2025 37th International Symposium on Power Semiconductor Devices and ICs (ISPSD 2025)

Kumamoto, Japan
1-5 June 2025

IEEE Catalog Number: CFP25ISP-POD
ISBN: 979-8-3315-4126-2

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IEEE Catalog Number: CFP25ISP-POD
ISBN (Print-On-Demand): 979-8-3315-4126-2
ISBN (Online): 978-4-88686-441-3
ISSN: 1063-6854

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[3]EMC Electromagnetic BCN, S.L., Barcelona, Spain
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[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China
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[1]Center for Power Electronics Systems, Virginia Tech, Blacksburg, VA, USA
[2]Department of Electrical and Electronic Engineering, University of Hong Kong, Hong Kong, China
[3]Xidian University, Xi'an, China
[4]Cambridge GaN Devices, Cambridge, UK
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[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China

[2]Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen, China

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[1]College of Integrated Circuits, Zhejiang University, Hangzhou, China

[2]ZJU-Hangzhou Global Scientific and Technological Innovation Center, Zhejiang University, Hangzhou, China

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[1]Shanghai Institute of Intelligent Electronics & Systems, School of Microelectronics, Fudan University, Shanghai, China

[2]School of Integrated Circuits, Jiangnan University, Wuxi, China

[3]Wuxi China Resources Huajing Microelectronics, Wuxi, China

[4]College of Physics, Sichuan University, Chengdu, China

[5]School of Academy of Engineering & Technology, Fudan University, Shanghai, China

[6]School of Electronic Information Engineering, Suzhou Vocational University, Suzhou, China

[7]Wuxi Microelectronics Scientific and Research Center, Wuxi, China

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[1]State Key Laboratory of ASIC and System, Shanghai Institute of Intelligent Electronics & Systems, School of Microelectronics, Fudan University, Shanghai, China

[2]Wuxi China Resources Huajing Microelectronics, Wuxi, China

[3]College of Physics, Sichuan University, Chengdu, China

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[2]Advanced Semiconductor Device Development Center, Toshiba Electronic Devices & Storage, Kanagawa, Japan

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[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China
[2]Technology Development Department, CSMC Technologies, Wuxi, China
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[1]Dept. Engineering of Foundry, DanKook University, Yongin, Korea
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[1]National ASIC System Engineering Research Center, Southeast University, Nanjing, Jiangsu, China
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[2]Department of Electrical and Electronic Engineering, The University of Hong Kong, Pokfulam Road, Hong Kong
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[1]School of Integrated Circuit Science and Engineering, University of Electronic Science and Technology of China, Chengdu, China
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[1]National ASIC System Engineering Research Center, Southeast University, Nanjing, China
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[1]School of Microelectronics, Fudan University, Shanghai, China
[2]School of Integrated Circuits, Jiangnan University, Wuxi, China
[3]School of Academy for Engineering & Technology, Fudan University, Shanghai, China
[4]Genettice, Qingdao, China
[5]Southern University of Science and Technology, Shenzhen, China
[6]National Key Laboratory of Integrated Circuits and Microsystems, Wuxi, China
[7]National Key Laboratory of Integrated Circuits and Microsystems, Chongqing, China
[8]Nanjing Electronic Devices Institute, Nanjing, China
[9]Guilin University of Electronic Technology, Guilin, China
[10]School of Electronic Information Engineering, Suzhou Vocational University, Suzhou, China
[11]CorEnergy Semiconductor, Zhangjiagang, China

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[1]School of Electronic Science and Engineering, Nanjing University, Nanjing, China
[2]Shenzhen Research Institute of Nanjing University, Shenzhen, China
[3]Space Environment Simulation Research Infrastructure (SESRI), Harbin Institute of Technology, Harbin, China
[4]Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou, China
[5]China Academy of Space Technology, Beijing, China
[6]CorEnergy Semiconductor, Suzhou, China

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[2]ANCORA Semiconductors, Taoyuan, Taiwan

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[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China
[2]Institute of Electronic and Information Engineering of UESTC in Guangdong, Dongguan, China
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[1]Department of Engineering and System Science (ESS), National Tsing-Hua University, Hsinchu, Taiwan
[2]Nuclear Science and Technology Development Center, National Tsing-Hua University, Hsinchu, Taiwan
[3]Institute of Nuclear Engineering and Science, National Tsing-Hua University, Hsinchu, Taiwan

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[1]National ASIC System Engineering Research Center, Southeast University, Nanjing, China
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[1]School of Electronic and Information Engineering and Institute of Physical Science and Information Technology, Anhui University, Hefei, China
[2]School of Microelectronics, University of Science and Technology of China, Hefei, China
[3]Guangzhou Wide Bandgap Semiconductor Innovation Center, Guangzhou Institute of Technology, Xidian University, Guangzhou, China

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[2]Nanjing Electronic Devices Institute, Nanjing, China

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[1]School of Integrated Circuits, Peking University, Beijing, China
[2]School of Physics, Peking University, Beijing, China
[3]Xingang Semiconductor, Xuzhou, China.

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[1]Guangzhou Wide Bandgap Semiconductor Innovation Center, Guangzhou Institute of Technology, Xidian University, Guangzhou, China
[2]State Key Laboratory of Wide Bandgap Semiconductor Devices and Integrated Technology, School of Microelectronics, Xidian University, Xi'an, China
[3]Guangdong Ziener Semiconductor, Shenzhen, China
[4]China Southern Power Grid Technology, Guangzhou, China

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[1]School of Electronics and Information Technology, Sun Yat-Sen University, Guangzhou, China
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[1]State Key Laboratory of Wide-Bandgap Semiconductor Devices and Integrated Technology, School of Microelectronics, Xidian University, Xi'an, China
[2]Guangzhou Wide Bandgap Semiconductor Innovation Center, Guangzhou Institute of Technology, Xidian University, Guangzhou, China

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[1]Institute of Physical Science and Information Technology, Anhui University, Hefei, China
[2]CloudSemi Technology, Hangzhou, China
[3]The Institute of Technological Sciences, Wuhan University, Wuhan, China;
[4]College of Physics and Optoelectronic Engineering, Shenzhen University, Shenzhen, China

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[1]Institute of Electronics Engineering, National Tsing Hua University, Hsinchu, Taiwan
[2]College of Semiconductor Research, National Tsing Hua University, Hsinchu, Taiwan

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[1]School of Microelectronics, Southern University of Science and Technology, Shenzhen, China
[2]Department of Electrical and Electronic Engineering, The University of Hong Kong, Pokfulam Road, Hong Kong
[3]School of integrated Circuit, Shenzhen Polytechnic University, Shenzhen, China

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[1]School of Electronic Science and Engineering, Nanjing University, Nanjing, China
[2]Shenzhen Research Institute of Nanjing University, Shenzhen, China
[3]China Electronic Product Reliability and Environmental Testing Research Institute, Guangzhou, China

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[1]International College of Semiconductor Technology, National Yang Ming Chiao Tung University, Taiwan
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[3]Institute of Electronics and Department of Electronics and Electrical Engineering, National Yang Ming Chiao Tung University, Taiwan

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[1]Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology, Hong Kong, China
[2]College of Electrical Engineering, Zhejiang University, Hangzhou, China

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[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China
[2]Songshan Lake Materials Laboratory, Dongguan, China
[3]Institute of Physics, China Academy of Sciences, Beijing, China

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[1]School of Advanced Technology, Xi'an Jiaotong-Liverpool University, Suzhou, China
[2]Department of Electrical Engineering and Electronics, University of Liverpool, Liverpool, UK
[3]School of Chips, Entrepreneur College, Xi'an Jiaotong-Liverpool University, Suzhou, China
[4]Institute of Microelectronics, University of Chinese Academy of Sciences, Beijing, China

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[1]School of Nano Technology and Nano Bionics, University of Science and Technology of China, Hefei, China
[2]Key Laboratory of Semiconductor Display Materials and Chips, Suzhou Institute of Nano-Tech and Nano- Bionics, Chinese Academy of Sciences, Suzhou, China

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Shenzhen Pinghu laboratory, Shenzhen, China

ISPSD 2025

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GaN-P2: Vertical GaN Devices (Poster Session)

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[1]College of Materials Science and Engineering, Shenzhen University, Shenzhen, China
[2]State Key Laboratory of Radio Frequency Heterogeneous Integration, Shenzhen University, Shenzhen, China
[3]School of Electronic Science and Engineering, Nanjing University, Nanjing, China
[4]Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen, China
[5]Graduate School of Engineering, Osaka Metropolitan University, Osaka, Japan
[6]State Key Discipline Laboratory of Wide Band Gap Semiconductor Technology, Xidian University, Xi'an, China

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[1]College of Materials Science and Engineering, Shenzhen University, Shenzhen, China
[2]State Key Laboratory of Radio Frequency Heterogeneous Integration, Shenzhen University, Shenzhen, China
[3]School of Electronic Science and Engineering, Nanjing University, Nanjing, China
[4]Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen, China
[5]State Key Discipline Laboratory of Wide Band Gap Semiconductor Technology, Xidian University, Xi'an, China
[6]Department of Electronic Engineering, Chang Gung University, Taoyuan, Taiwan
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[1]Department of Electronics, Nagoya University, Nagoya, Japan
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[1]School of Integrated Circuits, Shandong University, Jinan, China
[2]Shenzhen Research Institute of Shandong University, Shenzhen, China
[3]Huawei Technologies, Huawei Base, Bantian, Longgang district Shenzhen, Guangdong, China

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[1]School of Microelectronics, Fudan University, Shanghai, China
[2]School of Integrated Circuits, Jiangnan University, Wuxi, China
[3]School of Academy of Engineering & Technology Fudan University, Shanghai, China
[4]CEC Compound Semiconductor, Ningbo, China
[5]School of Electronic Information Engineering, Suzhou Vocational Univerisity, Suzhou, China

Wednesday, 4th June 2025

8:40 - 10:20
SiC-4: Gallium Oxide and Diamond Devices
Chairs: Peter Losee (*Qorvo, USA*), Hiroshi Kono (*Toshiba Electronic Devices & Storage, Japan*)

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Jiajun Han[1,2], Na Sun[3], Xinyi Pei[3], Kangkai Fan[2], Yu Xu[2], Zihao Huang[2], Renqiang Zhu[5], Nengjie Huo[1], Jingbo Li[6], Junfa Mao[4], Jiandong Ye[3], Xinke Liu[2,4]
[1]College of Electronic Science and Engineering (Microelectronics College), South China Normal University, Foshan, China
[2]College of Materials Science and Engineering, Shenzhen University, Shenzhen, China
[3]School of Electronic Science and Engineering, Nanjing University, Nanjing, China
[4]State Key Laboratory of Radio Frequency Heterogeneous Integration, Shenzhen University, Shenzhen, China
[5]Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen, China
[6]College of Optical Science and Engineering, Zhejiang University, Hangzhou, China

9:00 - 9:20
3.9 kV Vertical β-Ga_2O_3 Hetero-Junction Diode With High-Temperature Operational Capability 361
Jiangbin Wan[1], Hengyu Wang[1], Haoyuan Cheng[1], Chi Zhang[1], Ce Wang[1], Tiancheng Tao[1], Zijian Hu[1], Junze Li[1], Han Wang[1], Haoyu Wang[1], Haidong Yan[1,2], Na Ren[1,2], Qing Guo[1], Kuang Sheng[1,2]
[1]College of Electrical Engineering, Zhejiang University, Hangzhou, China
[2]ZJU-Hangzhou Global Scientific and Technological Innovation Center, Zhejiang University, Hangzhou, China

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Haoran Wang[1], Chi-Rui Hwang[1], Po-Yen Huang[2], Yeke Liu[1], Shawn S. H. Hsu[1,2], Roy K.-Y. Wong[1,2]
[1]Institute of Electronics Engineering, National Tsing Hua University, Hsinchu, Taiwan
[2]College of Semiconductor Research, National Tsing Hua University, Hsinchu, Taiwan

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[1]Novel Crystal Technology, Saitama, Japan
[2]Phenitec Semiconductor, Okayama, Japan

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Damien Michez[1,2], Juliette Letellier[2], Julien Pernot[3], Ralph Makhoul[2], Nicolas Rouger[2]
[1]DIAMFAB, Grenoble, France
[2]LAPLACE, Université de Toulouse, CNRS, INPT, Toulouse, France
[3]Institut Néel, Grenoble, France

10:50 – 12:30
SiC-2: Design Approaches and Physics for Reliability and Performance of SiC Devices
Chairs: Kung-Yen Lee (*National Taiwan University, Taiwan*), Shinsuke Harada (*AIST, Japan*)

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Kohei Ebihara, Hiroki Niwa, Yosuke Nakata, Toshikazu Tanioka, Takeshi Murakami, Katsuhiro Fujiyoshi, Shigeru Okimoto, Kenji Hatori, Katsutoshi Sugawara, Tatsuro Watahiki
Advanced Technology R&D Center, Mitsubishi Electric, Hyogo, Japan

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[1]*College of Electrical Engineering, Zhejiang University, Hangzhou, China*
[2]*Inventchip Technology, Shanghai, China*
[3]*ZJU-Hangzhou Global Scientific and Technology Innovation Center, Hangzhou, China*
[4]*Zhejiang Inventchip Technology, Zhejiang, China*

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Mohamed Alaluss[1], Madhu Lakshman Mysore[1], Clemens Herrmann[1], Sudhanshu Goel[2], Ahmed Elsayed[2], Thomas Basler[1]
[1]*Chair of Power Electronics, Chemnitz University of Technology, Chemnitz, Germany*
[2]*Robert Bosch GmbH, Reutlingen, Germany*

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[1]*Chair of Power Electronics, Chemnitz University of Technology, Chemnitz, Germany*
[2]*Infineon Technologies AG, Erlangen, Germany*

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Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Japan

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PK: Packaging Technologies
Chairs: Xavier Jorda (*IMB-CNM, Spain*), Wei-Chung Lo (*Industrial Technology Research Institute, Taiwan*)

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[1]*Department of Electrical Engineering, Nagoya University, Nagoya, Japan*
[2]*Institute of Materials and Systems for Sustainability (IMaSS), Nagoya University Nagoya, Japan*

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Yoshihiro Tateishi, Akira Kitamura, Keita Suzuki, Satoharu Tanai, Tetsuo Endoh, Yoshikazu Takahashi
Center for Innovative Integrated Electronic Systems, Tohoku University, Sendai, Japan

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[1]*Power Devices and Systems (PDS) Group, Institute of Microelectronics of Barcelona, IMB-CNM (CSIC), Barcelona, Spain*
[2]*Deep Concept, Pau, France*
[3]*Electronic Engineering Department, Polytechnic University of Catalonia (UPC), Barcelona, Spain*

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[1]State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources, North China Electric Power University, Beijing, China
[2]Beijing Institute of Smart Energy, Huairou Laboratory, Beijing, China

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[1]Advanced Power Semiconductor (APS) Laboratory, ETH Zurich, Zurich, Switzerland
[2]R&D, Ingeteam, Zamudio, Spain
[3]Infineon Technologies AG, Neubiberg, Germany

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HV-P: High Voltage Devices (Poster Session)

Extreme optimization of 1200V SuperJunction IGBT, competing with SiC MOSFET 417
Masahiro Tanaka[1], Naoki Abe[1], Akio Nakagawa[2]
[1]Nihon Synopsys G.K., Tokyo, Japan
[2]Nakagawa Consulting Office LLC., Chigasaki, Japan

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[1]China Resources Microelectronics (Chongqing), Chongqing, China
[2]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China

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[1]Corporate Research & Development Center, Toshiba, Kanagawa, Japan
[2]Institute of Industrial Science, The University of Tokyo, Tokyo, Japan
[3]Advanced Semiconductor Device Development Center, Toshiba Electronic Devices & Storage, Kanagawa, Japan

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[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China
[2]Chongqing Institute of Microelectronics Industry Technology, University of Electronic Science and Technology of China, Chongqing, China

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Guoliang Yao[1], Ming Qiao[1,2], Bo Zhang[1]
[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China
[2]Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen, China

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[1]Power Devices and Systems (PDS) Group, Institute of Microelectronics of Barcelona, IMB-CNM (CSIC), Barcelona, Spain
[2]BSH Home Appliances Group, Zaragoza, Spain

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[1]College of Integrated Circuit Science and Engineering, Nanjing University of Posts and Telecommunications, Nanjing, China
[2]University of Electronic Science and Technology, Chengdu, China.
[3]National & Local Joint Engineering Laboratory for RF Integration and Micro-Packaging Technologies, Nanjing, China
[4]China Resources Microelectronics, Chongqing, China

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[1]STMicroelectronics, Discrete & Filter Division, Tours, France
[2]Univ Lyon, INSA Lyon, Université Claude Bernard Lyon 1, Ecole Centrale de Lyon, CNRS, Ampère, Villeurbanne, France

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[1]Corporate Research & Development Center, Toshiba, Kawasaki, Japan
[2]Package & Test Technology Development Center, Toshiba Electronic Devices & Storage, Japan
[3]Advanced Semiconductor Device Development Center, Toshiba Electronic Devices & Storage, Japan
[4]Corporate Manufacturing Engineering Center, Toshiba, Japan
[5]Infrastructure Systems Research and Development Center, Toshiba Infrastructure Systems & Solutions, Japan

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[1]College of Electrical Engineering, Zhejiang University, Hangzhou, China
[2]Global Scientific and Technology Innovation Center, Zhejiang University, Hangzhou, China

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[1]Power Devices and Systems (PDS) Group, Institute of Microelectronics of Barcelona, IMB-CNM (CSIC), Barcelona, Spain
[2]BSH Home Appliances Group, Zaragoza, Spain

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[2]Deep Concept, Pau, France

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[1]The Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto, Toronto, Ontario, Canada
[2]Dana Canada, Advanced Technology and Research, Oakville, Ontario, Canada

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[1]College of Physics, Sichuan University, Chengdu, China
[2]Key Laboratory of Radiation Physics and Technology, Ministry of Education, Sichuan University, Chengdu, China

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[1]Electronic and Optoelectronic System Research Laboratories, Industrial Technology Research Institute, Hsinchu, Taiwan
[2]Electrical Measurement Laboratories, Taiwan Semiconductor Research Institute, Hsinchu, Taiwan

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[1]Infineon Technologies AG, Erlangen, Germany
[2]Infineon Technologies AG, Warstein, Germany

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[1]Institute of Microelectronics, Chinese Academy of Sciences, Beijing, China
[2]School of Integrated Circuits, University of Chinese Academy of Sciences, Beijing, China
[3]Zhuzhou CRRC Times Semiconductor, Zhuzhou, China

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[1]The State Key Laboratory of Materials for Integrated Circuits, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences
[2]The Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing, China

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[1]Institute of Microelectronics of the Chinese Academy of Sciences, Beijing, China
[2]University of Chinese Academy of Sciences, Beijing, China
[3]Zhuzhou CRRC Times Semiconductor, Zhuzhou, China

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[1]ABB Corporate Research Center, Baden-Dättwil, Switzerland
[2]ABB SpA, Bergamo, Italy

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[1]School of Integrated Circuits, Southeast University, Nanjing, China
[2]Nanjing Electronic Devices Institute, Nanjing, China

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[1]Center for Innovative Integrated Electronic Systems, Tohoku University, Sendai, Japan
[2]Laboratory for Brainware Systems, Research Institute of Electrical Communication, Tohoku University, Sendai, Japan
[3]Department of Electrical and Electronic Engineering, Ibaraki University, Ibaraki, Japan

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[1]College of Electrical Engineering, Zhejiang University, Hangzhou, China
[2]Semiconductors Business Group, Fuji Electric, Matsumoto, Japan

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[1]School of Integrated Circuits, Peking University, Beijing, China
[2]College of Microelectronics, Beijing University of Technology, Beijing, China
[3]Alpha Power Solutions, Shanghai, China

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[1]Institute of Pioneer Semiconductor Innovation, National Yang Ming Chiao Tung University, Taiwan
[2]International College of Semiconductor Technology, National Yang Ming Chiao Tung University, Taiwan
[3]Semiconductor Research Center, Hon Hai Research Institute, Taiwan
[4]Department of Electrical Engineering, National Central University, Taiwan
[5]Department of Photonics, National Yang Ming Chiao Tung University, Taiwan
[6]Institute of Electronics and Department of Electronics and Electrical Engineering, National Yang Ming Chiao Tung University, Taiwan

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[1]Department of Physics, National Sun Yat-sen University, Kaohsiung, Taiwan
[2]College of Semiconductor and Advanced Technology Research, National Sun Yat-sen University, Kaohsiung, Taiwan

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Advanced Power Semiconductor (APS) Laboratory, ETH Zurich, Zurich, Switzerland

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[1]School of Electrical and Electronic Engineering, Pusan National University, Busan, Korea
[2]Korea Atomic Energy Research Institute, Gyeongju, Korea
[3]Electronics and Telecommunications Research Institute, Daejeon, Korea
[4]Department of Semiconductor System Engineering, Kumoh National Institute of Technology, Gumi, Korea

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[1]Advanced Power Semiconductor Laboratory (APS), ETH Zurich, Zurich, Switzerland
[2]Ansys Germany GmbH, Weimar, Germany

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Chair of Power Electronics, Chemnitz University of Technology, Chemnitz, Germany

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School of Integrated Circuit Science and Engineering, University of Electronic Science and Technology of China, Chengdu, China

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[1]School of Engineering, University of Warwick Coventry, UK
[2]Istituto per la Microelettronica e Microsistemi – IMM-CNR Catania, Italy
[3]Department of Electrical Engineering and Information Technologies, University of Naples Federico II, Naples, Italy
[4]Faculty of Engineering and Technology, Cyprus University of Technology, Limassol, Cyprus

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[1]College of Nanotechnology Science and Engineering, University at Albany, Albany, NY, USA
[2]NoMIS Power, Albany, NY, USA

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[1]University at Albany, College of Nanotechnology Science and Engineering, Albany, NY, USA
[2]University of Arkansas, Department of Electrical Engineering and Computer Science, Fayetteville, AR, USA
[3]Sandia National Laboratories, Albuquerque, NM, USA
[4]NoMIS Power, Albany, NY, USA

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[1]Rensselaer Polytechnic Institute, Troy, New York, USA
[2]GE Aerospace, Niskayuna, New York, USA

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[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices of China, University of Electronic Science and Technology of China, Chengdu, China
[2]Power Device Research and Development Centre, Leshan Share Electronic, Leshan, China

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National ASIC System Engineering Research Center, School of Integrated Circuits, Southeast University, Nanjing, China

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University of Science and Technology of China, Hefei, China

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[1]Nanofabrication facility, Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences (CAS), Suzhou, Jiangsu, China
[2]School of Physics, Henan Normal University, Xinxiang, Henan, China

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[1]University of Science and Technology of China, Hefei, China
[2]Harbin Institute of Technology, Harbin, China

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University of Science and Technology of China, Hefei, China

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[1]School of Microelectronics, Southern University of Science and Technology, Shenzhen, China
[2]Department of Electrical and Electronic Engineering, The University of Hong Kong, Pokfulam Road, Hong Kong
[3]School of integrated Circuit, Shenzhen Polytechnic University, Shenzhen, China

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[1]Shanghai Institute of Intelligent Electronics & Systems, School of Microelectronics, Fudan University, Shanghai, China
[2]School of Integrated Circuits, Jiangnan University, Wuxi, China
[3]School of Information Science and Technology (SIST), ShanghaiTech University, Shanghai, China
[4]School of Electronic Information Engineering, Suzhou Vocational University, Suzhou, China
[5]Shanghai Institute of Space Power-Sources, Shanghai, China
[6]Wuxi Microelectronics Scientific and Research Center, Wuxi, China
[7]National Key Laboratory of Solid-State Microwave Devices and Circuits, Shijiazhuang, Hebei, China
[8]School of Academy for Engineering & Technology, Fudan University, Shanghai, China

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[1]Graduate school of Engineering, Osaka University, Osaka, Japan
[2]Advanced Products Development Center Technology & IP HQ, TDK, Chiba, Japan

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[1]College of Physics and Information Engineering, Fuzhou University, Fuzhou, China
[2]Key Laboratory of Materials for High Power Laser, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, Shanghai, China

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Department of Electronic Materials Engineering, Kwangwoon University, Seoul, Korea

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[1]Department of Electrical and Electronic Engineering, The University of Hong Kong, Hong Kong, China
[2]Center for Power Electronics Systems (CPES), Virginia Tech, Blacksburg, USA
[3]School of Electronic Science and Engineering, Nanjing University, Nanjing, China

Monolithic Integration of Enhancement- and Depletion-mode MOSFETs Based on Heteroepitaxial ε-Ga_2O_3 for Power ICs 649
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State Key Laboratory of Optoelectronic Materials and Technologies, School of Electronics and Information Technology, Sun Yat-sen University, Guangzhou, China

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University of Science and Technology of China, Hefei, China

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8:40 - 10:20
HV-2: Multi-Gate Technology and SJ Devices
Chairs: Ayanori Gatto (*Mitsubishi Electric, Japan*), Craig Fisher (*Vishay, UK*)

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A New Dimension of Hybrid Switches: Dual-gate IGBT and SiC MOSFET With Coordinated Gate Control 657
Roman Baburske, Alexander Philippou
Infineon Technologies AG, Neubiberg, Germany

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Kazuya Konishi, Koyo Matsuzaki, Kohei Onda, Kohei Sako, Shinya Soneda
Advanced Technology R&D Center, Mitsubishi Electric, Hyogo, Japan

9:20 - 9:40
Carrier-extraction Mechanism for MOS-controllable Stored-carrier Diode (MOSD) 665
Hiroshi Suzuki[1], Yujiro Takeuchi[1], Yusuke Takada[1], Takashi Hirao[1], Tsubasa Moritsuka[2], Masaki Shiraishi[2], Tetsuo Oda[2], Tomoyasu Furukawa[2]
[1]Research & Development Group, Hitachi, Ibaraki, Japan
[2]Minebea Power Semiconductor Device, Ibaraki, Japan

9:40 – 10:00
Next-Generation Superjunction Power Device with Trench Sidewall Doping 669
Chia Liang Liao[1,3], Lucio Renna[2], Voon Cheng Ngwan[1], Clelia Galati[2], Natalia Spinella[2], Giuseppe Longo[2], Francesco Patane[2], Gianfranco Di-Stefano[1], Jian Xin Zheng[3], Ning Xiang[3]
[1]STMicroelectronics, AMK, Singapore
[2]STMicroelectronics, Catania, Italy
[3]Singapore Institute of Technology, Singapore

10:00 – 10:20
Switching Loss Reduction in Superjunction IGBTs via Analysis of Vertical Charge Imbalance 673
Tomohiro Tamaki[1], Atsufumi Inoue[1], Shiro Hino[1], Kazuyasu Nishikawa[1], Makoto Hashimoto[2], Mitsuhisa Kawase[2], Yohei Sudo[2], Tsutomu Ogawa[2], Tatsuro Watahiki[1]
[1]Advanced Technology R&D Center, Mitsubishi Electric, Hyogo, Japan
[2]Nisshinbo Micro Devices, Japan

10:50 – 12:30
SiC-3: Novel Devices and Ruggedness of SiC
Chairs: Cheng-Tyng Yen (*Fast SiC Semiconductor, Taiwan*), Takaaki Tominaga (*Mitsubishi Electric, Japan*)

10:50 – 11:10
First Demonstration of SiC MOSFET with Monolithically Integrated Short-Circuit Protection 677
Shinichi Kimoto[1], Tatsunori Sakano[2], Ryosuke Iijima[2], Mitsuo Okamoto[1]
[1]Advanced Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan
[2]Corporate Research & Development Center, Toshiba, Kanagawa, Japan

11:10 – 11:30
Monolithic SiC Smart Power IC with Over-Temperature Protection 681
Mitsuo Okamoto, Atsushi Yao, Hiroshi Sato
Advanced Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

11:30 – 11:50

Experimental Demonstration and Analysis of 4.5kV Bidirectional Superjunction Power DMOSFETs in 4H-SiC 685

Zhaowen He[1], Reza Ghandi[2], Collin W. Hitchcock[2], Stacey Kennerly[2], T. Paul Chow[1]

[1]Rensselaer Polytechnic Institute, New York, USA

[2]GE Aerospace, New York, USA

11:50 – 12:10

Impact of bottom p-well grounding resistance on unclamped inductive switching ruggedness of SiC trench MOSFETs 689

Katsuhisa Tanaka[1], Yuji Kusumoto[1], Hideyuki Hasegawa[1], Hiroshi Kono[1], Kenya Sano[2]

[1]Advanced Semiconductor Device Development Center, Toshiba Electronic Devices & Storage, Hyogo, Japan

[2]Semiconductor Division, Toshiba Electronic Devices & Storage, Hyogo, Japan

12:10 – 12:30

The Accurate AC BTI Prediction of SiC Power MOSFETs by Comprehensive Understanding of Physical Mechanism Basic Vth Instability Phenomena 693

Tetsuya Yoshida[1], Katsumi Eikyu[1], Keiichi Maekawa[1], Hideki Aono[1], Tsunenobu Kimoto[2]

[1]Renesas Electronics, Ibaraki, Japan

[2]Department of Electronic Science and Engineering, Kyoto University, Kyoto, Japan

14:00 – 15:20

GaN-3: Novel GaN Power Device and Technologies 2

Chairs: Dong Seup Lee (*Texas Instruments, USA*), Hiroyuki Handa (*Panasonic Holdings, Japan*)

14:00 – 14:20

A Hybrid-Source Double-Channel p-GaN Gate AlGaN/GaN HEMT Featuring Suppression of Buffer Trapping Effects on Both Forward and Reverse Conductions 697

Xiaotian Tang[1,2], Zhongchen Ji[1,2], Qimeng Jiang[1,2], Sen Huang[1,2], Xinguo Gao[1], Ke Wei[1,2], Xinhua Wang[1,2], Xinyu Liu[1,2]

[1]Institute of Microelectronics of the Chinese Academy of Sciences, Beijing, China

[2]University of Chinese Academy of Sciences, Beijing, China

14:20 – 14:40

p-GaN Gate HEMT with the Buffer Hole Compensation Layer for Achieving Repetitive Avalanche-like Breakdown Capability 701

Cheng Yu[1], Wanjun Chen[1], Fangzhou Wang[2], Zhuocheng Wang[1], Xiaochuan Deng[1], Guojian Ding[2], Zheyu Huang[1], Yang Wang[2], Haiqiang Jia[2,3], Hong Chen[3], Bo Zhang[1]

[1]State Key Laboratory of Electronic, Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China

[2]Songshan Lake Materials Laboratory, Dongguan, China

[3]Institute of Physics, China Academy of Sciences, Beijing, China

14:40 – 15:00

Vth Adjustable p-Channel GaN FinFET For Complementary Logic Integration 705

Maolin Pan[1], Hai Huang[1], Xin Hu[1], Yifei Zhao[1], Yannan Yang[1], Saisheng Xu[1], Min Xu[1,2]

[1]State Key Laboratory of ASIC and System, Shanghai Institute of Intelligent Electronics & Systems, School of Microelectronics, Fudan University, Shanghai, China

[2]Shanghai Integrated Circuit Manufacturing Innovation Center, Shanghai, China

15:00 – 15:20

GaN/SiC-based Polarization Superjunction Hybrid HEMTs (PSJ-hyHEMTs) on Vicinal Off-angle SiC 709

Akira Nakajima, Hirohisa Hirai, Yoshinao Miura, Kazutoshi Kojima, Tomohisa Kato, Shinsuke Harada

Advanced Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan