2015 IEEE Nanotechnology Materials and Devices Conference (NMDC 2015)

Anchorage, Alaska, USA 13-16 September 2015



IEEE Catalog Number: CI ISBN: 97

CFP15NMD-POD 978-1-4673-9363-8

Copyright © 2015 by the Institute of Electrical and Electronic Engineers, Inc All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***This publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP15NMD-POD

 ISBN (Print-On-Demand):
 978-1-4673-9363-8

 ISBN (Online):
 978-1-4673-9362-1

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



Program

2015 IEEE Nanotechnology Materials and Devices Conference (NMDC)

Monday - Session 1

Recent Progress in InAs/InP Quantum Dash Nanostructures and Devices

Boon S. Ooi (King Abdullah University of Science and Technology, Saudi Arabia), Mohammed Zahed Mustafa Khan (King Abdullah University of Science and Technology, Saudi Arabia), Tien Khee Ng (King Abdullah University of Science and Technology, Saudi Arabia) 1

Monday - Session 2

 Towards Functionality-Enhanced Devices: Controlling the Modes of Operation in Three-Independent-Gate Transistors

Pierre-Emmanuel Gaillardon (EPFL, Switzerland), Jian Zhang (EPFL, Switzerland), Michele De Marchi (EPFL, Switzerland), Giovanni De Micheli (EPFL, Switzerland) 3

• 3D Atomic-Scale Insight Into Semiconductor Nanowires

Rongkun Zheng (The University of Sydney, Australia) 5

Monday - Session 3

• Raman Spectroscopy Studies of Ponons in a Nanowire Subjected to a Magnetic Field

Md. Iftekhar Hossain (Virginia Commonwealth University, USA), Jayasimha Atulasimha (Virginia Commonwealth University, USA), Supriyo Bandyopadhyay (Virginia Commonwealth University, USA) 6

• Biodegradable Nanoporous Microspheres by RAFT and Photodegradation

Ildoo Chung (Pusan National University, Korea), Taeyoon Kim (Pusan National University, Korea) 9

• Nanoscaled Self-Assemblies for Facilitated Energy Conversion

Hsing-Lin Wang (MSJ567, Chemistry Division, Los Alamos National Laboratory & Los Alamos National Laboratory, USA), Hsinhan Tsai (MSJ567, Chemistry Division, Los Alamos National Laboratory, USA) 11

• Dielectric engineering of nanostructured layers preventing electrostatic charging in thin dielectrics

Kremena Makasheva (LAPLACE, University of Toulouse, France), Christina Villeneuve-Faure (LAPLACE, University of Toulouse, France), Caroline Bonafos (CEMES-CNRS, France), Christian Laurent (University of Toulouse and CNRS & LAPLACE, France), Alessandro Pugliara (LAPLACE, CEMES-CNRS, University of Toulouse, France), Bernard Despax (LAPLACE, University of Toulouse, France), Laurent Boudou (LAPLACE, University of Toulouse, France), Gilbert Teyssedre (University of Toulouse & CNRS, LAPLACE & CNRS, Paul Sabatier University, France) 13

Monday - Session 4

• Photon Induced Negative Capacitance in Metal Oxide Semiconductor Structures

Anant M. P. Anantram (University of Washington, USA), Anita Fadavi Roudsari (University of Waterloo, Canada), Iman Khodadad (University of Waterloo, Canada), Simarjeet Saini (University of Waterloo, Canada) 15

 Exploration of Digital Latch Design Using Ballistic Deflection Transistors - Modeling and Simulation

Poorna Marthi (University of Massachusetts Lowell, USA), Jean Francois Millithaler (University of Massachusetts Lowell, USA), Ignacio Iñiguez-de-la-Torre (University of Salamanca, Spain), Javier Mateos (University of Salamanca, Spain), Tomás González (University of Salamanca, Spain), Martin Margala (University of Massachusetts Lowell, USA) 17

- Resistive Switching Effect At Boundary Between Film Like Grown ZnO Nanorods
 Eunji Yoo (Sejong University, Korea) 21
- Correlation Between Gate Length, Geometry and Electrostatic Driven Performance in Ultra-Scaled Silicon Nanowire Transistors

Talib Al-Ameri (University of Glasgow & Device Modelling Group, United Kingdom), Y. Wang (Peking University, P.R. China), Vihar Georgiev (University of Glasgow, United Kingdom), F. Adamu-Lema (University of Glasgow, United Kingdom), Xingsheng Wang (University of Glasgow, United Kingdom), A. Asenov (University of Glasgow, United Kingdom) 23

Monday - Session 5

Length Control of Packed Single Crystalline TiO2 Nanorods for Dye-sensitized Solar Cell
 YoungSoo Kang (Sogang University & Korea Center for Artificial Photosynthesis, Korea) 28

A Low-cost Superlyophobic Dry Adhesive Film Based on EVA Copolymer

Lifang Yuan (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, P.R. China), Lei Wang (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, P.R. China), Zhiwei Wang (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, P.R. China), Tianzhun Wu (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, P.R. China), Yu Zhao (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, P.R. China) 30

 Mesaporous Polyurea Aerogel for Large Loading, Uniform and Slow Release of Insect Repellent Oil

Hao Tang (Onechip Co. Ltd, P.R. China), Chunrong Zhu (Onechip Co. Ltd, P.R. China), Wanli Niu (WindTalk Co. Ltd, P.R. China), Honglei Wang (University of Texas at Dallas, USA), Walter Hu (800 W. Campbell Rd & University of Texas at Dallas, USA) 34

• A Wireless Motion Detection System with Silver Nano Ink Printed Accelerometer

Jae Sung Park (Simon Fraser University, Canada), Woo Soo Kim (Simon Fraser University, Canada) 36

 Optical and Morphological Properties of Porous Silicon Grown At Low Hydrofluoric Acid Concentration by Electrochemical Anodization

Mateus Moura (Federal University of Bahia, Brazil), Ademir Costa (Federal Institute of Bahia, Brazil), Leizer Schnitman (Universidade Federal da Bahia, Brazil), Marcio Fontana (Federal University of Bahia, Brazil) 38

• 3D Printed Inductor Designs Decorated with Silver Nano Ink

Benny Chou (Simon Fraser University, Canada), Jae Sung Park (Simon Fraser University, Canada), Woo Soo Kim (Simon Fraser University, Canada) 43

Monday - Session 6

Synthesis and Characterization of MoS2 Nanostructures Using Pulsed-laser Deposition System
 Anderson Sunda-Meya (Xavier University of Louisiana, USA) 45

• Heterodimensional Transistor Technology for Attojoule Electronics

Michael Shur (Rensselaer Polytechnic Institute, USA) 47

• Electronic Properties of Metal-Molecular Nanojunctions and Networks

Po Zhang (University of Victoria, Canada), Chris Papadopoulos (University of Victoria, Canada) 51

 Study on the ESD-Induced Gate-Oxide Breakdown and the Protection Solution in 28nm High-K Metal-Gate CMOS Technology

Chun-Yu Lin (National Taiwan Normal University, Taiwan), Ming-Dou Ker (National Chiao-Tung University, Taiwan), Pin-Hsin Chang (National Chiao Tung University, Taiwan), Wen-Tai Wang (Global Unichip Corporation, Taiwan) 56

• Self-assembled Coffee-ring Colloidal Crystal Arrays with Periodical Structural Colours Utilizing Porous Polydimethylsiloxane Film as a Template

Xuemin Du (Shenzhen Institutes of Advanced Technology (SIAT), Chinese Academy of Sciences (CAS), P.R. China), Tengyue Li (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, P.R. China), Tianzhun Wu (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, P.R. China) 60

 Nanoimprinted Solar Cells with Large Molecular Weight P3HT Nanogratings with Enhanced Molecular Alignment

Yi Yang (University of Texas at Dallas, USA), Kamil Mielczarek (University of Texas at Dallas, USA), Anvar Zakhidov (University of Texas at Dallas, USA), Walter Hu (800 W. Campbell Rd & University of Texas at Dallas, USA) 64

Tuesday - Session 1

 Straintronics: Strain-switched Multiferroic Nanomagnets for Extremely Low Energy Logic/ memory

Hasnain Ahmad (Virginia Commonwealth University, USA), Ayan Kumar Biswas (BUET, Bangladesh), Jayasimha Atulasimha (Virginia Commonwealth University, USA), Supriyo Bandyopadhyay (Virginia Commonwealth University, USA) 66

Tuesday - Session 2

• A Modeling Study of Mechanisms for NDR in graphene-BN-graphene Heterostructures

Yunqi Zhao (University of Washington, USA), Zhenni Wan (University of Washington, USA), Xu Xu (University of Washington, USA), Sunil Patil (University of Washington, USA), Ulrich Hetmaniuk (University of Washington, USA), Anant M. P. Anantram (University of Washington, USA) 69

Tuesday - Session 3

• Delay and Yield of CNFET-based Circuits in the Presence of Variations

Malgorzata Chrzanowska-Jeske (Portland State University, USA) 71

• Enabling Antenna Design with Nano-magnetic Materials Using Machine Learning

Carmine Gianfagna (Georgia Tech, Italy), Madhavan Swaminathan (Georgia Tech, USA), Raj Pulugurtha (Georgia Tech, USA), Rao Tummala (Georgia Institute of Technology, USA), Giulio Antonini (Università degli Studi dell'Aquila, Italy) 73

• Enhancing the Electronic Conductivity of Lignin-sourced, Sub-micron Carbon Particles

Naveen kumar Palapati (300 W Franklin St, USA), Muslum Demir (Virginia Commonwealth University, USA), Charles Harris (Sandia National Laboratories, USA), Arunkumar Subramanian (Virginia Commonwealth University, USA), Ram Gupta (Virginia Commonwealth University, USA) 78

• Thin Graphite Membranes for Laser Photoacoustic Spectroscopy

Jan Suchánek (J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i. & Faculty of Safety Engineering, VŠB - Technical University of Ostrava, Czech Republic), Michal Dostál (J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i., Czech Republic), Tereza Vlasáková (Faculty of Science, Charles University in Prague, Czech Republic), Pavel Janda (J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i., Czech Republic), Monika Klusáčková (J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i., Czech Republic), Pavel Kubát (J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i., Czech Republic), Václav Nevrlý (Faculty of Safety Engineering, VSB - Technical University of Ostrava, Czech Republic), Petr Bitala (Faculty of Safety Engineering, VSB - Technical University of Ostrava, Czech Republic), Svatopluk Civiš (J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i., Czech Republic), Zdeněk Zelinger (J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i., Czech Republic) 80

Graphene Based Photoconductivity and Surface Enhanced Raman Scattering

Yonhua Tzeng (National Cheng Kung University, Taiwan), Pinyi Li (National Cheng Kung University, Taiwan), Minjui Lo (National Cheng Kung University, Taiwan), Chuncheng Chang (National Cheng Kung University, Taiwan) 82

Tuesday - Session 4

HSPICE Macromodel of a PMA Racetrack Memory

Pilin Junsangsri (Northeastern University, USA), Jie Han (University of Alberta, Canada), Fabrizio Lombardi (Northeastern University, USA) 84

Food Nanotechnology and Nano Food Safety

Hongwu Bai (Jiangsu Academy of Agricultural Sciences, Canada) 89

• Cell Impedance Sensing System Based on Vertically Aligned Carbon Nanofibers

Syed Islam (University of Tennessee, USA), Nicole McFarlane (University of Tennessee, USA), Yongchao Yu (University of Tennessee, USA), Khandaker Abdullah Al Mamun (The University of Tennessee, USA) 93

• Nanopatterning in GeTe Phase Change Materials Using Heated Atomic Force Microscope Tips

Adrian Podpirka (United States Naval Research Laboratory, USA), Woo Lee (United States Naval Research Laboratory, USA), Todd Brintlinger (United States Naval Research Laboratory, USA), Nabil Bassim (United States Naval Research Laboratory, USA), Paul Sheehan (United States Naval Research Laboratory, USA), Laura Ruppalt (United States Naval Research Laboratory, USA) 95

Tuesday - Session 5

• Theoretical Investigation of the Oxygen Bond Dissociation Energies in Graphene Oxide

Walid M. I. Hassan (Qatar University, Qatar), Amit Verma (Texas A&M University – Kingsville, USA), Reza Nekovei (Texas A&M University – Kingsville, USA), R. Jeyakumar (CSIR-National Physical Laboratory, Pusa Campus, India), Mahmoud M Khader (Qatar University, Qatar) 97

• Polaron Effect on Ballistic Transport in Armchair Graphene Nanoribbon

Nazir Hossain (University of Massachusetts Lowell, USA), Poorna Marthi (University of Massachusetts Lowell, USA), Jean Francois Millithaler (University of Massachusetts Lowell, USA), Martin Margala (University of Massachusetts Lowell, USA) 99

• Origin of Competing Blue and Green Emission in InGaN/GaN Quantum-Disks in Nanowires Heterostructure'''

Aditya Prabaswara (King Abdullah University of Science and Technology, Saudi Arabia), Tien Khee Ng (King Abdullah University of Science and Technology, Saudi Arabia), Dalaver Anjum (King Abdullah University of Science and Technology, Saudi Arabia), Nini Wei (King Abdullah University of Science and Technology, Saudi Arabia), Chao Zhao (King Abdullah University of Science and Technology, Saudi Arabia), Abdulrahman M. Albadri (King Abdulaziz City for Science and Technology, Saudi Arabia), Ahmed Y. Alyamani (King Abdulaziz City for Science and Technology, Saudi Arabia), Munir El-Desouki (King Abdulaziz City for Science and Technology, Saudi Arabia), Boon S. Ooi (King Abdullah University of Science and Technology, Saudi Arabia) 101

• A Novel Approach for Preparation of CuO Nanostructures on Conductive Substrate

Fanan Wei (Shenyang Institute of Automation, P.R. China), Quan Tao (University of Pittsburgh, USA), Guangyong Li (University of Pittsburgh, USA), Lianqing Liu (Shenyang Institute of Automation, P.R. China) 103

• Antimicrobial Properties of Nanorods: Chemical or Physical Kill?

Md. Iftekhar Hossain (Virginia Commonwealth University, USA), Jarrod Edwards (US Army Engineer Research and Development Center, USA), James Tyler (Virginia Commonwealth University, USA), John Anderson (US Army Engineer Research and Development Center, USA), Supriyo Bandyopadhyay (Virginia Commonwealth University, USA) 107

Tuesday - Session 6

 Towards Nanomagnetic Logic Systems: A Programmable Arithmetic Logic Unit for Systolic Array-based Computing

Stephan Breitkreutz-v. Gamm (Technische Universität München, Germany), Irina Eichwald (Technische Universität München, Germany), Grazvydas Ziemys (Technische Universität München, Germany), György Csaba (University of Notre Dame, USA), Gary Bernstein (University of Notre Dame, USA), Michael Niemier (University of Notre Dame, USA), Wolfgang Porod (University of Notre Dame, Germany), Mariagrazia Graziano (Politecnico di Torino, Italy), Doris Schmitt-Landsiedel (Technische Universität München, Germany), Markus Becherer (Technische Universität München, Germany) 112

• Strain Induced and Spin Torque Induced Switching of Nanomagnets: Coherent or Incoherent?

Md Mamun Al-Rashid (Virginia Commonwealth University, USA), Dhritiman Bhattacharya (Virginia Commonwealth University, USA), Supriyo Bandyopadhyay (Virginia Commonwealth University, USA), Jayasimha Atulasimha (Virginia Commonwealth University, USA) 114

- Nanorods Self-Assembled From Polyaromatic Compounds: A Molecular Dynamics Study
 Cuiying Jian (University of Alberta, Canada), Tian Tang (University of Alberta, Canada) 116
- Tuning Macroscopic Body Interactions by Manipulation of Quantum Vacuum Photon-modes At the Nanoscale

Louis Dellieu (University of Namur, Belgium), Olivier Deparis (University of Namur, Belgium), Branko Kolaric (UNAMUR, Belgium), Michael Sarrazin (University of Namur, Belgium) 118

Multilevel Resistance in Ti/Pt/AlOx/HfOy/Ti/Pt/Ag Resistive Switching Devices

Farhana Anwar (University of New Mexico, USA), John Nogan (Center for Integrated Nanotechnologies, USA), Payman Zarkesh-Ha (University of New Mexico, USA), Marek Osiński (University of New Mexico, USA) 122

Wednesday - Session 1

Device and Energy Properties of Two-Dimensional (2D) Atomically Thin Materials
 Eric Pop (Stanford University, USA) 125

Nanotechnology Laboratory and Nanoelectronics Simulation Courses

James Morris (Portland State University, USA) 127

• Yield Estimation for CNFET- Based Circuits with Imperfections

Rehman Ashraf (Tyfone & Tyfone, USA), Malgorzata Chrzanowska-Jeske (Portland State University, USA) 131

 Channel Limitation of 1-D Wire Random Network for Transparent Conducting Electrodes Application

Jinyoung Hwang (Samsung Advanced Institute of Technology, Korea), Sang Hyun Lee (Sejong University, Korea), Hyosung Lee (Samsung Advanced Institute of Technology, Korea) 137

Wednesday - Session 2

• Optical Modulation and Manipulation of Neurons and Cells with High Efficiency Through Quantum Dots and Photonic Crystals

Lih Lin (University of Washington, USA), Peifeng Jing (University of Washington, USA), Ethan Keeler (University of Washington, USA), Jingda Wu (University of Washington, USA) 139

• Detection of Base Pair Charges During DNA Extension with Si Nanowire FETs Towards DNA Sequencing

Yuchen Liang (University of Texas at Dallas, USA), Silu Zhang (University of Texas at Dallas, USA), Walter Hu (800 W. Campbell Rd & University of Texas at Dallas, USA) 141

• Physico-chemical characterization of the interaction of red fluorescent protein - DsRed with silica layers

Marvine Soumbo (LAPLACE, University of Toulouse, France), Alessandro Pugliara (LAPLACE, CEMES-CNRS, University of Toulouse, France), Marie-Carmen Monje (LGC, University of Toulouse, France), Christine Roques (LGC, University of Toulouse, France), Bernard Despax (LAPLACE, University of Toulouse, France), Caroline Bonafos (CEMES-CNRS, France), Robert Carles (CEMES-CNRS, University of Toulouse, France), Adnen Mlayah (CEMES-CNRS, University of Toulouse, France), Kremena Makasheva (LAPLACE, University of Toulouse, France) 143