yonezawa[1] and Hajime Okumura[1]; [1]AIST, Japan; [2]University of Tsukuba, Japan.

11:15 AM TU.B1.3
A Method for Analyzing Traps at the SiO2/4H-SiC Interface Directly from Transfer Characteristics of 4H-SiC n-MOSFETs
Martin Hauck, Heiko Weber and Michael Krieger; Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany.

11:30 AM TU.B1.4
Determination of Performance-Relevant Trapped Charge in 4H Silicon Carbide MOSFETs
Fabian Rasinger[1, 2], Gregor Pobegen[1], Thomas Aichinger[3], Heiko Weber[2] and Michael Krieger[2]; [1]KAI Kompetenzzentrum Automobil- u. Industrieelektronik GmbH, Austria; [2]FAU Erlangen, Germany; [3]Infineon Technologies Austria, Austria.

11:45 AM TU.B1.5
Oxide Traps Probed by Transient Capacitance Measurements on Lateral SiO_2/4H-SiC MOSFETs
Patrick Fiorenza[1], Ferdinando Iucolano[2], Mario Saggio[2] and Fabrizio Roccaforte[1]; [1]CNR-IMM, Italy; [2]STMicroelectronics, Italy.

Low Voltage SiC MOSFETs I

Session Chair: Takashi Nakamura
Tuesday Afternoon, September 19, 2017
Thurgood Marshall Ballroom, North Salon
1:30 pm – 3:00 pm

1:30 PM TU.D2.1
650 V, 7 mΩ 4H-SiC DMOSFETs for Dual-Side Sintered Power Modules
Qingchun J. Zhang[1], Matthew McCain[1], Brett Hull[1], Jeff Casady[1], Scott Allen[1], Palmour W. John[1], Monty Hayes[2], Aditya Neelakantan[2] and John Fruth[2]; [1]Wolfspeed, A Cree Company, United States; [2]Delphi LLC, United States.

1:45 PM TU.D2.2
1.2 kV 4H-SiC Split-Gate MOSFET—Analysis and Experimental Results
Kijeong Han[1], Bantval J. Baliga[1] and Woongje Sung[2]; [1]North Carolina State University, United States; [2]State University of New York Polytechnic Institute, United States.

2:00 PM TU.D2.3
Switching Characterization of 1.2 kV 4H-SiC Power MOSFETs and Si IGBTs at Cryogenic and High Temperatures
Jinwei Qi, Kai Tian, Zhangsong Mao, Jindou Liu, Song Yang, Wenjie Song, Shenhui Ma and Anping Zhang; Xi'an Jiaotong University, China.

2:15 PM TU.D2.4
Practical Design of 4H-SiC Superjunction Devices in the Presence of Charge Imbalance
Md Monzurul Alam[1], Dallas T. Morisette[1] and James A. Cooper[1, 2]; [1]Purdue University, United States; [2]Sonrisa Research, Inc., United States.

2:30 PM *TU.D2.5
SiC MOSFET Device Parameter Spread and Ruggedness of Parallel Multichip Structures
Alberto Castellazzi[1], Asad Fayyaz[1] and Rainer Kraus[2]; [1]University of Nottingham, United Kingdom; [2]University of Bundeswehr, Germany.

3:00 PM BREAK

High Voltage SiC MOSFETs

Session Chairs: Brett Hull and Ljubisa Stevanovic
Tuesday Afternoon, September 19, 2017
Thurgood Marshall Ballroom, North Salon
3:30 pm – 4:45 pm

3:30 PM TU.D2.6
3 kV, 13.5 mΩcm^2 4H-SiC Reverse Blocking MOSFET with a Non-Punch-Through Drift Layer
Seigo Mori[1], Masatoshi Aketa[1], Takui Sakaguchi[1], Hirokazu Asahara[1], Takashi Nakamura[1] and Tsunenobu Kimoto[2]; [1]ROHM Co., Ltd., Japan; [2]Kyoto University, Japan.

3:45 PM TU.D2.7
Development of a High Performance 3,300V Silicon Carbide MOSFET
Leonid Fursin, Xing Huang, Xueqing Li, Ke Zhu, William Simon and Anup Bhalla; United Silicon Carbide, Inc., United States.

4:00 PM TU.D2.8
Impact of Embedding Schottky Barrier Diodes into 3.3 kV and 6.5 kV SiC MOSFETs
Koutarou Kawahara, Shiro Hino, Koji Sadamatsu, Yukiyasu Nakao, Toshiaki Iwamatsu, Shuhei Nakata, Shingo Tomohisa and Satoshi Yamakawa; Mitsubishi Electric, Japan.

4:15 PM TU.D2.9
3300V SiC Planar DMOSFETs Fabricated on 150mm Substrates
Blake Powell, Sauvik Chowdhury, Chris Hundley and Kevin Matocha; Monolith Semiconductor Inc., United States.

4:30 PM TU.D2.10
4600 V SiC DMOSFETs with $R_{on,sp}$ = 17.5 mΩ-cm^2
Siddarth Sundaresan, Stoyan Jeliazkov and Ranbir Singh; GeneSiC Semiconductor, United States.

Fundamental Characterization

Session Chairs: Robert Devaty and Masashi Kato
Tuesday Afternoon, September 19, 2017
Thurgood Marshall Ballroom, West Salon
1:30 pm – 3:00 pm

1:30 PM *TU.B2.1
High Resolution Optical Spectroscopy of Free Exciton and Electronic Band Structure near the Fundamental Gap in 4H SiC
Walter M. Klahold, Wolfgang J. Choyke and Robert P. Devaty; University of Pittsburgh, United States.

2:00 PM TU.B2.2
Reliable Measurement of Silicon Carbide Thermal Conductivity
Björn Lundqvist, Robin Karhu, Ivan G. Ivanov, Jawad Ul Hassan and Olof Kordina; Linköping University, Sweden.

2:15 PM TU.B2.3
Diffusion of the Carbon Vacancy in A-Cut and C-Cut N-Type 4H-SiC
Marianne E. Bathen[1], Hussein Ayedh[1], Lasse Vines[1], Ildiko Farkas[2], Erik Janzén[2] and Bengt Svensson[1]; [1]University of Oslo, Norway; [2]Linköping University, Sweden.

2:30 PM TU.B2.4
Kinetics Modeling of the Carbon Vacancy Thermal Equilibration in 4H-SiC
Hussein Ayedh[1], Roberta Nipoti[2], Anders Hallén[3] and Bengt Svensson[1]; [1]University of Oslo, Norway; [2]Consiglio Nazionale delle Ricerche, Italy; [3]Royal Institute of Technology KTH, Sweden.

2:45 PM TU.B2.5
Processing Induced Surface Paramagnetic Defects in 4H-SiC
Nguyen T. Son, Robin Karhu, Pontus Stenberg, Valdas Jokubavicius, Olof Kordina and Jawad Ul Hassan; Linkoping University, Sweden.

3:00 PM BREAK

MOS Interface Defects

Session Chairs: Ulrike Grossner and Nadeemullah Mahadik
Tuesday Afternoon, September 19, 2017
Thurgood Marshall Ballroom, West Salon
3:30 pm – 4:45 pm

3:30 PM TU.B3.1
Evidence of Carbon-Related Defects at the SiC MOS Interface and Mechanism of Defect Passivation by Nitridation and Phosphorus Treatment—Chemical Analyses Combined with DFT Calculations
Takuma Kobayashi[1], Yu-ichiro Matsushita[2], Takafumi Okuda[1], Atsushi Oshiyama[2] and Tsunenobu Kimoto[1]; [1]Kyoto University, Japan; [2]The University of Tokyo, Japan.

3:45 PM TU.B3.2
Atomistic Insight into Carbon Defects at Thermally Grown SiC/SiO_2 Interfaces—Theory and Experiment
Dipanwita Dutta[1], Alla Sologubenko[2], Deb De[3], Shantanu Roy[3], Stefan Goedecker[3], Massimo Camarda[1], Joerg Lehmann[4], Giovanni Alfieri[4], Holger Bartolf[4], Adolf Schöner[5] and Thomas Jung[1,3]; [1]Paul Scherrer Institute, Switzerland; [2]ETHZ, Switzerland; [3]Uni Basel, Switzerland; [4]ABB, Switzerland; [5]Ascatron, Sweden.

4:00 PM TU.B3.3
Exploring the Buried SiO_2/SiC Interface by Soft X-Ray ARPES
Judith Woerle[1,2], Vladimir N. Strokov[1], Hans Sigg[1], Jens Gobrecht[1], Ulrike Grossner[2] and Massimo Camarda[1]; [1]Paul Scherrer Institut, Switzerland; [2]ETH Zürich, Switzerland.

4:15 PM TU.B3.4
DC Bias Dependence of Local Deep Level Transient Spectroscopy Signal and Quantitative Two-Dimensional Imaging of SiO_2/SiC Interface Trap Density
Norimichi Chinone[1], Ryoji Kosugi[2], Yasunori Tanaka[2], Shinsuke Harada[2], Hajime Okumura[2] and Yasuo Cho[1]; [1]Tohoku University, Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan.

4:30 PM TU.B3.5
Investigation of Trap Behavior in SiC MOSCAPs with High Temperature High Frequency Method
Zhaoyang Peng[1], Shengkai Wang[1], Yun Bai[1], Yidan Tang[1], Ximing Chen[2], Chengzhan Li[3], Kean Liu[3] and Xinyu Liu[1]; [1]Institute of Microelectronics of Chinese Academy of Sciences, China; [2]University of Electronic Science and Technology of China, China; [3]Zhuzhou CRRC Times Electric Co., Ltd, China.

Tutorial

SiC Power Electronic Applications

Session Chair: Victor Veliadis
Tuesday Afternoon, September 19, 2017
Thurgood Marshall Ballroom, North Salon
5:45 pm – 6:45 pm

5:45 PM
15 kV IGBT Converters and High Voltage Circuit Topologies
Subhashish Bhattacharya, North Carolina State University

6:15 PM
Heavy-Duty Vehicle Inverter
Brij Singh, John Deere Electronic Solutions

WEDNESDAY

ORAL PRESENTATIONS

* Invited Paper

Applications and Package Integration

Session Chairs: Anup Bhalla and Peter Friedrichs
Wednesday Morning, September 20, 2017
Thurgood Marshall Ballroom, North Salon
8:30 am – 10:30 am

8:30 AM *WE.D1.1
SiC MOSFETs for Multi-MW PV Inverters—Opportunities and Challenges
Ljubisa Stevanovic; GE Global Research, United States.

9:00 AM WE.D1.2
30-kW All-SiC Inverter with 3D-Printed Air Cooled Heatsinks for Plug-in and Full Electric Vehicle Applications
Madhu Chinthavali; Oak Ridge National Laboratory, United States.

9:15 AM WE.D1.3
Module and System Considerations to Maximize Performance Advantages of SiC Power Devices
Ty R. McNutt[1], Kraig Olejniczak[2], Stephen Minden[2], Daniel Martin[2], Jonathan Hayes[2], Ajith Wijenayake[2] and David Simco[2]; [1]Wolfspeed, A Cree Company, United States; [2]Wolfspeed, A Cree Company, United States.

9:30 AM WE.D1.4
Impact of a Kelvin Source Connection on Discrete High Power SiC-MOSFETs
Christian Bödeker[1], Edgar Ayerbe[2] and Nando Kaminski[1]; [1]University of Bremen, Germany; [2]Wolfspeed, A Cree Company, United States.

9:45 AM WE.D1.5
The Development of High Thermal Conductivity SiC Power Modules through the Implementation of Advanced Cooling Techniques Coupled with High Heat Transfer Materials
Brandon Passmore, Brice McPherson and Alex Lostetter; Wolfspeed, A Cree Company, United States.

10:00 AM WE.D1.6
Benefits of High Voltage SiC Applications in Medium Voltage Power Distribution Grids
Shiqi Ji[1], Xiaojie Shi[2], Zheyu Zhang[1], Wenchao Cao[1] and Fred Wang[1]; [1]University of Tennessee Knoxville, United States; [2]EPRI, United States.

10:15 AM WE.D1.7
30 kV Pulse Diode Stack Based on 4H-SiC
Vladimir A. Ilyin[2], Alexey V. Afanasyev[2], Yuri S. Demin[2], Boris V. Ivanov[2], Alexey F. Kardo-Sysoev[3], Victor V. Luchinin[2], Sergey A. Reshanov[1], Adolf Schöner[1], K. A. Sergushichev[2] and A. A. Smirnov[2]; [1]Ascatron AB, Sweden; [2]St. Petersburg Electrotechnical University “LETI”, Russian Federation; [3]Ioffe Physical Technical Institute of the Russian Academy of Science, Russian Federation.

Novel Sensors, Devices and Circuits

Session Chairs: Robert Okojie and Anping Zhang
Wednesday Morning, September 20, 2017
Thurgood Marshall Ballroom, West Salon
8:30 am – 10:30 am

8:30 AM WE.E1.1
Opto-Mechanical 3C-SiC High Pressure Sensors for Harsh Environments
Francesco La Via; CNR-IMM, Italy.

8:45 AM WE.E1.2
Single Crystal 3C-SiC MEMS Resonators on 3C-SiC on Si3N4
Vida Pashaei; Case Western Reserve University, United States.

9:00 AM WE.E1.3
Magnetic Field Sensing with 4H SiC Diodes—Nitrogen vs Phosphorous Implantation
Corey J. Cochrane[1], Philip G. Neudeck[2] and David J. Spry[2]; [1]JPL/CalTech, United States; [2]NASA GRC, United States.

9:15 AM WE.E1.4
400°C Operation of SiC N- and P-Channel JFETs Fabricated by Ion Implantation into a High-Purity Semi-Insulating Substrate
Mitsuaki Kaneko and Tsunenobu Kimoto; Kyoto University, Japan.

9:30 AM WE.E1.5
Electrical Characterization of Integrated 2-Input TTL NAND Gate at Elevated Temperature, Fabricated in Bipolar SiC-Technology
Muhammad Shakir, Hossein Elahipanah, Raheleh Hedayati and Carl-Mikael Zetterling; KTH Royal Institute of Technology, Sweden.

9:45 AM *WE.E1.6
Power Electronic Devices and Systems Based on Bulk GaN Substrates
Isik c. Kizilyalli, Eric Carlson and Daniel Cunningham; ARPA-E, United States.

10:15 AM WE.E1.7
(LATE NEWS) First Demonstration of Ga2O3 Junction Barrier Schottky Diodes
Kohei Sasaki[1, 2], Quang Tu Thieu[1], Daiki Wakimoto[1, 2], Yuki Koishikawa[1, 2], Akito Kuramata[1, 2] and Shigenobu Yamakoshi[1, 2]; [1]Novel Crystal Technology, Japan; [2]Tamura Corporation, Japan.

Tutorial

SiC Material Properties—Advantages, Challenges and Solutions

Session Chair: Victor Veliadis
Wednesday Morning, September 20, 2017
Thurgood Marshall Ballroom, North Salon
11:30 am – 12:30 pm

11:30 AM
SiC Bulksubstrates
Elif Balkas, Wolfspeed, A Cree Company

12:00 PM
SiC Epitaxy
Al Burk, Wolfspeed, A Cree Company

THURSDAY

ORAL PRESENTATIONS

* Invited Paper

Reliability and Ruggedness II

Session Chairs: A. Q. Huang and Edward Van Brunt
Thursday Morning, September 21, 2017
Thurgood Marshall Ballroom, North Salon
8:30 am – 10:00 am

8:30 AM TH.D1.1
H3TRB Test on 650 V SiC JBS Diodes
Christian Zorn[1], Felix Hoffmann[1], Michael Hanf[1], Nando Kaminski[1], Andrei Konstantinov[2], Fredrik Allerstam[2] and Thomas Neyer[3]; [1]Universität Bremen, Germany; [2]ON Semiconductor, Sweden; [3]ON Semiconductor, Germany.

8:45 AM TH.D1.2
Short-Circuit Capability of SiC Cascode
Xueqing Li; United Silicon Carbide, Inc., United States.

9:00 AM TH.D1.3
An Experimental Demonstration of Short Circuit Protection of SiC Devices
Eddy Aeloiza; ABB Inc., United States.

9:15 AM TH.D1.4
Suppression of Short-Circuit Current with Embedded Source Resistance in SiC-MOSFET
Hideyuki Hatta[1], Takaaki Tominaga[1], Shiro Hino[1], Naruhisa Miura[2], Shingo Tomohisa[1] and Satoshi Yamakawa[1]; [1]Mitsubishi Electric Corporation, Japan; [2]Mitsubishi Electric Corporation, Japan.

9:30 AM TH.D1.5
Influences of Bias Interruption and Reapplication on High-Temperature Threshold-Voltage Shifts of SiC DMOSFETs
Daniel B. Habersat, Aivars Lelis and Ronald Green; U.S. Army Research Laboratory, United States.

9:45 AM TH.D1.6
(LATE NEWS) Extremely Compact Half-Bridge SiC Power Modules Built into EV In-Wheel Motor
Satoshi Tanimoto[1, 3], A. Hara[1], M. Yamashita[1], T. Suzuki[1], S. Araki[1], S. Sato[2] and K. Akatsu[3]; [1]Nissan ARC Ltd., Japan; [2]AIST, Japan; [3]Shibaura Institute of Technology, Japan.

10:00 AM BREAK

Diodes and Bipolar Devices II

Session Chairs: Sei-Hyung Ryu and Yoshiyuki Yonezawa
Thursday Morning, September 21, 2017
Thurgood Marshall Ballroom, North Salon
10:30 am – 12:00 pm

10:30 AM TH.D1.6
Performance Evaluation of SiC JBS Diodes Rated for 6.5kV Applications
Andrei Mihaila, Lars Knoll, Lukas Kranz, Enea Bianda, Giovanni Alfieri, Marco Bellini, Charalampos Papadopoulos and Munaf Rahimo; ABB, Switzerland.

10:45 AM TH.D1.7
Breakdown Characteristics of 4H-SiC p-n Junction Diodes with a Wide Range of Doping Concentration
Xilun Chi, Hiroki Niwa and Tsunenobu Kimoto; Kyoto University, Japan.

11:00 AM TH.D1.8
Impact of Cell Layout and Device Structure on On-Voltage Reduction of 6.5-kV n-Channel SiC IGBTs
Naoki Watanabe, Hiroyuki Yoshimoto and Akio Shima; Hitachi, Japan.

11:15 AM TH.D1.9
Low Loss 4H-SiC PiN Diode with Local Low Carrier Lifetime Region
Koji Nakayama[1], Tetsuo Hatakeyama[1], Yoshiyuki Yonezawa[1], Hajime Okumura[1] and Hidekazu Tsuchida[2]; [1]National Institute of Advanced Industrial Science and Technology, Japan; [2]Central Research Institute of Electric Power Industry, Japan.

11:30 AM TH.D1.10
SiC MPS Devices—One Step Closer to the Ideal Diode
Rudolf Elpelt[1], Mihai Draghici[2], Rolf Gerlach[1], Roland Rupp[1] and Reinhold Schörner[1]; [1]Infineon Technologies AG, Germany; [2]Infineon Technologies Austria AG, Austria.

11:45 AM TH.D1.11
(LATE NEWS) High Temperature Characterization of a 4H-SiC PiN Rectifier
Benedikt Lechner, S. Schaub, Aldin Striković, Y. Huang and Gerhard Wachutka; Technical University of Munich, Germany.

Quantum Technology

Session Chairs: Adam Gali and Nguyen Son
Thursday Morning, September 21, 2017
Thurgood Marshall Ballroom, West Salon
8:30 am – 10:00 am

8:30 AM *TH.B1.1
Sub-Bandgap Photoluminescence Study on Implantation-Induced Color Centers in 4H-SiC
Maximilian Rühl, Christian Ott, Heiko Weber and Michael Krieger; Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany.

9:00 AM TH.B1.2
Enhanced Single Photon Emission near Stacking Fault in 4H-SiC Epilayer
Yasuto Hijikata[1], Shuhei Akahori[1] and Takeshi Ohshima[2]; [1]Saitama University, Japan; [2]National Institutes for Quantum and Radiological Science and Technology, Japan.

9:15 AM TH.B1.3
Oxidation-Process Dependence of Single Photon Sources Embedded in 4H-SiC MOSFETs
Yuta Abe; University of Tsukuba, Japan.

9:30 AM TH.B1.4
Processing of Cavities in SiC Material for Quantum Technologies
Rachael L. Myers-Ward, Karl D. Hobart, Kevin M. Daniels, Alex Giles, Marko J. Tadjer, Lunet E. Luna, Fritz J. Kub, Shojan Pavunny, Sam Carter, Hunter B. Banks, Evan Glaser, Paul Klein and Kurt Gaskill; U.S. Naval Research Laboratory, United States.

9:45 AM TH.B1.5
(LATE NEWS) Optical Charge State Control of Spin Defects in 4H-SiC
Gary Wolfowicz[1], Christopher P. Anderson[1], Andrew P. Yeats[1], Samuel J. Whiteley[1], Jen Niklas[2], Oleg G. Poluektov[2], F. Joseph Heremans[3] and David Awschalom[1]; [1]University of Chicago, United States; [2]Argonne National Laboratory, United States; [3]Argonne National Laboratory, United States.

10:00 AM BREAK

Impact of Additives in SiC Materials

Session Chairs: Yuri Khlebnikov and Rajan Rengarajan
Thursday Morning, September 21, 2017
Thurgood Marshall Ballroom, West Salon
10:30 am – 12:00 pm

10:30 AM *TH.A1.1
Effects of Al Co-Doping for Reducing Stacking Faults in High N Doped 4H-SiC Crystal
Kazutoshi Kojima; National Institute of Advanced Industrial Science and Technology, Japan.

11:00 AM TH.A1.2
Achieving Semi-Insulating On-Axis 4H-SiC Epilayers by Vanadium Doping
Robin Karhu[1], Einar Sveinbjörnsson[1, 2], Ivan G. Ivanov[1], Erik Janzén[1] and Jawad Ul Hassan[1]; [1]Linköping University, Sweden; [2]Science Institute, Iceland.

11:15 AM TH.A1.3
Optical and Structural Investigation of Heavy B-Doping Effects in Sublimation-Grown 3-SiC
Augustinas Galeckas[1], Patricia Carvalho[2], Quanbao Ma[1], Alexander Azarov[1], Sigurd Hovden[2], Annett Thøgersen[2], Daniel N. Wright[3], Spyros Diplas[2], Ole M. Løvvik[2], Valdas Jokubavicius[4], Jianwu Sun[4], Mikael Syväjärvi[4] and Bengt Svensson[1]; [1]University of Oslo, Norway; [2]SINTEF, Norway; [3]SINTEF, Norway; [4]Linköping University, Sweden.

11:30 AM TH.A1.4
High Aluminum-Doping in Fast Growth of 4H-SiC Bulk Crystals Using Gas Source Method
Norihiro Hoshino[1], Isaho Kamata[1], Yuichiro Tokuda[2], Emi Makino[2], Takahiro Kanda[2], Naohiro Sugiyama[2, 3], Hironari Kuno[2], Jun Kojima[2] and Hidekazu Tsuchida[1]; [1]Central Research Institute of Electric Power Industry (CRIEPI), Japan; [2]Denso Corporation, Japan; [3]National Institute of Advanced Industrial Science and Technology (AIST), Japan.

11:45 AM TH.A1.5
Influence of Additives on Surface Smoothness and Polytype Stability in Solution Growth of N-Type 4H-SiC
Naoyoshi Komatsu, Takeshi Mitani, Yuichiro Hayashi, Tomohisa Kato and Hajime Okumura; National Institute of Advanced Industrial Science and Technology (AIST), Japan.

Contacts

Session Chairs: Roberta Nipoti and Ranbir Singh
Thursday Afternoon, September 21, 2017
Thurgood Marshall Ballroom, North Salon
1:30 pm – 3:15 pm

1:30 PM *TH.C2.1
Metal/Semiconductor Contacts to Silicon Carbide—Physics and Technology
Fabrizio Roccaforte[1], Marilena Vivona[1], Giuseppe Greco[1], Raffaella Lo Nigro[1], Filippo Gianazzo[1], Simone Rascunà[2] and Mario Saggio[2]; [1]Istituto per la Microelettronica e Microsistemi (CNR-IMM), Italy; [2]STMicroelectronics, Italy.

2:00 PM TH.C2.2
Co-Sputtered Pt:Ti as a Diffusion Barrier and Simultaneous Ohmic Contact to N- and P-Type 4H-SiC
Robert Okojie[1] and Dorothy Lukco[2]; [1]NASA Glenn Research Center, United States; [2]Vantage Partners, LLC, United States.

2:15 PM TH.C2.3
Ni-Al-Ti Ohmic Contacts with Preserved Form Factor and Few 10^{-4} Ωcm^2 Specific Resistance on 0.1 - 1 Ωcm P-Type 4H-SiC
Roberta Nipoti[1], Maurizio Puzzanghera[2, 1], Maria Concetta Canino[1], Giovanna Sozzi[2] and Paolo Fedeli[1]; [1]CNR, Italy; [2]UniPR, Italy.

2:30 PM TH.C2.4
Silicidation-Less Ohmic Contact Formation on N-Type 4H-SiC with Silicon Cap Annealing
Hiroaki Hanafusa, Taichi Taniguchi and Seiichiro Higashi; Hiroshima, Japan.

2:45 PM TH.C2.5
Formation of Ohmic Contacts to N-Type 4H-SiC at Low Annealing Temperatures
Vinoth Sundaramoorthy, Renato Amaral Minamisawa, Lukas Kranz, Lars Knoll and Giovanni Alfieri; ABB Switzerland Ltd, Switzerland.

3:00 PM TH.C2.6
Extremely Thermal Stable Ni/W/$TaSi_2$/Pt Simultaneous Ohmic Contacts to N-Type and P-Type 4H-SiC
YanLiang Li, Yimeng Zhang, Xiaoyan Tang, Tao Guo and Yuming Zhang; Xidian University, China.

Extended Defects

Session Chairs: Michael Dudley and Isaho Kamata
Thursday Afternoon, September 21, 2017
Thurgood Marshall Ballroom, West Salon
1:30 pm – 3:15 pm

1:30 PM *TH.B2.1
Progress in Defect Characterization of WBG Semiconductors
Peder Bergman[1], L. Lilja[1], A. Ellison[2] and Björn Magnusson[2]; [1]Linkoping University, Sweden; [2]Norstel AB, Sweden.

2:00 PM TH.B2.2
Direct Observation of Stress Relaxation Process in 4H-SiC Homoepitaxial Layers via *In Situ* Synchrotron X-Ray Topography
Jianqiu Guo, Yu Yang, Balaji Raghothamachar and Michael Dudley; Stony Brook University, United States.

2:15 PM TH.B2.3
Extension, Closure and Conversion of In-Grown Stacking Faults in 4H-SiC Epilayers
Zhe Li[1, 2], Li-Guo Zhang[1], Tao Ju[1], Ze-Hong Zhang[1], Xuan Zhang[1] and Bao-Shun Zhang[1]; [1]Suzhou Institute of Nano-Tech and Nano-Bionics, China; [2]University of Chinese Academy of Sciences, China.

2:30 PM TH.B2.4
***In Situ* Synchrotron X-Ray Topography Observation of Double Ended Frank-Read Sources in PVT-Grown 4H-SiC Wafers**
Yu Yang, Jianqiu Guo, Balaji Raghothamachar and Michael Dudley; Stony Brook University, United States.

2:45 PM TH.B2.5
Decay Time of Photoluminescence from 1SSFs and PDs in 4H-SiC
Masashi Kato[1], Shinya Katahira[1], Yoshihito Ichikawa[1], Shunta Harada[2] and Tsunenobu Kimoto[3]; [1]Nagoya Institute of Technology, Japan; [2]Nagoya University, Japan; [3]Kyoto University, Japan.

3:00 PM TH.B2.6
An Application of Si-Vapor Etching to Control the Surface Stability of 4H-SiC (0001) On-Axis Substrate Revealed by LE-ECCI of SEM
Daichi Dojima, Kazunori Koide, Natsuki Yoshida, Tomoya Ihara, Koji Ashida and Tadaaki Kaneko; Kwansei Gakuin University, Japan.

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

FRIDAY

ORAL PRESENTATIONS

* 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 Masunaga[1], Shntaro Sato[1], Ryo Kuwana[1], Isao Hara[2] and Akio Shima[1]; [1]Hitachi, Japan; [2]Hitachi, Japan.

9:15 AM FR.D1.3
Comparison of the Effect of Electron and Proton Irradiation on 4*H*-SiC and Si Device Structures
Alexander A. Lebedev[1], Klavdia S. Davydovskaya[1], Anatoly M. Strel'chuk[1], Andrey N. Yakimenko[2] and V. Kozlovski[2]; [1]Ioffe Institute, Russian Federation; [2]Peter 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. Spry[1], Philip G. Neudeck[1], Dorothy Lukco[2], Liangyu Chen[3], Michael J. Krasowski[1], Norman F. Prokop[1], Carl W. Chang[2] and Glenn M. Beheim[1]; [1]NASA Glenn Research Center, United States; [2]Vantage Partners LLC, United States; [3]Ohio Aerospace Institute, United States.

9:45 AM FR.D1.5
First Demonstration of Lateral MOSFETs Fabricated on Semi-Insulating 4H-SiC Substrates
Ogyun Seok[1], Hyun Soo Lee[1, 2], Jeong Hyun Moon[1], Hyoung Woo Kim[1], In Ho Kang[1] and Wook Bahng[1]; [1]Korea Electrotechnology Research Institute, Korea (the Republic of); [2]Gyeongsang 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

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-O_2 Annealing to Enhance 4H-SiC (0001) MOSFET Mobility by Improving Near Interface SiO_2 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 SiO_2 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 Miyasaka[2], Hirokuni Asamizu[2, 3], Hidenori Kitai[2], Ryoji Kosugi[2], Shinsuke Harada[2] and Kazutoshi Kojima[2]; [1]Toshiba Corporation, Japan; [2]Advanced Industrial Science and Technology, Japan; [3]ROHM Co. Ltd., Japan.

11:30 AM FR.C1.5
Local Lifetime Control in 4H-SiC by Proton Irradiation
Pavel Hazdra[1], Stanislav Popelka[1] and Adolf Schöner[2]; [1]Czech Technical University in Prague, Czech Republic; [2]Ascatron AB, Sweden.

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

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 Kawanishi[1], Hiroyuki Shibata[1] and Takeshi Yoshikawa[2]; [1]Tohoku University, Japan; [2]The 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 Yeghoyan[1], Kassem Alassaad[1], Sean Robert Craig McMitchell[2], Véronique Souliere[1] and Gabriel Ferro[1]; [1]Université Claude Bernard Lyon 1, France; [2]Centre de Diffraction Institut des Sciences Analytiques, France.

9:45 AM FR.A1.5
Growth Rate Effect on 3C-SiC Homo-Epitaxial Films
Grazia Litrico[1], Ruggero Anzalone[2], Corrado Bongiorno[3], Marco Mauceri[4], Salvatore Coffa[2] and Francesco La Via[3]; [1]LNS Laboratori Nazionali del Sud, Italy; [2]STMicroelectronics, Italy; [3]IMM-CNR, Italy; [4]LPE, 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})$_2O_3$/β-Ga_2O_3 (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-Ga_2O_3 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 Akashi[1], Akinori Seki[2], Hiroaki Saito[2], Fumiaki Kawai[2] and Shinichi Shikata[1]; [1]Kwansei Gakuin University, Japan; [2]Toyota 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 Kurosaka[1], Kanaparin Ariyawong[1], Taka Narumi[1], Sakiko Kawanishi[2] and Takeshi Yoshikawa[1]; [1]Institute of Industrial Science, The University of Tokyo, Japan; [2]Institute 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 Schlesser; 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 Ohse[1], Tadao Morimoto[2], Takahito Kojima[1], Manabu Takei[1, 2], Hiroshi Kimura[1, 2] and Shinsuke Harada[2]; [1]Fuji Electric Co., Ltd., Japan; [2]National 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 Ariyoshi[1], Ryosuke Iijima[1], Yusuke Kobayashi[2, 3] and Shinsuke Harada[2]; [1]Toshiba Corporation, Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan; [3]Fuji 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 O_2 Re-Oxidation
Kimimori Hamada[1], Akira Mikami[1], Hideki Naruoka[1] and Kikuo Yamabe[2]; [1]Toyota Motor Corporation, Japan; [2]University 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

1:15 PM *FR.B1.1
Identification of Si-Vacancy Related Room Temperature Qubits in *4H* and *6H*-SiC
Viktor Ivady[1, 2], Joel Davidsson[1], Igor A. Abrikosov[1, 3] and Adam Gali[2, 4]; [1]Linköping University, Sweden; [2]Wigner Research Centre for Physics, Hungary; [3]National University of Science and Technology 'MISIS', Russian Federation; [4]Budapest University of Technology and Economics, Hungary.

1:45 PM FR.B1.2
Optical Properties of Silicon Vacancies in 4H-SiC
Hunter B. Banks[1], Rachael L. Myers-Ward[2], Alex Giles[2], Josh Caldwell[2], Fritz J. Kub[2], Karl D. Hobart[2], Shojan Pavunny[3], Paul Klein[4], Brad Weaver[2], Evan Glaser[2], Kurt Gaskill[2] and Sam Carter[2]; [1]NRC Postdoc at the Naval Research Laboratory, United States; [2]Naval Research Laboratory, United States; [3]American Society for Engineering Education, United States; [4]Sotera Defense Solutions, United States.

2:00 PM FR.B1.3
Engineering of Coherent Defects in Silicon Carbide with Varying Irradiation Methods
Christian Kasper[1], Dmitrij Simin[1], Hannes Kraus[1], Takeshi Ohshima[2], Wataru Kada[3], Andreas Sperlich[1], Michael Trupke[4, 5], Cameron Salter[4, 5], Vladimir Dyakonov[1, 6] and Georgy Astakhov[1]; [1]Julius Maximilians University of Würzburg, Germany; [2]National Institutes for Quantum and Radiological Science and Technology, Japan; [3]Gunma University, Japan; [4]University of Vienna, Austria; [5]Technical University of Vienna, Austria; [6]ZAE 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 Simin[1], Christian Kasper[1], Wataru Kada[4], Yasuto Hijikata[5], Corey J. Cochrane[2], Takeshi Ohshima[3], Vladimir Dyakonov[1] and Georgy Astakhov[1]; [1]Julius Maximilian University of Würzburg, Germany; [2]California Institute of Technology, United States; [3]National Institutes for Quantum and Radiological Science and Technology (QST), Japan; [4]University of Gunma, Japan; [5]University of Saitama, Japan.

2:30 PM BREAK

Closing Ceremony

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

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

MONDAY

POSTER PRESENTATIONS

* Invited Paper

Bulk and Epitaxial Growth I

Monday Afternoon, September 18, 2017
4:15 PM - 6:15 PM
Exhibit Hall C

***MO.AIP.1**
SEMI Standards for SiC
James D. Oliver[1,2], Russ Kremer[3,2] and Arnd-Dietrich Weber[4,2]; [1]Northrop Grumman, United States; [2]SEMI, United States; [3]Freiberger Compound Materials, United States; [4]SiCrystal AG, Germany.

MO.AP.2
The Characteristics of the SiC Single Crystal Grown from the Ultrafine Particle Materials
Yoshimitsu Yamada; CPD Technology Institution, Japan.

MO.AP.3
Crystal Habit of 3C-, 4H-, 6H-SiC Fine Particles in Liquid Si During Ostwald Ripening
Taka Narumi[1], Didier Chaussende[2] and Takeshi Yoshikawa[1]; [1]The University of Tokyo, Japan; [2]University Grenoble Alpes, France.

MO.AP.4
Transport Phenomena in PVT Growth of SiC Bulk Crystals
Matthias Arzig[4], Maxim Bogdanov[1], Alexey Denisov[2], Alexey Kulik[1], Bari Mamin[3], Mark Ramm[1], Roman Sidorov[3], Denis Skvortsov[3], Burkhard Spill[2] and Peter Wellmann[4]; [1]STR Group, Inc. and Soft-Impact, Ltd., Russian Federation; [2]PVA Crystal Growing Systems GmbH, Germany; [3]Mordovia State University, Russian Federation; [4]Friedrich Alexander Universität Erlange, Nürnberg, Germany.

MO.AP.5
High In-Wafer Uniformity of Growth Rate and Doping Concentration on N-Type 4H-SiC Epitaxial Films Achieved by High Speed Wafer Rotation Vertical CVD Tool
Yoshiaki Daigo, Akio Ishiguro, Shigeaki Ishii and Hideki Ito; NuFlare Technology, Inc., Japan.

MO.AP.6
Major Carrier Element Concentrations in SiC Powder and Bulk Crystal
Ta Ching Hsiao; Industrial Technology Research Institute, Taiwan.

MO.AP.7
Improvement of the Growth Rate in TSSG Process Using Modified Crucible Structure
Young - Gon Kim[1,2]; [1]Dong-Eui University, Korea (the Republic of); [2]Korea Institute of Ceramic Engineering and Technology, Korea (the Republic of).

MO.AP.8
Effective Carbon Translation to Seed by Top Seeded Solution Growth using Si Melt
Su-hun Choi[1,2]; [1]University Dong-eui, Korea (the Republic of); [2]Korea Institute of Ceramic Engineering and Technology, Korea (the Republic of).

MO.AP.9
Experimental Determination of Carbon Solubility in $Si_{0.56}Cr_{0.4}M_{0.04}$ (M=Transition Metals) Solvents for the Solution Growth of SiC
Koangyong Hyun[2], Toshinori Taishi[2,1] and Katsuya Teshima[1]; [1]Shinshu University, Japan; [2]Shinshu University, Japan.

MO.AP.10
Investigation of Run-to-Run Fluctuation in Growth Conditions of Physical Vapor Transport Growth of 4H-SiC Crystals
Nana Matsumoto[1], Hiroaki Shinya[1], Koji Ashida[1], Tadaaki Kaneko[1,2], Noboru Ohtani[1,2], Masakazu Katsuno[3], Hiroshi Tsuge[3], Shinya Sato[3] and Tatsuo Fujimoto[3]; [1]Kwansei Gakuin University, Japan; [2]Kwansei Gakuin University, Japan; [3]Nippon Steel & Sumitomo Metal Corporation, Japan.

MO.AP.11
Quick and Practical Cleaning Process for Silicon Carbide Epitaxial Reactor
Kohei Shioda[1], Keisuke Kurashima[1], Hitoshi Habuka[2], Hideki Ito[3], Shinichi Mitani[3] and Yoshinao Takahashi[4]; [1]Yokohama National University, Japan; [3]NuFlare Technology, Japan; [4]Kanto Denka Kogyo, Japan.

MO.AP.12
(LATE NEWS) Advantages of Tantalum Carbide in SiC Crystal and Epitaxial Growth
Wei Fan, Hao Qu, Sudarshan Natarajan, Creighton Tomek, Katherine Kozlov, Brian Kozak and Gregory Shaffer; Momentive Performance Materials Inc., United States.

MO.AP.13
(LATE NEWS) Control of Nucleation of 3C-SiC Utilizing Screw Dislocations in 6H-S
Ryo Watanabe, Sakiko Kawanishi and Hiroyuki Shibata; Tohoku University, Japan.

Defects, Material Studies and Characterization I

Monday Afternoon, September 18, 2017
4:15 PM - 6:15 PM
Exhibit Hall C

***MO.BIP.1**
Electrostatic-Energy Model for Single Shockley Stacking Fault Formation in 4H-SiC Crystals
Akifumi Iijima, Jun Suda and Tsunenobu Kimoto; Kyoto University, Japan.

MO.BP.2
Physical Model of the Carrier Lifetime in SiC
Tetsuo Hatakeyama, Koji Nakayama, Yoshiyuki Yonezawa and Hajime Okumura; AIST, Japan.

MO.BP.3
Thermally Stimulated Luminescence in 6H Fluorescent SiC
Yi Wei[1], Ulrike Künecke[2], Peter Wellmann[2] and Haiyan Ou[1]; [1]Technical University of Denmark, Denmark; [2]University of Erlangen-Nürnberg, Germany.

MO.BP.4
Visible Luminescence from Silicon Carbide and Silicon Carbo-Nitride Nanostructures—Influence of Nitrogen
Zahra Khatami, Jeremy W. Miller, Jacek Wojcik and Peter Mascher; McMaster University, Canada.

MO.BP.5
Measurement of Transient Resistivity of Semi-Insulating SiC Excitated by Nanosecond Laser Pulse
Wei Huang[1], Pengfei Cao[2], Hui Guo[2] and Erwei Shi[1]; [1]Shanghai Institute of Ceramics, Chinese Academy of Sciences, China; [2]Xidian University, China.

MO.BP.6
Optical Stressing of SiC Material and Devices
Birgit Kallinger[1], Daniel Kaminzky[1], Patrick Berwian[1], Jochen Friedrich[1] and Steffen Oppel[2]; [1]Fraunhofer IISB, Germany; [2]Intego GmbH, Germany.

MO.BP.7
Rearrangement of Surface Structure of 4º Off-Axis 4H-SiC (0001) Epitaxial Wafer by High Temperature Annealing in Si/Ar Ambient
Koji Ashida[1], Daichi Dojima[1], Satoshi Torimi[2], Norihito Yabuki[2], Yusuke Sudo[2], Satoru Nogami[2], Makoto Kitabatake[2] and Tadaaki Kaneko[1]; [1]Kwansei Gakuin University, Japan; [2]Toyo Tanso Corporation, Japan.

MO.BP.8
Expansion and Contraction of Stacking Faults in SiC Epitaxial Layer for Bipolar Devices under Ultraviolet Irradiation
Takanori Tanaka[1], Hiromu Shiomi[1], Naoyuki Kawabata[2], Yoshiyuki Yonezawa[1], Tomohisa Kato[1] and Hajime Okumura[1] [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Mitsubishi Electric Corporation, Japan.

MO.BP.9
Influence of Basal Plane Stacking Faults on the Electron Transport in *N*-Type 4H-SiC Crystals
Kiyo Okawa[1], Yuina Mannen[1], Kentaro Shioura[1], Noboru Ohtani[1, 2], Masakazu Katsuno[3], Hiroshi Tsuge[3], Shinya Sato[3] and Tatsuo Fujimoto[3]; [1]Kwansei Gakuin University, Japan; [2]Kwansei Gakuin University, Japan; [3]Nippon Steel & Sumitomo Metal Corporation, Japan.

MO.BP.10
Modeling and Simulation of Electrical Activation of Acceptor-Type Dopants in Silicon Carbide
Vito Šimonka[1], Andreas Hössinger[2], Josef Weinbub[1] and Siegfried Selberherr[3]; [1]Christian Doppler Laboratory for HPTCAD, Institute for Microelectronics, TU Wien, Austria; [2]Silvaco Europe Ltd., United Kingdom; [3]Institute for Microelectronics, TU Wien, Austria.

MO.BP.11
Dynamics of the Carbon Vacancy in 4H-SiC—Refining of the Current Theoretical Description
Jose Coutinho[1], Vitor Torres[1], Kamel Demmouche[2] and Sven Öberg[3]; [1]University of Aveiro, Portugal; [2]Centre Universitaire -Belhadj Bouchaib- Ain Temouchent, Algeria; [3]Luleå University of Technology, Sweden.

MO.BP.12
Radiation Hardness of 4H-SiC Epitaxial Layers—The Role of Deep Level Defects
Ivana Capan[1], Tomislav Brodar[1], Damjan Blazeka[1], Takeshi Ohshima[2], Shin-ichiro Sato[2], Takahiro Makino[2], Zeljko Pastuovic[3], Rainer Siegele[3], Luka Snoj[4], Vladimir Radulovic[4], Vitor Torres[5] and Jose Coutinho[5]; [1]Rudjer Boskovic Institute, Croatia; [2]QST, Japan; [3]ANSTO, Australia; [4]Jozef Stefan Institute, Slovenia; [5]University of Aveiro, Portugal.

MO.BP.13
(LATE NEWS) Observation of Oxidation-Induced Carbon-Rich Region in the Near-Interface SiC by High-Resolution STEM-EDX
Takuma Kobayashi and T. Kimoto; Kyoto University, Japan.

MO.BP.14
(LATE NEWS) Immobilization Phenomenon of Partials Surrounding Double Shockley Stacking Faults in Heavily Nitrogen Doped 4H-SiC Crystal with Thermal Anneal
Naohiro Sugiyama[1, 2], Hiromasa Suo[1, 3], Kazuma Eto[1], Yuichiro Tokuda[2], Isaho Kamata[4], Norihiro Hoshino[4], Tomohisa Kato[1], Hidekazu Tsuchida[4] and Hajime Okumura[1]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]DENSO Corporation, Japan; [3]Showa Denko K.K., Japan; [4]Central Research Institute of Electric Power Industry (CRIEPI), Japan.

Processing and Manufacturing I

Monday Afternoon, September 18, 2017
4:15 PM - 6:15 PM
Exhibit Hall C

***MO.CIP.1**
About the Electrical Activation of 1×10^{20} cm^{-3} Ion Implanted Al in 4H-SiC at Temperatures in the Range 1500 - 1950°C
Roberta Nipoti[1], Alberto Carnera[2], Giovanni Alfieri[3] and Lukas Kranz[3]; [1]CNR, Italy; [2]University of Padova, Italy; [3]ABB, Switzerland.

MO.CP.2
Influence of Lateral Straggling of Implanted Aluminum Ions on High Voltage 4H-SiC Device Edge Termination Design
Yifan Jiang, Bantval J. Baliga and A. Q. Huang; North Carolina State University, United States.

MO.CP.3
Effect of Post Oxide Annealing on the Electrical and Interface 4H-SiC/Al_2O_3 MOS Capacitors
Idzdihar Idris, Nick Wright and Alton Horsfall; Newcastle University, United Kingdom.

MO.CP.4
MOCVD Compatible Atomic Layer Deposition of Al_2O_3 on SiC and Graphene/SiC Heterostructures
Marco Eckstein[2], Christian Koppka[3], Sebastian Thiele[1], Yan Mi[4], Riu Xu[4], Yong Lei[4], Bernd Hähnlein[2], Frank Schwierz[1] and Joerg Pezoldt[2]; [1]TU Ilmenau, Germany; [2]TU Ilmenau, Germany; [3]TU Ilmenau, Germany; [4]TU Ilmenau, Germany.

MO.CP.5
Crystal Defect Analysis of Latent Scratch Induced During CMP Process on 4H-SiC Wafer using Electron Microscopy
Takahiro Sato[1, 2], Hiroaki Matsumoto[1], Seiichi Suzuki[3], Toshiyuki Isshiki[2] and Kuniyasu Nakamura[1]; [1]Hitachi High-Technologies Corporation, Japan; [2]Kyoto Institute of Technology, Japan; [3]TSL Solutions Corporation, Japan.

MO.CP.6
Effect of Ion Implantation-Induced Defects on Leakage Current Characteristics of IEMOS
Yukihiro Furukawa[1], Hideo Suzuki[1], Noriaki Tani[1], Yusuke Kobayashi[2, 3], Naoyuki Ohse[3], Shinsuke Harada[2] and K. Fukuda[2]
[1]ULVAC Inc., Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan; [3]Fuji Electric Co.,Ltd, Japan.

MO.CP.7
Application of Si-Vapor Ambient Anneal for Post Ion Implantation Anneal and Simultaneous Improvement of Trench Sidewall Smoothness
Norihito Yabuki[1], Satoshi Torimi[1], Satoru Nogami[1], Makoto Kitabatake[1] and Tadaaki Kaneko[2]; [1]Toyo Tanso Co., Ltd., Japan; [2]Kwansei Gakuin University, Japan.

MO.CP.8
Improvement of SiO_2/4H-SiC(0001) Interface Properties by H_2 and Ar Mixture Gas Treatment Prior to SiO_2 Deposition
Hidenori Tsuji[1, 2], Takuji Hosoi[2], Yutaka Terao[1], Takayoshi Shimura[2] and Heiji Watanabe[2]; [1]Fuji Electric Co., Ltd., Japan; [2]Osaka University, Japan.

MO.CP.9
Formation of the Uniform Interface Ni/4H-SiC Ohmic Contact with Titanium as Barrier Layer
Moonkyong Na[1], Ju Yeon Keum[1, 2], In Ho Kang[1], Jeong Hyun Moon[1], Sang Cheol Kim[1], Hyoung Woo Kim[1], Ogyun Seok[1] and Wook Bahng[1]; [1]Korea Electrotechnology Research Institute, Korea (the Republic of); [2]Changwon National University, Korea (the Republic of).

MO.CP.10
PRESiCE™—Process Engineered for Manufacturing SiC Electronic-Devices
Bantval J. Baliga; North Carolina State University, United States.

MO.CP.11
A Manufacturing Cost and Supply Chain Analysis of SiC Power Electronics Applicable to Medium-Voltage Motor Drives
Samantha Reese, Timothy Remo and Kelsey Horowitz; National Renewable Energy Lab (NREL), United States.

MO.CP.12
(LATE NEWS) Cross-Section Profiling of 4H-SiC VJFETs by Various Techniques
K. Tsagaraki[1], M. Nafouti[3], H. Peyré[4], K. Vamvoukakis[1], N. Makris[1], Maria Kayambaki[1], A. Stavrinidis[1], G. Konstantinidis[1], D. Alquier[3] and Konstantino Zekentes[1, 2]; [1]MRG-IESL/FORTH, Greece; [2]Grenoble-INP, IMEP-LAHC, France; [3]Université de Tours, France; [4]Université de Montpellier, France.

Power Devices, Circuits and Applications I

Monday Afternoon, September 18, 2017
4:15 PM - 6:15 PM
Exhibit Hall C

***MO.DIP.1**
Reliability and Ruggedness of 1200V SiC Planar Gate MOSFETs Fabricated in a High Volume CMOS Foundry
Sauvik Chowdhury, Levi Gant, Blake Powell, Kasturirangan Rangaswamy and Kevin Matocha
Monolith Semiconductor, United States.;

MO.DP.2
SPICE Modeling of Body Bias Effect in 4H-SiC Integrated Circuit Resistors
Philip G. Neudeck; NASA Glenn Research Center, United States.

MO.DP.3
Impact of Multi-Level Trap Assisted Tunneling on the Field and Temperature Dependence of SiC-JBS Reverse Leakage Current
Gary Dolny[1], Sheng Yang[2], Yue Fu[2], Zhanming Li[2], Rahul Radhakrishnan[3] and Richard Woodin[3]; [1]Gary Dolny Scientific/ Technical Consulting, United States; [2]Crosslight Software Inc., Canada; [3]Global Power Technologies, United States.

MO.DP.4
Electrical Performances and Physics Based Analysis of 10kV SiC Power MOSFETs at High Temperatures
Siyang Liu[1], Bantval J. Baliga[2], Yifan Jiang[2], Weifeng Sun[1], Subhashish Bhattacharya[2] and A. Q. Huang[2]; [1]Southeast University, China; [2]North Carolina State University, United States.

MO.DP.5
Temperature-Dependent Gate Current in SiO_2/4H-SiC MOS Capacitors
Patrick Fiorenza[1], Marilena Vivona[1], Ferdinando Iucolano[2], Andrea Severino[2], Simona Lorenti[2] and Fabrizio Roccaforte[1]
[1]CNR-IMM, Italy; [2]STMicroelectronics, Italy.

MO.DP.6
Investigation of the Edge Termination Applied for 6.5 kV SiC MOSFET
Kohei Ebihara, Koutarou Kawahara, Shiro Hino, Koji Sadamatsu, Akemi Nagae, Yukiyasu Nakao, Hiroshi Watanabe and Satoshi Yamakawa; Mitsubishi Electric, Japan.

MO.DP.7
Breakdown Field Modeling for 3C-SiC Power Device Simulations
Hamid Fardi[2] and Bart Van Zeghbroeck[1]; [1]University of Colorado, United States; [2]University of Colorado, United States.

MO.DP.8
Al_2O_3/4H-SiC Interface for Device Applications
Muhammad Usman[1, 2], Sethu . Suvanam[2], Anders Hallén[2], Muhammad Arshad[3], Milad G. Yazdi[2] and Mats Götelid[2]
[1]National Centre for Physics, Pakistan; [2]KTH Royal Institute of Technology, Sweden; [3]National Centre for Physics, Pakistan.

MO.DP.9
High Workfunction, Compound Gate Metal Engineering for Low DIBL, High Gain, High Density Advanced RF Power Static Induction Transistor (SIT) and HV Schottky Diode in 4H Silicon Carbide
James Pan; Northrop Grumman Corporation, United States.

MO.DP.10
(LATE NEWS) 1MHz Switching Operation of 1200V Full SiC Power Module
K. Hayashi[1], T. Funaki[1], H. Michikoshi[2] and K. Fukuda[2]; [1]Osaka University, Japan; [2]National Institute of Advanced Industrial Science and Technology (AIST), Japan.

MO.DP.11
Observation of Carrier Distribution in SiC PiN Diodes by Using Optical Transmission
Masashi Kato[1], Shinichi Mae[1], Yoshiyuki Yonezawa[2] and Tomohisa Kato[2]; [1]Nagoya Institute of Technology, Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan.

MO.DP.12
Comprehensive Evaluation of Bias Temperature Instabilities of 4H-SiC MOSFETs Using Device Preconditioning
Gerald Rescher[1, 2], Gregor Pobegen[1], Thomas Aichinger[3] and Tibor K. Grasser[2]; [1]KAI GmbH, Austria; [2]Vienna University of Technology, Austria; [3]Infineon Austria AG, Austria.

MO.DP.13
(LATE NEWS) 4H-SiC Trench MOSFET with Ultra-Low On-Resistance by Using Miniaturization Technology
Aiko Ichimura, Yasuhiro Ebihara, Shuhei Mitani, Masato Noborio, Yuichi Takeuchi, Shoji Mizuno, Toshimasa Yamamoto and Kazuhiro Tsuruta; DENSO Corporation, Japan.

MO.DP.14
(LATE NEWS) Radiation Hardness Study on SiC Power MOSFETs
Xingguang Zhu[1], Jean-Marie Lauenstein[2], Alexander Bolotnikov[1], Biju Jacob[1], Avinash Kashyap[3], Kouros Sariri[4] and Yuan Chen[5]; [1]GE Global Research, United States; [2]NASA Goddard Space Flight Center, United States; [3]Microsemi, United States; [4]Frequency Management, Inc., United States; [5]NSAS/LaRC, United States.

MO.DP.15
(LATE NEWS) First Demonstration of High Temperature SiC CMOS Gate Driver in Bridge Leg for Hybrid Power Module Application
Ming-Hung Weng[1], Muhammad Idzdihar Idris[1], Sean Wright[2], D.T. Clark[2], R.A.R. Young[2], J.R. McIntosh[2], D.L. Gordon[2] and Alton Horsfall[1]; [1]Newcastle University, United Kingdom; [2]Raytheon UK, United Kingdom.

Novel Devices and Concepts, Emerging Materials I
Monday Afternoon, September 18, 2017
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Exhibit Hall C

***MO.EIP.1**
Piezoresistive Characteristics of NMOS FET Technology on 4H-SiC
Richard C. Jaeger[1], Jeffrey C. Suhling[2], Leonid Fursin[3] and William Simon[3]; [1]Auburn University, United States; [2]Auburn Univ., United States; [3]United Silicon Carbide Inc., United States.

MO.EP.2
GaN Lateral MISFETs Fabricated in Mg Ion Implanted Layer
Kota Sugamata, Hirofumi Tsuge, Kiyoji Ikeda, Michitaka Yoshino, Tomoyoshi Mishima, Kazuo Kuriyama and Tohru Nakamura, Hosei University, Japan.

MO.EP.3
Electrical Properties of Schottky-Diodes Based on P-Doped Diamond
Andreas Hürner and Tobias Erlbacher; Fraunhofer IISB, Germany.

MO.EP.4
High Quality Graphene Grown by Sublimation on 6H-SiC (0001)
Alexander A. Lebedev[1], Valerii Y. Davydov[1], Dmitriy Y. Usachov[3], Sergey P. Lebedev[1], Alexander N. Smirnov[1, 2], Vladimir S. Levitskii[1], Ilya A. Eliseyev[3], Mikhail S. Dunaevsckiy[1], Oleg Y. Vilkov[3] and Artem Rybkin[3]; [1]Ioffe Institute, Russian Federation; [2]ITMO University, Russian Federation; [3]St. Petersburg State University, Russian Federation.

MO.EP.5
(LATE NEWS) Fabrication of Full-SiC Comb-Drive Resonators by Conduction-Type-Selective Electrochemical Etching
Taro Enokizono, Tsunenobu Kimoto and Jun Suda; Kyoto University, Japan.

Sunday Program Reviews I
Monday Afternoon, September 18, 2017
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***MO.PRP.1**
National Programs on SiC Power Devices in China—From Research to Applications
Fei Yang; State Grid Corporation of China, China.

***MO.PRP.2**
SiC Power Electronics Technology for Energy Efficient Devices (SPEED)—Introduction Overview;
High Quality Substrate Material for High Power Application;
High Voltage SiC Devices for Power Transmission Application;
Solid State Transformers with Increased Functionalities and SiC in Future Wind Power Applications
Anton J. Bauer[1], Peter Friedrichs[2], Peder Bergman[3], Adolf Schöner[4], Andrei Mihaila[5], Philippe Godignon[6], Antonio de la Cruz[7], Christian Sommer[8], Itziar Kortazar[9] and Jose Maria Cuartas Alonso[10]; [1]Frauhofer IISB, Germany; [2]Infineon Technologies, Germany; [3]Norstel AB, Sweden; [4]Ascatron, Sweden; [5]ABB Corporate Research, Switzerland; [6]CNM-CSIC, Spain; [7]INAEL, Spain; [8]University of Hannover, Germany; [9]Ingeteam, Spain; [10]University of Oviedo, Spain.

***MO.PRP.3**
Manufacturing Job Creation through Accelerated Large-Scale Adoption of SiC Semiconductor Devices
Victor Veliadis; PowerAmerica, United States.

***MO.PRP.4**
Genealogy of National Projects on SiC Power Electronics and Related Current Research and Development Activities in Japan
Hajime Okumura[1] and Tsunenobu Kimoto[2]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Kyoto University, Japan.

***MO.PRP.5**
The New York Power Electronics Manufacturing Consortium—Enabling the Power Electronics Revolution
Brian Sapp, Jeffrey C. Hedrick, Lindsay M. Bessette, Alexander Bialy, Matthew Bosco, Michael Bryant, Wenli Collison, Shannon Dunn, Daniel Franca, Thomas Gorczyca, Pui Yee Hung, Anne-Sophie Larrea, Vincent Pedone, Joseph Piccirillo, Jamie Prudhomme, Susan Rogers, Gerard Stapf, Vlad Stolkarts, Sean Valente and Paul Woodin; SUNY Polytechnic Institute, United States.

***MO.PRP.6**
3C-SiCHetero-epitaxiALLy srown on silicon compliancE substrates and new 3C-SiC substrates for sustaiNable wide-band-Gap powEr devices (CHALLENGE)
Francesco La Via; CNR-IMM, Italy.

***MO.PRP.7**
Optimal SiC Substrates for Integrated Microwave and Power Circuits—OSIRIS
Sylvain Delage[1], Örjan Danielsson[2], Bruno Ceccaroli[3], Christophe Chang[4], Fulvio Infante[5], Jaroslav Kovac[6], Björn Magnusson[7], Pierre Ruterana[8] and Adolf Schöner[9]; [1]III-V Lab, France; [2]Linköping University, Sweden; [3]Isosilicon AS, Norway; [4]United Monolithic Semiconductors, France; [5]Intraspec Technologies, France; [6]Slovak University of Technology, Slovakia; [7]Norstel AB, Sweden; [8]CNRS-CIMAP, France; [9]Ascatron AB, Sweden.

***MO.PRP.8**
Wide Band Gap Innovative SiC for Advanced Power (WInSiC4AP)—A New European Project Started in June 2017
Leoluca Liggio[1], Antonio Imbriuglia[2], Mario Saggio[2], Mario Cacciato[3], Joseph Domingo Salvany[4], Benedicte Silvestre[5], Susanna Reggiani[6], Gaudenzio Meneghesso[6], Salvatore Patanè[7], Miroslav Husak[8], Marc Christoferr Wurz[9], Fabrizio Roccaforte[10], Patrick Fiorenza[10], Francesco La Via[10], Antonino La Magna[10], Xavier Pignat[11], Olivier Metzelard[12], Jacques Favre[13], Federica Di Leo[14], Martin Haug[15], Jean-Francois Michaud[16], Daniel Alquier[16], Jiri Havlik[17], Tiziano Valentinetti[18], Gianni Viano[19] and Gennaro Russo[20]; [1]Distretto Tecnologico Sicilia Micro Nano Sistemi - DTSMNS, Italy; [2]STMicroelectronics, Italy; [3]University of Catania, Italy; [4]NEXTER Electronics, France; [5]VALEO Systems de Controle Moteurs, France; [6]IUNET, Italy; [7]University of Messina, Italy; [8]University of Praha, Czech Republic; [9]University of Hannover, Germany; [10]CNR-IMM, Italy; [11]ZODAERO Aero Electric SAS, France; [12]APOJEE, France; [13]APSI3D, France; [14]SAT, Italy; [15]Wührt, Germany; [16]University of Tours, France; [17]IMA, Czech Republic; [18]Enel Distribuzione, Italy; [19]SOFTECO Simat SRL, Italy; [20]Distretto Tecnologico Aerospaziale della Campania, Italy.

TUESDAY

POSTER PRESENTATIONS

* Invited Paper

Bulk and Epitaxial Growth II

Tuesday Afternoon, September 19, 2017
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Exhibit Hall C

***TU.AIP.1**
SEMI Standards for SiC
James D. Oliver[1, 2], Russ Kremer[3, 2] and Arnd-Dietrich Weber[4, 2]; [1]Northrop Grumman, United States; [2]SEMI, United States; [3]Freiberger Compound Materials, United States; [4]SiCrystal AG, Germany.

TU.AP.2
Reduction of Surface and PL Defects on N-Type 4H-SiC Epitaxial Films Grown by High Speed Wafer Rotation Vertical CVD Tool
Yoshiaki Daigo, Akio Ishiguro, Shigeaki Ishii and Hideki Ito; NuFlare Technology, Inc., Japan.

TU.AP.3
Model of Growth of N- and Al-Doped SiC Structures in the SiH_4+C_3H_8+HCl System
Mark Ramm[1, 2], Maxim Bogdanov[1, 2], Alexander Segal[1, 2], Masaya Iizuka[3], Yuji Mukaiyama[3], Hiroaki Fujibayashi[4] and Kazukuni Hara[4]; [1]STR Group, Inc., Russian Federation; [2]Soft-Impact, Ltd., Russian Federation; [3]STR Japan K.K., Japan; [4]Denso Corporation, Japan.

TU.AP.4
Molecular Dynamics Study of Morphologies Instability in Growth of 4H-SiC(000-1) Surface
Wei Huang, Huijun Guo, Xuechao Liu and Erwei Shi; Shanghai Institute of Ceramics, Chinese Academy of Sciences, China.

TU.AP.5
Evaluation of 2-Inch Wafer by Solution Growth Method Using Synchrotron X-Ray Topography
Kazuaki Seki[1], Kazuhiko Kusunoki[1], Yutaka Kishida[1], Hiroshi Kaido[1], Koji Moriguchi[1], Motohisa Kado[2], Hironori Daikoku[2], Takayuki Shirai[2], Mitsutoshi Akita[2], Akinori Seki[2], Hiroaki Saito[2], Shunta Harada[3] and Toru Ujihara[3]; [1]Nippon Steel & Sumitomo Metal Corporation, Japan; [2]Toyota Motor Corporation, Japan; [3]Nagoya University, Japan.

TU.AP.6
Reduction Dislocation Density in the Silicon Carbide Crystals Grown by Sublimation on the Profiled On-Axis Seeds
Sergey S. Nagalyuk; Ioffe Institute, Russian Federation.

TU.AP.7
Resistivity Increase in 6H-SiC Crystal Grown with Simple Modification in PVT Process
Jung-Woo Choi[2] and Won Jae Lee[1]; [1]Dongeui University, Korea (the Republic of); [2]SKC, Korea (the Republic of).

TU.AP.8
***In Situ* Observation on Step-Bunching and Inclusion Formation During Solution Growth of SiC Combined with *Ex Situ* Analysis**
Kosuke Fukui[1], Miki Shiraishi[1], Sakiko Kawanishi[2], Takeshi Yoshikawa[1], Hironori Daikoku[3], Hiroaki Saito[3] and Kazuhiko Kusunoki[4]; [1]The University of Tokyo, Japan; [2]Tohoku University, Japan; [3]Toyota Motor Corporation, Japan; [4]Nippon Steel & Sumitomo Metal Corporation, Japan.

TU.AP.9
Growth of 150mm 4H-SiC Epitaxial Layer by a Hot-Wall Reactor
Gan Feng; EpiWorld International Co., LTD, China.

TU.AP.10
Effect of Degree of Supersaturation on Solution Growth of 4H-SiC Using Cr-Si Solvent
Yoichiro Nagamatsu[1], Sakiko Kawanishi[1], Hiroyuki Shibata[1] and Takeshi Yoshikawa[2]; [1]Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Japan; [2]Institute of Industrial Science, The University of Tokyo, Japan.

TU.AP.11
Influence and Mutual Interaction of Process Parameters on the $Z_{1/2}$ Defect Concentration during Epitaxy of 4H-SiC
Jürgen Erlekampf, Daniel Kaminzky, Katharina Roßhirt, Birgit Kallinger, Mathias Rommel, Patrick Berwian and Jochen Friedrich; Fraunhofer IISB, Germany.

TU.AP.12
Structural Characterization of the Growth Front of 4H-SiC Boules Grown by the Physical Vapor Transport Growth Method
Masashi Sonoda[1], Kentaro Shioura[1], Takahiro Nakano[1], Noboru Ohtani[1, 2], Masakazu Katsuno[3], Hiroshi Tsuge[3], Shinya Sato[3] and Tatsuo Fujimoto[3]; [1]Kwansei Gakuin University, Japan; [2]Kwansei Gakuin University, Japan; [3]Nippon Steel & Sumitomo Metal Corporation, Japan.

TU.AP.13
(LATE NEWS) Dislocation-Free Selective Area Growth of SiC on 4H-SiC(0001) Patterned Substrate by Using Metastable Solvent Epitaxy
Tadaaki Kaneko[1], R. Watanabe[1], Koji Ashida[1], Daichi Dojima[1], N. Yabuki[2], Y. Abe[2], Y. Sudo[2], S. Nogami[2] and M. Kitabatake[2]; [1]Kwansei Gakuin University, Japan; [2]Toyo Tanso Corp., Japan.

Defects, Material Studies and Characterization II

Tuesday Afternoon, September 19, 2017
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Exhibit Hall C

***TU.BIP.1**
Electrostatic-Energy Model for Single Shockley Stacking Fault Formation in 4H-SiC Crystals
Akifumi Iijima, Jun Suda and Tsunenobu Kimoto; Kyoto University, Japan.

TU.BP.2
Analysis of Compensation Effects in Aluminum Implanted N-Type 4H-SiC Devices
Julietta M. Weiße[1], Martin Hauck[2], Tomasz Sledziewski[3], Michael Krieger[2], Anton J. Bauer[3], Lothar Frey[1, 3] and Tobias Erlbacher[3, 1]; [1]Friedrich-Alexander Universität Erlangen-Nürnberg, Germany; [2]Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; [3]Fraunhofer IISB, Germany.

TU.BP.3
Comparison of Conduction Mechanisms in Heavily Al-Doped 4H-SiC and Heavily Al- and N-Codoped 4H-SiC
Hideharu Matsuura[1], Akinobu Takeshita[1], Tatsuya Imamura[1], Kota Takano[1], Kazuya Okuda[1], Atsuki Hidaka[1], Shiyang Ji[2], Kazuma Eto[2], Kazutoshi Kojima[2], Tomohisa Kato[2], Sadafumi Yoshida[2] and Hajime Okumura[2]; [1]Osaka Electro-Communication University, Japan; [2]National Institute of Advanced Industrial Science and Technology, Japan.

TU.BP.4
Direct Observation of Stacking Faults Expansion in 4H-SiC at High Temperatures by *In Situ* X-Ray Topography
Fumihiro Fujie[1], Shunta Harada[1, 2], Kenta Murayama[2], Kenji Hanada[2], Penglei Chen[1], Tomohisa Kato[3], Miho Tagawa[1, 2] and Toru Ujihara[1, 2, 4]; [1]Nagoya University, Japan; [2]Nagoya University, Japan; [3]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [4]GaN Advanced Device Open Innovation Laboratory (GaN-OIL), National Institute of Advanced Industrial Science and Technology (AIST), Japan.

TU.BP.5
Comparative Evaluation of Forward Voltage Degradation due to Propagating and Converted Basal Plane Dislocations
Yoshitaka Nishihara, Koji Kamei, Kenji Momose and Hiroshi Osawa; Showa Denko K.K., Japan.

TU.BP.6
Observation of a Latent Scratch on Chemo-Mechanical Polished 4H-SiC Wafer by Mirror Projection Electron Microscopy
Toshiyuki Isshiki[1], Masaki Hasegawa[2], Takahiro Sato[2, 1], Kenji Kobayashi[2], Atsushi Miyaki[2], Masato Iyoki[2], Takehiro Yamaoka[2] and Katsunori Onuki[2]; [1]Kyoto Institute of Technology, Japan; [2]Hitachi High-Technologies Corp., Japan.

TU.BP.7
Influence of Triangular Defects on the Electrical Characteristics of 4H-SiC Devices
Johannes Schöck, Holger Schlichting, Tobias Erlbacher, Mathias Rommel and Anton J. Bauer; Fraunhofer Institute for Integrated Systems and Device Technology (IISB), Germany.

TU.BP.8
Radiation Hardness for Silicon Dioxide and Aluminum Oxide on 4H-SiC
Anders Hallén; Royal Institute of Technology, Sweden.

TU.BP.9
Investigation of 3C-SiC/SiO_2 Interfacial Point Defects from *Ab Initio* G-Tensor Calculations and Electron Paramagnetic Resonance Measurements
Taufik A. Nugraha[1, 2]; [1]Max-Planck-Institut für Eisenforschung, Germany; [2]University of Paderborn, Germany.

TU.BP.10
Various Single Photon Sources Observed in SiC Pin Diodes
Hiroki Tsunemi[1,2], Tomoya Honda[1,2], Takahiro Makino[2], Shinobu Onoda[2], Shin-ichiro Sato[2], Yasuto Hijikata[1] and Takeshi Ohshima[2]; [1]Saitama University, Japan; [2]National Institutes for Quantum and Radiological Science and Technology, Japan.

TU.BP.11
The Effects of Illumination on Point Defects Detected in High Purity Semi-Insulating 4H-SiC
Giovanni Alfieri, Lukas Kranz, Lars Knoll and Vinoth Sundaramoorthy; ABB, Switzerland.

TU.BP.12
(LATE NEWS) The Effect of Nitrogen on the 4H-SiC/SiO2 Interface Studied with Variable Resonance Frequency Spin Dependent Charge Pumping
Mark A. Anders[1], P. M. Lenahan[1] and Aivars Lelis[2]; [1]Pennsylvania State University, United States; [2]U.S. Army Research Laboratory, United States.

Processing and Manufacturing II

Tuesday Afternoon, September 19, 2017
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Exhibit Hall C

***TU.CIP.1**
About the Electrical Activation of 1×10^{20} cm^{-3} Ion Implanted Al in 4H-SiC at Temperatures in the Range 1500 - 1950°C
Roberta Nipoti[1], Alberto Carnera[2], Giovanni Alfieri[3] and Lukas Kranz[3]; [1]CNR, Italy; [2]University of Padova, Italy; [3]ABB, Switzerland.

TU.CP.2
Stress Relaxation Mechanism of Post Processing 4H-SiC Substrates
Ruggero Anzalone; STMicroelectronics, Italy.

TU.CP.3
Incorporation and Stability of Phosphorus in the SiO_2/SiC Interfacial Region Deposited by Sputtering
Eduardo Pitthan[2,3], Angelo Gobbi[4], Voshadhi Amarasinghe[3], Can Xu[3], Gustavo Dartora[2], Henri Boudinov[5], Leonard Feldman[3] and Fernanda Stedile[2,1]; [1]Universidade Federal do Rio Grande do Sul, Brazil; [2]Universidade Federal do Rio Grande do Sul, Brazil; [3]Rutgers University, United States; [4]Centro Nacional de Pesquisa em Energia e Materiais, Brazil; [5]Universidade Federal do Rio Grande do Sul, Brazil.

TU.CP.4
4H-Silicon Carbide Wafer Surface after Chlorine Trifluoride Gas Etching
Shogo Okuyama[1], Keisuke Kurashima[1], Ken Nakagomi[1], Hitoshi Habuka[1], Yoshinao Takahashi[2] and Tomohisa Kato[3]
[1]Yokohama National University, Japan; [2]Kanto Denka Kogyo, Japan; [3]National Institute of Advanced Industrial Science and Technology, Japan.

TU.CP.5
Influence of Ti_3SiC_2 Layer on TiAl Based Ohmic Contacts on Al-Doped 4H-SiC
Matthias Kocher, Mathias Rommel, Tobias Erlbacher and Anton J. Bauer; Fraunhofer IISB, Germany.

TU.CP.6
Improved Doping Performance of Laser Al Doping in 4H-SiC by Substrate Heating
Akihiro Ikeda, Rikuho Sumina, Ryota Tsutsui, Akira Suwa, Hirohi Ikenoue and Tanemasa Asano; Kyushu University, Japan.

TU.CP.7
Electrical Properties of Ti-Si-C Ohmic Contact on Ion-Implanted N-Type 4H-SiC C Face
Milantha De Silva[1], Teruhisa Kawasaki[2] and Shin-Ichiro Kuroki[1]; [1]Hiroshima University, Japan; [2]Sumitomo Heavy Industries, Japan.

TU.CP.8
Oxygen Pressure Controlled Oxidation for Gate Insulator Process of SiC MOSFET
Keisuke Kobayashi, Haruka Shimizu and Akio Shima; Hitachi, Japan.

TU.CP.9
Double Step Annealing for the Recovering of Ion Implantation Defectiveness for 4H-SiC DIMOSFET
Massimo Zimbone[1], Nicolò Piluso[2], Grazia Litrico[4], Roberta Nipoti[5], Riccardo Reitano[3], Maria Ausilia Di Stefano[2], Simona Lorenti[2] and Francesco La Via[1]; [1]CNR IMM, Italy; [2]STMicroelectronics, Italy; [3]Università di Catania, Italy; [4]Laboratori Nazionali del Sud, Italy; [5]CNR IMM, Bologna, Italy.

TU.CP.10
Borosilicate Glass (BSG) as Gate Dielectric for 4H-SiC MOSFETs
Yongju Zheng, Tamara Isaacs-Smith, Ayayi C. Ahyi and Sarit Dhar; Auburn University, United States.

TU.CP.11
(LATE NEWS) High-Mobility SiC MOSFETs with Low-Temperature Gate Oxide
Jesús Urresti, Faiz Arith, Konstantin Vassilevski, Amit Tiwari, Sarah Olsen, Nick Wright and Anthony O'Neill; Newcastle University, United Kingdom.

Power Devices, Circuits and Applications II

Tuesday Afternoon, September 19, 2017
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Exhibit Hall C

***TU.DIP.1**
Reliability and Ruggedness of 1200V SiC Planar Gate MOSFETs Fabricated in a High Volume CMOS Foundry
Sauvik Chowdhury, Levi Gant, Blake Powell, Kasturirangan Rangaswamy and Kevin Matocha; Monolith Semiconductor, United States.

TU.DP.2
SiC JBS Diode Symmetrical Voltage Doubler Represented as the Diffusion-Welded Stack
Oleg Korolkov, Raul Land, Jana Toompuu, Natalja Sleptsuk and Toomas Rang; Tallinn University of Technology, Estonia.

TU.DP.3
High Current Gain 4H-SiC BJTs of Regrowth Epitaxial Passivation Structure
Yourun Zhang; University of Electronic Science and Technology of China, China.

TU.DP.4
Suppression of PBTI of SiC-MOSFETs under 100 kHz Gate-Switching Operation by Using a Gate Off-Voltage of -5 V
Eiichi Murakami, Takahiro Furuichi, Tatsuya Takeshita and Kazuhiro Oda; Kyushu Sangyo University, Japan.

TU.DP.5
4H-SiC 1200 V Junction Barrier Schottky Diodes with High Avalanche Ruggedness
Amaury Gendron-Hansen, Dumitru Sdrulla, Bruce Odekirk, Avinash Kashyap and Linda Starr
Microsemi, United States.

TU.DP.6
Simultaneous Forward and Reverse Characterization of JBS Diodes Using Analytical Models for Outgoing Inspection
Jonas Buettner, Johannes Schöck, Tobias Erlbacher, Anton J. Bauer and Lothar Frey; Fraunhofer IISB, Germany.

TU.DP.7
Study of Temperature-Dependent Mechanisms and Characteristics of 4H-SiC Junction Barrier Schottky Rectifiers
Yidan Tang[2, 1], Xinyu Liu[1], Yun Bai[1], Shengxu Dong[2, 1] and Shaodong Xu[1]; [1]Institute of Microelectronics of Chinese Academy of Sciences(IMCAS), China; [2]University of Chinese Academy of Sciences, China.

TU.DP.8
Investigation of 4H-SiC Extraction-Enhanced Vertical Insulated-Gate Bipolar Transistor with Lightly Doped Extractor in Collector Region
Guannan Tang[1], Xiaoyan Tang[1], Qingwen Song[2], Yimen Zhang[1] and Yuming Zhang[1]; [1]Xidian University, China; [2]Xidian University, China.

TU.DP.9
Effect of High Energy Electron Irradiation on Electrical and Noise Properties of 4H-SiC Schottky Diodes
Alexander A. Lebedev[1], V. Kozlovski[2], Michael E. Levinshtein [1], Sergey L. Rumyantsev[1] and Palmour W. John[3]; [1]Ioffe Institute, Russian Federation; [2] St. Petersburg State Polytechnic University, Russian Federation; [3]Wolfspeed, A Cree Company, United States.

TU.DP.10
Comparison of 3C-SiC and 4H-SiC Power MOSFETs
Bart Van Zeghbroeck and Hamid Fardi; University of Colorado at Boulder, United States.

TU.DP.11
Simulation-Based Sensitivity Analysis of Conduction and Switching Losses for Silicon Carbide Power MOSFETs
Johanna Müting and Ulrike Grossner; ETH Zurich, Switzerland.

TU.DP.12
Surge Stress Driven Evolution of Schottky Barrier Height on 4H-SiC JBSD
Besar Asllani[1], Jean-Baptiste Fonder[2], Dominique Planson[1], Pascal Bevilacqua[1] and Luong Viêt Phung[1]; [1]CNRS UMR 5005, Ampère, France; [2]CALY Technologies, France.

TU.DP.13
Analysis of Forward Surge Performance of SiC Schottky Diodes
Rahul Radhakrishnan, Nathanael Cueva, Tony Witt and Richard Woodin; Global Power Technologies Group, United States.

TU.DP.14
An Improved I-V Model of GaN HEMT for High Temperature Applications
Jie Yang[1], Yeting Jia[1], Ning Ye[1], Zhenyu Yuan[1], Hongyuan Shen[1] and Jia Di[2]; [1]Northeastern University, China; [2]University of Arkansas, United States.

TU.DP.15
(LATE NEWS) Design of SiC-Based DC-DC Converters for Future Offshore Wind Power Applications
Christian Sommer[1], Axel Mertens[1], Itziar Kortazar[2] and Igor Larrazabal[2]; [1]University of Hannover, Germany; [2]Ingeteam, Spain.

TU.DP.16
(LATE NEWS) Experimental Study on Short Channel Effects in 4H-SiC MOSFETs
Keita Tachiki, Takahisa Ono, Takuma Kobayashi and Tsunenobu Kimoto; Kyoto University, Japan.

TU.DP.17
(LATE NEWS) Demonstration of 3.3kV class SiC DMOSFET with CD-JTE
Jheng-Yi Jiang[1], Tan-Hsi Lin[1], Chih-Fang Huang[1], Cheng-Tyng Yen[2], Lurng-Shehng Lee[2], Chien-Chung Hung[2], Chwan-Ying Lee[2], Feng Zhao[3] and Kung-Yen Lee[4]; [1]National Tsing Hua University, Taiwan; [2]Hestia Power, Inc., Taiwan; [3]Washington State University, United States; [4]National Taiwan University, Taiwan.

Novel Devices and Concepts, Emerging Materials II

Tuesday Afternoon, September 19, 2017
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Exhibit Hall C

***TU.EIP.1**
Piezoresistive Characteristics of NMOS FET Technology on 4H-SiC
Richard C. Jaeger[1], Jeffrey C. Suhling[2], Leonid Fursin[3] and William Simon[3]; [1]Auburn University, United States; [2]Auburn University, United States; [3]United Silicon Carbide Inc., United States.

TU.EP.2
Addressing the Properties of Ultranano- and Microcrystalline CVD Diamond Films Grown on 4H-SiC Substrates
Mariana Fraga[1], André Contin[2], Graziela S. Savonov[2], Divani Barbosa[2], Rodrigo Pessoa[1] and Vladimir Trava Airoldi[2]
[1]Universidade Brasil, Brazil; [2]Instituto Nacional de Pesquisas Espaciais, Brazil.

TU.EP.3
Infrared Reflectance Study of the Graphene/Semi-Insulating 6H-SiC(0001) Heterostructure
Manuel Auge, Bernd Hählein and Joerg Pezoldt; TU Ilmenau, Germany.

TU.EP.4
SiC MEMS Technology Based on Wafer Bonding and Deep Etching
Lunet E. Luna[1], Marko J. Tadjer[1], Rachael L. Myers-Ward[1], Anindya Nath[1], Travis J. Anderson[1], Karl D. Hobart[1], Fritz J. Kub[1], Eugene H. Cook[2] and Jonathan J. Bernstein[2]
[1]Naval Research Laboratory, United States; [2]Draper, United States.

TU.EP.5
Structure of Porous SiC by Voltage Controlled Anodic Oxidation Method
Hiroaki Kurokawa, Satoshi Kamiyama, Tetsuya Takeuchi, Motoaki Iwaya, Isamu Akasaki and Yoshimi Iwasa; Meijo University, Japan.

TU.EP.6
THz Emission from SiC Natural Superlattice Diodes Induced by Strong Electrical Field
Vladimir I. Sankin, Alexander V. Andrianov, Alexey O. Zachar'in, Alexey G. Petrov, Sergey S. Nagalyuk and Pavel P. Shkrebiy
Ioffe Institute, Russian Federation.

Sunday Program Review II

Tuesday Afternoon, September 19, 2017
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***TU.PRP.1**
National Programs on SiC Power Devices in China—From Research to Applications
Fei Yang; State Grid Corporation of China, China.

***TU.PRP.2**
SiC Power Electronics Technology for Energy Efficient Devices (SPEED)—Introduction Overview;
High Quality Substrate Material for High Power Application;
High Voltage SiC Devices for Power Transmission Application;
Solid State Transformers with Increased Functionalities and SiC in Future Wind Power Applications
Anton J. Bauer[1], Peter Friedrichs[2], Peder Bergman[3], Adolf Schöner[4], Andrei Mihaila[5], Philippe Godignon[6], Antonio de la Cruz[7], Christian Sommer[8], Itziar Kortazar[9] and Jose Maria Cuartas Alonso[10]; [1]Frauhofer IISB, Germany; [2]Infineon Technologies, Germany; [3]Norstel AB, Sweden; [4]Ascatron, Sweden; [5]ABB Corporate Research, Switzerland; [6]CNM-CSIC, Spain; [7]INAEL, Spain; [8]University of Hannover, Germany; [9]Ingeteam, Spain; [10]University of Oviedo, Spain.

***TU.PRP.3**
Manufacturing Job Creation through Accelerated Large-Scale Adoption of SiC Semiconductor Devices
Victor Veliadis; PowerAmerica, United States.

***TU.PRP.4**
Genealogy of National Projects on SiC Power Electronics and Related Current Research and Development Activities in Japan
Hajime Okumura[1] and Tsunenobu Kimoto[2]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Kyoto University, Japan.

***TU.PRP.5**
The New York Power Electronics Manufacturing Consortium—Enabling the Power Electronics Revolution
Brian Sapp, Jeffrey C. Hedrick, Lindsay M. Bessette, Alexander Bialy, Matthew Bosco, Michael Bryant, Wenli Collison, Shannon Dunn, Daniel Franca, Thomas Gorczyca, Pui Yee Hung, Anne-Sophie Larrea, Vincent Pedone, Joseph Piccirillo, Jamie Prudhomme, Susan Rogers, Gerard Stapf, Vlad Stolkarts, Sean Valente and Paul Woodin; SUNY Polytechnic Institute, United States.

***TU.PRP.6**
3C-SiCHetero-epitaxiALLy srown on silicon compliancE substrates and new 3C-SiC substrates for sustaiNable wide-band-Gap powEr devices (CHALLENGE)
Francesco La Via; CNR-IMM, Italy.

***TU.PRP.7**
Optimal SiC Substrates for Integrated Microwave and Power Circuits—OSIRIS
Sylvain Delage[1], Örjan Danielsson[2], Bruno Ceccaroli[3], Christophe Chang[4], Fulvio Infante[5], Jaroslav Kovac[6], Björn Magnusson[7], Pierre Ruterana[8] and Adolf Schöner[9]; [1]III-V Lab, France; [2]Linköping University, Sweden; [3]Isosilicon AS, Norway; [4]United Monolithic Semiconductors, France; [5]Intraspec Technologies, France; [6]Slovak University of Technology, Slovakia; [7]Norstel AB, Sweden; [8]CNRS-CIMAP, France; [9]Ascatron AB, Sweden.

***TU.PRP.8**
Wide Band Gap Innovative SiC for Advanced Power (WInSiC4AP)—A New European Project Started in June 2017
Leoluca Liggio[1], Antonio Imbriuglia[2], Mario Saggio[2], Mario Cacciato[3], Joseph Domingo Salvany[4], Benedicte Silvestre[5], Susanna Reggiani[6], Gaudenzio Meneghesso[6], Salvatore Patanè[7], Miroslav Husak[8], Marc Christoferr Wurz[9], Fabrizio Roccaforte[10], Patrick Fiorenza[10], Francesco La Via[10], Antonino La Magna[10], Xavier Pignat[11], Olivier Metzelard[12], Jacques Favre[13], Federica Di Leo[14], Martin Haug[15], Jean-Francois Michaud[16], Daniel Alquier[16], Jiri Havlik[17], Tiziano Valentinetti[18], Gianni Viano[19] and Gennaro Russo[20]; [1]Distretto Tecnologico Sicilia Micro Nano Sistemi - DTSMNS, Italy; [2]STMicroelectronics, Italy; [3]University of Catania, Italy; [4]NEXTER Electronics, France; [5]VALEO Systems de Controle Moteurs, France; [6]IUNET, Italy; [7]University of Messina, Italy; [8]University of Praha, Czech Republic; [9]University of Hannover, Germany; [10]CNR-IMM, Italy; [11]ZODAERO Aero Electric SAS, France; [12]APOJEE, France; [13]APSI3D, France; [14]SAT, Italy; [15]Wührt, Germany; [16]University of Tours, France; [17]IMA, Czech Republic; [18]Enel Distribuzione, Italy; [19]SOFTECO Simat SRL, Italy; [20]Distretto Tecnologico Aerospaziale della Campania, Italy.

WEDNESDAY

POSTER PRESENTATIONS

* Invited Paper

Bulk and Epitaxial Growth III

Wednesday Morning, September 20, 2017
10:30 AM - 12:30 PM
Exhibit Hall C

***WE.AIP.1**
SEMI Standards for SiC
James D. Oliver[1, 2], Russ Kremer[3, 2] and Arnd-Dietrich Weber[4, 2]; [1]Northrop Grumman, United States; [2]SEMI, United States; [3]Freiberger Compound Materials, United States; [4]SiCrystal AG, Germany.

WE.AP.2
Difference of Double Shockley-Type Stacking Faults Expansion in Highly Nitrogen-Aluminum Co-Doped and Nitrogen-Doped N-Type 4H-SiC Crystals
Hiromasa Suo[1, 2], Kazuma Eto[1], Tatsuhiko Ise[3], Yuichiro Tokuda[4], Hiroshi Osawa[2], Hidekazu Tsuchida[5], Tomohisa Kato[1] and Hajime Okumura[1]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Showa Denko K.K., Japan; [3]Asahi Diamond Industrial Corporation, Japan; [4]DENSO Corporation, Japan; [5]Central Research Institute of Electric Power Industry (CRIEPI), Japan.

WE.AP.3
Fabrication of Large-Sized TaC-Coated Carbon Crucibles for Low-Cost Sublimation Growth of Large-Diameter Bulk SiC Crystals
Daisuke Nakamura and Keisuke Shigetoh; Toyota Central R&D Labs., Inc., Japan.

WE.AP.4
Improved Uniformity of Silicon Carbide Epitaxy Grown in a High-Volume Multi-Cassette Epitaxy Reactor
Michael F. MacMillan[1], Rajan Rengarajan[2], Tim Oldham[2] and Ping Wu[2]; [1]Global Power Technologies Group, United States; [2]II-VI Advanced Materials, United States.

WE.AP.5
Development of Solvent Inclusion Free 4H-SiC Off-Axis Wafer Grown by the Top-Seeded Solution Growth Technique
Kazuhiko Kusunoki[1], Kazuaki Seki[1], Yutaka Kishida[1], Hiroshi Kaido[1], Koji Moriguchi[1], Hironori Daikoku[2], Motohisa Kado[2], Takayuki Shirai[2], Mitsutoshi Akita[2], Akinori Seki[2] and Hiroaki Saito[2]; [1]Nippon Steel and Sumitomometal Corporation, Japan; [2]Toyota Motor Corporation, Japan.

WE.AP.6
Growth of V Doped SiC Single Crystal from V Doped SiC Powder as a Source Using PVT Method
Eunjin Jung[1, 2], Yongjin Kwon[1], Myung-Hyun Lee[1], Younghee Kim[1] and Seong-Min Jeong[1]; [1]Korea Institute of Ceramic Engineering and Technology (KICET), Korea (the Republic of); [2]Yonsei University, Korea (the Republic of).

WE.AP.7
Real-Time Visualization System for Temperature and Fluid Flow Distributions in SiC Solution Growth Using Prediction Model Constructed by Machine Learning
Goki Hatasa, Yosuke Tsunooka, Sangil Lee, Kenta Murayama, Ryota Murai, Shunta Harada, Miho Tagawa and Toru Ujihara Nagoya University, Japan.

WE.AP.8
The Role of C Vacancy on the Mechanism of Nitrogen Incorporation into 4H-SiC During Epitaxy
Gabriel Ferro[1] and Didier Chaussende[2]; [1]Université Claude Bernard Lyon 1, France; [2]University Grenoble Alpes, France.

WE.AP.9
Structural Quality, Polishing and Thermal Stability of 3C-SiC/Si Templates
Marcin Zielinski[1], Sylvain Monnoye[1], Hugues Mank[1], Catherine Moisson[1], Thierry Chassagne[1], Adrien Michon[2] and Marc Portail[2]; [1]NOVASiC, France; [2]CRHEA-CNRS, France.

WE.AP.10
(LATE NEWS) Optimization of 150 mm 4H SiC Substrate Crystal Quality
Ian Manning[1], Gilyong Chung[1], Edward Sanchez[1], Yu Yang[2], Jianqui Guo[2], Ouloide Goue[2], Balaji Raghothamachar[2] and Michael Dudley[2]; [1]Dow Chemical Company, United States; [2]Stony Brook University, United States.

Defects, Material Studies and Characterization III

Wednesday Morning, September 20, 2017
10:30 AM - 12:30 PM
Exhibit Hall C

***WE.BIP.1**
Electrostatic-Energy Model for Single Shockley Stacking Fault Formation in 4H-SiC Crystals
Akifumi Iijima, Jun Suda and Tsunenobu Kimoto; Kyoto University, Japan.

WE.BP.2
Influence of Aluminum Incorporation on Mechanical Properties of 3C-SiC Epilayers
Jean-Francois Michaud[1], Marcin Zielinski[2], Jaweb Ben Messaoud[1], Thierry Chassagne[2], Marc Portail[3] and Daniel Alquier[1] [1]Université de Tours, France; [2]NOVASiC, France; [3]CRHEA - CNRS, France.

WE.BP.3
JFET Threshold Voltage—Definition, Extraction and Applications
Maria Kayambaki; Foundation for Research and Technology Hellas, Greece.

WE.BP.4
Phosphorus Related Complexes for N-Type Doping in Diamond
Giovanni Alfieri, Lukas Kranz and Andrei Mihaila; ABB, Switzerland.

WE.BP.5
Defects and Polytype Instabilities
Joerg Pezoldt[1] and Andrei Kalnin[2]; [1]TU Ilmenau, Germany; [2]Department of Micro and Nanoelectronics, St. Petersburg Electrotechnical University "LETI", Russian Federation.

WE.BP.6
A Novel Observation Technique for Defect and Dislocation Analysis in SiC Bulk Wafers
Tomohisa Kato[1], Kensuke Takenaka[1, 2] and Hajime Okumura[1]; [1]National Institute of Advanced Industrial Science and Technology, Japan; [2]Fuji Electric Co., Ltd., Japan.

WE.BP.7
Investigation of the Hexagonal Pattern at the Facetted Region of Off-Axis 4H-SiC
Fu Fen, KaiLi Mao, YingMin Wang, Rusheng Wei and Bin Li China Electronics Technology Group Corporation No.2 Research Institute, China.

WE.BP.8
Expansion of Basal Plane Dislocation in 4H-SiC Epitaxial Layer on A-Plane by Electron Beam Irradiation
Masaki Sudo[2], Yukari Ishikawa[1, 2], Yongzhao Yao[1], Yoshihiro Sugawara[1] and Masashi Kato[2]; [1]Japan Fine Ceramics Center, Japan; [2]Nagoya Institute of Technology, Japan.

WE.BP.9
Local Structure of Nitrogen Passivating SiO_2/SiC(1-100) Interface
Daisuke Mori[1, 2], Yoshiki Fujita[2], Takayuki Hirose[1], Yutaka Terao[1], Akira Saito[1] and Fumihiko Matsui[2]; [1]Fuji Electric Co., Ltd., Japan; [2]Graduate School of Materials Science, Nara Institute of Science and Technology, Japan.

WE.BP.10
SiC-SiO_2 Interface Dangling Bonds Passivation and *Ab Initio* Calculation
Jinghua Xia and Fei Yang; Global Energy Interconnection Research Institute, China.

WE.BP.11
Effect of Electron Irradiation on Electrical and Electroluminescent Properties of n^+p 4H SiC Structures
Anatoly M. Strel'chuk; Ioffe Physical Technical Institute, Russian Federation.

WE.BP.12
(LATE NEWS) Trace Metal Analysis of Silicon Carbide Wafers Using Surface Extraction ICP-MS
Jaya Chowdhury, Peng Sun and Patrick Taylor; ChemTrace, Inc., United States.

Processing and Manufacturing III

Wednesday Morning, September 20, 2017
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Exhibit Hall C

***WE.CIP.1**
About the Electrical Activation of 1×10^{20} cm^{-3} Ion Implanted Al in 4H-SiC at Temperatures in the Range 1500 - 1950°C
Roberta Nipoti[1], Alberto Carnera[2], Giovanni Alfieri[3] and Lukas Kranz[3]; [1]CNR, Italy; [2]University of Padova, Italy; [3]ABB, Switzerland.

WE.CP.2
Erosion of Ion-Implanted 4H-SiC During Annealing with Carbon Cap
Margareta Linnarsson[1], Hussein Ayedh[2], Anders Hallén[3], Lasse Vines[2] and Bengt Svensson[2]; [1]KTH Royal Institute of Technology, Sweden; [2]University of Oslo, Norway; [3]KTH Royal Institute of Technology, Sweden.

WE.CP.3
Study of Ti/Al/Ni Ohmic Contacts to P-Type Implanted 4H-SiC
Marilena Vivona[1], Giuseppe Greco[1], Corrado Bongiorno[1], Raffaella Lo Nigro[1], Silvia Scalese[1], Simone Rascunà[2], Mario Saggio[2] and Fabrizio Roccaforte[1]; [1]CNR-IMM, Italy; [2]STMicroelectronics, Italy.

WE.CP.4
Study on NO Passivation on the Near Interface Electron and Hole Traps of N-Type 4H-SiC MOS Capacitors by Ultraviolet Light
Yifan Jia[1], Hongliang Lv[1], Xiaoyan Tang[1], Qingwen Song[2], Yimen Zhang[1] and Yuming Zhang[1]; [1]Xidian University, China; [2]Xidian University, China.

WE.CP.5
Properties of Sputtered SiO_2 Gate Oxide with Post-Deposition Annealing for 4H-SiC Metal-Oxide-Semiconductor Devices
Suhyeong Lee[1], Young Seok Kim[1], Hyunwoo Kim[1], Hong Jeon Kang[1], Min-Woo Ha[2] and Hyeong Joon Kim[1]
[1]Seoul National University, Korea (the Republic of); [2]Myongji University, Korea (the Republic of).

WE.CP.6
Effect of Design Variations and N_2O Annealing on 1.7kV 4H-SiC Diodes
Yogesh Sharma; Dynex Semiconductor Limited, United Kingdom.

WE.CP.7
Automated Mapping of Micropipes in SiC Wafers Using Polarized-Light Microscope
Robert Blasi[1], Sean McGuire[1], Ping Wu[1], Efstathios Loukas[1], Ejiro Emorhokpor[1], Svetoslav Dimov[1], Xueping Xu[1], Jianqiu Guo[2], Yu Yang[2] and Michael Dudley[2]; [1]II-VI Incorporated, United States; [2]State University of New York at Stony Brook, United States.

WE.CP.8
Electrical Property Study of Ni/Nb Contact to N-Type 4H-SiC
Xuechao Liu, Jun Xin, Chengfeng Yan, Haikuan Kong, Pan Gao, Jianjun Chen, Yongliang Zhang and Erwei Shi; Shanghai Institute of Ceramics, Chinese Academy of Sciences, China.

WE.CP.9
Effects of CF_4 Surface Etching on 4H-SiC MOS Capasitors
Kiichi Kobayakawa[1], Kosuke Muraoka[1], Hiroshi Sezaki[1, 2], Seiji Ishikawa[1, 2], Tomonori Maeda[1, 2] and Shin-Ichiro Kuroki[1]
[1]Hiroshima University, Japan; [2]Phenitec Semiconductor, Japan.

WE.CP.10
High Throughput Silicon Carbide Planarization
Robert Vacassy; Engis Corporation, United States.

WE.CP.11
(LATE NEWS) Significant Performance Improvement in 4H-SiC(0001) P-Channel MOSFETs with Gate Oxides Grown at Ultrahigh-Temperature
Kidist Moges, Takuji Hosoi, Takayoshi Shimura and Heiji Watanabe; Osaka University, Japan.

WE.CP.12
(LATE NEWS) Interface Carbon Defect at Si-face 4H-SiC/SiO2 Interfaces Detected by Electron Spin Resonance
Takahide Umeda[1], Takafumi Okuda[2] and T. Kimoto[2]; [1]University of Tsukuba, Japan; [2]Kyoto University, Japan.

Power Devices, Circuits and Applications III

Wednesday Morning, September 20, 2017
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***WE.DIP.1**
Reliability and Ruggedness of 1200V SiC Planar Gate MOSFETs Fabricated in a High Volume CMOS Foundry
Sauvik Chowdhury, Levi Gant, Blake Powell, Kasturirangan Rangaswamy and Kevin Matocha; Monolith Semiconductor, United States.

WE.DP.2
High Temperature Behavior Prediction Techniques for Non-Uniform Ni/SiC Schottky Diodes
Gheorghe Pristavu[1], Gheorghe Brezeanu[1], Marian Badila[1], Florin Draghici[1], Razvan Pascu[2], Florea Craciunoiu[2], Ion Rusu[1] and Adriana Pribeanu[3]; [1]Politehnica University Bucharest, Romania; [2]IMT-Bucharest, Romania; [3]CEPROCIM SA, Romania.

WE.DP.3
Characterization and Modeling of a SiC MOSFET's Turn-off Overvoltage
Wen Zhang, Zheyu Zhang, Fred Wang, Leon Tolbert, Daniel Costinett and Benjamin Blalock; University of Tennessee, United States.

WE.DP.4
Low-Parasitic-Capacitance Self-Aligned 4H-SiC nMOSFETs for Harsh Environment Electronics
Tatsuya Kurose[1], Shin-Ichiro Kuroki[1], Seiji Ishikawa[2], Tomonori Maeda[2], Hiroshi Sezaki[2], Takahiro Makino[3], Takeshi Ohshima[3], Mikael Östling[4] and Carl-Mikael Zetterling[4]; [1]Hiroshima University, Japan; [2]Phenitec Semiconductor Co., Ltd, Japan; [3]National Institute for Quantum and Radiological Science and Technology, Japan; [4]KTH Royal Institute of Technology, Sweden.

WE.DP.5
Analytical Model for the Influence of the Gate-Voltage on the Forward Conduction Properties of the Body-Diode in SiC-MOSFETs
Andreas Hürner[1], Thomas Heckel[1], Acchim Endruschat[1], Tobias Erlbacher[1], Anton J. Bauer[1] and Lothar Frey[1, 2]; [1]Fraunhofer IISB, Germany; [2]University of Erlangen-Nuremberg, Germany.

WE.DP.6
High Current SiC Diodes as Dose Rate Detectors for Hard X-Rays
Nino R. Pereira[1], Karl D. Hobart[2], Travis J. Anderson[2], Andy D. Koehler[2], Bruce V. Weber[2], Jacob C. Zier[2] and Joey T. Engelbrecht[2]; [1]Ecopulse, United States; [2]Naval Research Laboratory, United States.

WE.DP.7
Towards Bipolar 4H-SiC Memory Architecture for High Temperature Applications
Hazem Elgabra, Amna Sidiqui and Shakti Singh; Khalifa University, United Arab Emirates.

WE.DP.8
Effects of Parasitic Region in SiC Bipolar Junction Transistors on Forced Current Gain
Satoshi Asada, Jun Suda and Tsunenobu Kimoto; Kyoto University, Japan.

WE.DP.9
Design and Manufacturing of 1200V SiC JBS Diodes with Low On-State Voltage Drop and Reverse Blocking Leakage Current
Woongje Sung[1], Kijeong Han[2] and Bantval J. Baliga[2]; [1]State University of New York Polytechnic Institute, United States; [2]North Carolina State University, United States.

WE.DP.10
TCAD Modeling of a 1200 V SiC MOSFET
Kwangwonk Lee, Benedetto Buono, Martin Domeij, Jimmy Franchi, Krister Gumaelius, Fredrik Allerstam and Thomas Neyer On Semiconductor, Korea (the Republic of).

WE.DP.11
Vertical Tri-Gate Power MOSFETs in 4H-SiC
James A. Cooper[2, 1], Naeem Islam[1], Rahul Ramamurthy[1], Madankumar Sampath[1] and Dallas T. Morisette[1]; [1]Purdue University, United States; [2]Sonrisa Research, Inc., United States.

WE.DP.12
Performance and Reliability Requirements for the Application of SiC Power MOSFET in Electrified Vehicle Drive Systems
Ming Su and Chingchi Chen; Ford Motor Company, United States.

WE.DP.13
Improvement in Single Pulse Avalanche Ruggedness of 1.2 kV Silicon Carbide Trench MOSFETs by Applying a Negative Gate Bias
Selamnesh M. Nida, Bhagyalakshmi Kakarla, Thomas Ziemann and Ulrike Grossner; ETH Zurich, Switzerland.

WE.DP.14

Interface Properties of Entirely Implanted Lateral MOSFETs Using On-Axis Semi-Insulating SiC Substrates without Epi-Layer

Jeong Hyun Moon; Korea Electrotechnology Research Institute, Korea (the Republic of).

WE.DP.15

Complementary P-Channel and N-Channel SiC MOSFETs for CMOS Integration

Victor Soler[1], Maria Cabello[1], Viorel Banu[2], Josep Montserrat[1], Jose Rebollo[1] and Philippe Godignon[1]; [1]CSIC, Spain; [2]D+T Microelectronica A.I.E., Spain.

Novel Devices and Concepts, Emerging Materials III

Wednesday Morning, September 20, 2017
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Exhibit Hall C

***WE.EIP.1**

Piezoresistive Characteristics of NMOS FET Technology on 4H-SiC

Richard C. Jaeger[1], Jeffrey C. Suhling[2], Leonid Fursin[3] and William Simon[3]; [1]Auburn University, United States; [2]Auburn University, United States; [3]United Silicon Carbide Inc., United States.

WE.EP.2

Dislocation Analysis of P-Type and Insulating HPHT Diamond Seed Crystals

Shinichi Shikata, Eiichi Kamei, Koji Yamaguchi and Hiroyuki Takahashi; Kwansei Gakuin University, Japan.

WE.EP.3

Electrochemical Formation of Porous Silicon Carbide for Micro-Device Applications

Gaël Gautier, Thomas Defforge, Guillaume Gommé, Damien Valente and Daniel Alquier; INSA-CVL, France.

WE.EP.4

4H-SiC Schottky Diode and p^+-n^- Junction Particles Detectors

Grazia Litrico[1], Francesco La Via[2], Lucia Calcagno[3], Roberta Nipoti[2], Annamaria Muoio[1], Gaetano Lanzalone[1, 4] and Salvatore Tudisco[1]; [1]LNS Laboratori Nazionali del Sud, Italy; [2]IMM-CNR, Italy; [3]Physics Department, Catania University, Italy; [4]Università Kore Enna, Italy.

WE.EP.5

Fabrication and Characterization of β-Ga_2O_3 Heterojunction Rectifiers

Marko J. Tadjer, Karl D. Hobart and Fritz J. Kub; Naval Research Laboratory, United States.

WE.EP.6

Chemical Trend in Band Structure of *3d*-Transition Metal Doped AlN Films

Nobuyuki Tatemizo, Saki Imada, Yoshio Miura, Koji Nishio and Toshiyuki Isshiki; Kyoto Institute of Technology, Japan.

Sunday Program Reviews III

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Exhibit Hall C

***WE.PRP.1**

National Programs on SiC Power Devices in China—From Research to Applications

Fei Yang; State Grid Corporation of China, China.

***WE.PRP.2**

**SiC Power Electronics Technology for Energy Efficient Devices (SPEED)—Introduction Overview;
High Quality Substrate Material for High Power Application;
High Voltage SiC Devices for Power Transmission Application;
Solid State Transformers with Increased Functionalities and SiC in Future Wind Power Applications**

Anton J. Bauer[1], Peter Friedrichs[2], Peder Bergman[3], Adolf Schöner[4], Andrei Mihaila[5], Philippe Godignon[6], Antonio de la Cruz[7], Christian Sommer[8], Itziar Kortazar[9] and Jose Maria Cuartas Alonso[10]; [1]Frauhofer IISB, Germany; [2]Infineon Technologies, Germany; [3]Norstel AB, Sweden; [4]Ascatron, Sweden; [5]ABB Corporate Research, Switzerland; [6]CNM-CSIC, Spain; [7]INAEL, Spain; [8]University of Hannover, Germany; [9]Ingeteam, Spain; [10]University of Oviedo, Spain.

***WE.PRP.3**

Manufacturing Job Creation through Accelerated Large-Scale Adoption of SiC Semiconductor Devices

Victor Veliadis; PowerAmerica, United States.

***WE.PRP.4**

Genealogy of National Projects on SiC Power Electronics and Related Current Research and Development Activities in Japan

Hajime Okumura[1] and Tsunenobu Kimoto[2]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Kyoto University, Japan.

***WE.PRP.5**

The New York Power Electronics Manufacturing Consortium—Enabling the Power Electronics Revolution

Brian Sapp, Jeffrey C. Hedrick, Lindsay M. Bessette, Alexander Bialy, Matthew Bosco, Michael Bryant, Wenli Collison, Shannon Dunn, Daniel Franca, Thomas Gorczyca, Pui Yee Hung, Anne-Sophie Larrea, Vincent Pedone, Joseph Piccirillo, Jamie Prudhomme, Susan Rogers, Gerard Stapf, Vlad Stolkarts, Sean Valente and Paul Woodin; SUNY Polytechnic Institute, United States.

***WE.PRP.6**

3C-SiCHetero-epitaxiALLy srown on silicon compliancE substrates and new 3C-SiC substrates for sustaiNable wide-band-Gap powEr devices (CHALLENGE)

Francesco La Via; CNR-IMM, Italy.

***WE.PRP.7**
Optimal SiC Substrates for Integrated Microwave and Power Circuits—OSIRIS
Sylvain Delage[1], Örjan Danielsson[2], Bruno Ceccaroli[3], Christophe Chang[4], Fulvio Infante[5], Jaroslav Kovac[6], Björn Magnusson[7], Pierre Ruterana[8] and Adolf Schöner[9]; [1]III-V Lab, France; [2]Linköping University, Sweden; [3]Isosilicon AS, Norway; [4]United Monolithic Semiconductors, France; [5]Intraspec Technologies, France; [6]Slovak University of Technology, Slovakia; [7]Norstel AB, Sweden; [8]CNRS-CIMAP, France; [9]Ascatron AB, Sweden.

***WE.PRP.8**
Wide Band Gap Innovative SiC for Advanced Power (WInSiC4AP)—A New European Project Started in June 2017
Leoluca Liggio[1], Antonio Imbriuglia[2], Mario Saggio[2], Mario Cacciato[3], Joseph Domingo Salvany[4], Benedicte Silvestre[5], Susanna Reggiani[6], Gaudenzio Meneghesso[6], Salvatore Patanè[7], Miroslav Husak[8], Marc Christoferr Wurz[9], Fabrizio Roccaforte[10], Patrick Fiorenza[10], Francesco La Via[10], Antonino La Magna[10], Xavier Pignat[11], Olivier Metzelard[12], Jacques Favre[13], Federica Di Leo[14], Martin Haug[15], Jean-Francois Michaud[16], Daniel Alquier[16], Jiri Havlik[17], Tiziano Valentinetti[18], Gianni Viano[19] and Gennaro Russo[20]; [1]Distretto Tecnologico Sicilia Micro Nano Sistemi - DTSMNS, Italy; [2]STMicroelectronics, Italy; [3]University of Catania, Italy; [4]NEXTER Electronics, France; [5]VALEO Systems de Controle Moteurs, France; [6]IUNET, Italy; [7]University of Messina, Italy; [8]University of Praha, Czech Republic; [9]University of Hannover, Germany; [10]CNR-IMM, Italy; [11]ZODAERO Aero Electric SAS, France; [12]APOJEE, France; [13]APSI3D, France; [14]SAT, Italy; [15]Wührt, Germany; [16]University of Tours, France; [17]IMA, Czech Republic; [18]Enel Distribuzione, Italy; [19]SOFTECO Simat SRL, Italy; [20]Distretto Tecnologico Aerospaziale della Campania, Italy.

THURSDAY

POSTER PRESENTATIONS

* Invited Paper

Bulk and Epitaxial Growth IV

Thursday Afternoon, September 21, 2017
3:15 PM - 5:15 PM
Exhibit Hall C

***TH.AIP.1**
SEMI Standards for SiC
James D. Oliver[1, 2], Russ Kremer[3, 2] and Arnd-Dietrich Weber[4, 2]; [1]Northrop Grumman, United States; [2]SEMI, United States; [3]Freiberger Compound Materials, United States; [4]SiCrystal AG, Germany.

TH.AP.2
Effect of Growth Conditions on Crystal Quality in Solution Growth of SiC Using Cr Solvent without Si
Koki Suzuki and Toshinori Taishi; Shinshu University, Japan.

TH.AP.3
Growth of Highly Al-Doped P-Type 4H-SiC by PVT
Kazuma Eto[1], Hiromasa Suo[1, 2], Tomohisa Kato[1] and Hajime Okumura[1]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Showa Denko K. K., Japan.

TH.AP.4
Solution Growth of SiC from the Crucible Bottom with Dipping under Unsaturation State of Carbon in Solvent
Toshinori Taishi, Masaru Takahashi, Naomichi Tsuchimoto, Koki Suzuki and Koangyong Hyun; Shinshu University, Japan.

TH.AP.5
High-Speed Prediction Model for Supersaturation and Flow Distribution by CFD Simulation and Machine Learning in SiC Solution Growth
Yosuke Tsunooka[1], Nobuhiko Kokubo[1], Goki Hatasa[1], Shunta Harada[1, 2], Miho Tagawa[1, 2] and Toru Ujihara[1, 2, 3]
[1]Nagoya University, Japan; [2]Institute of Materials and Systems for Sustainability, Japan; [3]National Institute of Advanced Industrial Science and Technology, Japan.

TH.AP.6
Co-Doping of 3C-SiC Using Sublimation Epitaxy
Valdas Jokubavicius[1], Lasse Vines[2], Margareta Linnarsson[3], Filippo Gianazzo[4], Peter Wellmann[5], Rositsa Yakimova[1] and Mikael Syväjärvi[1]; [1]Linkoping University, Sweden; [2]University of Oslo, Norway; [3]KTH Royal Institute of Technology, Sweden; [4]CNR-IMM, Italy; [5]University of Erlangen, Germany.

TH.AP.7
Thermal Stress Analysis on the 4H-SiC Single Crystal Grown by Top Seeded Solution Growth Process
Yeong-Jae Yu[1], Dae-Seop Byeon[1], Su-hun Choi[1, 2], Myung-Hyun Lee[1], Won Jae Lee[2] and Seong-Min Jeong[1]; [1]Korea Institute of Ceramic Engineering and Technology (KICET), Korea (the Republic of); [2]Dong-Eui University, Korea (the Republic of).

TH.AP.8
Glide of Basal Plane Dislocations During 150 mm 4H-SiC Epitaxial Growth by a Hot-Wall Reactor
Gan Feng; EpiWorld International Co., LTD, China.

TH.AP.9
Trichlorosilane for SiC Homo-Epitaxy in a Large Capacity Production Reactor
Philip Hens[1], Ziyao Gao[1], Katharina Roßhirt[2], Ifeanyi Francis Edokam[2], Hiroya Kitahata[1], Birgit Kallinger[2], Patrick Berwian[2] and Frank Wischmeyer[1]; [1]AIXTRON SE, Germany; [2]Fraunhofer IISB, Germany.

TH.AP.10
Growth of 4H-SiC Epitaxial Layer Through Optimization of Buffer Layer
Nicolò Piluso[1], Andrea Severino[1], Ruggero Anzalone[1], Maria Ausilia Di Stefano[1], Enzo Fontana[1], Marco Salanitri[1], Simona Lorenti[1], Alberto Campione[1], Patrick Fiorenza[2] and Francesco La Via[2]; [1]STMicroelectronics, Italy; [2]IMM-CNR, Italy.

TH.AP.11
Hot Filament CVD Growth of 4H-SiC Epitaxial Layers
Bart Van Zeghbroeck[1, 2], Hannah Robinson[2] and Ryan Brow[1]; [1]University of Colorado at Boulder, United States; [2]BASiC 3C, Inc., United States.

TH.AP.12
(LATE NEWS) Two-Step Sic Solution Growth with Extremely Low-Dislocation-Density 4h-SiC Crystal for Suppression of Polytype Transformation
Kenta Murayama[1], Shunta Harada[1, 2], Fumihiro Fujie[2], Xinbo Liu[2], Ryuta Murai[2], Can Zhu[1], Kenji Hanada[3], Miho Tagawa[1, 2] and Toru Ujihara[1, 2, 4]; [1]Nagoya University, Japan; [2]Nagoya University, Japan; [3]Aichi Science and Technology Foundation, Japan; [4]National Institute of Advanced Industrial Science and Technology, Japan.

Defects, Material Studies and Characterization IV

Thursday Afternoon, September 21, 2017
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***TH.BIP.1**
Electrostatic-Energy Model for Single Shockley Stacking Fault Formation in 4H-SiC Crystals
Akifumi Iijima, Jun Suda and Tsunenobu Kimoto; Kyoto University, Japan.

TH.BP.2
TEM Observation of Femtosecond-Laser-Induced Periodic Structures on SiC Substrates
Reina Miyagawa[1], Yutaka Ohno[2], Momoko Deura[2], Ichiro Yonenaga[2] and Osamu Eryu[1]; [1]Nagoya Institute of Technology, Japan; [2]Institute for Materials Research, Japan.

TH.BP.3
Electrical Behaviour of Epitaxial 3C-SiC on Silicon
Aiswarya Pradeepkumar; University of Technology Sydney, Australia.

TH.BP.4
Level Anticrossing and Optically Detected Magnetic Resonance Spectroscopy of Silicon Vacancies in Heavily Irradiated SiC
Andrey Anisimov[1], Sergey S. Nagalyuk[1], Evgeny Mokhov[1], Pavel Baranov[1], Victor Soltamov[1], Georgy Astakhov[2] and Vladimir Dyakonov[2]; [1]Ioffe Institution, Russian Federation; [2]Experimental Physics VI, Julius-Maximilians, University of Würzburg, Germany.

TH.BP.5
Simulations of Heterostructures Based on 3C-4H and 6H-4H Silicon Carbide Polytypes
Ants Koel, Haroon Rashid and Toomas Rang; Tallinn University of Technology, Estonia.

TH.BP.6
Evaluation of the Effect of Ultraviolet Light Excitation During Characterization of Silicon Carbide Epitaxial Layers
Hrishikesh Das[1], Swapna Sunkari[1], Oener Akdik[2], Andrei Konstantinov[2], Krister Gumaelius[2], Jan-Olov Svedberg[2] and Fredrik Allerstam[2]; [1]ON Semiconductor, United States; [2]ON Semiconductor, Sweden.

TH.BP.7
Origin Analysis and Elimination of Obtuse Triangular Defects in 4° off 4H-SiC Epitaxy
KaiLi Mao[1, 2], YingMin Wang[2], Bin Li[2] and G.Y. Zhao[1]; [1]Xi'an University of Technology, China; [2]The 2nd Research Institute of China Electronics Technology Group Corporation, China.

TH.BP.8
EBSD Investigation of Structure Properties of Low-Angle Grain Boundaries in 4H-SiC
Yan Peng, Qiyue Zhao, Xianglong Yang, Xiaobo Hu and Xiangang Xu; Shandong University, China.

TH.BP.9
***Ab Initio* Calculations on Interface States Caused by Atomic Stacking Sequence at SiO_2/SiC Interfaces**
Yu-ichiro Matsushita and Atsushi Oshiyama; The University of Tokyo, Japan.

TH.BP.10
Improvement of Local Deep Level Transient Spectroscopy for Microscopic Evaluation of SiO_2/4H-SiC Interfaces
Yuji Yamagishi and Yasuo Cho; Tohoku University, Japan.

TH.BP.11
Characterization of Inhomogeneity in Thermal Oxide SiO_2 Films on 4H-SiC Epitaxial Substrates by a Combination of Fourier Transform Infrared Spectroscopy and Cathodoluminescence Spectroscopy
Masanobu Yoshikawa; Toray Research Center, Inc., Japan.

TH.BP.12
Density Functional Modeling of Oxygen Defects in 4H-SiC
Jose Coutinho, Tiago A. Oliveira and Vitor Torres; University of Aveiro, Portugal.

TH.BP.13
(LATE NEWS) Visualization of Electric Field in a SiC p-n Junction by Differential Phase Contrast Scanning Transmission Electron Microscopy
Hideki Sako[1], Tsukasa Koyama[1], Yuji Otsuka[1], Naoya Shibata[2] and Tsunenobu Kimoto[3]; [1]Toray Research Center, Inc., Japan; [2]University of Tokyo, Japan; [3]Kyoto University, Japan.

Processing and Manufacturing IV

Thursday Afternoon, September 21, 2017
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Exhibit Hall C

***TH.CIP.1**
About the Electrical Activation of 1×10^{20} cm^{-3} Ion Implanted Al in 4H-SiC at Temperatures in the Range 1500 - 1950°C
Roberta Nipoti[1], Alberto Carnera[2], Giovanni Alfieri[3] and Lukas Kranz[3]; [1]CNR, Italy; [2]University of Padova, Italy; [3]ABB, Switzerland.

TH.CP.2
Correlation between Field Effect Mobility and Accumulation Conductance at 4H-SiC MOS Interface with Barium
Kosuke Muraoka[1], Seiji Ishikawa[1, 2], Hiroshi Sezaki[1, 2], Tomonori Maeda[1, 2] and Shin-Ichiro Kuroki[1]; [1]Hiroshima University RNBS, Japan; [2]Phenitec Semiconductor Corp., Japan.

TH.CP.3
4H-SiC pMOSFETs with Al-Doped S/D and NbNi Silicide Ohmic Contacts
Jun Kajihara[1], Shin-Ichiro Kuroki[1], Seiji Ishikawa[2], Tomonori Maeda[2], Hiroshi Sezaki[2], Takahiro Makino[3], Takeshi Ohshima[3], Mikael Östling[4] and Carl-Mikael Zetterling[4]; [1]Research Institute for Nanodevice and Bio Systems, Hiroshima University, Japan; [2]Phenitec Semiconductor Co., Ltd, Japan; [3]National Institutes for Quantum and Radiological Science and Technology (QST), Japan; [4]KTH Royal Institute of Technology, Sweden.

TH.CP.4
Low Temperature Ni-Al Ohmic Contacts to P-Type 4H-SiC Using Semi-Salicide Processing
Mattias Ekström, Shuoben Hou, Hossein Elahipanah, Arash Salemi, Mikael Östling and Carl-Mikael Zetterling; KTH Royal Institute of Technology, Sweden.

TH.CP.5
Investigation on the Effect of Ge Co-Doped Epitaxy on 4H-SiC Based MPS Diodes and Trench MOSFETs
Christian Heidorn, Romain Esteve, Tobias Hoechbauer and Roland Rupp; Infineon Technologies, Austria.

TH.CP.6
Effect of Post Oxidation Annealing Processes on Deposited DCS-HTO for Gate Oxide in SiC MOSFETs
Andrea Severino, Maria Ausilia Di Stefano, Angelo Mazzeo and Simona Lorenti; STMicroelectronics, Italy.

TH.CP.7
Analysis of 3-Dimensional 4H-SiC MOS Capacitors Grown by Atomic Layer Deposition of Al_2O_3
Idzdihar Idris, Nick Wright and Alton Horsfall; Newcastle University, United Kingdom.

TH.CP.8
Lifetime Enhancement of 4H-SiC PiN Diodes Using High Temperature Oxidation Treatment
yeganeh Bonyadi, Peter Gammon, Olayiwola Alatise, Roozbeh Bonyadi and Philip Mawby; University of Warwick, United Kingdom.

TH.CP.9
Improved Threshold Voltage Instability in 4H-SiC MOSFETs with Atomic Layer Deposited SiO_2
Minseok Kang, Bongmook Lee and Veena Misra; North Carolina State University, United States.

TH.CP.10
Leveraging the Scale of Silicon to Accelerate Mainstream Adoption of Silicon Carbide
Joseph Shovlin; X-Fab, United States.

TH.CP.11
(LATE NEWS) Simplified SiC Substrate Processing
Sarah Okada; Revasum, United States.

Power Devices, Circuits and Applications IV

Thursday Afternoon, September 21, 2017
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***TH.DIP.1**
Reliability and Ruggedness of 1200V SiC Planar Gate MOSFETs Fabricated in a High Volume CMOS Foundry
Sauvik Chowdhury, Levi Gant, Blake Powell, Kasturirangan Rangaswamy and Kevin Matocha; Monolith Semiconductor, United States.

TH.DP.2
Continuous Compact Model of a SiC VDMOSFET Based on Surface Potential Theory
Beat Jäger, Ju Yanrui, Roger Stark and Ulrike Grossner; ETH Zurich, Switzerland.

TH.DP.3
Investigation on On-State Performances of P-Channel 4H-SiC IGBT
Ximing Chen[1, 2], Yunbin Gao[1], Chengzhan Li[1], Xiaoping Dai[1], Xiaoli Tian[3], Xiaochuan Deng[2], Yanli Zhao[1], Yiyu Wang[1], Jingshu Wu[1], Yun Bai[3], Huajun Shen[3], Yudong Wu[1] and Bo Zhang[2]; [1]State Key Laboratory of Advanced Power Semiconductor Devices, Zhuzhou CRRC Times Electric Co., Ltd., China; [2]State Key Laboratory of Electronic Thin Films and Integrated Devices, University of Electronic Science and Technology of China, China; [3]Institute of Microelectronics, Chinese Academy of Sciences, China.

TH.DP.4
Near Breakdown Voltage Optical Beam Induced Current (OBIC) on 4H-SiC Bipolar Diode
Dominique Planson; INSA de Lyon, France.

TH.DP.5
Hole Trapping in the NBTI Characteristic of SiC MOSFET
Yan j. He[1, 2], Hongliang Lv[1, 2], Xianyan Tang[1, 2], Qingwen Song[2, 3], Yimeng Zhang[1, 2] and Yuming Zhang[1, 2]; [1]Xidian University, China; [2]Key Laboratory of Wide Band Gap Semiconductor Technology, China; [3]Xidian University, China.

TH.DP.6
Short-Circuit Robustness of SiC Trench MOSFETs
Ronald Green, Damain Urciuoli and Aivars Lelis; U.S. Army Research Laboratory, United States.

TH.DP.7
Study of Interactions between Fast Neutrons and 4H-SiC Detectors
Wilfried Vervisch; IM2NP, France.

TH.DP.8
Split Gate SiC Trench Power MOSFET with Ultra-Low Switching Loss
Xuan Li[1], Xing Tong[1], A. Q. Huang[3], Shi Qiu[1], Xu She[2], Xiaochuan Deng[1] and Bo Zhang[1]; [1] University of Electronic Science and Technology of China, China; [2]GE Global Research, United States; [3]North Carolina State University, United States.

TH.DP.9
Analysis of $Zr_xSi_yO_z$ as High-K Dielectric for 4H-SiC MOSFETs
Maria Cabello[1], Victor Soler[1], Josep Montserrat[1], Philippe Godignon[1], Annesha Varghese[2] and Jean-Manuel Decams[2] [1]IMB-CNM-CSIC, Spain; [2]Annealsys, France.

TH.DP.10
Emergence of SiC Thyristors Featuring Amplifying Gate Design
Sigo Scharnholz[1], Ralf Hassdorf[1], Dirk Bauersfeld[1], Bertrand Vergne[1], Luong Viêt Phung[2] and Dominique Planson[2] [1]French-German Research Institute of Saint-Louis (ISL), France; [2]INSA Lyon, France.

TH.DP.11
Thermal Considerations on the Scaling of SiC MOSFETs
Cheng-Tyng Yen, Fu-Jen Hsu, Chien-Chung Hung, Chwan-Ying Lee, Lurng-Shehng Lee and Ya-fang Li; Hestia Power Incorporated, Taiwan.

TH.DP.12
An Auxiliary Power Supply for Gate Drive of Medium Voltage SiC Devices in High Voltage Applications
Boxue Hu[1], He Li[1], Zhuo Wei[1], Yafeng Wang[1], Diang Xing[1], Risha Na[1, 2] and Jin Wang[1]; [1]The Ohio State University, United States; [2]Harbin University of Science and Technology, China.

TH.DP.13
Impact of Cell Geometry on Zero-Energy Turn-Off of SiC Power MOSFETs
Xueqing Liu[1], Sauvik Chowdhury[1, 2], Collin W. Hitchcock[1] and T. P. Chow[1]; [1]Rensselaer Polytechnic Institute, United States; [2]Monolith Semiconductor, Inc., United States.

TH.DP.14
Characterization and Evaluation of a 3.3 kV, 45 A 4H-SiC MOSFET
Anup Anurag, Ghanshyamsinh Gohil, Kasunaidu Vechalapu, Sayan Acharya and Subhashish Bhattacharya; North Carolina State University, United States.

TH.DP.15
Comparison of Single- and Double-Trench UMOSFETs in 4H-SiC
Madankumar Sampath[1, 2], Dallas T. Morisette[1, 2] and James A. Cooper[1, 2, 3]; [1]Purdue University, United States; [2]Birck Nanotechnology Center, United States; [3]Sonrisa Research, Inc., United States.

TH.DP.16
A Continuous Semi-Empirical VJFET Capacitance Model from sub to above Threshold Regime
Nikolaos Makris and Maria Kayambaki; Foundation for Research and Technology-Hellas, Greece.

TH.DP.17
Planar to Trench—Short Circuit Capability Analysis of State-of-the-Art 1.2 kV SiC MOSFETs
Bhagyalakshmi Kakarla, Thomas Ziemann, Selamnesh M. Nida, Elias Doenni and Ulrike Grossner; ETHZ, Switzerland.

TH.DP.18
(LATE NEWS) Fabrication and Characterization of 15kV Self-Aligned 4H-SiC p-ChannelIGBTs with Enhanced Minority Lifetime
Kai Tian[1, 2], Chuangjie Zhou[1, 2], Jindou Liu[1, 2], Jinwei Qi[1, 2], Zhangsong Mao[1, 2], Song Yang[1, 2], Wenjie Song[1, 2], Mingchao Yang[1], Xiuhui Wang[1, 2] and Anping Zhang[1, 2]; [1]Xi'an Jiaotong University, China; [2]Xi'an Jiaotong University, China.

Novel Devices and Concepts, Emerging Materials IV

Thursday Afternoon, September 21, 2017
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Exhibit Hall C

***TH.EIP.1**
Piezoresistive Characteristics of NMOS FET Technology on 4H-SiC
Richard C. Jaeger[1], Jeffrey C. Suhling[2], Leonid Fursin[3] and William Simon[3]; [1]Auburn University, United States; [2]Auburn University, United States; [3]United Silicon Carbide Inc., United States.

TH.EP.2
Estimation of the Electrical Field at the Edge of Diamond Schottky Barrier Diode
Hitoshi Umezawa[2, 1]; [1]AIST, Japan; [2]Inst Neel/CNRS, France.

TH.EP.3
Graphene/SiC Functionalizing for Sensor Applications
Sergey P. Lebedev[4], Alexander Usikov[1, 2], Sergey Novikov[3], Evgeniia Shabunina[4], Natalia Shmidt[4], Iosif Barash[5], Alexander Roenkov[5], Alexander A. Lebedev[4, 2] and Yuri Makarov[1, 5]; [1]Nitride Crystals, Inc., United States; [2]University ITMO, Russian Federation; [3]Aalto University, Micronova, Finland; [4]Ioffe Institute, Russian Federation; [5]Nitride Crystals Group Ltd., Russian Federation.

TH.EP.4
Bipolar Conductivity in Aerosol Deposited SiC on Si
So-Mang Kim[1], Minseok Kang[2], Sung-Joon Park[1], Mun-Ho Jang[1], Jong-Min Oh[1] and Sang-Mo Koo[1]; [1]Kwangwoon University, Korea (the Republic of); [2]North Carolina State University, United States.

TH.EP.5
Electric Field Characterization of Diamond Metal Semiconductor Field Effect Transistors Using Electron Beam Induced Current
Khaled Driche[2, 1, 4], Hitoshi Umezawa[2, 1, 3] and Etienne Gheeraert[2, 1, 5]; [1]Neel Institute (CNRS), France; [2]University Grenoble Alpes, France; [3]AIST, Japan; [4]University of Tsukuba, AIST, Japan; [5]University of Tsukuba, Japan.

TH.EP.6
(LATE NEWS) Demonstrating the Promise of Heteroepitaxial -Ga2O3 on 4H and 6H Silicon Carbide
Stephen Russell[1], David Walker[2], Amador Pérez-Tomás[3, 4], Philip Mawby[1] and Mike Jennings[1]; [1]University of Warwick, United Kingdom; [2]University of Warwick, United Kingdom; [3]Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC, Spain; [4]Barcelona Institute of Science and Technology, Spain.

Sunday Program Reviews IV

Thursday Afternoon, September 21, 2017
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Exhibit Hall C

***TH.PRP.1**
National Programs on SiC Power Devices in China—From Research to Applications
Fei Yang; State Grid Corporation of China, China.

***TH.PRP.2**
SiC Power Electronics Technology for Energy Efficient Devices (SPEED)—Introduction Overview;
High Quality Substrate Material for High Power Application;
High Voltage SiC Devices for Power Transmission Application;
Solid State Transformers with Increased Functionalities and SiC in Future Wind Power Applications
Anton J. Bauer[1], Peter Friedrichs[2], Peder Bergman[3], Adolf Schöner[4], Andrei Mihaila[5], Philippe Godignon[6], Antonio de la Cruz[7], Christian Sommer[8], Itziar Kortazar[9] and Jose Maria Cuartas Alonso[10]; [1]Frauhofer IISB, Germany; [2]Infineon Technologies, Germany; [3]Norstel AB, Sweden; [4]Ascatron, Sweden; [5]ABB Corporate Research, Switzerland; [6]CNM-CSIC, Spain; [7]INAEL, Spain; [8]University of Hannover, Germany; [9]Ingeteam, Spain; [10]University of Oviedo, Spain.

***TH.PRP.3**
Manufacturing Job Creation through Accelerated Large-Scale Adoption of SiC Semiconductor Devices
Victor Veliadis; PowerAmerica, United States.

***TH.PRP.4**
Genealogy of National Projects on SiC Power Electronics and Related Current Research and Development Activities in Japan
Hajime Okumura[1] and Tsunenobu Kimoto[2]; [1]National Institute of Advanced Industrial Science and Technology (AIST), Japan; [2]Kyoto University, Japan.

***TH.PRP.5**
The New York Power Electronics Manufacturing Consortium—Enabling the Power Electronics Revolution
Brian Sapp, Jeffrey C. Hedrick, Lindsay M. Bessette, Alexander Bialy, Matthew Bosco, Michael Bryant, Wenli Collison, Shannon Dunn, Daniel Franca, Thomas Gorczyca, Pui Yee Hung, Anne-Sophie Larrea, Vincent Pedone, Joseph Piccirillo, Jamie Prudhomme, Susan Rogers, Gerard Stapf, Vlad Stolkarts, Sean Valente and Paul Woodin; SUNY Polytechnic Institute, United States.

***TH.PRP.6**
3C-SiCHetero-epitaxiALLy srown on silicon compliancE substrates and new 3C-SiC substrates for sustaiNable wide-band-Gap powEr devices (CHALLENGE)
Francesco La Via; CNR-IMM, Italy.

***TH.PRP.7**
Optimal SiC Substrates for Integrated Microwave and Power Circuits—OSIRIS
Sylvain Delage[1], Örjan Danielsson[2], Bruno Ceccaroli[3], Christophe Chang[4], Fulvio Infante[5], Jaroslav Kovac[6], Björn Magnusson[7], Pierre Ruterana[8] and Adolf Schöner[9]; [1]III-V Lab, France; [2]Linköping University, Sweden; [3]Isosilicon AS, Norway; [4]United Monolithic Semiconductors, France; [5]Intraspec Technologies, France; [6]Slovak University of Technology, Slovakia; [7]Norstel AB, Sweden; [8]CNRS-CIMAP, France; [9]Ascatron AB, Sweden.

***TH.PRP.8**
Wide Band Gap Innovative SiC for Advanced Power (WInSiC4AP)—A New European Project Started in June 2017
Leoluca Liggio[1], Antonio Imbriuglia[2], Mario Saggio[2], Mario Cacciato[3], Joseph Domingo Salvany[4], Benedicte Silvestre[5], Susanna Reggiani[6], Gaudenzio Meneghesso[6], Salvatore Patanè[7], Miroslav Husak[8], Marc Christoferr Wurz[9], Fabrizio Roccaforte[10], Patrick Fiorenza[10], Francesco La Via[10], Antonino La Magna[10], Xavier Pignat[11], Olivier Metzelard[12], Jacques Favre[13], Federica Di Leo[14], Martin Haug[15], Jean-Francois Michaud[16], Daniel Alquier[16], Jiri Havlik[17], Tiziano Valentinetti[18], Gianni Viano[19] and Gennaro Russo[20]; [1]Distretto Tecnologico Sicilia Micro Nano Sistemi - DTSMNS, Italy; [2]STMicroelectronics, Italy; [3]University of Catania, Italy; [4]NEXTER Electronics, France; [5]VALEO Systems de Controle Moteurs, France; [6]IUNET, Italy; [7]University of Messina, Italy; [8]University of Praha, Czech Republic; [9]University of Hannover, Germany; [10]CNR-IMM, Italy; [11]ZODAERO Aero Electric SAS, France; [12]APOJEE, France; [13]APSI3D, France; [14]SAT, Italy; [15]Wührt, Germany; [16]University of Tours, France; [17]IMA, Czech Republic; [18]Enel Distribuzione, Italy; [19]SOFTECO Simat SRL, Italy; [20]Distretto Tecnologico Aerospaziale della Campania, Italy.