SYMPOSIUM ED7

Materials and Device Engineering for Beyond the Roadmap Devices in Logic, Memory and Power
April 18 - April 21, 2017

Symposium Organizers
Alexander Demkov, University of Texas, Austin
Andrew Kummel, University of California, San Diego
John Robertson, University of Cambridge
Shinichi Takagi, University of Tokyo

Proceedings Statement
All authors are invited to submit articles based on their 2017 MRS Spring Meeting presentations to the journals in the MRS portfolio (www.mrs.org/publications-news). Papers submitted and accepted for publication in MRS Advances (www.mrs.org/mrs-advances) will be available as symposium collections. Visit the MRS/Cambridge University Press Publications Booth #100 in the Exhibit Hall to learn more, including MRS Advances print options available at special rates during the meeting week only.

* Invited Paper

SESSION ED7.1: Memory I
Session Chairs: Andrew Kummel and Dirk Wouters
Tuesday Morning, April 18, 2017
PCC North, 100 Level, Room 131 A

10:30 AM *ED7.1.01
Computing with Coupled Dynamical Systems Suman Datta; University of Notre Dame, United States.

11:00 AM ED7.1.02
Growth of NbO by Molecular-Beam Epitaxy and Characterization of its Metal-Insulator Transition Lindsey Noskin; Cornell University, United States.

11:15 AM ED7.1.03
Infrared Near-Field Spectroscopy of Free Charge Carriers at Grain Boundaries in Sr$_3$La$_{1-x}$TiO$_3$ Ceramics on the nm-Scale Martin Lewin; 1, 2; RWTH Aachen University, Germany; 1Fraunhofer Institute for Laser Technology (ILT), Germany.

11:30 AM ED7.1.04
Molecular Beam Epitaxy Grown NbO Thin Films for Selector Devices Alex Demkov; University of Texas, United States.

11:45 AM ED7.1.05
A Novel Forming-Free Bipolar Resistive Memory Based On ITO/V$_2$O$_5$/ITO Structure Zhenni Wan; University of Washington, United States.

SESSION ED7.2: Memory II
Session Chairs: Alex Demkov and John Robertson
Tuesday Afternoon, April 18, 2017
PCC North, 100 Level, Room 131 A

1:30 PM *ED7.2.01
ReRAM Devices—From New Memory to beyond von Neumann Computing Applications Dirk J. Wouters; RWTH Aachen University, Germany.

2:00 PM ED7.2.02
Oxygen Stoichiometry Controlled Resistive Switching Modes in HfO$_2$ and TaO$_x$ Based RRAM Devices Sankaramangalam U. Sharath; TU Darmstadt, Germany.

2:15 PM ED7.2.03
The Effect of Oxygen Exchange Layer on the Performance of Tantalum Oxide-Based RRAM Zahiruddin Alamgir; State University of New York Polytechnic Institute, United States.

2:30 PM *ED7.2.04
In Case of Emergency Break the Z-Glass Ceiling—Thin Film Processes for Advanced Integration and Devices R. D. Clark; TEL Technology Center, America LLC, United States.

3:00 PM BREAK

3:30 PM *ED7.2.05
Quantum Computing in Silicon with Donors Michelle Y. Simmons; Centre for Quantum Computation and Communication Technology, Australia.

4:00 PM ED7.2.06
Impact of In Situ Reducing Plasma Treatments on the Electrical Properties of RRAM Devices Based on ALD Deposited AlO$_x$, Dielectric Material Bruce Hughes; 1, 2; LTM-CNRS, France; 1CEA-LETI, France.

4:15 PM ED7.2.07
Investigation of the Cell-to-Cell Interference Induced by the Bended ONO Structure in 3D NAND Flash Memories Won-Hyo Chul; SK HYNIX, Korea (the Republic of).

4:30 PM ED7.2.08
Controllable Formation of Conductive Filament by Selective Oxidation near the Tip-Region of Pyramid-Structured Active Electrode in Resistive Memory Youngjin Kim; 1, 2; Korea Institute of Science and Technology, Korea (the Republic of); 1Korea University, Korea (the Republic of).

4:45 PM ED7.2.09
The Low Temperature Data Retention Improvement in 1Zum TLC NAND Flash Jaewook Yang; SK Hynix Inc., Korea (the Republic of).

SESSION ED7.3: CMOS
Session Chair: Robert Clark
Wednesday Morning, April 19, 2017
PCC North, 100 Level, Room 131 A

8:00 AM ED7.3.01
Selective Isotropic Etching of Silicon in Preference to Germanium and Si$_x$Ge$_{1-x}$ Christopher Ahles; University of California, San Diego, United States.

8:15 AM ED7.3.02
Reducing Fermi Level Pinning at Contacts on Ge by Germanides Hongfei Li; University of Cambridge, United Kingdom.

8:30 AM ED7.3.03
Trap Characterization and Capacitance-Voltage Hysteresis of AlO$_x$/InGaAs Gate Stacks Kechao Tang; Stanford University, United States.

8:45 AM ED7.3.04
Temperature Dependent Border Trap Response Produced by a Defective Interfacial Oxide Layer in AlO$_x$/InGaAs Gate Stacks Kechao Tang; Stanford University, United States.

9:00 AM *ED7.3.05
Bringing III-Vs into CMOS—From Epitaxy to Circuits Lukas Czornomaz; IBM Research GmbH, Switzerland.

9:30 AM BREAK

10:00 AM *ED7.3.06
Reliability of Metal Gate/High-K Devices and Its Impact on CMOS Technology Scaling Andreas Kerber; GLOBALFOUNDRIES, United States.

10:30 AM ED7.3.07
AlO$_x$/HfO$_2$, Nanolaminate Gate Oxides with Organic Precursor on Silicon Germanium Mahmut Sami Kavrik; University of California San Diego, United States.

10:45 AM ED7.3.08
Yttrium Passivation of Defects in GeO$_x$ and GeO$_x$/Ge Interfaces Honglei Li; University of Cambridge, United Kingdom.
11:00 AM Transistors
Approaching the Quantum Conductance Limit in Carbon Nanotube Array

Gate Dielectric
Quasi-2D β-Ga

10:30 AM Materials
Graphene and Beyond—Creating and Exploring Atomically Thin
2D Semiconductor Electronics—Advances, Challenges and

9:00 AM Tunnel FETs—Vertical or Lateral?

8:30 AM Charge Transition Levels in ZrO2 and Si3ZrO4 Interfacial Layer Probed by DLTS

3:30 PM Exploring Interfacial Properties of Pristine MoS2, MOS Interface Mitsuhiro Takenaka

2:30 PM 2D Crystals for Smart Life Kaustav Banerjee; University of California, Santa Barbara, United States.

3:00 PM BREAK

SESSION ED7.6: 2D and Others
Session Chair: John Conley
Thursday Morning, April 20, 2017
PCC North, 100 Level, Room 131 A

8:00 AM ED7.6.01
Cause of RRAM Device Switching Variability and its Impact on Memristive Dynamic Adaptive Neural Network Arrays Nathaniel Cady; SUNY Polytechnic Institute, United States.

8:15 AM ED7.6.02
The Analog Information Limit of Magnetic Domain Wall Positions in Nanowires Sumit Dutta; Massachusetts Institute of Technology, United States.

8:30 AM *ED7.6.03
Tunnel FETs—Vertical or Lateral? Huili G. Xing; Cornell University, United States.

9:00 AM *ED7.6.04
2D Semiconductor Electronics—Advances, Challenges and Opportunities Ali Javey; University of California, Berkeley, United States.

9:30 AM BREAK

10:00 AM *ED7.6.05
Graphene and Beyond—Creating and Exploring Atomically Thin Materials Joshua A. Robinson; The Pennsylvania State University, United States.

10:30 AM ED7.6.06
Quasi-2D β-Ga2O3 Field-Effect Transistors with Hexagonal Boron Nitride Gate Dielectric Janghyuk Kim; Korea University, Korea (the Republic of).

10:45 AM ED7.6.07
Approaching the Quantum Conductance Limit in Carbon Nanotube Array Transistors Gerald J. Brady; University of Wisconsin–Madison, United States.

11:00 AM *ED7.6.08
Two Dimensional Materials for Electronic Devices Seongjun Park; Samsung Advanced Institute of Technology, Korea (the Republic of).

11:30 AM ED7.6.09
Internal Photocemission Spectroscopy Measurement of Energy Barriers between Amorphous Metals and High-K Dielectrics John F. Conley; Oregon State University, United States.

11:45 AM ED7.6.10
All-Transparenet and Flexible Schottky Barrier Transistors and Logics Based on Ion Gel-Gated Graphene/Metal Oxide Heterostructure Seong Chan Kim; Sungkyunkwan University, Korea (the Republic of).

SESSION ED7.7: TFET
Session Chairs: Lukas Czornomaz and Huili Xing
Thursday Afternoon, April 20, 2017
PCC North, 100 Level, Room 131 A

1:30 PM *ED7.7.01
The Impact of Contact Deposition Ambient on the Interfacial Chemistry of 2D Materials Robert M. Wallace; University of Texas at Dallas, United States.

2:00 PM ED7.7.02
Vertical InAs/GaAsSb/GaSb Tunneling Field-Effect Transistors on Si with Sub 50 mV/dec. Operation Lars-Erik M. Wernersson; Lund University, Sweden.

2:15 PM ED7.7.03
Band Engineering, Doping and Tunnel FETs with InSe Yuzheng Guo; University of Swansea, United Kingdom.

2:30 PM *ED7.7.04
2D Crystals for Smart Life Kaustav Banerjee; University of California, Santa Barbara, United States.

3:00 PM BREAK

SESSION ED7.8: Processing and Others
Session Chairs: Alex Demkov and John Robertson
Friday Morning, April 21, 2017
PCC North, 100 Level, Room 131 A

8:30 AM ED7.8.01
Heat-Induced Bipolar to Unipolar Resistive Switching Transition Simone Cortese; University of Southampton, United Kingdom.

8:45 AM ED7.8.02
How Do the Electrodes Affect the Electrical Response of a M/La2NiO3/M' Memristive Device? Klausjan Mans; Univ Grenoble Alpes, CNRS, LMGP, France.

9:00 AM ED7.8.03
Structural Properties of Cerium Dioxide Film Prepared by Atomic Layer Deposition on TiN and Si Substrates Silvia Vangelista; IMM-CNR, MDM, Unit, Italy.

9:15 AM ED7.8.04
Characterization of Low Temperature Thermal ALD BN on Si4Ge2(001) Steven Wolf; University of California, San Diego, United States.
9:30 AM ED7.8.05
Uniform Atomic Layer Deposition of $\text{Al}_2\text{O}_3$ on Graphene by Reversible Hydrogen Plasma Functionalization Rene Vervuurt; Eindhoven University of Technology, Netherlands.

9:45 AM ED7.8.06
Inkjet-Printed Four-Terminal Microelectromechanical Relays for 3-Dimensional Logic Applications Seungjun Chung$^{1,2}$; 1Seoul National University, Korea (the Republic of); 2University of California, Berkeley, United States.

10:00 AM BREAK

10:30 AM ED7.8.07
Chemical Vapor Deposition of Stiochiometric TaSi$_2$ on Si(001) Jong Youn Choi; University of California, San Diego, United States.

10:45 AM ED7.8.08
Antiferromagnetic Ordering in 25% Ca Doped Antisite-Disordered Ferromagnetic $\text{La}_2\text{CoMnO}_6$ Double Perovskite Ramchandra Sahoo; IIT Kharagpur, India.

11:00 AM ED7.8.09
Flexible Memristive Memory Arrays Based on Vapor-Phase Deposited Polymer Thin Film Byung Chul Jang; KAIST, Korea (the Republic of).

11:15 AM ED7.8.10
Resistive Switching of Nanoengineered $\text{LaMnO}_3$ Thin Films for ReRAM Applications Dolors D. Pla Asesio; Laboratoire des Matériaux et du Génie Physique (LMGP), France.

11:30 AM ED7.8.11
Interface-Type Resistive Switching in Epitaxial GdBa$\text{CO}_3$$_{1-x}$ Thin Film Heterostructures Sarunas Bagdzгevicius; Univ Grenoble Alpes, CNRS, LMGP, France.