2020 IEEE Electron Devices Technology and Manufacturing Conference (EDTM)

Opening Remarks

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EDTM 2020 Co-General Chairs Arjun Kantimahanti, SilTerra Samar Saha, Prospicient Devices

Plenary Session

Chair: Arokia Nathan, Cambridge Touch Technologies, Ltd.

PL-1

The Forever Exponential? Moore's Law: Past, Present and Future, Kaizad Mistry, Intel Corporation

PL-2

Semiconductor Nanowires for Optoelectronics Applications, Chennupati Jagadish, The Australian National University

PL-3

Rapid Yield Improvement Using Intelligent Data Mining, Vivek Jain, Maxim Integrated

Session 1A - Focus Sesison 1: Thin-Film Transistor

Chair: Naoto Horiguchi, IMEC

1A-1 (Invited)

Co-Design between Semiconductor, Low-Variation Fully-Additive Printed/Flexible Printing and Variation-Tolerant Digital Circuit Design, Joseph Chang, Tong Ge, and Tong Lin, Nanyang Technological University

1A-2 (Invited)

Contact Printed ZnO Nanowires Based FET for Large Area Electronics, Nivasan Yogeswaran, Adamos Christou, Fengyuan Liu, and Ravinder Dahiya, University of Glasgow

1A-3 (Invited)

Printable Low Power Organic Transistor for Highly Customizable IoT Devices, Xiaojun Guo¹, Yukun Huang¹, Linrun Feng², Sujie Chen¹, Jiaqing Zhao³, Wei Tang¹, Zhe Liu², Lei Han¹, and Bang Ouyang¹, ¹Shanghai Jiao Tong University, ²Wuhan LinkZill Technology Co., Ltd., ³Shanghai Aerospace Electronic Technology Institute

1A-4 (Invited)

Ultralow-Power All-Inkjet-Printed Organic Thin-Film Transistors for Wearables, Chen Jiang¹, Xiang Cheng², Constantinos P. Tsangarides², Yang Su⁴, Hanbin Ma³, and Arokia Nathan², ¹University of Cambridge, ²Cambridge Touch Technologies, ³ACXEL Tech Ltd

1A-5 (Invited)

Systematic Defect Manipulation in Metal Oxide Semiconductors towards High-Performance Thin-Film Transistors, Yuqing Zhang¹, Zhihe Xia², Jiapeng Li², Yang Shao¹, Sisi Wang², Lei Lu¹, Shengdong Zhang¹, Hoi-Sing Kwok², and Man Wong², ¹Peking University Shenzhen Graduate School, ²The Hong Kong University of Science and Technology

Session 1B - Nanotechnology Materials and Manufacturing

Chair: Anupam Mitra, Kioxia Corp.

1B-1 (Invited)

High Volume Semiconductor Manufacturing Using Nanoimprint Lithography, Yukio Takabayashi¹, Takehiko Iwanaga¹, Mitsuru Hiura¹, Hiroshi Morohoshi¹, Tatsuya Hayashi¹, Takamitsu Komaki¹, Osamu Morimoto¹, Keita Sakai¹, Wei Zhang², Anshuman Cherala², Se-Hyuk Im², Mario Meissl², and Jin Choi², ¹Canon Inc., ²Canon Nanotechnologies, Inc.

1B-2 (Invited)

Engineering Nanomaterials and Nanostructures for Electronic Applications: A Case Study of Carbon Nanotubes for Memory Devices, Rahul Sen, Thomas Kocab, Jennifer Black, Joseph McDermott, Sushanta K. Pal, Steve Buffat, David C. Gilmer, and Thomas Rueckes, Nantero, Inc.

1B-3 (Invited)

Manufacturing of Super Growth Carbon Nanotubes and Its Aqueous Solution for Electronic **Devices**, RShigemi Murakawa, Zeon Corporation

1B-4 (Invited)

Atomic Layer Defect-Free Top-Down Process for Future Nano-Devices, Seiji Samukawa, Tohoku University

1B-5

Back Gate Tunable Thin Film α-Si Nanowire BioFET for pH Detection by Compatible CMOS Fabrication Process, Nawaz Shafi¹, Jaydeep Singh Parmaar¹, Ankita Porwal¹, Aasif Mohammad Bhat¹, Chitrakant Sahu¹, C. Periasamy¹, and Shubhankar Majumdar², ¹Malaviya National Institute of Technology, Jaipur, ²National Institute of Meghalaya

Session 1C - Density Functional Theory-Based Simulation

Chair: Risho Koh, Renesas

1C-1 (Invited)

RSDFT-NEGF Quantum Transport Simulation of Ultra-Small Field-Effect Transistors, Nobuya Mori¹, Gennady Mil'nikov¹, Jun-ichi Iwata², and Atsushi Oshiyama³, ¹Osaka University, ²AdvanceSoft Corporation, ³Nagoya University

1C-2 (Invited)

Engineering Atom Scale Defects in Materials for Future Electronic Devices, Dipankar Pramanik¹, Federico Nardi², and Andrea Padovani², ¹DSPAN Solutions, ²Applied Materials

1C-3 Withdrawn

1C-4 Withdrawn

1C-5

Impact of Interface Traps Induced Degradation on Negative Capacitance FinFET, Om Prakash², Aniket Gupta², Girish Pahwa¹, Jörg Henkel², Yogesh S. Chauhan¹, and Hussam Amrouch², ¹Indian Institute of Technology, Kanpur, ²Karlsruhe Institute of Technology

Session 1D - Power and RF Devices

Chair: Saptarshi Das, Pennsylvania State Univ.

1D-1 (Invited)

Applications of Oxygen Inserted Silicon Devices in Power and RF, Robert J Mears¹, Hideki Takeuchi¹, Yi-Ann Chen¹, Richard Burton¹, Shuyi Li1, Robert J¹. Stephenson¹, Marek Hytha¹, Nyles W. Cody¹, K. Doran Weeks¹, Dmitri Choutov¹, Daniel Connelly¹, and Hiu-Yung Wong², ¹Atomera Incorporated, ²San Jose State University

1D-2

3-Dimensional 4H-SiC MOSFETs for Harsh Environment Electronics, M. I. Idris¹ and A. B. Horsfall², ¹Universiti Teknikal Malaysia Melaka, ²Durham University

1D-3 (Invited)

Growth-Microstructure-Device Performance Correlations for III-Nitride Optoelectronic and Power Devices on Sapphire and Silicon, Anisha Kalra, Shashwat Rathkanthiwar, Nayana Remesh, R. Muralidharan, Digbijoy Nath, and Srinivasan Raghavan, Indian Institute of Science, Bangalore

1D-4

The Benefits of Using SiN as a Buried Oxide in Germanium-On-Insulator Substrate, Sethavut Duangchan¹, Keisuke Yamamoto², Dong Wang², Hiroshi Nakashima², and Akiyoshi Baba³, ¹King Mongkut's University of Technology, ²Kyushu University, ³Kyushu Institute of Technology

1D-5 (Invited)

A Microscopic "Toy" Model of Ferroelectric Negative Capacitance, Michael Hoffmann¹, Prasanna Venkatesan Ravindran², and Asif Islam Khan², ¹NaMLab gGmbH/TU Dresden, ²Georgia Institute of Technology

Session 2A - Large Area and Flexible Electronics

Chair: Tian-Li Wu, National Chiao Tung Univ.

2A-1

Performances of Self-Aligned Top-Gate a-IGZO TFTs with Ultrathin PECVD SiO₂ Gate Dielectric, Yuqing Zhang, Hao Peng, Huan Yang, Yunkai Cao, Ludong Qin, Haishi Fu, Lei Lu, and Shengdong Zhang, Peking University Shenzhen Graduate School

2A-2 (Invited)

High Performance Printed Electronics on Large Area Flexible Substrates, Mahesh Soni, Dhayalan Shakthivel, Adamos Christou, Ayoub Zumeit, Nivasan Yogeswaran, and Ravinder Dahiya, University of Glasgow

2A-3 (Invited)

Fully Printed Vertical Transport Edge FETs for High Power Oxide Electronics, Nehru Devabharathi, Sandeep Kumar Mondal, Jyoti Ranjan Pradhan, and Subho Dasgupta, Indian Institute of Science, Bangalore

2A-4

Printing Quasi-1D Nanomaterials for Large-Area Flexible UV Photodetectors, Fengyuan Liu, Yogeenth Kumaresan, and Ravinder Dahiya, University of Glasgow

2A-5 (Invited)

Self-Healing Interconnects for Flexible Electronics, Virendra Parab¹, Amit Kumar¹, Li Ding², Pushkaraj Joshi², Manju Nair^{1,3}, Oppili Prasad¹, Arindan Handu¹, Sreelal Pillai³, and Sanjiv Sambandan^{1,2}, ¹Indian Institute of Science, Bangalore, ²University of Cambridge, ³Indian Space Research Organization

Session 2B - Design and Technology

Chair: Xiaojun Guo, Shanghai Jiao Tong Univ.

2B-1 (Invited)

Technology and Manufacturing Challenges for Si and 2D Material Based Nano-Scale Devices and Systems, Irfan Saadat, Khalifa University

2B-2

Near Threshold Design Technology Optimization in 12LP Process, Navneet Jain, Richard Fetherston, Deepesh Bagmar, Venkata Naresh Mudhireddy, and Mahbub Rashed, GLOBALFOUNDRIES Inc.

2B-3 (Invited)

An Agile and Scalable Manufacturing Model to Support 5G Growth, Luis Andia, Carlos Mazure, Ionut Radu, and Jean-Marc Le Meil, Soitec

2B-4

Yield Estimation of NCFET-Based 6-T SRAM, Yuri Hong and Changhwan Shin, Sungkyunkwan University

2B-5 (Invited)

Design Thinking Underlying Fully Integrated Systems, Mitsuhiko Nagata, Ph. D., Azbil Corporation

Session 2C - TCAD-1

Chair: Yogesh Singh Chauhan, Indian Inst. of Tech., Kanpur

2C-1 (Invited)

Particle-Based Device Modeling, Sima Dimitrijev, Griffith University

2C-2

Growth and Kinetics of Elemental and Binary Semiconducting Nanowires, Dhayalan Shakthivel and Ravinder Dahiya, University of Glasgow

2C-3

Significance of L-Valley Charges and a Method to Include It in Electrostatic Model of III-V GAA FETs, Mohit D. Ganeriwala¹, Francisco G. Ruiz², Enrique G. Marin², and Nihar R. Mohapatra¹, ¹Indian Institute of Technology, Gandhinagar, ²University of Granada

2C-4

Virtual Process-Based Spacer & Junction Optimization for an Inverter Circuit, S. Guissi¹, T. Schram², P. Schuddinck², S. Demuynck², and P. Meijer¹, ¹Lam Research, ²IMEC

2C-5

Investigating Doping Effect of Si on Opto-Electronic Performance of Photo-Voltaic Material ZnGa₂S₄: A Density Functional Theory Computation, Aditi Gaur¹, Karina Khan¹, Amit Soni¹, Alpa Dashora², Jagrati Sahariya³, and Ushma Ahuja⁴, ¹Manipal University Jaipur, ²The Maharaja Sayajirao University Baroda, ³National Institute of Technology, Uttarakhand, ⁴Mukesh Patel School of Technology Management & Engineering

Session 2D - GaN and III-V Devices

Chair: William (Bill) Nehrer, Applied Materials

2D-1

Low Leakage Mg-Compensated GaN Schottky Diodes on Free-Standing GaN Substrate for High Energy α-Particle Detection, A. Sandupatla¹, S. Arulkumaran^{1,2}, K. Ranjan¹, G. I. Ng¹, P. P. Murumu³, J. Kennedy³, M. Deki², S. Nitta², Y. Honda², and H. Amano², ¹Nanyang Technological University, ²Nagoya University, ³GNS Science

2D-2

Low Interface Trap Density in AlGaN/GaN Metal-Insulator-Semiconductor High-Electron-Mobility Transistors on CVD-Diamond, K. Ranjan, S. Arulkumaran, G. I. Ng, and A. Sandupatla, Nanyang Technological University

2D-3

Change of High-Voltage Conduction Mechanism in Vertical GaN-on-GaN Schottky Diodes at Elevated Temperatures, A. Sandupatla¹, S. Arulkumaran^{1,2}, G. I. Ng¹, K. Ranjan¹, M. Deki², S. Nitta², Y. Honda², and H. Amano², ¹Nanyang Technological University, ²Nagoya University

2D-4

Modeling and Characterization of InAs Quantum-Well Metal-Oxide-Semiconductor Field Effect Transistors on Quartz for 1.0 THz Wave Detection, T. Maeda¹, H. Ishii¹, W. H. Chang¹, H. Kanaya², and T. Asano², ¹National Institute of Advanced Industrial Science and Technology (AIST), ²Kyushu University

2D-5

Compact Modeling of Negative Capacitance Nanosheet FET including Quasi-Ballistic Transport, A. D. Gaidhane¹, G. Pahwa¹, A. Dasgupta², A. Verma¹, and Y. S. Chauhan¹, ¹Indian Institute of Technology, Kanpur, ²University of California, Berkeley

Session 3A - Advanced Photovoltaic Devices and Detectors

Chair: Shreepad Karmalkar, Indian Inst. of Tech., Madras

3A-1

Optimization of Electron Transport Layers for High Performance Perovskite Solar Cells, Damir Aidarkhanov¹, Askar Maxim¹, Zhiwei Ren¹, Zhuldyz Yelzhanova¹, Oral Ualibek¹, Bayan Daniyar¹, Aheyeerke Saibitihan¹, Mannix Balanay¹, Aleksandra Djurisic², Charles Surya¹, and Annie Ng¹, ¹Nazarbayev University, ²The University of Hong Kong

3A-2

Performance Enhancement of Double Quantum Well Solar Cell by Strain-Modulated Piezo-Phototronics Effect, S Routray¹, K P Pradhan², and G P Mishra³, ¹SRM Institute of Science and Technology, ²Indian Institute of Information Technology Design and Manufacturing, Kancheepuram, ³National Institute of Technology, Raipur

3A-3 Withdrawn

3A-4

A Spectrum-Tunable and Flexible Light-Emitting Device with Ultra-Wide Wavelength Range, Guangya Jiang, He Tian, Yi-Chi Zhang, Rong-Kun Zheng, Yan-Cong Qiao, Sifan Yang, Yi Yang, and Tian-Ling Ren, Tsinghua University

Session 3B - 2.5/3D Integration

Chair: Saad Mekhilef, University of Malaya

3B-1 (Invited)

Low Temperature SmartCut[™] Enabling 3D Integration, W. Schwarzenbach, G. Besnard, and B.-Y. Nguyen, Soitec

3B-2 (Invited)

Advanced Layer Transfer Technology of Post-Si Materials for Heterogeneous Integration, Tatsuro Maeda^{1,2}, Toshifumi Irisawa¹, Hiroyuki Ishii¹, and Wen-Hsin Chang¹, ¹National Institute of Advance Industrial Science and Technology (AIST), ²Tokyo University of Science

3B-3

Backstepping Position Control of High Frequency Piezoelectric Actuator Used in Ultrasonically Assisted Manufacturing, Mohammad Salah¹ and Ashraf Saleem², ¹The Hashemite University, ²Sultan Qaboos University

3B-4

The Investigation of Material Modification for SiO₂, **Si**₃N₄ **Film and Photo-Resist Using High-Dose Ion Implantation Technique**, R. Wada, H. Kai, N. Kawakami, J. Sasaki, and T. Kuroi, NISSIN ION EQUIPMENT CO., LTD.

Session 3C - TCAD-2

Chair: Albert Wang, Univ. of California, Riverside

3C-1 (Invited)

Comprehensive Design Solutions for Wide Bandgap Power Electronics, Sun Tao, Qingda Zhao, Vito Simonka, Andreas Hoessinger, and Eric Guichard, Silvaco

3C-2

Modeling Thermal Behavior in Multi-Layered GaN HEMT-Like Structures, Nidhin K, Suresh Balanethiram, Deleep R. Nair, and Anjan Chakravorty, Indian Institute of Technology, Madras

3C-3

First Time Enablement of RF Reliability Simulation Using Cadence Relxpert, Rajat Vishnoi, Naga Satish, Stewart Rauch, and Fernando Guarin, GLOBALFOUNDRIES Inc.

3C-4

Simulation and Device Characterization of the P+PN+P Junction Type Pinned Photodiode and Schottky Barrier Photodiode, Yoshiaki Hagiwara, Artificial Intelligent Partner Laboratory

Session 3D - GaN Power Devices

Chair: Juzer Vasi, Indian Inst. of Tech., Bombay

3D-1 (Invited)

Vertical Gallium Oxide Transistors with Current Aperture Formed Using Nitrogen-Ion Implantation Process, Masataka Higashiwaki¹, Man Hoi Wong¹, Ken Goto², Hisashi Murakami², and Yoshinao Kumagai², ¹National Institute of Information and Communications Technology, ²Tokyo University of Agriculture and Technology, ³University of Massachusetts

3D-2

Quasi-Normally-Off AlGaN/GaN HEMTs with Strained Comb Gate for Power Electronics Applications, Wei-Chih Cheng^{1,2}, Minghao He^{1,3}, Fanming Zeng^{1,4,5}, Qing Wang^{1,4,5}, Mansun Chan², and Hongyu Yu^{1,4,5}, ¹Southern University of Science and Technology, ²The Hong Kong University of Science and Technology, ³National University of Singapore, ⁴Shenzhen Institute of Wide-bandgap Semiconductors, ⁵The Key Laboratory of the Third Generation Semi-conductor

3D-3

Study on the Optimization of Off-State Breakdown Performance of p-GaN HEMTs, Fanming Zeng^{1,2,3}, Qing Wang^{1,2,3}, Shuxun Lin⁴, Liang Wang^{1,2,3}, Guangnan Zhou^{1,2,3}, Wei-Chih Cheng^{1,2,3}, Minghao He^{1,2,3}, Yang Jiang^{1,2,3}, Qi Ge^{1,2,3}, Ming Li⁴, and Hongyu Yu^{1,2,3}, ¹Southern University of Science and Technology, ²Shenzhen Institute of Wide-bandgap Semiconductors, ³GaN Device Engineering Technology Research Center of Guangdong, ⁴Chengdu HiWafer Semiconductor Co., Ltd.

3D-4 (Invited)

Simulation and Design of Step-Etched Junction Termination Extensions for GaN Power Diodes, Jeramy R. Dickerson, Andrew T. Binder, Greg Pickrell, Brendan P. Gunning, and Robert J. Kaplar, Sandia National Laboratories

Plenary Session

Chair: Samar Saha, Prospicient Devices

PL-4

Critical Feature Size of Device Manufacturing for Dominating MOSFET Evolutions, Digh Hisamoto, Research & Development Group, Hitachi, Ltd.

PL-5

Research Toward Monolithic Three-Dimensional ICs, Lance Li, Taiwan Semiconductor Manufacturing Company (TSMC)

Session 4M - Focus Session 2: Reliability and DTCO

Chair: Souvik Mahapatra, Indian Inst. of Tech., Bombay

4M-1 (Invited)

Hot Carrier Degradation in Classical and Emerging Logic and Power Electronic Devices: Rethinking Reliability for Next Generation Electronics, Muhammad Ashraful Alam, Bikram Kishore Mahajan, and Yen-Pu Chen, Purdue University

4M-2 (Invited)

A Model for Hole Trapping-Detrapping Kinetics during NBTI in p-Channel FETs, Nilotpal Choudhury, Narendra Parihar, Nilesh Goel, Thirunavukkarasu A, and Souvik Mahapatra, Indian Institute of Technology, Bombay

4M-3 (Invited)

Logic Block Level Design-Technology Co-Optimization is the New Moore's Law, Victor Moroz, Xi-Wei Lin, and Thuc Dam, Synopsys, Inc.

4M-4 (Invited)

Reliability of Advanced FinFET Technology Nodes beyond Planar, Hyun Chul Sagong, Kihyun Choi, Hai Jiang, Junekyun Park, Hwasung Rhee, and Sangwoo Pae, Samsung Electronics Co., Ltd.

4M-5 (Invited)

3D-NAND Reliability: Review of Key Mechanisms and Mitigations, Shyam Raghunathan, Micron Technology, Inc.

Session 4C - Novel Photodetectors

Chair: Kasturi Saha, Indian Inst. of Tech., Bombay

4C-1 (Invited)

High Gain Optical Sensors Enabled by Subthreshold Operation of Photodiode-Gated Transistors, Kai Wang¹, Jinming Liu¹, Yunfeng Hu², Yangbing Xu¹, Yihong Qi¹, Yitong Xu¹, and Xianda Zhou¹, ¹Sun Yat-sen University, ²University of Electronic Science and Technology of China

4C-2 (Invited)

Optimization of PMMA: PCBM Interlayer for MAPbl₃/**IGZO Phototransistor**, Yang Tan¹, Ben Xiang¹, Taoyu Zou¹, Chuan Liu², Kai Wang², Jun Chen², and Hang Zhou¹, ¹Peking University Shenzhen Graduate School, ²Sun Yat-sen University

4C-3

TiO₂ **Nanowire /RGO Thin-Film Based Hybrid White Light Photodetector**, Jay Chandra Dhar, Prasenjit Deb, Sudem Daimary, Priyanka Chetri, and Michael Cholines Pedapudi, National Institute of Technology, Nagaland

4C-4

Fabrication and Characterization of SnO₂/CH₃NH₃PbI₃ Based Photodetector, Rishibrind Kumar Upadhyay, Abhinav Pratap Singh, Deepchandra Upadhyay, Smrity ratan, and Satyabrata Jit, Indian Institute of Technology (BHU), Varanasi

4C-5 (Invited)

Implantable Fluorescent CMOS Imaging Device, Kiyotaka Sasagawa, Makito Haruta, Yasumi Ohta, Hironari Takehara, and Jun Ohta, Nara Institute of Science and Technology

Session 4D - Materials for Novel Devices

Chair: Pei-Wen Li, National Chiao Tung Univ.

4D-1

Organic Semiconductor Based Nitric Oxide Detector with Modulated Sensitivity and Selectivity, Govindasamy Madhaiyan¹, Hsiao-Wen Zan², and Hong-Cheu Lin¹, National Chiao Tung University

4D-2 (Invited)

Biopolymer Based Gate Dielectrics for High Performance Organic Thin Film Transistors, Jieun Ko and Wei Lin Leong, Nanyang Technological University

4D-3

Design and Fabrication of Self-Organized Ge Gate/SiO₂/Si_{1-x}Ge_x-nanoshell with Raised Source/ **Drain for Advanced Transistors**, I-Hsiang Wang, Keng-Ping Peng, Horng-Chih Lin, and Pei-Wen Li, National Chiao Tung University

4D-4 (Invited)

Effect of High Pressure Annealing Temperature on the Ferroelectric Properties of TiN/ Hf_{0.25}Zr_{0.75}O₂/TiN Capacitors, Sanghun Jeon, Dipjyoti Das, and Venkateswarlu Gaddam, Korea Advanced Institute of Science and Technology

4D-5 (Invited)

Applying Viscous Shear Stress to Align Single-Walled Carbon Nanotubes, Yarong Wang, Yubo Gao, Wenjun Li, Min Zhang, Jiaona Zhang, Qinghua Wang, Ziwei Zhang, and Zigang Li, Peking University Shenzhen Graduate School

Session 5A - Reliability 1

Chair: Mahadeva Iyer Natarajan, Allegro MicroSystems

5A-1 (Invited)

New Challenges of Design for Reliability in Advanced Technology Node, Changze Liu, Yongsheng Sun, Pengpeng Ren, Dan Gao, Weichun Luo, Zanfeng Chen, and Yu Xia, HiSilicon Technologies Co., Ltd.

5A-2 (Invited)

Misconception with Pad-Based CDM ESD Protection, Mengfu Di, Cheng Li, Zijin Pan, and Albert Wang, University of California, Riverside

5A-3

Compact Model of Read Disturbance by Hot Carrier Injection in 3D NAND Flash Memory, Jaeyeol Park, Dokyun Son, Minsoo Kim, Hyungjun Jo, and Hyungcheol Shin, Seoul National University

5A-4

Reliability Analysis of Gate-All-Around Floating Gate (GAA-FG) with Variable Oxide Thickness for Flash Memory Cell, Farah Hamid¹, N. Ezaila Alias¹, Afiq Hamzah¹, Zaharah Johari¹, M. L. Peng Tan¹, Razali Ismail¹, and Norhayati Soin², ¹Universiti Teknologi Malaysia, ²University Malaya

Session 5B - Compact Modeling

Chair: Slobodan Mijalkovic, Silvaco

5B-1

BSIM-IMG: Advanced Model for FDSOI Transistors with Back Channel Inversion, H. Agarwal¹, P. Kushwaha², A. Dasgupta², M. Y-Kao², T. Morshed³, G. Workman³, K. Shanbhag³, X. Li³, V. Vinothkumar³, Y. S. Chauhan⁴, S. Salahuddin², and C. Hu², ¹Indian Institute of Technology, Jodhpur, ²University of California, Berkeley, ³GLOBALFOUNDRIES Inc., ⁴Indian Institute of Technology, Kanpur

5B-2

A Complete Model of Gate Controlled Lateral PNP Devices in CMOS Technology Valid in All Regions of Operation, Wei Zheng Tan, Philip Beow Yew Tan, and Subhash C Rustagi, SilTerra Malaysia

5B-3 (Invited)

Tolerance Bound Calculation for Compact Model Calibration Using Functional Data Analysis, Shahed Reza, Nevin Martin, Thomas Buchheit, and James D. Tucker, Sandia National Laboratories

5B-4

Compact Modeling of Surface Potential and Drain Current in Multi-Layered MoS₂ **FETs**, Keshari Nandan¹, Chandan Yadav², Priyank Rastogi¹. Alejandro Toral-Lopez³, Antonio Marin-Sanchez³, Enrique G. Marin³, Francisco G. Ruiz³, Somnath Bhowmick¹, and Yogesh Singh Chauhan¹, ¹Indian Institute of Technology, Kanpur, ²University of Bordeaux, ³University of Granada

Session 5C - Sensors and Inductors

Chair: Roger Booth, Qualcomm

5C-1 (Invited)

Integration of Gas Sensors with CMOS Technology, Lado Filipovic and Siegfried Selberherr, TU Wien

5C-2

High Performance and Wireless Graphene Earphone towards Practical Applications, Yuhong Wei¹, Guofang Yu¹, Xiaoshi Li¹, Hua Shuai², Wanting Ye¹, Yancong Qiao¹, He Tian¹, Yi Yang¹, and Tian-Ling Ren¹, ¹Tsinghua University, ²The Ohio State University

5C-3

CMOS Low Power Current Source Based Tunable Inductor for IoT Devices, Selvakumar Mariappan^{1,2}, Jagadheswaran Rajendran¹, Yusman Mohd. Yusof², Harikrishnan Ramiah³, Mark Wong⁴, Subhash Chander Rustagi², and Arjun Kumar Kantimahanti², ¹Universiti Sains Malaysia ²SilTerra Malaysia ³University of Malaya, ⁴QRF Solutions Pte Ltd

5C-4 (Invited)

Overview of Recent Advances in Flexible Highly Compliant Magnetoelectronics, Denys Makarov, Helmholtz-Zentrum Dresden-Rossendorf

5C-5

Three Dimensional Modeling of Piezoelectric Micromachined Transducers Built on Top of Integrated Circuits, Kevin Chan¹, Mihir Patel¹, Nuria Barniol¹, Shomnath Bhowmick², Sebastien Cases³, and Angela Wong⁴, ¹Universitat Autonoma de Barcelona, ²SilTerra Malaysia, ³SoftMEMS EURL, ⁴Mentor Graphics

Session 5D - Materials for Manufacturing

Chair: Asrul Nizam, Univ. Sains Malaysia

5D-1

Patterning Platinum by Selective Wet Etching of Sacrificial Pt-Al Alloy, S. Meier^{1,2}, H. Rinck¹, B. Lange¹, E. Muellner¹, R. Brederlow², M. Enzelberger-Heim¹, S. Summerfelt¹, F. Kreupl², and B. Wolf^{2,3}, ¹Texas Instruments Incorporated, ²Technische Universität München, ³Steinbeis Zentrum Medizinische Elektronik & Lab on Chip-Systeme

5D-2

Withdrawn

5D-3 (Invited)

Printed Graphene Aerosol Gel Micro-Supercapacitors: Towards Flexible Energy Storage Devices, Anand P S Gaur, Wenjun Xiang, Arjun Nepal, Christopher M. Sorensen, and Suprem R. Das, Kansas State University

5D-4

SnO Thin Films Prepared by Reactive Sputtering for Ambipolar Thin-Film Transistor Applications, Jingyong Huo, Xiaolin Wang, Xiaohan Wu, Wen-Jun Liu, and Shi-Jin Ding, Fudan University

Session 6A - Reliability 2

Chair: Norhayati Binti Soin, Univ. of Malaya

6A-1

Impact and Quantization of Short-Term Relaxation Effect in Analog RRAM, Yue. Xi¹, Bin Gao^{1,2}, Jianshi Tang^{1,2}, Xing Mu¹, Feng Xu¹, Peng Yao¹, Xinyi Li¹, Wenbin Zhang¹, Meiran Zhao¹, He Qian^{1,2}, and Huaqiang Wu^{1,2}, ¹Tsinghua University, ²Beijing National Research Center for Information Science and Technology

6A-2

Reliability of 2DEG Diamond FET by Harsh-Continuous Stress Voltage Approach, N. M. Nashaain², S. Falina^{1,2}, Y. Kitabayashi¹, D. Matsumura¹, AA. Manaf², Z. Hassan², M. Syamsul^{1,2}, and H. Kawarada¹, ¹Waseda University, ²Universiti Sains Malaysia

6A-3

Analysis and Failure Modes of Highly Degraded PV Modules Inspected during the 2018 All India Survey of PV Module Reliability, Yogeswara Rao Golive, Sachin Zachariah, Sonali Bhaduri, Rajiv Dubey, Shashwata Chattopadhyay, Hemant K. Singh, Anil Kottantharayil, Narendra Shiradkar, and Juzer Vasi, Indian Institute of Technology, Bombay

6A-4

Hydrogen Proton Induced HTRB Reliability Degradation in Trench Power Devices, C. Jacquemont^{1,2}, K. M. Wong², and David Goh², ¹National Institute of Applied Sciences, ²STMicroelectronics

Session 6B - Memory Modeling and Interface Trap Modeling

Chair: Dondee Navarro, Hiroshima Univ.

6B-1

Perpendicular STT-MRAM Switching at Fixed Voltage and at Fixed Current, S. Fiorentini¹, R. L. de Orio¹, S. Selberherr¹, J. Ender¹, W. Goes², and V. Sverdlov¹, ¹TU Wien, ²Silvaco

6B-2

Extraction of Mobility in 3-D NAND Flash Memory with Poly-Si Based Macaroni Structure, Hyungjun Jo, Juhyun Kim, Minsoo Kim, and Hyungcheol Shin, Seoul National University

6B-3

Improved Lumped Element Model for GaN-Based MIS-HEMT Gate Stack in the Spill-Over Regime, Narendra Rai¹, Ashutosh Mahajan², Dipankar Saha¹, and Swaroop Ganguly¹, ¹Indian Institute of Technology, Bombay, ²Vellore Institute of Technology

6B-4

Impact of Interface Traps and Zn Diffusion on Performance of Lateral Hybrid III-V/Si Photodetectors , Q. Ding¹, Y. Baumgartner^{1,2}, L. Czornomaz², and A. Schenk¹, ¹ETH Zurich, ²IBM Research - Zurich

Session 6C - Neural Network and NVM 1

Chair: Nor Ashidi Mat Isa, Univ. Sains Malaysia

6C-1 (Invited)

Material Innovation in the Era of Artificial Intelligence – A Case Study of Hf-Zr Systems, Dina H. Triyoso, Robert D. Clark, Steven Consiglio, Kandabara Tapily, Hisashi Higuchi, Takahiro Hakamata, Danny Newman, Sophia Rogalskyj, Christopher Cole, Angelique Raley, Cory Wajda, and Gert Leusink, TEL Technology Center, America

6C-2 (Invited)

Enabling High-Performance DNN Inference Accelerators Using Non-Volatile Analog Memory, An Chen, Stefano Ambrogio, Pritish Narayanan, Hsinyu Tsai, Charles Mackin, Katherine Spoon, Alexander Friz, Andrea Fasoli, and Geoffrey W. Burr, IBM Research - Almaden

6C-3 (Invited)

A Low Computational Cost Visual Tracking Algorithm Designed for a Multiple Mode Brain-Machine-Interface, Xuecheng Wang¹, Milin Zhang¹, Liangrui Peng¹, Andrew G. Richardson², Timothy H. Lucas², and Jan Van der Spiegel², ¹Tsinghua University, ²University of Pennsylvania

6C-4

Resistive Switching Behaviour of PVP/HfO_x Hybrid RRAM on Flexible Substrate, Ishan Varun, Deepak Bharti, Ajay Kumar Mahato, Vivek Raghuwanshi, and Shree Prakash Tiwari, Indian Institute of Technology, Jodhpur

Session 6D - SiC-Power Devices

Chair: Qing Zhang, Nanyang Tech. Univ.

6D-1

Gen-3 PRESiCE[™] Technology for Manufacturing SiC Power Devices in a 6-inch Commercial Foundry, B. Jayant Baliga, North Carolina State University

6D-2

Charge Sheet Super Junction in 4H-Silicon Carbide, Akshay K.¹, M. G. Jaikumar², and Shreepad Karmalkar¹, ¹Indian Institute of Technology, Madras, ²National Institute of Technology Calicut

6D-3

A Novel Snapback-Free Reverse-Conducting IGBT with Si/SiC Heterojunction, Jinping Zhang, Junyi Luo, Zixun Chen, Zehong Li, and Bo Zhang, University of Electronic Science and Technology of China

6D-4 (Invited)

Roles of Semiconductor Junctions in Mechanical-Electrical Power Conversion, Qing Zhang, Nanyang Technological University

Plenary Session

Chair: Jagadheswaran Rajendran, Univ. Sains Malaysia

PL-6

Nanocarbon Interconnects - from 1D to 3D, Cary Y. Yang, Santa Clara University

PL-7

Semiconductor Nanowires for Optoelectronics Applications, David Lacey, OSRAM Opto Semiconductors (Malaysia) Sdn. Bhd.

Session 7A - Emerging Memory for IoT

Chair: Subhash Rustagi, SilTerra

7A-1 (Invited)

Ferroelectric-HfO₂ **Devices Technology and Manufacturing for Memory and Logic Applications**, Shinji Migita, National Institute of Advanced Industrial Science and Technology (AIST)

7**A-**2

Fabrication and Characterization of Ferroelectric HfZrO-Based Synaptic Transistors with Multi-State Plasticity, Tianqi Lu, Renrong Liang, Ruiting Zhao, Yi Yang, and Tian-Ling Ren, Tsinghua University

7A-3

A Novel Capacitor-Based Stateful Logic Operation Scheme for In-Memory Computing in 1T1R RRAM Array, Wensheng Shen¹, Peng Huang¹, Xiangyu Wang¹, YuLin Feng¹, WeiJie Xu¹, Bin Gao², Huaqiang Wu², He Qian², Lifeng Liu¹, Xiaoyan Liu¹, Xing Zhang¹, and Jinfeng Kang¹, ¹Peking University, ²Tsinghua University

7A-4

A Novel Bi-Functional Memory-PUF Module Utilizing Adjustable Switching Window of RRAM, Bohan Lin¹, Bin Gao¹, Yachuan Pang¹, Bing Chen², Jianshi Tang¹, He Qian¹, and Huaqiang Wu¹, ¹Tsinghua University, ²Zhejiang University

Session 7B - Advanced Transistors

Chair: Abhisek Dixit, Indian Inst. of Tech., Delhi

7B-1

Process-Induced V_t **Variability in Nanoscale FinFETs: Does V**_t **Extraction Methods Have Any Impact?**, Mandar S. Bhoir¹, Thomas Chiarella², Lars A. Ragnarsson², Jerome Mitard², Naoto Horiguchi², and Nihar R. Mohapatra¹, ¹Indian Institute of Technology, Gandhinagar, ²IMEC

7B-2

Impact of LER on Mismatch in Nanosheet Transistors for 5nm-CMOS, Chandan Kumar Jha¹, Charu Gupta¹, Anshul Gupta¹, Reinaldo A Vega², and Abhisek Dixit¹, ¹Indian Institute of Technology, Delhi, ²IBM Semiconductor Technology Research

7B-3 Withdr

Withdrawn

7B-4

Digital Type CMOS-MEMS Cointegrated Pressure Sensor Fabricated Using Cost-Effective Minimal-Fab Process, Y. X. Liu¹, I. Akita¹, T. Matsukawa¹, H. Tanaka¹, K. Koga², M. Nemoto¹, S. Khumpuang^{1,2}, M. Nagao¹, Y. Morita¹, and S. Hara^{1,2}, ¹National Institute of Advanced Industrial Science and Technology (AIST), ²Minimal Fab General Incorporated Association

Session 7C - Materials Processing

Chair: Sanjiv Sambandan, Cambridge Univ.

7C-1

Performance and Reliability Improvement in Ge *n***MOSFETs with Different Surface Orientations through Channel Flattening Process**, W. H. Chang, T. Irisawa, W. Mizubayashi, H. Ishii, and T. Maeda, National Institute of Advanced Industrial Science and Technology (AIST)

7C-2 (Invited)

COTS Semiconductor Components for the New Space Industry, Harshad Bokil, ispace, inc.

7C-3

Bi-Objective Indirect Optimization of Robotic Transportation Task Assignment Based on Auction Mechanism, Moussa G. Souleymane^{1,2}, Sahnoun M'hammed¹, Duval Fabrice¹, and Bensrhair Abdelaziz², ¹CESI LINEACT, ²LITIS - INSA de Rouen

7C-4 (Invited)

Switching and Charge Trapping in HfO₂-Based Ferroelectric FETs: An Overview and Potential Applications, Halid Mulaosmanovic¹, Evelyn T. Breyer¹, Thomas Mikolajick^{1,2}, and Stefan Slesazeck¹, ¹NaMLab gGmbH, ²TU Dresden

7C-5

Ferroelectricity Enhancement in $H_{0.5}Zr_{0.5}O_2$ Capacitors by Incorporating Ta_2O_5 Dielectric Seed Layers, Venkateswarlu Gaddam, Dipjyoti Das, and Sanghun Jeon, Korea Advanced Institute of Science and Technology

Session 7D - Neural Network and NVM 2

Chair: Suprem Das, Kansas State Univ.

7D-1

Neural Network Based Design Optimization of 14-nm Node Fully-Depleted SOI FET for SoC and 3DIC Applications, Hyeok Yun¹, Jun-Sik Yoon¹, Jinsu Jeong¹, Seunghwan Lee¹, Hyun-Chul Choi², and Rock-Hyun Baek¹, ¹Pohang University of Science and Technology, ²Yeungnam University

7D-2

Graphene Muscle with Artificial Intelligence, Ning-Qin Deng¹, He Tian¹, Fan Wu¹, Ye Tian¹, Xiao-Shi Li¹, Yang Xu², Yi Yang¹, and Tian-Ling Ren¹, ¹Tsinghua University, ²Zhejiang University

7D-3

Methodology to Predict Random Telegraph Noise Induced Threshold Voltage Shift Using Machine Learning, Eunseok Oh, Jang Kyu Lee, Youngsoo Seo, and Hyungcheol Shin, Seoul National University

7D-4

Development of Non-Volatile Tunnel-FET Memory as a Synaptic Device for Low-Power Spiking Neural Networks, Hisashi Kino, Takafumi Fukushima, and Tetsu Tanaka, Tohoku University

Session 8A - 2D Materials and Devices

Chair: Wai Yie Leong, MAHSA Univ.

8A-1 Withdr

Withdrawn

8**A-2**

Synthesis of MoS_{2(1-x)}Te_{2x} by Sputtering and the Change in the Physical Properties and Structure **Depending on the Chalcogen Composition**, Yusuke Hibino¹, Yusuke Hashimoto¹, Kota Yamazaki¹, Yuya Oyanagi¹, Naomi Sawamoto¹, Hitoshi Wakabayashi², and Atsushi Ogura¹, ¹Meiji University, ²Japanese Society for the Promotion of Science, ³Tokyo Institute of Technology

8A-3 (Invited)

Inter-Layer Charge and Energy Transfer in Layered Heterojunction Devices, Kausik Majumdar, Krishna Murali, Nithin Abraham, and Medha Dandu, Indian Institute of Science, Bangalore

8A-4 Withdrawn

Session 8B - Manufacturing and Characterization

Chair: Bernard Lim, Jabil Circuit Sdn. Bhd.

8B-1 (Invited)

Metrology and Inspection: Challenges and Solutions for Emerging Technology Nodes, Arun R. Srivatsa, Jingmin Leng, Navneet Singh, Yi Ding, Roman Mostovoy, Xiaodong Zhang, Matthias Bauer, Jothilingam Ramalingam, Prashanth Kulshrestha, and Timothy Thao, Applied Materials

8B-2

Physical Model for Rapid Thermal Annealing (RTA) Induced Mechanical Stress, Tingyou Lin^{1,2}, Jian-Hsing Lee¹, Cheng-Tsung Wu¹, Shao-Chang Huang¹, Chung-Chin Hung², and Chauchin Su², ¹Vanguard International Semiconductor Corp., ²National Chiao Tung University

8B-3

Residual Stress Analysis and Structural Parameters Optimization of Corrugated Diaphragms Applied to MEMS Device, Chuying Tang^{1,2}, Liang Wang², Yao Cai¹, Yi Zhang¹, Qing Wang^{2,3}, Chengliang Sun¹, and Hongyu Yu^{2,3}, ¹Wuhan University, ²Southern University of Science and Technology, ³Shenzhen Institute of Wide-bandgap Semiconductors

8B-4

Capacity Improvement for 200mm PVD Cluster Equipment CMOS Technology, MA Chik, MSA Abd Malik, and Faizah MDY, SilTerra Malaysia

Session 8C - Variability Modeling

Chair: Sachin Sonkusale, Solarlytics, Inc.

8C-1

General Formula to Capture the Impact of Dummy Gates on Layout Dependent Effects Modeling of Multi-Finger MOSFETs, Kejun Xia, Qilin Zhang, Hanyu Sheng, Lei Chao, and Wuxia Li, NXP Semiconductors

8C-2

An Accurate Structure Generation and Simulation of LER Affected NWFET, Agam Jain¹, Shashank V. Inge², Amita², and Udayan Ganguly², ¹Indian Institute of Technology, Roorkee, ²Indian Institute of Technology, Bombay

8C-3

Analysis on Process Variation Effect of 3D NAND Flash Memory Cell through Machine Learning Model, Jang Kyu Lee, Kyul Ko, and Hyungcheol Shin, Seoul National University

8C-4

Superior Work Function Variability Performance of Horizontally Stacked Nanosheet FETs for Sub-7-nm Technology and Beyond, Akhil Sudarsanan, Sankatali Venkateswarlu, and Kaushik Nayak, Indian Institute of Technology, Hyderabad

Session 8D - Focus Session 3: Packaging and Heterogeneous Integration

Chair: Piyush Gupta, Qualcomm

8D-1

Withdrawn

8D-2 (Invited)

System-Level Power Integrity Optimization Based on High-Density Capacitors for Enabling HPC/AI Applications, Sungwook Moon, Seungki Nam, Jungil Son, and Sumant Srikant, Samsung Electronics Co., Ltd.

8D-3 (Invited)

Multilithic 3D and Heterogeneous Integration Using Capillary Self-Assembly, Takafumi Fukushima, Tohoku University

8D-4 (Invited)

Surface Planarization of Polymeric Dielectrics for FOWLP Applications, Sangwon Lee, Habin Yoo, Soojung Kang, Yejin Kim, Seungjoo Han, Jungeun Pyun, and Sungdong Kim, Seoul National University of Science and Technology

Session 9C - RF Device Modeling

Chair: Harshit Agarwal, Indian Inst. of Tech., Jodhpur

9C-1 (Invited)

SOI Devices and Substrates towards RF and Millimeter Wave ICs, Martin Rack and Jean-Pierre Raskin, Université catholique de Louvain

9C-2

Modeling and Design of SiC-Based High-Frequency Photoconductive Switches, S. Rakheja¹, L. Huang², S. Hau-Riege³, S. E. Harrison³, L. F. Voss³, and A. M. Conway³, ¹University of Illinois at Urbana-Champaign, ²New York University, ³Lawrence Livermore National Laboratory

9C-3

Geometrical Dimension Impact for Performance of CMOS Based Circular Shape Aluminum Nitride (AIN) Piezoelectric Micromachined Ultrasonic Transducer (PMUT), Muhammad Naim Haron, Mohamad Adzhar Md Zawawi, Mohamed Fauzi Packeer, and Asrulnizam Abd Manaf, Universiti Sains Malaysia

9C-4

Non-Quasi-Static Effect on Ge-Body pTFET for Different Source Materials, Sayani Ghosh¹, Kalyan Koley², Samar K. Saha³, and Chandan K. Sarkar¹, ¹Jadavpur University, ²Indian Institute of Technology, Dhanbad ³Prospicient Devices

Poster Session

P-1

Top-Gate Self-Aligned InGaZnO TFTs with Copper Light Shield Layer, Sheng Sun¹, Zhenguo Lin², and Shengdong Zhang¹, ¹Peking University Shenzhen Graduate School, ²Shenzhen China Star Optoelectronics Semiconductor Display Technology Co. Ltd.

P-2

Charging Reduction Method for Auger Analysis on Bond Pad, Hemalatha Somu, Infineon Technologies

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2D MoWSe₂ Material Photoluminescence Characterization Based on MOS Device, Xinghua Wang, Zhouhui Tuo, Canbin Hu, and Hongwei Liu, Academy of Military Science

P-4

Stacked Ge Nanosheets GAAFETs Fabricated by 2D Ge/Si Multilayer Epitaxy, Wet Selective Etching, and New Method of Dislocation Removal, Chun-Lin Chu, Guang-Li Luo, Kehuey Wu, Shih-Hong Chen, Mu-Shih Yeh, Bo-Yuan Chen, Wen-Fa Wu, and Wen-Kuan Yeh, Taiwan Semiconductor Research Institute

P-5

High Frequency Monolithic Inductor with Air-Gaps, Clarissa Prawoto¹, Zichao Ma¹, Ying Xiao¹, Salahuddin Raju¹, Changjian Zhou^{1,2}, and Mansun Chan¹, ¹The Hong Kong University of Science and Technology, ²South China University of Technology

P-6

Monolithic CMOS-BAW Oscillator for Mass Sensing Applications, E. Marigo¹, M. Soundara Pandian¹, J. Bin Jamil Din¹, N. S. Binti Roslan¹, M. Atef², and A. Ahmed², ¹SilTerra Malaysia, ²Si-Ware Systems

P-7

Novel Hybrid MTJ-CMOS Based Programmable Gain Amplifier for Portable Applications, Shivam Verma, Indian Institute of Technology (BHU), Varanasi

P-8

A 1.8 V 8-Bit Pipelined ADC with Integrated Folded Cascode Op-Amp in CMOS 180 nm, Norhamizah Idros, Zulfiqar Ali Abdul Aziz, and Jagadheswaran Rajendran, Universiti Sains Malaysia

P-9

Design of a High Accuracy and Real-Time Indoor Positioning System Based on Coding Point Identification and Its FPGA Implementation, Guanting Huo¹, Chang Yu-Cheng¹, Langqing Wang², Yong Zhao¹, and Yufeng Jin¹, ¹Peking University Shenzhen Graduate School, ²Shenzhen State Micro Technology Co.,Ltd.

Low-Temperature Fully Photolithographic In-Si-O Thin-Film Transistors, Guangyu Yao¹, Hanbin Ma¹, Sanjiv Sambandan^{1,2}, and Arokia Nathan³, ¹University of Cambridge ²Indian Institute of Science, Bangalore ³Cambridge Touch Technologies, Ltd.

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Process Optimization for Improving the Threshold Voltage Distribution of 3300V IGBT Platform, Yaohua Wang¹, Kui Pu², Jun Zeng², Rui Jin¹, Wenhong Zhang², Longlai Xu², Mohamed N. Darwish², and Shaohua Dong¹, ¹Global Energy Interconnection Research Institute, ²MaxPower Semiconductor Inc.

P-12

A New Unity Gain Nine-Level Active Neutral Point Clamped (9L-ANPC) Multilevel Inverter Topology , Marif Daula Siddique¹, Saad Mekhilef¹, Noraisyah Mohamed Shah¹, Mehdi Seyedmahmoudian², Ben Horan³, and Alex Stojcevski², ¹University of Malaya ²Swinburne University of Technology ³Deakin University

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New Approach for Estimating Three Parameters in PV Cell Models Based on Odd Polynomial Regression, Ahmed Abdolkhalig¹, Qing Fang², and Ashraf Mohamed¹, ¹The University of Tobruk, ²State Grid Beijing Electric Power Company

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Proposed Process Flow for Potential Well Based FDSOI MOSFET at 20 nm Gate Length, Chandan K. Jaiswal, Nishant, Shruti Mehrotra, and S. Qureshi, Indian Institute of Technology, Kanpur

P-15

Analytical Study of WO₃-Based Memristive System for Neuromorphic Applications, Sanjay Kumar, Rajan Agrawal, Mangal Das, Pawan Kumar, and Shaibal Mukherjee, Indian Institute of Technology, Indore

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Analytical Modeling to Study the Effect of Cap Layer Thickness in ZnO/MgZnO/ZnO Heterostructure for HEMT Applications, Pawan Kumar, Md Arif Khan, Mangal Das, Gaurav Siddharth, Sanjay Kumar, and Shaibal Mukherjee, Indian Institute of Technology, Indore

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Centroid and Inversion Charge Model for Long Channel Strained-Silicon GAA MOSFET with Quantum Effect, Fatimah K. A. Hamid, N. Ezaila Alias, Zaharah Johari, and Razali Ismail, Universiti Teknologi Malaysia

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Carrier Density and Quantum Capacitance Model for Doped Graphene, Chandrasekar L and K P Pradhan, Indian Institute of Information Technology Design and Manufacturing, Kancheepuram

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Extensive Study on Effect of Pinhole Induced Electric Field in Si CS-TOPCon Solar Cell, Manish Verma¹, S. Routray², and G. P. Mishra¹, ¹National Institute of Technology, Raipur, ²SRM Institute of Science and Technology

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Assessment of Analog/RF Performances for 10 nm Tri-Metal Gate FinFET, Nikhil G P¹, S Routray¹, and K P Pradhan², ¹SRM Institute of Science and Technology, ²Indian Institute of Information Technology Design and Manufacturing, Kancheepuram

Corrections to WKB Approximation for Accurate Calculation of Gate Current in HKMG MOS Transistors, Apoorva Ojha and Nihar R. Mohapatra, Indian Institute of Technology, Gandhinagar

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The "Extrinsic" Compact Model of the MOSFET Drain Current Based on a New Interpolation Expression for the Transition between Linear and Saturation Regimes with a Monotonic Decrease of the Differential Conductance to a Nonzero Value, Valentin O. Turin¹, Roman S. Shkarlat², Gennady I. Zebrev³, Benjamín Iñiguez⁴, and Michael S. Shur⁵, ¹Orel State University named after I.S. Turgenev, ²JSC "Bolkhov Plant of Semiconductor Devices", ³National Research Nuclear University "MEPhI", ⁴Rovira i Virgili University, ⁵Rensselaer Polytechnic Institute

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Resistive Approach for Extraction of Gate to Source Bias-Dependent Source/Drain Parasitic Resistance, Mobility and Virtual Gate Length of GaN HEMT, Pragyey Kumar Kaushik, Ankur Gupta, and Ananjan Basu, Indian Institute of Technology, Delhi

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Beta-Ga₂O₃ MOSFET Device Optimization via TCAD, Minghao He^{1,2,3}, Fanming Zeng^{2,3}, Wei-Chih Cheng^{2,3,4}, Qing Wang^{2,3}, Hongyu Yu^{2,3}, and Kah Wee Ang¹, ¹National University of Singapore, ²Southern University of Science and Technology, ³Shenzhen Institute of Wide-bandgap Semiconductors, ⁴Hong Kong University of Science and Technology

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Impact of Source/Drain Underlap on the Ballistic Performance of Silicon and Germanium-Tin Nanowire p-MOSFETs, Dibakar Yadav and Deleep R. Nair, Indian Institute of Technology, Madras

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An Investigation of Transmission Line Modeling Test Structure in TCAD, Thanh PC^{1,2}, Duy Nguyen Phuong¹, Anthony Holland², and Alexandru Fechete¹, ¹RMIT University Vietnam, ²RMIT University

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Device Electrostatics and High Temperature Operation of Oxygen Terminated Boron Doped Diamond MOS Capacitor and MOSFET, Yerragudi Pullaiah, Naresh Kumar Emani, and Kaushik Nayak, Indian Institute of Technology, Hyderabad

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Reduction of Harmonic Distortion of 14-nm InAs Quantum Well n-MOSFET for High DC to AC Conversion Efficiency and High Voltage Gain, Sumedha Dasgupta¹, Chandrima Mondal², and Abhijit Biswas³, ¹Future Institute of Technology, ²Jadavpur University, ³University of Calcutta

P-29

Variation of the Efficiency of GaN Junctionless FinFET Based Boost Converter with Subthreshold Swing as a Unified Device Parameter, Sudipta Mukherjee, Dipankar Saha, Apurba Laha, and Swaroop Ganguly, Indian Institute of Technology, Bombay

P-30

Analysis and Compact Modeling of Thermal Noise in Halo Implanted MOSFETs, Ravi Goel, Chetan Gupta, and Yogesh S. Chauhan, Indian Institute of Technology, Kanpur

P-31

Investigation of Standard and Enclosed Gate n-MOSFET Degradation due to Total Ionizing Dose Using BSIM-BULK, Jay Hind Kumar Verma and Yogesh Singh Chauhan, Indian Institute of Technology, Kanpur

Geometrical Influence on Self Heating in Nanowire and Nanosheet FETs Using TCAD Simulations, Min Jae Kang¹, Ilho Myeong², and Kristel Fobelets¹, ¹Imperial College London, ²Seoul National University

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Performance Comparison of Ge/Si Hetero-Junction Vertical Tunnel FET with and without Gate-Drain Underlapped Structure with Application to Digital Inverter, Manas R. Tripathy, Ashish K. Singh, A Samad, Kamalaksha Baral, Prince K. Singh, and Satyabrata Jit, Indian Institute of Technology (BHU), Varanasi

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Ferroelectric Gate Heterojunction TFET on Selective Buried Oxide (SELBOX) Substrate for Distortionless and Low Power Applications, Ashish Kumar Singh, Manas Ranjan Tripathy, Kamalaksha Baral, Prince Kumar Singh, and S. Jit, Indian Institute of Technology (BHU), Varanasi

P-35

Robust Design of Bimetallic ZnO Nanofilm SPR Sensor Using Taguchi Method, G.S. Mei, N. R. Mohamad, N. A. Jamil, C.F. Dee, A. A. Hamzah, and P. S. Menon, Institute of Microengineering and Nanoelectronics (IMEN), Universiti Kebangsaan Malaysia (UKM)

P-36

Study of Thin Film Tin Oxide for Reliability as Gas Sensing Material, Ravi Shankar, Tien Choy Loh, Le Khaing Le, Chun Wei Khor, Shian Yeu Kam, and Patrice Ramonda, STMicroelectronics

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Abnormal Positive Bias Stress Instability for Amorphous In-Ga-Zn-O Thin-Film Transistors with Room Temperature Atomic-Layer-Deposited Al₂O₃ Dielectric, Yan Shao, Mei-Na Zhang, Xiaohan Wu, Wen-Jun Liu, and Shi-Jin Ding, Fudan University

P-38

Improvement in Electrical Properties of Al/La₂O₃/ZrO₂/ Gate Stack Deposited on LaoN Passivated GaAs Substrate, Viral N. Barhate¹, Khushabu S. Agrawal², Vilas S. Patil¹, and Ashok M. Mahajan¹, ¹Kavayitri Bahinabai Chaudhari North Maharashtra University, ²Sungkyunkwan University

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Adhesion Study on Different Surface Treatment by Button Shear Test, Lim Wei Lee and Lee Wei Cheat, Infineon Technologies

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Research on Failure Mechanism and Influence Factors of Single Event Burnout in SiC VDMOSFET, Qiumei Li¹, Xianping Chen^{1,2}, Houcai Luo², Xiandong Li², Xiaosong Ma¹, Jing Qian¹, Luqi Tao², and Jiabing Yu², ¹Guilin University of Electronic Technology, ²Chongqing University

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Studies on Correlation between Diluted NH₄OH Concentration of Pre-GOX Clean SC1 and GOX Breakdown Induced by Silicon Surface Oxides, Wan Tatt Wai, Vanita Manaogaran, Lee Wei Cheat, Cheng Weei Kai, Ishak Asmahan, and Liew Sun Khang, Infineon Technologies

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A Cycle-by-Cycle HCD and BTI Compact Model to Calculate FinFET Based RO Ageing Using SPICE, Uma Sharma, Chaitanya Pasupuleti, Narendra Gangwar, Thirunavukkarasu A., and Souvik Mahapatra, Indian Institute of Technology, Bombay

ESD Device Layout Design Guidelines by 3D TCAD Simulation, Cheng Li¹, Zijin Pan¹, Mengfu Di¹, Feilong Zhang¹, Zhiguo Li², Ning Jiang², and Albert Wang¹, ¹University of California, Riverside, ²Yangtze Memory Technologies Co., Ltd.

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Analysis of Extraction Methods for Threshold Voltage Shift in NBTI Degradation with Ultra-Fast Measurements, Yu-Hsing Cheng, Michael Cook, and Chris Kendrick, ON Semiconductor

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Modeling and Simulation of Low-Cost Composite Fiber-to-Chip Edge Coupler for Photonics and MEMS Packaging Applications, Ziji Wang and Jintang Shang, Southeast University

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In-Hole Diodes for On-Chip Thermal Sensing, Cheng Li¹, Qi Chen¹, Mengfu Di¹, Zijin Pan¹, Albert Wang¹, Huaqiang Wu², Tao Zhong², Jun Xu², and Rongren Liang², ¹University of California, Riverside, ²Tsinghua University

P-47

Enhanced WLCSP Reliability for RF Applications, Zhuo-Jie Wu, John Malinowski, and David Questad, GLOBALFOUNDRIES Inc.

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Withdrawn

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Manufacturing WIP Management Systems with Automated Dispatching Decision: SilTerra Case Study, MA Chik², Mohamad Zambri Mohd Darudin², K. Ibrahim¹, and Hasbullah Ashaari², ¹SilTerra Malaysia, ²Universiti Utara Malaysia

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Semiconductor Manufacturing Equipment: Challenges and Solutions to Enable Customer Yield Ramp, Roman Mostovoy, Arun R. Srivatsa, Jingmin Leng, Bill Nehrer, and Jong Yun Kim, Applied Materials

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Low Cost 2D-SnS₂ Nanosheets Based UV-A-Visible Band Photodetector, Sanjeev Mani Yadav and Amritanshu Pandey, Indian Institute of Technology (BHU), Varanasi

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Visible Light Response in Defect Engineered Wrinkle Network Nanostructured ZnO, Kamal Rudra, Indian Institute of Science, Bangalor

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Electroluminescence of Si Based MOS Device with Ternary Rare Earth Doped Oxide, T. Tomita¹, T. Matsuda¹, H. Iwata¹, and T. Ohzone², ¹Toyama Prefectural University, ²Dawn Enterprise Co., Ltd

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CVD-Grown Graphene-on-Au Characterization and Sensing Using Kretschmann-Based SPR, Nur Akmar Jamil¹, P. Susthitha Menon¹, Gan Siew Mei¹, Ahmad Rifqi Md Zain^{1,2}, Daniel Hewak³, and Chung-Che Huang³, ¹Universiti Kebangsaan Malaysia, ²Harvard University, ³University of Southampton

Ultralow Power Neuromorphic Accelerator for Deep Learning Using Ni/HfO₂/TiN Resistive Random Access Memory, Hoang-Hiep Le¹, Wei-Chen Hong¹, Jian-Wei Du¹, Tsung-Han Lin¹, Yi-Xiu Hong¹, I-Hsuan Chen¹, Wen-Jay Lee², Nan-yow Chen², and Darsen D. Lu¹, ¹National Cheng Kung University, ²National Center for High-Performance Computing

High School Student Poster Presentation

1.	
School Name:	Maktab Rendah Sains Mara Transkrian
Student Name:	. Muhd Ikhwan Bin Mohd Nizam
	. Tunku Mohd Wildan Habbani Bin Tungku Iskandar
Project Name:	Reprocessing Wasted Energy From Noise Pollution to be used as renewable electrical
	energy
Advisor Name:	Mrs Asharina Fiza Bt Ahmad

2.

School Name:	Sekolah Menengah Sains Tun Syed Sheh Shahabudin
Student Name:	. Roszaimaisarah Bt Roszelan
	. Puteri Nur Syaza Bt Megat Noraizal
Project Name:	The Odorant
Advisor Name:	Mrs Nadia Binti Zulkifli

3.

School Name:	Sekolah Menengah Chung Ling (Persendirian)
Student Name:	. Ong Paul Sherng
	. Lim Zi Yang
	. Kee Chee Peng
Project Name:	Authentic Crest Agro-Sanctuary
Advisor Name:	Mrs Madhuri Gunasekeran

4.

School Name:	Sekolah Menengah Abdullah Munshi
Student Name:	. Muhammad Akmal Irfan Bin Abdul Rahim
	. Nurfadhilah Fauzan Binti Ahmad Fauzi
Project Name:	Health Monitoring Device for elderly (HOGO)
Advisor Name:	Mr Izhan Bin Ishak