

# **2009 IEEE Nanotechnology Materials and Devices Conference (NMDC)**

**Traverse City, MI, USA  
2 – 5 June 2009**



**IEEE Catalog Number: CFP09NMD-PRT  
ISBN: 978-1-4244-4695-7**

**Copyright © 2009 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:	CFP09NMD-PRT
ISBN 13:	978-1-4244-4695-7
Library of Congress No.:	2009904792

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# Table of Contents

<b>WeA1-1</b>	Michigan EF
<b>Nanomaterial Sythesis</b> (Oral Session)	
Chair: Khan, Muhammad Ajmal Co-Chair: Lilley, Carmen	
10:20-10:55	WeA1-1.1
<i>Effect of Catalyst and Underlayer Metal on PECVD Growth of Vertically Aligned Carbon Nanotubes (Invited) (I)</i> , pp. 1-2.	
Sun, Xuhui Li, Ke Wu, Wen Tsutomu, Saito Yang, Cary	
10:55-11:30	WeA1-1.2
<i>Nanomaterials Fabrication Using Advanced Thin Film Deposition and Nanohybrid Process (Invited) (I)</i> , pp. 3-4.	
Kim, Hyungjun Lee, Han-Bo-Ram Park, Sang-Joon Kim, Woo-Hee Hwang, Inchan	
11:30-11:55	WeA1-1.3
<i>Low Temperature Synthesis of Germanium Oxide Nanowires by Thermal Evaporation of Germanium in an Oxidizing Environment</i> , pp. 5-8.	
Khan, Muhammad Ajmal Muhammad, Farhan Hogan, Tim	
<b>WeA1-2</b>	Michigan GH
<b>Single Electron Transistors</b> (Oral Session)	
Chair: Delgado, Alberto Co-Chair: Bhanja, Sanjukta	
10:20-10:40	WeA1-2.1
<i>Manufacturable Process for Si-SET Fabrication</i> , pp. 9-12.	
Joshi, Vishwanath Lee, Yen-Chun Orlov, Alexei Snider, Gregory	
10:40-11:00	WeA1-2.2
<i>A Study of Effects of Deflector Position Variation on Leakage Currents in Ballistic Deflection Transistors</i> , pp. 13-18.	
Margala, Martin Kaushal, Vikas Guarino, Gregg Yu, Qiaoyan Donaldson, William Sobolewski, Roman Ampadu, Paul	
11:00-11:20	WeA1-2.3
<i>Effects of Visible Light on Al/AIOx Single-Electron Transistors</i> , pp. 19-22.	
George, Hubert Tang, Yong Joyce, Robin Orlov, Alexei Snider, Gregory	
11:20-11:55	WeA1-2.4
<i>Shunt-Protected Single-Electron Tunneling Circuits Fabricated on a Quartz Wafer (Invited) (I)</i> , pp. 23-26.	
Lotkhov, Sergey Camarota, Benedetta Scherer, Hansjörg Weimann, Thomas Hinze, Peter Zorin, Alexander B.	
<b>WeP1-1</b>	Michigan EF
<b>Nanomaterials and Systems</b> (Oral Session)	
Chair: Li, Alex Co-Chair: Tsai, Chia-Lung	
14:00-14:35	WeP1-1.1
<i>Buckling Nanoneedle for Characterizing Single Cells Mechanics Inside Environmental SEM (Invited) (I)</i> , pp. 27-32.	
Ahmad, Mohd Ridzuan	

Nakajima, Masahiro Kojima, Seiji Homma, Michio Fukuda, Toshio	
14:35-14:55 <i>Microstructure and Electronic Properties of Zinc Nitride Thin Films</i> , pp. 33-37. Georgiev, Daniel Moening, Joseph Ahalapitiya, Jayatissa Naleshwar, Sandeepkumar	WeP1-1.2
14:55-15:15 <i>Development of Plasma Integrated AFM Nano Manufacturing Workcell</i> , pp. 38-41. Lai, King Wai Chiu Xi, Ning Zhang, Jiangbo Narendra, Jeffri Grotjohn, Timothy Asmussen, Jes	WeP1-1.3
15:15-15:35 <i>Yield Improvements for the SiGe Selective Epitaxial Growth Fabrication Process on Nano Scale Pmos Strain Engineering</i> , pp. 42-45. Chu, Ming Mao Chou, Jung Hua	WeP1-1.4

---

<b>WeP1-2</b>	Michigan GH
---------------	-------------

<b>Quantum Cellular Automata I (Oral Session)</b>	
Chair: Lilley, Carmen Co-Chair: Perera, A. G. Unil	
14:00-14:35 <i>A System to Demonstrate the Bistability in Molecules for Application in a Molecular QCA Cell (Invited) (I)</i> , pp. 46-49. Joyce, Robin Qi, Hua Fehlner, Thomas Lent, Craig Orlov, Alexei Snider, Gregory	WeP1-2.1
14:35-15:10 <i>Magnetic Cellular Automata (MCA) Arrays under Spatially Varying Field (Invited) (I)</i> , pp. 50-53. Kumari, Anita Bhanja, Sanjukta	WeP1-2.2
15:10-15:35 <i>Integration of CMOS, Single Electron Transistors, and Quantum-Dot Cellular Automata</i> , pp. 54-58. Prager, Aaron A. Orlov, Alexei Snider, Gregory	WeP1-2.3

---

<b>WeP2-1</b>	Michigan EF
---------------	-------------

<b>Nanowire Growth and Characterization (Oral Session)</b>	
Chair: Li, Alex Co-Chair: Tsai, Chia-Lung	
15:55-16:30 <i>III-V Compound Semiconductor Nanowires (Invited) (I)</i> , pp. 59-60. Joyce, Hannah Paiman, Su Gao, Qiang Tan, H.H. Jagadish, C.	WeP2-1.1
16:30-16:50 <i>Characterization of Electron Surface Scattering in Single Crystalline Metallic Nanowires</i> , pp. 61-63. Lilley, Carmen	WeP2-1.2
16:50-17:10 <i>Comparative Study of Charge Transport in Si and Ge Nanowires</i> , pp. 64-67. Verma, Amit Buin, Andrei Anantram, Anant	WeP2-1.3

---

<b>WeP2-2</b>	Michigan GH
---------------	-------------

<b>Quantum Cellular Automata II (Oral Session)</b>	
Chair: Perera, A. G. Unil Co-Chair: Li, Guangyong	

15:55-16:15		WeP2-2.1
<i>Parallel Multipliers for Quantum-Dot Cellular Automata</i> , pp. 68-72.		
Kim, Seong-Wan		
Swartzlander, Earl		
16:15-16:35		WeP2-2.2
<i>Magnetic Cellular Automata Wires</i> , pp. 73-75.		
Pulecio, Javier		
Bhanja, Sanjukta		
16:35-16:55		WeP2-2.3
<i>Towards Real-Time Testing of Clocked Quantum Dot Cellular Automata</i> , pp. 76-79.		
Tang, Yong		
Orlov, Alexei		
Snider, Gregory		
Fay, Patrick		

---

<b>ThA1-1</b>		Michigan EF
<b>Field Emission and Optical Detection (Oral Session)</b>		

---

Chair: Kim, Hyungjun		
Co-Chair: Georgiev, Daniel		
10:20-10:55		ThA1-1.1
<i>The Study of a Tetrapod-Like Nanostructure ZnO Field Emission Display (Invited) (I)</i> , pp. 80-83.		
Lin, Zhixian		
Ye, Yun		
Guo, Tailiang		
L.A., Ma		
10:55-11:15		ThA1-1.2
<i>A Stable Backgated-Type SnO<sub>2</sub> Nanowires Field Emitter for Mass Production</i> , pp. 84-86.		
L.A., Ma		
Guo, Tai.Liang		
Lin, Zhixian		
Ye, Yun		
11:15-11:35		ThA1-1.3
<i>Dipole and Bowtie Nano-Antenna for Carbon Nanotube (CNT) Based Infrared Sensors</i> , pp. 87-90.		
Fung, Carmen Kar Man		
Xi, Ning		
Shanker, Balasubramaniam		
Lai, King Wai Chiu		
Chen, Hongzhi		
11:35-11:55		ThA1-1.4
<i>CNT Infrared Detectors Using Schottky Barriers and P-N Junctions Based FETs</i> , pp. 91-95.		
Chen, Hongzhi		
Xi, Ning		
Lai, King Wai Chiu		
Fung, Carmen Kar Man		
Yang, Ruiguo		

---

<b>ThA1-2</b>		Michigan GH
<b>Sensors and AFM Nanomanipulation (Oral Session)</b>		

---

Chair: Singh, Mahi		
Co-Chair: Margala, Martin		
10:20-10:40		ThA1-2.1
<i>Estimation and Analysis of Tip Shape for Reconstructing AFM SWNT Image</i> , pp. 96-99.		
Yuan, Shuai		
10:40-11:00		ThA1-2.2
<i>Ph Dependent Electrical Characteristic of Bottom-Up Synthesized Silicon Nanowire FETs with DDT Passivation</i> , pp. 100-103.		
Choi, Minsu		
Lee, Dongjin		
Kim, Byungsung		
Whang, Dongmok		
Hwang, Sungwoo		
11:00-11:35		ThA1-2.3
<i>Nanometer-Scale Elastic Modulus of Surfaces and Thin Films Determined Using an Atomic Force Microscope (Invited) (I)</i> , pp. 104-108.		
Li, Alex		

---

<b>ThP1-1</b>		Michigan EF
<b>Optical Devices (Oral Session)</b>		

---

Chair: Budnik, Mark Michael  
Co-Chair: Georgiev, Daniel

14:00-14:35	<a href="#">All-Optical Switching Due to a Two-Photon Process in Photonic Crystal Nanowires (Invited) (I)</a> , pp. 109-114. Singh, Mahi	ThP1-1.1
14:35-14:55	<a href="#">InGaN Light-Emitting Diodes with the Strained AlGaIn/InGaIn Multiple Quantum Barriers</a> , pp. 115-117. Tsai, Chia-Lung Liu, Guan-Shan Lin, Jia-Qing Tseng, Hung-Wei Wang, Chien-Yu	ThP1-1.2
14:55-15:15	<a href="#">Electroluminescent Organic Light Emitting Micro/Nanofibers Fabricated Using Three-Fluid Coaxial Electrospinning</a> , pp. 118-120. Yang, Haifeng Dong, Liang	ThP1-1.3
15:15-15:35	<a href="#">Observation of Ultraviolet and Visible Luminescence Due to the Presence of Defect States in the Forbidden Bandgap of Tin Oxide Nanowires.</a> , pp. 121-125. Kar, Ayan Stroscio, Michael Dutta, Mitra Kumari, Jyoti Meyyappan, M.	ThP1-1.4

---

<b>ThP1-2</b>	Michigan GH
<b>Sensors (Oral Session)</b>	

---

	Chair: Wejinya, Uchechukwu C. Co-Chair: Famouri, Parviz	
14:00-14:20	<a href="#">Photodetector Based on GaN Double-Barrier Resonant Tunneling Diode Coupled with Colloidal Quantum Dots</a> , pp. 126-129. Liao, Sicheng Sun, Ke Stroscio, Michael Dutta, Mitra	ThP1-2.1
14:20-14:40	<a href="#">Development of Carbon Nanotube Based Spectrum Infrared Sensors</a> , pp. 130-135. Lai, King Wai Chiu Xi, Ning Fung, Kar Man Chen, Hongzhi Tarn, T. J.	ThP1-2.2
14:40-15:00	<a href="#">Synthesis and Characterization of Transition Metal Doped ZnS Nanocrystals for Phosphor and Photo-Catalytic Applications</a> , pp. 136-141. Chitkara, Mansi Singh, Karamjit Sandhu, I S Bhatti, H S	ThP1-2.3
15:00-15:35	<a href="#">GaN-Based Heterojunction Structures for Ultraviolet/Infrared Dual-Band Detection (Invited) (I)</a> , pp. 142-147. Perera, A. G. Unil Jayasinghe, Ranga C. Ariyawansa, Gamini Dietz, Nikolaus Matsik, Steven G. Ferguson, Ian T. Liu, Hui Chun	ThP1-2.4

---

<b>ThP2-1</b>	Michigan EF
<b>Modeling of Nanodevices and Systems (Oral Session)</b>	

---

	Chair: Budnik, Mark Michael Co-Chair: Dong, Liang	
15:55-16:15	<a href="#">Silver-Dielectric Stack with Near-Zero Epsilon at a Visible Wavelength</a> , pp. 148-153. Karri, Jyothi Mickelson, Alan	ThP2-1.1
16:15-16:35	<a href="#">Input – Output Linearization of Memristive Systems</a> , pp. 154-157. Delgado, Alberto	ThP2-1.2
16:35-16:55	<a href="#">A Model of Staggered Organic Thin-Film Transistors with Contact Resistance</a> , pp. 158-161.	ThP2-1.3

Rim, Tai-Uk  
Sohn, Chang-Woo  
Jeong, Yoon-Ha

<b>ThP2-2</b>		Michigan GH
<b>Nanomaterial Fabrication (Oral Session)</b>		
Chair: Wejinya, Uchechukwu C. Co-Chair: Famouri, Parviz		
15:55-16:15		ThP2-2.1
<a href="#">Advances in Selective Etching for Nano Scale Salicide Fabrication</a> , pp. 162-165. Chu, Ming Mao Chou, Jung Hua		
16:15-16:35		ThP2-2.2
<a href="#">Joule-Heating Dependence of Carbon Nanofiber Resistance</a> , pp. 166-168. Yabutani, Hisashi Yamada, Toshishige Yang, Cary Saito, Tsutomu		
16:35-16:55		ThP2-2.3
<a href="#">Formation of Microbumps and Protrusions on Metal Thin Films by Localized Laser Irradiation</a> , pp. 169-173. Moening, Joseph Thanawala, Sachin Georgiev, Daniel		
<b>FrA1-1</b>		Michigan EF
<b>Materials and Processes for Device Fabrication (Oral Session)</b>		
Chair: Yang, Cary Y. Co-Chair: Snider, Gregory		
10:20-10:55		FrA1-1.1
<a href="#">Solution-Phase Surface Reconstruction and Structural Transformation in MWNTs (Invited) (I)</a> , pp. 174-177. Subramanian, Arunkumar Dong, Lixin Xu, Didi Nelson, Bradley J.		
10:55-11:15		FrA1-1.2
<a href="#">Design, Fabrication and Measurement of CNT Based ISFET for NANO Devices</a> , pp. 178-182. Dong, Zhuxin Wejinya, Uchechukwu C.		
11:15-11:35		FrA1-1.3
<a href="#">Gate-Defined Quantum Devices Realized on an InGaAs/InP Heterostructure by Incorporating a High-<math>\epsilon_r</math> Dielectric Material</a> , pp. 183-185. Sun, Jie Larsson, Marcus Maximov, Ivan Xu, Hongqi		
11:35-11:55		FrA1-1.4
<a href="#">Toward a Universal Anti-Stick Layer for Nanoimprint Lithography Imprinters: Ultra-Thin F-DLC</a> , pp. 186-189. Fillman, Ryan Carroll, John Krchnavek, Robert		
<b>FrA1-2</b>		Michigan GH
<b>Field Effect Devices (Oral Session)</b>		
Chair: Lotkhov, Sergey Co-Chair: Lin, Zhixian		
10:20-10:40		FrA1-2.1
<a href="#">Piezoresistive Sensor Technology and RFMEMS Using P-Type Polycrystalline Diamond</a> , pp. 190-195. Cao, Zongliang Aslam, Dean		
10:40-11:00		FrA1-2.2
<a href="#">Design Considerations for Tunneling MOSFETs Based on Staggered Heterojunctions for Ultra-Low-Power Applications</a> , pp. 196-199. Wang, Lingquan (Dennis) Asbeck, Peter		
11:00-11:20		FrA1-2.3
<a href="#">Microwave Performance of Surface Channel Diamond MESFETs</a> , pp. 200-204. Calvani, Paolo Corsaro, Alessio Sinisi, Fabio Rossi, Maria Cristina Conte, Gennaro		

Carta, Stefano  
 Limiti, Ernesto  
 11:20-11:55 FrA1-2.4  
*Megahertz Frequency Characterization of Transparent Nanowire-Based Thin-Film Transistors (Invited) (I)*, pp. 205-206.  
 Dattoli, Eric  
 Kim, Kuk-Hwan  
 Choi, Seok-Youl  
 Lu, Wei

---

**FrP1-1** Michigan EF  
**Optical Detection and Photovoltaics** (Oral Session)

---

Chair: Krchnavek, Robert  
 Co-Chair: Zhang, Mingjun

14:00-14:35 FrP1-1.1  
*Performance Analysis of Bulk Heterojunction Solar Cells Fabricated by Polymer: Fullerene: Carbon-Nanotube Composites (Invited) (I)*, pp. 207-211.  
 Liu, Liming  
 Stanchina, William  
 Li, Guangyong

14:35-14:55 FrP1-1.2  
*Infrared Detection Using an InSb Nanowire*, pp. 212-216.  
 Chen, Hongzhi  
 Sun, Xuhui  
 Lai, King Wai Chiu  
 Meyyappan, M.  
 Xi, Ning

14:55-15:15 FrP1-1.3  
*Proposal of ZnSe/GaAs Digital Alloys for High Band Gap Solar Cells and True Green LEDs*, pp. 217-220.  
 Montgomery, Kyle  
 Agarwal, Samarth  
 Klimeck, Gerhard  
 Woodall, Jerry

15:15-15:35 FrP1-1.4  
*Reducing the Roughness of Transparent Electrodes in Organic Photovoltaic Devices on Plastic Substrate by PEDOT: PSS Treatment*, pp. 221-224.  
 Ebadian, Soheil  
 Servati, Peyman

---

**FrP1-2** Michigan GH  
**Dielectrics and Capacitors** (Oral Session)

---

Chair: George, Hubert  
 Co-Chair: Dong, Lixin

14:00-14:20 FrP1-2.1  
*Effects of High Pressure Hydrogen Anneal Process on Performance and Reliability in HfO<sub>2</sub>/SiO<sub>2</sub> Dielectric with Contact Etch Stop Layer Stressor*, pp. 225-228.  
 Song, Seung Hyun  
 Park, Minsang  
 Lee, Kyong Taek  
 Choi, Hyun-Sik  
 Choi, Gil-Bok  
 Baek, Rock Hyun  
 Sagong, Hyun Chul  
 Jung, Sung-Woo  
 Kang, Chang Yong  
 Wu, Bob  
 Jeong, Yoon-Ha

14:20-14:40 FrP1-2.2  
*High Pressure Hydrogen Annealing Effect of CESL Nitride Stressor MOSFETs with Metal Gate/High-K Dielectric on the Performance and Reliability*, pp. 229-232.  
 Park, Min Sang  
 Lee, Kyong Taek  
 Song, Seung Hyun  
 Hong, Seung-Ho  
 Choi, Gil-Bok  
 Baek, Rock Hyun  
 Choi, Hyun-Sik  
 Sagong, Hyun Chul  
 Jung, Sung-Woo  
 Kang, Chang Yong  
 Wu, Bob



Jeong, Yoon-Ha  
14:40-15:00 FrP1-2.3  
[A Carbon Nanotube Capacitor](#), pp. 233-236.  
Budnik, Mark Michael  
Johnson, Eric

15:00-15:35 FrP1-2.4  
[Material Characterization and Process Modeling Issues of High-K Dielectrics for FET Applications \(Invited\) \(I\)](#), pp. 237-240.  
Kang, Jung Han  
Kim, Chang Eun  
Kim, Myoung-Seok  
Myoung, Jae-Min  
Yun, Ilgu

---

**FrP2-1** Michigan EF  
**Bio Related Devices (Oral Session)**

---

Chair: Lotkhov, Sergey  
Co-Chair: George, Hubert

15:55-16:30 FrP2-1.1  
[Sensing and Closing Mechanism for Venus Flytrap: Theoretical and Experimental Studies \(Invited\) \(I\)](#), pp. 241-246.  
Yang, Ruoting  
Lenaghan, Scott  
Xia, Lijin  
Zhang, Mingjun

16:30-16:50 FrP2-1.2  
[Unidirectional Movement of Myosin-Driven Beads on Immobilized F-Actin Arrays in a Microfluidic Channel](#), pp. 247-250.  
Lee, Yongkuk  
Carroll, R. Lloyd  
Holland, Lisa  
Famouri, Parviz

---

**FrP2-2** Michigan GH  
**Nanomaterials Fabrication and Memory Devices (Oral Session)**

---

Chair: Snider, Gregory  
Co-Chair: Lin, Zhixian

15:55-16:15 FrP2-2.1  
[Channel Doping Concentration and Fin Width Effects on Self-Boosting in NAND-Type SONOS Flash Memory Array Based on Bulk-FinFETs](#), pp. 251-254.  
Cho, Seongjae

16:15-16:35 FrP2-2.2  
[Effects of Equivalent Oxide Thickness on Bandgap-Engineered SONOS Flash Memory](#), pp. 255-258.  
Li, Dong Hua  
Park, Il Han  
Cho, Seongjae  
Yun, Jang-Gn  
Lee, Jung Hoon  
Kim, Doo-Hyun  
Lee, Gil Sung  
Kim, Yoon  
Park, Se Hwan  
Shim, Won Bo  
Kim, Wandong  
Park, Byung-Gook

16:35-16:55 FrP2-2.3  
[Body-Raised Double-Gate Structure for 1T DRAM](#), pp. 259-263.  
Kim, Garam  
Kim, Sang Wan  
Song, Jae Young  
Kim, Jong Pil  
Ryoo, Kyung-Chang  
Oh, Jeong-Hoon  
Park, Jae Hyun  
Kim, Hyun Woo  
Park, Byung-Gook