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Session V-A. ATOMICALLY THIN DEVICES

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VI-A.-3 2:50 PM	10 nm Nominal Channel Length MoS₂ FETs with EOT 2.5 nm and 0.52 mA/um Drain Current 237 L. Yang ¹ , R.T.P. Lee ² , S.S. Papa Rao ² , W. Tsai ³ , and P. D. Ye ^{1*} ¹ School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47906USA; ² SEMATECH, Albany, NY 12203, U.S.A. ³ Intel Corporation, Santa Clara, CA 95054
VI-A.-4 3:10 PM	High Mobility in Monolayer MoS₂ Devices Grown by Chemical Vapor Deposition 239 Kirby K. H. Smith [†] , Christopher D. English [†] , Saurabh V. Suryavanshi, and Eric Pop*, Electrical Engineering, Stanford Univ., Stanford, CA 94305 USA
VI-A.-5 3:30 PM	Phosphorene as a New 2D Material for Device Applications 241 Peide D. Ye, School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47907
VI-A.-6 4:10 PM	Black Phosphorus n-MOSFETs with Record Transconductance 243 Nazila Haratipour, Matthew C. Robbins and Steven J. Koester*, ECE Department, University of Minnesota-Twin Cities, 200 Union St. SE, Minneapolis, MN 55455

Session VI-B. III-V FETs

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VI-B.-1 1:50 PM	The Low Voltage TFET Demands Higher Perfection than Previously Required in Electronics 247 Sapan Agarwal ¹ and Eli Yablonovitch ² , ¹ Sandia National Laboratories, PO Box 5800 MS 1084, Albuquerque, NM 87185-1084; ² University of California, Berkeley, 267M Cory Hall, Berkeley, CA 94720
VI-B.-2 2:30 PM	An analytic model for heterojunction and homojunction tunnel FETs with 3D density of states 249 Jianzhi Wu*, Jie Min, Jingwei Ji and Yuan Taur, Department of Electrical and Computer Engineering, University of California, San Diego, CA 92093-0407, U.S.A.
VI-B.-3 2:50 PM	Novel method to determine the band offset in hetero staggered bandgap TFET using Esaki diodes 251 Q. Smets ^{1,2} , A. S. Verhulst ¹ , S. El Kazzi ¹ , A. Mocuta ¹ , V.-Y. Thean ¹ , M. M. Heyns ^{1,2} ¹ Imec, Kapeldreef 75, 3001 Heverlee, Belgium; ² KULeuven, 3000 Leuven, Belgium
VI-B.-4 3:10 PM	InP FinFETs with Damage-Free and Record High-Aspect-Ratio (45:1) Fins Fabricated by Metal-Assisted Chemical Etching 253 Yi Song ¹ , Parsian K. Mohseni ¹ , Seung Hyun Kim ¹ , Jae Cheol Shin ² , Chen Zhang ¹ , Kelson Chabak ^{1,3} and Xiuling Li ^{1,*} , ¹ Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL 61801 USA; ² Department of physics, Yeungnam University, Republic of Korea; ³ Air Force Research Laboratory, Sensors Directorate, Wright-Patterson AFB, OH 45433 USA
VI-B.-5 3:30 PM	III-V device integration on Si using template-assisted selective epitaxy 255 Heinz Schmid ^{1*} , Mattias Borg ¹ , Kirsten Moselund ¹ , Lynne Gignac ² , Chris Breslin ² , John Bruley ² , Davide Cutaia ¹ , and Heike Riel ¹ ¹ IBM Research – Zurich, 8803 Rüschlikon, Switzerland; ² IBM Research –T. J. Watson Research Center, Yorktown Heights, NY 10598, USA

VI-B.-6 3:50 PM	Conductance Quantization in Quasi-Ballistic InGaAs Nanowire MOSFETs 257 Cezar B. Zota, Lars-Erik Wernersson and Erik Lind Department of Electrical and Information Technology, Lund University, Sweden
VI-B.-7 4:10 PM	Performance Enhancement of InAsSb QW-MOSFETs with <i>in-situ</i> H₂ Plasma Cleaning for Gate Stack Formation 259 M. Barth ¹ , G. B. Rayner Jr. ² , S. Mack ³ , B.R. Bennett ³ , and S. Datta ¹ ¹ The Pennsylvania State University, University Park, PA 16802, USA; ² Kurt J. Lesker Company, Pittsburgh, PA 15025, USA; ³ Naval Research Laboratory, Washington, DC 20375 USA
8:30 AM	12 nm-Gate-Length Ultrathin-Body InGaAs/InAs MOSFETs with 8.3 105 Ion/loff 260a Cheng-Ying Huang ¹ , Prateek Choudhary ¹ , Sanghoon Lee ¹ , Stephan Kraemer ² , Varistha Chobpattana, Brian Thibeault, William Mitchell, Susanne Stemmer, Arthur Gossard, Mark Rodwell

RUMP SESSIONS

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R.1 8:15 PM	X-enes 2D buckled atomic sheets: Do we need more semiconductors? & % Session Moderators: Deji Akinwande (UT-Austin) and Aaron Franklin (Duke)
R.2 8:15 PM	Device Modeling: Do we need any new models? & % Session Moderators: Matthew Gilbert (UIUC), Debdeep Jena (Cornell), and Sayeef Salahuddin (Cal)

JOINT DRC/EMC PLENARY SESSION

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8:30 AM	The History and Developments of InGaN-Based LEDs and Laser Diodes 263 H Shuji Nakamura; Materials and ECE Departments, University of California Santa Barbara, Santa Barbara, California, USA
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Session VII-A. CARBON-BASED DEVICES

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VII-A.-1 10:00 AM	Graphene negative differential resistance (GNDR) circuit with enhanced performance at room temperature 267 P. Sharma, L.S. Bernard, A. Bazigos, A. Magrez and A.M. Ionescu École Polytechnique Fédérale de Lausanne, Switzerland
VII-A.-2 10:20 AM	Gate tunable resonant tunneling in graphene-based heterostructures and device applications 269 E. Tutuc ¹ , B. Fallahazad ¹ , S. Kang ¹ , K. Lee ¹ , K. Kim ¹ , H. C. P. Movva ¹ , X. Mou ¹ , C. M. Corbet ¹ , L. F. Register ¹ , S. K. Banerjee ¹ , T. Taniguchi ² , and K. Watanabe ² ¹ Microelectronics Research Center and Department of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78758; ² National Institute for Materials Science, 1-1 Namiki Tsukuba, Ibaraki 305-0044, Japan
VII-A.-3 11:00 AM	Terahertz Emitters and Detectors Based on Double-Graphene-Layer Van der Waals Heterostructures 271 Deepika Yadav ¹ , Stephane Boubanga Tombet ¹ , Takayuki Watanabe ¹ , Victor Ryzhii ^{1,2} , and Taiichi Otsuji ¹ ¹ Research Institute of Electrical Communication, Tohoku University, Sendai 980-8577, Japan; ² Institute of Ultra-High-Frequency Semiconductor Electronics, RAS, Moscow 111005, Russia
VII-A.-4 11:20 AM	The Path to Fabricating Carbon Nanotube Array Field Effect Transistors with Uniform Wafer Scale Performance Suitable for Advanced RF Applications 273 M.E. Grubbs, A.E. Berghmans, M.J. Walker, M.P. Lilly and J.X. Przybysz Advanced Concepts and Technologies, Northrop Grumman Corporation, Linthicum, MD 21090
VII-A.-5 11:40 AM	Compact Modeling and Design Optimization of Carbon Nanotube Field-Effect Transistors for the Sub-10-nm Technology Nodes 275 Chi-Shuen Lee*, Eric Pop, and H.-S. Philip Wong Dept. of Electrical Engineering, Stanford University, Stanford, CA 94305, USA
VII-A.-6 12:00 PM	Mid-infrared Materials and Devices for 4th Generation Infrared Imagers 277 Sanjay Krishna, Director, Center for High Technology Materials, Professor and Regents' Lecturer, Department of Electrical and Computer Engineering, University of New Mexico, Albuquerque NM

Session VII-B. SMOS DEVICES AND MEMORY

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VII-B.-1 10:00 AM	Demonstration of Ge CMOS Inverter and Ring Oscillator with 10 nm Ultra-thin Channel 281 Heng Wu, Nathan Conrad, Mengwei Si, and Peide D. Ye* School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47906, USA
VII-B.-2 10:20 AM	Electron Trapping Dominance in Strained Germanium Quantum Well Planar and FinFET devices with NBTI 283 Nidhi Agrawal ¹ , Ashish Agrawal ¹ , Subhadeep Mukhopadhyay ² , Souvik Mahapatra ² , and Suman Datta ¹ ¹ The Pennsylvania State University, University Park, USA; ² Indian Institute of Technology Bombay, Mumbai, India
VII-B.-3 10:40 AM	Enhanced Ge n-channel gate stack performance using HfAlO high-k dielectric 285 Shraddha Kothari, Chandan Joishi, Dipankar Biswas, Dhirendra Vaidya, Swaroop Ganguly and Saurabh Lodha Dept. of Electrical Engineering, IIT Bombay, Powai, Mumbai, India- 400076
VII-B.-4 11:00 AM	BSIM-IMG: Compact Model for RF-SOI MOSFETs 287 Pragya Kushwaha ¹ , Harshit Agarwal ¹ , Sourabh Khandelwal ² , Juan-Pablo Duarte ² , Aditya Medury ² , Chenming Hu ² , and Yogesh S. Chauhan ¹ ¹ Nanolab, Department of Electrical Engineering, Indian Institute of Technology Kanpur, India; ² Electrical Engineering and Computer Science, University of California Berkeley, USA
VII-B.-5 11:20 AM	Low Temperature Epitaxial Germanium P⁺IN⁺P⁺ Selector for RRAM 289 V. S. Senthil Srinivasan ¹ , B. Das ² , V. Sangwan ² , C. Pinto Gómez ¹ , M. Oehme ¹ , U. Ganguly ² and J. Schulze ¹ ¹ Institute of Semiconductor Engineering, University of Stuttgart, Stuttgart, Germany; ² Dept. of Electrical Engineering, IIT Bombay, Mumbai, India
VII-B.-6 11:40 AM	Read disturb and device failure studies in TiO₂-based resistive switches 291 J. Kwon ¹ , A. A. Sharma ² , J. A. Bain ² , Y. N. Picard ¹ , and M. Skowronski ¹ ¹ Materials Science and Engineering Department, ² Electrical and Computer Engineering Department, Carnegie Mellon University, 5000 Forbes Ave., Pittsburgh, PA 15213, USA