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THE **2<sup>ND</sup>** IEEE WORKSHOP *on*  
WIDE BANDGAP POWER DEVICES AND APPLICATIONS



**2014 EVENT AGENDA**  
Knoxville, Tennessee

**MONDAY, OCTOBER 13<sup>TH</sup>**

10:00 a.m. – 5:30 p.m.	Registration and Exhibit Setup	Park Level Atrium
	<i>Tutorial Session I – Crystal Room</i> <i>Chair: Madhu Chinthavali</i>	<i>Tutorial Session II – Medallion &amp; Carriage Rooms</i> <i>Chair: Daniel Costinett</i>
<b>Time:</b>	<b>Title, Author, and Affiliation</b>	<b>Title, Author, and Affiliation</b>
1:00 p.m. – 3:00 p.m.	<i>“Driving and Characterization of Wide Bandgap Semiconductors for Voltage Source Converter Applications,”</i> <b>Fred Wang</b> and <b>Zheyu Zhang</b> , University of Tennessee	<i>“Reliability and High Field Related Issues in GaN-HEMT Devices,”</i> <b>Gaudenzio Meneghesso</b> , University of Padova
<b>3:00 p.m. – 3:30 p.m.</b>	<b>BREAK – Pre-Function Hallway Meeting Space Hallway</b>	
3:30 p.m. – 5:30 p.m.	<i>“WBG Devices Enabled MV Power Converters for Utility Applications – Opportunities and Challenges,”</i> <b>Ram Adapa</b> , Electric Power Research Institute; <b>Subhashish Bhattacharya</b> , North Carolina State University	<i>“Packaging Technologies to Exploit the Attributes of WBG Power Electronics,”</i> <b>Zhenxian Liang</b> , Oak Ridge National Laboratory; <b>Fred Wang</b> and <b>Leon Tolbert</b> , University of Tennessee
6:00 p.m. – 8:00 p.m.	Welcome Reception with Exhibits & Displays <b>Johny Green</b> , Oak Ridge National Laboratory	Medallion & Carriage Rooms

# TUESDAY, OCTOBER 14<sup>TH</sup>

TIME:	EVENT:	LOCATION:
7:00 a.m. – 8:00 a.m.	Author's Breakfast	Cumberland Ballroom
7:30 a.m. – 4:00 p.m.	Registration	Park Level Atrium
8:00 a.m. – 8:10 a.m.	Welcome <b>Burak Ozpineci</b> , Oak Ridge National Laboratory	Medallion & Carriage Rooms
<b>Keynote Sessions – Medallion &amp; Carriage Rooms</b> <b>Chair: Leon Tolbert</b>		
8:10 a.m. – 8:40 a.m.	<i>"A Vision for U.S. Leadership in Wide Bandgap Power Electronics,"</i> <b>Anant Agarwal</b> , Department of Energy	
8:40 a.m. – 9:10 a.m.	<i>"Is GaN a Game Changing Device?,"</i> <b>Fred Lee</b> , Virginia Tech	
9:10 a.m. – 9:40 a.m.	<i>"Ultra High Voltage SiC Power Devices and Their Applications in Solid State Transformer and Circuit Breaker for Future Electric Power Grid,"</i> <b>Alex Huang</b> , North Carolina State University	
9:40 a.m. – 10:10 a.m.	<i>"Next-Generation Silicon Carbide Power Modules Enable New Levels of Performance,"</i> <b>Ty McNutt</b> , Arkansas Power Electronics International	
<b>10:10 a.m. – 10:30 a.m.</b>	<b>BREAK – Pre-Function Hallway Meeting Space Hallway</b>	
	<b>WBG Characterization Technical Session – Crystal Room</b> <b>Chair: John Hostetler</b>	<b>WBG Application Challenges Technical Session - Medallion &amp; Carriage Rooms</b> <b>Chair: Chingchi Chen and Jürgen Schuderer</b>
10:30 a.m. – 10:55 a.m.	<i>"4500 Volt Si/SiC Hybrid Module Qualification for Modern MegaWatt Scale Wind Energy Inverters,"</i> <b>William Erdman</b> , Cinch LLC	<i>"Packaging SiC Power Semiconductors – Challenges, Technologies and Strategies,"</i> <b>Jürgen Schuderer</b> , <b>Umamaheswara Vemulapati</b> , and <b>Felix Traub</b> , ABB Corporate Research
10:55 a.m. – 11:20 a.m.	<i>"Understanding the Limitations and Impact Factors of Wide Band-gap Devices' High Switching-Speed Capability in Voltage Source Converter,"</i> <b>Zheyu Zhang</b> , <b>Fred Wang</b> , <b>Leon M. Tolbert</b> , <b>Benjamin J. Blalock</b> , and <b>Daniel Costinett</b> , University of Tennessee	<i>"The Opportunities and Challenges of Wide-Band-Gap Technologies for Automotive Applications,"</i> <b>Chingchi Chen</b> , and <b>Ming Su</b> , Ford Motor Company
11:20 a.m. – 11:45 a.m.	<i>"The Development of a High-Voltage Power Device Evaluation Platform,"</i> <b>Lixing Fu</b> , <b>Xuan Zhang</b> , <b>He Li</b> , <b>Xintong Lu</b> , and <b>Jin Wang</b> , Ohio State University	<i>"Application-Based Review of GaN HFETs,"</i> <b>Edward Jones</b> and <b>Fred Wang</b> , University of Tennessee; <b>Burak Ozpineci</b> , Oak Ridge National Laboratory
<b>11:45 a.m. – 1:30 p.m.</b>	<b>Attendees Lunch – Tennessee Ballroom</b> <b>Steering Committee Lunch – Private Dining Area</b> (Conference Room at the entrance to onsite Windows on the Park Restaurant)	

TIME:	EVENT:	LOCATION:
	<p><b><i>GaN Devices Technical Session I – Crystal Room</i></b>  <b><i>Chair: Gaudenzio Meneghesso</i></b></p>	<p><b><i>Power Module Technical Session – Medallion &amp; Carriage Rooms</i></b>  <b><i>Chair: Laura Marlino and Alan Mantooth</i></b></p>
<p>1:30 p.m. – 1:55 p.m.</p>	<p><i>“Vertical GaN Electronic Devices on Bulk-GaN Substrates,”</i>  <b>David Bour, Hui Nie, Quentin Diduck, Ozgur Aktas, Tom Prunty, Andrew Edwards, Gangfeng Ye, Ming Zhang, and Isik Kizilyalli, Avogy</b></p>	<p><i>“High-Temperature SiC Power Module with Integrated SiC Gate Drivers for Future High-Density Power Electronics Applications,”</i>  <b>Bret Whitaker, Zach Cole, Brandon Passmore, Daniel Martin, Ty McNutt, and Alex Lostetter, Arkansas Power International, Inc.; Nance Ericson, Shane Frank, and Charles Britton, Oak Ridge National Laboratory</b></p>
<p>1:55 p.m. – 2:20 p.m.</p>	<p><i>“Advances in Reliability and Operation Space of High-voltage GaN Power Devices Grown on Si Substrates,”</i>  <b>Yifeng Wu, Jose Guerrero, and Kurt Smith, Transphorm Incorporated</b></p>	<p><i>“Development of Packaging Technologies for Advanced SiC Power Modules,”</i>  <b>Zhenxian Liang, Oak Ridge National Laboratory</b></p>
<p>2:20 p.m. – 2:45 p.m.</p>	<p><i>“Application Specific Device Characterization and Datasheet Parameters for Commercial (600V) GaN-on-Si-Based Conversion Switches,”</i>  <b>Tim McDonald, Deepak Veeredy, and Mohamed Imam, International Rectifier Corporation</b></p>	<p><i>“A 10-kW SiC Inverter with A Novel Printed Metal Power Module With Integrated Cooling Using Additive Manufacturing,”</i>  <b>Madhu Chinthavali, Curt Ayers, Steven Campbell, Randy Wiles, and Burak Ozpineci, Oak Ridge National Laboratory</b></p>
<p>2:45 p.m. – 3:10 p.m.</p>	<p><i>“Degradation Mechanisms of AlGaIn/GaN HEMTs on Sapphire, Si, and SiC Substrates under Proton Irradiation,”</i>  <b>Andrew Koehler, Travis Anderson, Jennifer Hite, Bradley Weaver, Marko Tadjer, and Jordan Greenlee, U.S. Naval Research Laboratory; Petra Specht, University of California Berkeley; Matthew Porter and Todd Weatherford, Naval Postgraduate School</b></p>	<p><i>“10 kV, 120 A SiC MOSFET Modules for a Power Electronics Building Block (PEBB),”</i>  <b>Christina DiMarino, Igor Cvetkovic, Rolando Burgos, and Dushan Boroyevich, Zhiyu Shen, Virginia Tech</b></p>
<p><b>3:10 p.m. – 3:30 p.m.</b></p>	<p><b>BREAK – Pre-Function Hallway Meeting Space Hallway</b></p>	
	<p><b><i>GaN Devices Technical Session II – Crystal Room</i></b>  <b><i>Chair: Tim McDonald</i></b></p>	<p><b><i>Gate Drive and Isolation Circuits Technical Session – Medallion &amp; Carriage Rooms</i></b>  <b><i>Chair: Jin Wang and Bulent Sarlioglu</i></b></p>
<p>3:30 p.m. – 3:55 p.m.</p>	<p><i>“Process Optimization of Multicycle Rapid Thermal Annealing of Mg-implanted GaN,”</i>  <b>Jordan Greenlee, National Research Council; Boris Feigelson, Travis Anderson, Jennifer Hite, Charles Eddy, Jr., Karl Hobart, and Francis Kub, Naval Research Laboratory; Marko Tadjer, American Society for Engineering Education</b></p>	<p><i>“An Integrated Gate Driver in 4H-SiC for Power Converter Applications,”</i>  <b>Nance Ericson, Oak Ridge National Laboratory</b></p>
<p>3:55 p.m. – 4:20 p.m.</p>	<p><i>“Design and Fabrication of High Current AlGaIn/GaN HFET for Gen III Solid State Transformers,”</i>  <b>In-Hwan Ji, Sizhen Wang, Bongmook Lee, Haotao Ke, Veena Misra, and Alex Q. Huang, NSF FREEDM Center at North Carolina State University</b></p>	<p><i>“Understanding the Influence of Dead-time on GaN Based Synchronous Boost Converter,”</i>  <b>Di Han, and Bulent Sarlioglu, University of Wisconsin-Madison</b></p>

## TUESDAY, OCTOBER 14<sup>TH</sup> (CONTINUED)

TIME:	EVENT:	LOCATION:
4:20 p.m. – 4:45 p.m.	<p><i>“Low ON-state Resistance of GaN PiN Rectifiers grown on FS-GaN Substrate,”</i>  <b>Jeomoh Kim, Tsung-Ting Kao, Mi-hee Ji, Yi-Che Lee, Teeradetch Detchprohm, Russell Dupis, and Shyh-Chiang Shen,</b>                      Georgia Tech</p>	<p><i>“Discussions on the Semiconductor-based Galvanic Isolation,”</i>  <b>Xuan Zhang, Lixing Fu, Mingzhi Leng, and Jin Wang,</b>                      Ohio State University</p>
4:45 p.m. – 5:15 p.m.	<b>Travel to University of Tennessee, West Club Neyland Stadium</b>	
5:15 p.m. – 8:30 p.m.	<b>Poster Session &amp; Banquet – University of Tennessee, West Club at Neyland Stadium</b>	
	<ul style="list-style-type: none"> <li>❖ <i>“Investigation of Drive Circuits for GaN HEMTs in Leaded Packages,”</i>  <b>Zhan Wang and Jim Honea,</b> Transphorm, Incorporated; <b>Yuxiang Shi and Hui Li,</b> Florida State University</li> <li>❖ <i>“An Isolated Bi-directional Soft-Switched High-Frequency-AC Link DC-AC Converter Using SiC MOSFETs,”</i>  <b>Mengqi Wang, Qingyun Huang, Wensong Yu, and Alex Huang,</b> North Carolina State University</li> <li>❖ <i>“Dependence of Ti/C Ratio on Ohmic Contact with TiC Electrode in AlGaIn/GaN Structure,”</i>  <b>Wataru Saito,</b> Toshiba Corporation <b>Mari Okamoto, Kuniyuki Kakushima, Yoshinori Kataoka, Kenji Natori, Hitoshi Wakaabayashi, and Hiroshi Iwai,</b> Tokyo Institute of Technology;</li> <li>❖ <i>“Impact of Current Measurement of Switching Characterization of GaN Transistors,”</i>  <b>Jennifer Lautner and Bernhard Piepenbreier,</b> University of Erlangen-Nuremberg</li> <li>❖ <i>“The Influence of SiC/SiO<sub>2</sub> Interface Morphology on the Electrical Characteristics of 4H-SiC MOS Structure,”</i>  <b>Li Liu,</b> XiDian University; <b>Chunkun Jiao and Sarit Dhar,</b> Auburn University; <b>Yi Xu, Gang Liu, and Leonard Feldman,</b> Rutgers University</li> <li>❖ <i>“Optically-Switched High-Voltage Bipolar SiC Device,”</i>  <b>Supid K. Mazumber,</b> University of Illinois-Chicago</li> </ul>	
8:00 p.m. – 10:00 p.m.	Tour of the University of Tennessee-Knoxville’s Laboratories	1 <sup>st</sup> floor of the Min Kao Building

## WEDNESDAY, OCTOBER 15<sup>TH</sup>

TIME:	EVENT:	LOCATION:
7:00 a.m. – 8:00 a.m.	Author’s Breakfast	Cumberland Ballroom
7:30 a.m. – 11:30 a.m.	Registration	Park Level Atrium

# WEDNESDAY, OCTOBER 15<sup>TH</sup> (CONTINUED)

TIME:	EVENT:	LOCATION:
<b>Keynote Sessions – Medallion &amp; Carriage Rooms</b> <b>Chair: Fred Wang</b>		
8:00 a.m. – 8:10 a.m.	Welcome <b>Burak Ozpineci</b> , Oak Ridge National Laboratory	
8:10 a.m. – 8:40 a.m.	<i>“The New York Power Electronics Manufacturing Consortium at CNSE-SUNY Poly,”</i> <b>Michael Liehr</b> , State University of New York System	
8:40 a.m. – 9:10 a.m.	<i>“Industrial Readiness of SiC Power Devices,”</i> <b>Ljubisa Stevanovic</b> , General Electric	
9:10 a.m. – 9:40 a.m.	<i>“Merits of Epitaxial Re-growth Technologies for Advanced SiC Device Concepts,”</i> <b>Adolf Schoner</b> , Ascatron AB	
9:40 a.m. – 10:10 a.m.	<i>“Power America: Next Generation Power Electronics Manufacturing Innovation Institute,”</i> <b>Dennis Kekas</b> , North Carolina State University	
<b>10:10 a.m. – 10:30 a.m.</b>	<b>BREAK – Pre-Function Hallway Meeting Space Hallway</b>	
	<b>Gate Dielectrics – Crystal Room</b> <b>Chair: Sarit Dhar</b>	<b>High Efficiency Power Converters – Medallion &amp; Carriage Rooms</b> <b>Chair: Robert Dean and Benjamin Blalock</b>
10:30 a.m. – 10:55 a.m.	<i>“Enhanced Oxidation of SiC Substrates using La2O3 Capped Annealing and a Proposal for Uniform LaSiON Gate Dielectric Formation,”</i> <b>Yiming Lei, Shu Munekiyo, Takamasa Kawanago, Kuniyuki Kakushima, Hitoshi Wakabayashi, Kazuo Tsutsui, Hiroshi Iwai</b> , Tokyo Institute of Technology; <b>Masayuki Furuhashi</b> , and <b>Naruhisa Miura</b> , Mitsubishi Electric Corporation	<i>“Wide Band Gap Power Devices Based High Efficiency Power Converters for Data Center Application,”</i> <b>Weimin Zhang, Ben Guo, Fan Xu, Yutian Cui, Yu Long, Fred Wang, Leon Tolbert, Benjamin J. Blalock</b> , and <b>Daniel Costinett</b> , University of Tennessee
10:55 a.m. – 11:20 a.m.	<i>“Passivation of SiO2/SiC Interface with La2O3 Capped Oxidation,”</i> <b>Shu Munekiyo, Yiming Lei, Takamasa Kawanago, Kuniyuki Kakushima, Hitoshi Wakabayashi, Kazuo Tsutsui</b> , and <b>Hiroshi Iwai</b> , Tokyo Institute of Technology; <b>Masayuki Furuhashi</b> and <b>Naruhisa Miura</b> , Mitsubishi Electric Corporation	<i>“125 W Multiphase GaN/Si Hybrid Point of Load Converter for Improved High Load Efficiency,”</i> <b>Luke L. Jenkins, Benjamin K. Rhea, William E. Abell, Frank T. Werner, Christopher G. Wilson, Robert N. Dean</b> , and <b>Daniel K. Harris</b> , Auburn University
11:20 a.m. – 11:45 a.m.	<i>“Effect of Post Deposition Annealing for High Mobility 4H-SiC MOSFET Utilizing Lanthanum Silicate and Atomic Layer Deposited SiO2,”</i> <b>Xiangyu Yang, Bongmook Lee</b> , and <b>Veena Misra</b> , North Carolina State University	<i>“A Full-Bridge Current-Source Isolated DC/DC Converter with Reduced Number of Switches and Voltage Stresses for PV Applications,”</i> <b>Feng Guo, Lixing Fu, He Li, Mohammed Alsolami, Xuan Zhang, Jie Zhang</b> , and <b>Jin Wang</b> , Ohio State University
<b>11:45 a.m. – 1:30 p.m.</b>	<b>LUNCH – Tennessee Ballroom</b>	
1:30 p.m. – 3:10 p.m.	<i>Panel Discussion</i> <b>Jin Wang</b> , Ohio State University, Moderator <b>Anant Agarwal</b> , Department of Energy; <b>Eric Persson</b> , International Rectifier Corporation; <b>Lin Cheng</b> , CREE, Incorporated; <b>Tom Baker</b> , Catapillar; <b>Hao Huang</b> , General Electric Aviation	Medallion & Carriage Rooms

WEDNESDAY, OCTOBER 15<sup>TH</sup> (CONTINUED)

TIME:	EVENT:	LOCATION:
3:10 p.m. – 3:30 p.m.	<b>BREAK- Pre-Function Hallway Meeting Space Hallway</b>	
	<b><i>SiC Devices Technical Session II – Crystal Room</i></b> <b>Chair: Avinash Kashyap</b>	<b><i>GaN Power Converters Technical Session – Medallion &amp; Carriage Rooms</i></b> <b>Chair: Eric Persson and Kevin Bai</b>
3:30 p.m. – 3:45 p.m.	<i>“Reliability and Stability of SiC power MOSFETs and Next-Generation SiC MOSFETs”</i> <b>Scott Allen, Brett Hull, Jon Zhang, Don Gajewski, Vipindas Pala, Jim Richmond, Sei-Hyung Ryu, Michael O’Loughlin, and Edward VanBrunt, Cree Incorporated</b>	<i>“Matching GaN Characteristics to Power Circuit Topology Maximizes Performance Benefit”</i> <b>Eric Persson, Internation Rectifier Corporation</b>
3:45 p.m. – 4:10 p.m.	<i>“6.5 kV Normally-off JFETs Technology Status,”</i> <b>John L. Hostetler, Anup Bhalla, Petre Alexandrov, and Xueqing Li, United Silicon Carbide, Incorporated</b>	<i>“A 12 to 1 V Five Phase Interleaving GaN POL Converter for High Current Low Voltage Applications,”</i> <b>Benjamin Rhea, Luke Jenkins, William Abell, Frank Werner, Christopher Wilson, Robert Dean, and Daniel Harris, Auburn University</b>
4:10 p.m. – 4:35 p.m.	<i>“Silicon Carbide Transient Voltage Suppressor for Next Generation Lightning Protection,”</i> <b>Avinash Kashyap, Peter Sandvik, James McMamahon, Alexander Bolotnikov, Jeffrey Erlbaum, and Emad Andarawis, GE Global Research Center</b>	<i>“High-Frequency Wireless Charging System Study Based on Normally-off GaN HEMTs,”</i> <b>Hua Bai, Kettering University</b>
4:35 p.m. – 5:00 p.m.	<i>“Temperature Dependence Design of Silicon Carbide Schottky Diodes,”</i> <b>Rahul Radhakrishnan, Tony Witt, and Richard Woodin, Global Power Technologies Group</b>	<i>“Reflected Wave Phenomenon in Motor Drive Systems Using Wide Bandgap Devices,”</i> <b>Mark Scott, Jared Brockman, Boxue Hu, Lixing Fu, and Longya Xu, Ohio State University; Rachid Darbali Zamora, University of Puerto Rico</b>
<b>END OF 2014 IEEE WiPDA WORKSHOP</b>		

