

International Semiconductor Device Research Symposium
December 7-9, 2005
Holiday Inn Select Bethesda
Bethesda, Maryland, USA

Technical Program

Wednesday, December 7, 2005

WP1: Oxides and Dielectrics I - 1:30pm - 3:30pm

Chairperson: Jerry Thaler, University of Florida

Meeting Room: Versailles I & II

- 1:30pm - 2:00pm **WP1-01 *Invited***
Electrical Characterization of Defects in High-k Gate Dielectrics
Eric M. Vogel, NIST
- 2:00pm - 2:20pm **WP1-02**
Highly Reliable High-k Gate Dielectrics by Gradual Hf-profile in the
HfO₂/SiO₂ Interface Region
*K. Iwamoto, A. Ogawa, T. Nabatame, and H. Satake, MIRAI-ASET, W.
Mizubayashi and A. Toriumi, MIRAI-ASRC, AIST*
- 2:20pm - 2:40pm **WP1-03 *Student****
Trapping in Deep Defects under Substrate Hot Electron Stress in TiN/Hf-silicate
Based Gate Stacks
*N. A. Chowdhury, P. Srinivasan and D. Misra, New Jersey Institute of
Technology*
- 2:40pm - 3:00pm **WP1-04 *Student***
Gate-Dielectric Interface Effects on Low-Frequency (1/f) Noise in p-MOSFETs
with High-K Dielectrics
*P. Srinivasan, E. Simoen, R. Singanamalla, H.Y. Yu, and C. Claeys, IMEC
Belgium, D. Misra, New Jersey Institute of Technology*
- 3:00pm - 3:20pm **WP1-05 *Student***
Magnetic Properties of Atomic-Layer-Deposited Hafnium Dioxide
*H.-Y. Chen and P.D. Ye, Purdue University, J. Murray, P. Xiong, and S. von
Molnar, Florida State University, G.D. Wilk, ASM America*

WP2: GaN Material and Characterization - 1:30pm - 3:30pm

Chairperson: Ken Jones, ARL

Meeting Room: Versailles III & IV

- 1:30pm - 2:00pm **WP2-01 *Invited***
Nitride-based UV Geiger-Mode Avalanche Photodiodes
Richard Molnar, MIT
- 2:00pm - 2:30pm **WP2-02 *Invited***
Physics of textured III-Nitride Quantum Wells for Applications to LEDs
T. Moustakas and J.S. Cabalu, Boston University, S. Riyopoulos, SAIC
- 2:30pm - 2:50pm **WP2-03**
Schottky Barrier Height in GaN/AlGaN Heterostructures
A. F. M. Anwar and Elias W. Faraclas, University of Connecticut, Kurt V. Smith, Raytheon Company
- 2:50pm - 3:10pm **WP2-04 *Student***
Ge/Cu/Ti Ohmic Contacts to N-type GaN
Nadeemullah Mahadik and Mulpuri V. Rao, George Mason University, Albert V. Davydov, National Institute of Sciences and Technology
- 3:10pm - 3:30pm **WP2-05**
Temperature-dependent Radiative Lifetimes of Excitons in Non-polar GaN/AlGaN Quantum Wells
S. Rudin, G. A. Garrett, H. Shen, and M. Wraback, U.S. Army Research Laboratory, B. Imer, B. Haskell, J. S. Speck, S. Keller, S. Nakamura, and S. P. DenBaars, University of California at Santa Barbara

WP3: Molecular and Organic Electronics - 1:30pm - 3:30pm

Chairperson: Dean DeLongchamp, NIST

Meeting Room: Washington

- 1:30pm - 2:00pm **WP3-01 *Invited***
New Tools for Molecular Electronics
James Kushmerick, National Institute of Standards and Technology
- 2:00pm - 2:30pm **WP3-02 *Invited***
Organic Field-effect Transistor Channel Perturbation at Two Surfaces through Analyte Binding and Dielectric Charging
H.E. Katz, C. Huang, J. Huang, K. See, J. Miragliotta, A. Becknell, Johns Hopkins University
- 2:30pm - 2:50pm **WP3-03**
Organic and Carbon Nanotube Thin-film Transistors Fabricated on Flexible Substrates using Transfer Printing
Daniel R. Hines, Mihaela Breban, Vinod Sangwan, Andrew Tunnell, Ellen D. Williams, Vince W. Ballarotto, Gokhan Esen, and Michael Fuhrer, University of Maryland, Yue Shao and Stuart A. Solin, Washington University in St. Louis

- 2:50pm - 3:10pm **WP3-04**
 Transport in Metal-Molecule-Silicon Devices
Adina Scott and David Janes, Purdue University
- 3:10pm - 3:30pm **WP3-05**
 Interface Characterization of Molecular-Monolayer/SiO₂ Based Molecular Junctions
C.A. Richter, C.A. Hacker, O.A. Kirillov, E.M. Vogel, and L.J. Richter, National Institute of Standards and Technology
- 3:30pm - 3:45pm **Coffee Break - Versailles Foyer**

WP4: Oxides and Dielectrics II - 3:45pm - 5:45pm

Chairperson: Eric Vogel, NIST

Meeting Room: Versailles I & II

- 3:45pm - 4:15pm **WP4-01 *Invited***
 Interface Passivation of Silicon Dioxide layers on Silicon Carbide
S. Dhar, S.T. Pantelides and L.C Feldman, Vanderbilt University, S. Wang, T. Issacs-Smith, J.R. Williams, Auburn University
- 4:15pm - 4:35pm **WP4-02**
 Low Leakage Current Transport and High Breakdown Strength of HfO₂/SiC MIS Device Structures
S.S. Hullavarad, E.B. Jones, R.D. Vispute, and T. Venkatesan, University of Maryland
- 4:35pm - 4:55pm **WP4-03**
 Dramatic Reduction of Gate Leakage Current of Ultrathin Oxides Through Oxide Structure Modification
Zhi Chen, Jun Guo and Chandan B. Samantaray, University of Kentucky
- 4:55pm - 5:15pm **WP4-04 *Student****
 A New Gate Dielectric HfLaO with Metal Gate Work Function Tuning Capability and Superior NMOSFETs Performance
X.P. Wang, M.F. Li, Albert Chin, C.X. Zhu, Ren Chi, X.F. Yu, C. Shen, and D.S.H. Chan, National University of Singapore, A.Y. Du, Institute of Microelectronics, and Dim-Lee Kwong, University of Texas at Austin
- 5:15pm - 5:35pm **WP4-05**
 Characterization of Sb-Doped Fully-Silicided NiSi/SiO₂/Si MOS Structure
Takuji Hosoi, Kousuke Sano, Masaki Hino, Akio Ohta, Katsunori Makihara, Hirotaka Kaku, Seiichi Miyazaki, and Kentaro Shibahara, Hiroshima University

WP5: GaN Devices and Characterization - 3:45pm - 5:45pm

Chairperson: Pankaj Shah, ARL

Meeting Room: Versailles III & IV

- 3:45pm - 4:15pm **WP5-01 Invited**
Reliability Optimization for Wide Bandgap Devices: Recent Developments in High-spatial Resolution Thermal Imaging of GaN Devices
M. Kuball, University of Bristol, M.J. Uren and T. Martin, QinetiQ Ltd.
- 4:15pm - 4:35pm **WP5-02**
Monitoring the Self-Heating in a High Frequency GaN HFET
S.P. McAlister, J.A. Bardwell, S. Haffouz, and H. Tang, Institute for Microstructural Sciences, National Research Council of Canada
- 4:35pm - 4:55pm **WP5-03 Student**
Analysis of Temperature Model on Device Characteristics for AlGaIn/GaN MODFET for High Power Electronics
Hasina F. Huq, Mohammad T. Alam, and Syed K. Islam, The University of Tennessee
- 4:55pm - 5:15pm **WP5-04 Student**
AlGaIn/GaN HEMTs: Experiment and Simulation of DC Characteristics
Elias W. Faraclas and A.F.M. Anwar, University of Connecticut, Richard T. Webster, Air Force Research Laboratory
- 5:15pm - 5:35pm **WP5-05 Student**
Characterization of Post-Gate Annealing Impact on Traps in AlGaIn/GaN Schottky Diodes by Capacitance and Conductance Dispersion
Junghui Song, Hyeongnam Kim, and Wu Lu, The Ohio State University

WP6: MEMS and Integrated Sensors - 3:45pm - 5:45pm

Chairperson: Paul Pellegrino, ARL

Meeting Room: Washington

- 3:45pm - 4:15pm **WP6-01 Invited**
Nanosystems - The Next MEMS Revolution
Dennis Polla, DARPA
- 4:15pm - 4:45pm **WP6-02 Invited**
Applications of Semiconductor Ultraviolet Optical Sources and Detectors to Bioagent Detection and Sterilization
M. Wraback, U.S. Army Research Laboratory
- 4:45pm - 5:15pm **WP6-03 Invited**
Heat and Temperature in Micromechanical Systems
J. Talghader, University of Minnesota

- 5:15pm - 5:35pm **WP6-04**
Microhotplate-Based Sensor Platform for Submicron CMOS SoC Designs
Interfaces
*M. Afridi, A. Hefner, J. Geist, and C. Ellenwood, National Institute of Standards
and Technology, A. Varma, and B. Jacob, University of Maryland*
- 5:35pm - 5:55pm **WP6-05 Student**
Silicon Substrates with Buried Distributed Bragg Reflectors for Biosensing
David A. Bergstein, Michael F. Ruane, and M. Selim Ünlü, Boston University
- 5:55pm - 6:15pm **WP6-06 Student**
Indium Phosphide MEMS for Integrated Bio-Sensing
*Nathan Siwak, Marcel Pruessner, Jonathan McGee, and Reza Ghodssi,
University of Maryland*
- 7:30pm - 10:00pm **Welcome Reception and Poster Session - Versailles Ballroom**

WP7: Poster Presentations - 7:30pm - 10pm

Chairperson: Marc Sherwin, Northrup Grumman Corporation

Meeting Room: Versailles Ballroom

WP7-01 - Oxides and Dielectrics

WP7-01-01

Fluorinated ALD Al₂O₃ Gate Dielectrics by CF₄ Plasma
*Chao Sung Lai, Kung Ming Fan, Yi Jung Chen, Kuo Hui Su, Chang Rong Wu,
Shian Jyh Lin, and Chung-Yuan Lee, Chang Gung University*

WP7-01-02 Student

Implications of SiO₂ Breakdown in an Integrated Nanoscale Power Supply
Mark M. Budnik and Kaushik Roy, Purdue University

WP7-01-03 Student*

Characterization of Sputtered-TaN Metal Gate for SiO₂ and HfO₂ Gate
Dielectrics
*Yijie Zhao, Brandon Eberly, and Marvin H. White, Lehigh University, Huiling
Shang, IBM T.J. Watson Research Center*

WP7-01-04

Al₂O₃ MIM Capacitor with Various Metal Bottom Electrodes for DRAM
Applications
*Seung Woo Do, Cheol Yeong Jang, Dae Gab Lee, Sung Hwan Choi, and Yong
Hyun Lee, Kyungpook National University*

WP7-01-05

Characteristics of RuO₂ Bottom Electrode for MIM Capacitor
*Seung Woo Do, Cheol Yeong Jang, Dae Gab Lee, Sung Hwan Choi, and Yong
Hyun Lee, Kyungpook National University*

WP7-01-06 Student

CMOS Compatibility of Crystalline Gd₂O₃ High-K / Metal Gate Stacks
H.D.B. Gottlob, T. Echtermeyer, T. Mollenhauer, J. Efavi, M. Schmidt, T. Wahlbrink, M.C. Lemme, and H. Kurz, Advanced Microelectronic Center Aachen (AMICA)

WP7-02 - Wide Bandgap Materials and Devices

WP7-02-01 Student

Morphological Evaluation and Binding Properties of Interleukin-6 on Thin ZnO Layers Grown on (100) Silicon Substrates for Biosensor Applications
Soumya Krishnamoorthy and Agis Iliadis, University of Maryland, Thaleia Bei, Emmanouil Zoumakis, and George P. Chrousos, NIH

WP7-02-02

High Breakdown Voltage AlGa_N/Ga_N MIS-HEMT with Si₃N₄ and TiO₂ Gate Insulator
Shuich Yagi, Mitsuaki Shimizu, Yuki Yamamoto, and Guanxi Piao, National Institute of Advanced Industrial Science and Technology, Yoshiki Yano and Hajime Okumura, Taiyo Nippon Sanso Corporation

WP7-02-03 Student

Structural Characteristics of Hydride Vapor Phase Epitaxially Grown Ga_N
Nadeemullah Mahadik and Mulpuri V. Rao, George Mason University, S.B. Qadri and James P. Yesinowski, Naval Research Laboratory

WP7-02-04 Student

Athermal Annealing of Ion-implanted SiC
K. B. Mulpuri, The Thomas Jefferson High School for Science and Technology, S. B. Qadri and J. Grun, U.S. Naval Research Laboratory, M. C. Ridgway, Australian National University

WP7-02-05 Student

Large-Signal Modeling of SiC-Based RF MESFET
Sankha S. Mukherjee and Syed S. Islam, Rochester Institute of Technology

WP7-02-06

The Reverse Leakage Current of Present-Day Manufactured Silicon PN
Vasile V.N. Obreja, National R&D Institute for Microtechnology

WP7-02-07

Thermal Modeling of Multi-finger SiC Power MESFETs
C.-M. Zetterling, W. Liu, and M. Östling, KTH, Royal Institute of Technology

WP7-02-07

Parameter Extraction and SPICE Model Development for 4H-Silicon Carbide (SiC) Power MOSFET
Md Hasanuzzaman, Tennessee State University, Syed K. Islam and Mohammad T. Alam, The University of Tennessee, Knoxville

WP7-02-08

Homo and Heteroepitaxial Growth of Hexagonal and Cubic $\text{Mg}_x\text{Zn}_{1-x}\text{O}$ Alloys
S.S.Hullavarad, D.E.Pugel, S.Dhar, I.Takeuchi, and T.Venkatesan, University of Maryland, R.D.Vispute, Blue Wave Semiconductors

WP7-02-09

Characterization and Application of SiC TI-VJFETs
K. Sheng, J. H. Lee, P. Alexandrov, and J. H. Zhao, Rutgers University

WP7-02-10 Student

The Effects of Implanting Al and Al and C at Different Temperatures in Different Concentrations into SiC
D. Stepp, R.D. Vispute, S. Hullavarad, and S. Dar, University of Maryland, K.A. Jones, T.S. Zheleva, and M.A. Derenge, U.S. Army Research Lab - SEDD

WP7-02-11

Structural Comparison of the (3 -3 2n) and (3 -3 n) 2H, 4H and 6H Surfaces for Application to the Growth of AlGa_N on Off-Axis 4H- and 6H-SiC Substrates
K. A. Jones, Army Research Lab – SEDD

WP7-02-12

A Transmission Electron Microscopy Investigation of GaN Grown on Patterned, Step-Free 4H-SiC Mesas
N. D. Bassim, M.E. Twigg, M.A. Mastro, C.R. Eddy Jr., R. L. Henry, and R. N. Holm, US Naval Research Laboratory, P. Neudeck, J.A. Powell, and A.J. Trunek, NASA Glenn Research Center

WP7-02-13

Growth and Characterization of $\text{Cd}_{0.22}\text{Zn}_{0.78}\text{S}$ Thin Films Prepared by Spray Pyrolysis Method:Optical and Structural Properties
M.C. Baykul, N. Orhan, and A. Gulec, Eskisehir Osmangazi University

WP7-02-14

Preparation and Characterization of ZnS Thin Films Produced by Chemical Bath Deposition (CBD) Method: Optical, Electrical, and Structural Properties
M.C. Baykul and C. Turkmen, Eskisehir Osmangazi University

WP7-02-15

High Current (200 A), Low Resistance ($0.87 \text{ m}\Omega\text{-cm}^2$) Normally-off SiC VJFETs for Power Switching Applications
E.J. Stewart, A.P. Walker, T.R. McNutt, S.D. Van Campen, H.C. Hearne, T.J. Knight, M.J. McCoy, V. Veliadis, G.M. Bates, and G.C. DeSalvo, Northrup Grumman Advanced Technology Laboratory

WP7-02-16

The Reverse Leakage Current of Present-Day Manufactured Silicon PN Junctions and Their Maximum Permissible Operation Temperature
Vasile V.N. Obreja, National R&D Institute for Microtechnology

WP7-03 - Molecular and Organic Electronics

WP7-03-01

Temperature and Gate Field Dependent Transport of Pentacene Thin Film Transistors
Dong Guo, The University of Tokyo

WP7-03-02 Student

Molecular Dynamics of Biological Ion Channels
Santosh Pandey, Akwete Bortei-Doku, and Marvin H. White, Lehigh University

WP7-03-03 Student*

Capacitance-Voltage Hysteresis Effects in Metal-SiO₂-Thin Film Organic Semiconductor Devices
Darrell Niemann, Norman Gunther, Charles Kwong, Mark Barycza, and Mahmud Rahman, Santa Clara University

WP7-03-04

Conductivity Measurements of Few Molecule Systems in Metal-Molecule-Metal Device Structure
Ajit Kumar Mahapatro and David B. Janes, Purdue University

WP7-04 - MEMS and Integrated Sensors

WP7-04-01 Student

A BioMEMS Platform for Planar Patch-Clamping
Santosh Pandey, Rajiv Mehrotra, Matthew Chabalko, Akwete Bortei-Doku, and Marvin H. White, Lehigh University

WP7-04-02 Student

A Novel CMOS Integrated Amplifier for Sensing Single Ion-Channel Current in Biological Cells
Santosh Pandey, Akwete Bortei-Doku, and Marvin H. White, Lehigh University

WP7-04-03

1/f Noise Characteristics of Gold Nanocluster Chemical Sensors
W. Kruppa, M.G. Ancona, R.W. Rendell, A.W. Snow, E.E. Foos, and R. Bass, Naval Research Laboratory

WP7-04-04

A Microshield RF MEMS Shunt Switch
Jeyasingh Nithianandam and Satish N. Samson, Morgan State University, Eugene Zakar, U.S. Army Research Laboratory

WP7-04-05 Student

Realization of Self-Powered Electronics by 3-D Integration
Zeynep Dilli, Neil Goldsman, and Martin Peckerar, University of Maryland, George Metze, Laboratory for Physical Sciences

WP7-04-06

Characteristics of Capacitive Membrane-Type RF MEMS Switches
Yeong-Lin Lai and Yueh-Hung Chen, National Changhua University of Education

WP7-05 - SiGe Materials and Devices

WP7-05-01 Student

CMOS Device Reliability for Emerging Cryogenic Space Electronics Applications

Tianbing Chen, Laleh Najafizadeh, Chendong Zhu, Adnan Ahmed, Ryan Diestelhorst, Gustavo Espinel, and John D. Cressler, Georgia Institute of Technology

WP7-05-02

Impact of Device Scaling on VCOs Phase Noise in SiGe HBTs

Ulrich L. Rohde and Ajay K. Poddar, Synergy Microwave Corporation

WP7-05-03

Efficient Approach to Optimization of fT for Graded-Base SiGe HBTs

Lei Ai, University of California, Irvine, Ming-Cheng Cheng, Clarkson

WP7-05-04 Student*

Analysis of the Biasing Conditions and Latching Operation for Si/SiGe Resonant Interband Tunnel Diode Based Tunneling SRAM

Stephen Sudirgo, David J. Pawlik, Sean L. Rommel, and Santosh K. Kurinec, Rochester Institute of Technology, Phillip E. Thompson, Naval Research Laboratory, Paul R. Berger, The Ohio State University

WP7-05-05 Student

Analytical Modeling and Simulation of V_{th} and V_{tl} of the Delta-Doped MOS-Gate Si/SiGe HEMT

Mohammad T. Alam, Touhidur Rahman, and Syed K. Islam, The University of Tennessee, Md. Hasanuzzaman, Tennessee State University

WP7-06 - Narrow Bandgap Materials and Devices

WP7-06-01 Student

Modeling and Simulation of Narrowband Gap Semiconductor Indium Antimonide (InSb) Based MOSFET

Lei Ma, Yawei Jin, Chang Zeng, and Doug Barlage, North Carolina State University

WP7-07 - NanoElectronics Materials and Devices

WP7-07-01

Characterization of Compositional Oscillations in InGaAs Films Induced by MBE Cell Configuration and Substrate Rotation

Wendy L. Sarney and Stefan P. Svensson, US Army Research Laboratory

WP7-07-02

Deposition and Electrical Characterization of a MOS Memory Structure Containing Au Nanoparticles in a High-K Dielectric Layer

Ch. Sargentis and D. Tsamakias, National Technical University of Athens, K. Giannakopoulos and A. Travlos, National Centre for Scientific Research Demokritos

WP7-07-03 Student

Two-Dimensional Quantum Mechanical Modeling for Multiple-Channel FinFET

Joong-sik Kim and Taeyoung Won, Inha University

WP7-07-04 Student

Transport Properties of Wide Band Gap Nanotubes

Gary Pennington, Akin Akturk, James M. McGarrity, and Neil Goldsman, University of Maryland

WP7-07-05 Student

On the Accuracy of Analytical Model for Room-Temperature Operating Silicon Single-Electron Transistors with Discrete Quantum Energy Levels

Kousuke Miyaji, Masaharu Kobayashi, Tetsu Ohtou, and Toshiro Hiramoto, University of Tokyo, Masumi Saitoh, Toshiba Corporation

WP7-07-06 Student*

Selective MBE Growth of Shape-, Size-, and Position- Controlled GaAs Nanowire Networks on (111)B Patterned Substrates

Isao Tamai, Taketomo Sato, and Hideki Hasegawa, Hokkaido University

WP7-07-07 Student

Densified Vertically-Aligned Carbon Nanotube Arrays by Chemical Vapor Infiltration

Stephen J. Kilpatrick, U.S. Army Research Laboratory, Anyuan Cao, Xuesong Li, Nicholas J. Renna, and Pulickel M. Ajayan, Rensselaer Polytechnic Institute Research Laboratory

WP7-07-08 Student

Large Scale Assembly of GaN Nanowires using Electric Field Assisted Alignment Techniques for Device Applications

Abhishek Motayed and Albert V. Davydov, National Institute of Standards and Technology, Dr. Maoqi He and S. N. Mohammad, Howard University

WP7-08 - Device Modeling**WP7-08-01**

Effect of Channel Doping Levels in LDMOSFET on the Transfer Characteristic of CMOS Inverter

Nam-Soo Kim, Hyung-Gyoo Lee and Cuizhiyuan, Chingbuk National University

WP7-08-02 Student

First Principle Study of Si and Ge Band Structure for UTB MOSFETs Applications

T. Low, G. Samudra, Y.C. Yeo, and Y.P. Feng, National University of Singapore, M.F. Li, Institute of Microelectronics, P. Bai, Institute of High Performance Computing, D.L. Kwong, University of Texas, Austin, and L. Chan, Chartered Semiconductor

WP7-08-03

A Subthreshold Drain Current Model for Deep Submicron Pocket Implanted MOSFETs

S. Baishya and C.K. Sarkar, Jadavpur University, A. Mallik, Kalyani Gov't Engineering College

WP7-08-04 Student

Critical Substrate Bias in Variable Threshold Voltage CMOS (VTCMOS) Scheme with Short Channel Devices

A. Tamsir P., T. Ohtou, T. Nagumo, and T. Hiramoto, University of Tokyo

WP7-08-05 Student

Modeling of Doping Profile in Active-Silicon Region of Silicon-On-Insulator transistor as a function of Channel Length

Jay Mody, IMEC Belgium and Prasanta Ghosh, Syracuse University

WP7-08-06

Numerical Modeling and Characterization of n-Channel 4H-SiC Double-Diffused Vertical Power MOSFET

J. Wu, S. Potbhare, and N. Goldsman, University of Maryland, A. Lelis, U.S Army Research Laboratory

WP7-08-07 Student

Full Wave Modeling of Substrate Doping Effects and Nonideal Conductors in Integrated Circuit Interconnects

Bo Yang, Xi Shao, Neil Goldsman, Omar Ramahi, and Parvez N. Guzdar, University of Maryland

WP7-08-08 Student

Gate Line Edge Roughness Amplitude and Frequency Variation Effects on Intra Die MOS Device Characteristics

Emad Hamadeh, Norman Gunther, Darrell Nieman, and Mahmud Rahman, Santa Clara University

WP7-08-09 Student

Accurate MOS Gate Impedance Model for 200MHz-20GHz Frequency Range

Sripriya R Bandi, Clyde Washburn, and P.R.Mukund, Rochester Institute of Technology, Jan Kolnik, Ken Paradis, Steve Howard, and Jeff Burleson, LSI Logic Corporation

WP7-08-10 Student

CMOS Foundry Schottky Diode Microwave Power Detector Fabrication, Spice Modeling, and Application

Woochul Jeon and John Melngailis, University of Maryland

WP7-08-11 Student

Quantum Mechanical Modeling of Nanoscale MOSFETs Carrier Transportation

Huixian Wu, Marvin H. White, and James Cargo, Lehigh University

WP7-08-12

High-Frequency Modeling of Quad Flat No-Lead Packages

Yeong-Lin Lai and Cheng-Yu Ho, National Changhua University of Education

WP7-08-13 Student

Modeling of MOSFET Gate Leakage for High k Gate Dielectrics

Huixian Wu, Yijie Zhao, and Marvin H. White, Lehigh University

WP7-08-14 Student

Topography Simulation for Wafer-scale Structural Analysis

Jun-Gu Lee and Taeyoung Won, Inha University

WP7-08-15 Student

First Principle Study of Si and Ge Band Structure for UTB MOSFETs Applications

T. Low, G. Samudra, Y.C. Yeo, and Y.P. Feng, National University of Singapore, M.F. Li, Institute of Microelectronics, P. Bai, Institute of High Performance Computing, D.L. Kwong, University of Texas, Austin, and L. Chan, Chartered Semiconductor

WP7-09 - Novel Devices and Concepts

WP7-09-01 Student

A Novel Flash Memory Device Based on Recessed Channel Structure

Kyoung-Rok Han, Ki-Heung Park, Sang-Goo Jung, Young-Min Kim, and Jong-Ho Lee, Kyungpook National University

WP7-09-02 Student

25nm Programmable Virtual Source/drain MOSFETs Using a Twin SONOS Memory Structure

Woo Young Choi, Byung Yong Choi, Ju Hee Park, Jong Duk Lee, Young June Park, and Byung-Gook Park, Seoul National University, Dong-Won Kim, Choong-Ho Lee, and Donggun Park, Samsung Elec. Co.

WP7-09-03 Student

A Low Voltage SANOS Nonvolatile Semiconductor Memory (NVSM) Device

Yijie Zhao, Xiaonan Wang, and Marvin H. White, Lehigh University, Huiling Shang, IBM T.J. Watson Research Center

WP7-09-04 Student

An Optimum Design of Saddle MOSFET with Recess Channel and Side-Gate
Ki-Heung Park, Kyoung-Rok Han, and Jong-Ho Lee, Kyungpook National University

WP7-09-05 Student

The Impact of InAlAs Spacer Layer on DC Characteristics of
InP/InAlAs/GaAsSb/InP DHBTs

S. W. Cho, M. S. Park, T. W. Kim, and J. H. Jang, Gwangju Institute of Science and Technology, I. Adesida, University of Illinois at Urbana Champaign, N. Pan, Microlink Devices

WP7-09-06 Student

Design of Silicon Devices for Pass-Transistor-Logic Circuits

F. Vasefi and Z. Abid, University of Western Ontario

WP7-09-07

Effect of Graded Base Doping on the Gain of SiC BJT

J. H. Zhao, J. Zhang, X. Li, and K. Sheng, Rutgers University

WP7-09-08 Student

Compact n-Well Design of High Density p-type Bulk FinFET for CMOS
Technology

Byung-Kil Choi, Kwang-Ho Baek, Young Min Kim and Jong-Ho Lee, Kyungpook National University

WP7-10 - Advanced Processing and Characterization

WP7-10-01 Student

Piezoelectric Coupling Constant in Epitaxial Mg-doped GaN

X. Xu and R.C. Woods, Iowa State University

WP7-10-02

A New Low-cost Technique for Mobility Enhancement of PMOSFETs Strained
by Ge Pre-amorphization Implantation for Source/Drain Extension

Qiuxia Xu, Xiaofong Duan, He Qian, Haihua Liu, and Ming Liu, Chinese Academy of Sciences

WP7-10-03

Determination of Evolution Path for BmIn Clusters in Atomistic Model

Jae-Hyun Yoo, Chi-Ok Hwang, Kwan-Sun Yoon, Jung-Sik Kim, and Taeyoung Won, Inha University

WP7-10-04 Student*

Impact Ionization Rate of the Bulk FinFETs with Width and Bias Condition

Sang-Yun Kim, Kwang-Ho Baek, Kyoung-Rok Han, Byung-Kil Choi, and Jong-Ho Lee, Kyungpook National University

WP7-10-05 Student

Investigation of Ni Induced Deep Levels in N-Type Si by a Temperature
Shoichiro Sato, Shin-ichi Fukushima, Tetsuo Ikari and Kentaro Sakai, Miyazaki University, Shuji Tanaka and Atsuhiko Fukuyama, Fukuoka Institute of Technology

WP7-10-06 Student

Piezoelectric Photo Thermal and Surface Photo Voltage Spectra of Chalcopyrite
CuGaSe₂ Epitaxial Layers Fabricated on Semi-insulating GaAs

Naoto Ohryoji, Akihiro Goto, Hirosumi Yokoyama, Kentaro Sakai, Atsuhiko Fukuyama, and Tetsuo Ikari, Miyazaki University, Akimasa Yamada and Shigeru Niki, National Institute of AIST

WP7-10-07 Student

Carrier Recombination Mechanism at SiO₂/Si Interface Studied by a Photo-thermal and a Surface Photo-voltage Spectroscopy

T. Saisho, K. Sakai, H. Hayashi, S. Sato, A. Fukuyama, and T. Ikari, University of Miyazaki, M. Suemitsu, Tohoku University

WP7-10-08 Student

Piezoelectric Photothermal and Surface Photovoltage Spectra in Extremely Thin GaInNAs/GaAs Single Quantum Well

Shinichi Fukushima, Tetsuo Ikari, Atsuhiko Fukuyama, Kentaro Sakai, and Hirosumi Yokoyama, Miyazaki University, Masahiko Kondow, Osaka University

WP7-10-09 Student

Characterization of Polysilicon-Oxide-Nitride-Oxide-Silicon (SONOS) Nonvolatile Semiconductor Memory (NVSM) Devices

Xiaonan Wang, Yu Wang, Matthew J. Chabalko, Marvin H. White, and Stephen J. Wrazien, Lehigh University

WP7-10-10 Student

Isolation Method for Bulk FinFET without Using CMP Process

Il Hwan Cho, Junsoo Kim, Il Han Park, Hyungcheol Shin, Byung-Gook Park, and Jong Duk Lee, Seoul National University, Jong Ho Lee, Kyungpook National University

WP7-10-11 Student

Ab-initio Calculations for Indium Diffusion in Silicon

Kwan-Sun Yoon, Chi-Ok Hwang, and Taeyoung Won, Inha University

WP7-11 - Optoelectronics and LED Lighting

WP7-11-01 Student

Responsivity and Lifetime of Resonant Cavity Enhanced HgCdTe Detectors

J. G. A. Wehner, R. H. Sewell, C. A. Musca, J. M. Dell, and L. Faraone, The University of Western Australia

WP7-11-02 Student

A Silicon-based Light Emitter

Yanli Zhang, Yijie Zhao, Isaac Wildeson, Marvin H. White, Zackery Fleischman, and Volkmar Dierolf, Lehigh University

WP7-11-03 Student*

Optical Thin Films with Very Low Refractive Index and Their Application in Photonic Devices

J.-Q. Xi, Jong Kyu Kim, Dexian Ye, Jasbir S. Juneja, T.-M. Lu, Shawn-Yu Lin, and E. Fred Schubert, Rensselaer Polytechnic Institute

WP7-11-04

Optical Properties of Full Digital-alloy InGaAlAs Multi-quantum Wells and Application to CW 200-mW 1.3- μ m Laser Diodes

J. D. Song, D. C. Heo, W. J. Choi, I. K. Han, and J. I. Lee, Korea Institute of Science and Technology, J. M. Kim, K. S. Chang, and Y. T. Lee, Gwangju Institute of Science and Technology

WP7-11-05 Student

Investigation of Frequency Modulation Method for Detection of Optical Beam

Asmolova O.V., National Technical University of Ukraine

WP7-11-06

Investigation and Design of Wide Dynamic Range Gating Photosensor Module on the Base Hamamatsu Photomultiplier Tube R7400U with Output Signal Compression for LIDAR-RADAR Applications

Pavlo Molchanov, Olha Asmolova, Iryna Petrosyuk, and Yulia Podobna, National Technical University of Ukraine "KPI", Vincent Contarino, Naval Air Systems Command Research and Engineering Group

WP7-11-07

Feasibility of High Speed Operation of 1.55 μ m Quantum Dot Laser Diode

Byung Seok Choi, Jin Soo Kim, Sung Ui Hong, Jin Hong Lee, Ho-Sang Kwack, and Dae Kon Oh, Electronics and Telecommunications Research Institute (ETRI)

WP7-11-08

Injection-Locking in Fabry-Perot Quantum-well Lasers

X. Jin, California Polytechnic State University, S. L. Chuang, University of Illinois at Urbana-Champaign

WP7-12 - Flexible Electronics**WP7-12-01 Student***

Nanocrystalline-Si Thin Film Fabricated by Inductively Coupled Plasma Chemical Vapor Deposition for Flexible Electronics

Sang-Myeon Han, Joong-Hyun Park, Hye-Jin Lee, Kwang-Sub Shin and Min-Koo Han, Seoul National University

WP7-13 - SOI

WP7-13-01

Electrothermal Modeling of an SOI Differential Amplifier

Feixia Yu, Eastman Kodak Company, Ming-Cheng Cheng, Clarkson University

WP7-13-02

Influence of SOI-generated Stress on BiCMOS Performance

Ted Johansson, B. Gunnar Malm, and Mikael Östling, KTH – Royal Institute of Technology, Hans Norström, Infineon Technologies Sweden AB, Ulf Smith, Uppsala University

WP7-13-03

Large-Signal Modeling of SOI MESFETs

Asha Balijepalli, Joseph Ervin, Jinman Yang and Trevor J. Thornton, Arizona State University, Rajagopal Vijayaraghavan and Syed K. Islam, University of Tennessee

WP7-13-04 Student*

Simulation Study of Source/Drain Doping Profile for 10nm Gate Length Fully Depleted N-type SOI MOSFET

Yawei Jin, Lei Ma, Chang Zeng, and Doug Barlage, North Carolina State University

WP7-14 - High Frequency and THz Devices

WP7-14-01 Student*

Basic Study of Plasma Wave Interactions in GaAs Interdigital-Gated HEMT Devices from Microwave up to THz Frequencies

Abdul Manaf Hashim, Seiya Kasai, Hideki Hasegawa, and Tamotsu Hashizume, Hokkaido University

Thursday, December 8, 2005

Plenary Session - 8am - 10:30am

Chairperson: Marc Sherwin, Northrup Grumman Corporation

Meeting Room: Versailles I & II

8:15am - 9:00am **PL1 Invited**
TFT Technology for Large Area Electronics
R. Reuss, DARPA

9:00am - 9:45am **PL2 Invited**
Lattice-Mismatch and CMOS
Gene Fitzgerald, MIT

9:45am - 10:30 am **PL3 Invited**
Nanotechnology
Charlie Lieber, Harvard

10:30am - 10:45am **Coffee Break - Versailles Foyer**

TA1: Oxides and Dielectrics III - 10:45am - 12:15pm

Chairperson: Sarit Dahr, Vanderbilt University

Meeting Room: Versailles I & II

10:45am - 11:15am **TA1-01 Invited**
New Dielectrics for Gate Oxides and Surface Passivation on GaN
J.B.P. Gila, G.T. Thaler, A.H. Onstine, M. Hlad, A. Gerger, A. Herrero, K.K. Allums, D. Stodilka, S. Jang, B. Kang, T. Anderson, C.R. Abernathy, F Ren, and S.J. Pearton, University of Florida

11:15am - 11:35am **TA1-02**
The Electrical Characteristics of Thin Gadoline Oxide Films on Silicon Substrate by DC Reactive RF-sputtering
Tung-Ming Pan, Chao-Sung Lai, Hui-Hsin Hsu, Kuan-Di Wang, Chun-Lin Chen, Jian-Chi Lin, and Jian-Der Lee, Chang Gung University, Jer-Chyi Wang, Nanya Technology Corporation

11:35am - 11:55am **TA1-03 Student***
Electrical Characterization of ltrathin Atomic-layer-deposited Al₂O₃ on GaAs
H.C. Lin and P.D. Ye, Purdue University

11:55am - 12:15pm **TA1-04 Student**
Electrical Characteristics of Epitaxial γ -Al₂O₃ Films for Quantum Tunneling Device
Jang-Seop Kim, Kazuaki Sawada, and Makoto Ishida, Toyohashi University of Technology, Mohammad Shahjahan, Rajshahi University

TA2: SiC Material and Characterization - 10:45am - 12:25pm

Chairperson: Chip Eddy, NRL

Meeting Room: Versailles III & IV

- 10:45am - 11:15am **TA2-01 *Invited***
Degradation of Hexagonal Silicon Carbide-based Bipolar Devices
Marek Skowronski, Carnegie Mellon University
- 11:15am - 11:35am **TA2-02**
Structural and Analytical Studies of 4H Silicon Carbide MOSFETs with Thermally Grown Oxides
Tsvetanka Zheleva, Dan Habersat, and Aivars Lelis, U.S. Army Research Laboratory, Igor Levin, NIST, Morgen Dautrich and Patrick Lenahan, Penn State University
- 11:35am - 12:05pm **TA2-03 *Invited***
The Impact of Surface Defects on SiC Schottky and Ohmic Contact Formation
L.J. Brillson, S.P. Tumakha, and M. Gao, The Ohio State University, D.J. Ewing and L.M. Porter, Carnegie Mellon University, R.S. Okojie, NASA Glenn Research Center, M. Zhang and P. Pirouz, Case Western Reserve University, Q. Wahab, Linköping University, X. Ma, MaxMile Technologies, T.S. Sudharshan, University of South Carolina, T. Onishi, S. Tsukimoto, and M. Murakami, Kyoto University
- 12:05pm - 12:25pm **TA2-04**
Impact of Surface Steps on the Roughness Mobility in 4H-SiC
Gary Pennington, Siddharth Potbhare, Neil Goldsman, and James M. McGarrity, University of Maryland, Aivars Lelis, U.S. Army Research Laboratory

TA3: Narrow Bandgap Materials and Devices - 10:45am - 12:05pm

Chairperson: Jerry Woodall, Purdue University

Meeting Room: Washington

- 10:45am - 11:15am **TA3-01 *Invited***
Ultra-low-power HEMT and HBT Devices and Circuit Demonstrations
M.D. Lange, A. Cavus, R.S. Tsai, C. Monier, W.R. Deal, B. Chan, A.C. Cox, D.G. Pascua, R.S. Sandhu, R. Hsing, B.D. Poust, J.L. Kraus, P.S. Nam, L.J. Lee, D. Li, and A.L. Gutierrez-Aitken, Northrop Grumman Space Technology and A.M. Noori, S.L. Hayashi, and M.S. Goorsky, University of California
- 11:15am - 11:45am **TA3-02 *Invited***
High Quality Epitaxially-grown InAs on GaP Substrates
Aristo Yulius, Yale University, Jerry M. Woodall, Purdue University
- 11:45am - 12:05pm **TA3-03**
Quantum Dots with Type II Band Alignments for Infrared Detector Applications
Wendy L. Sarney, John W. Little, and Stefan P. Svensson, US Army Research Laboratory

12:30pm - 1:30pm **Lunch (on your own)**

TP1: Strained MOS and NDR Devices - 1:30pm - 3:40pm

Chairperson: John Cressler, Georgia Tech University

Meeting Room: Versailles I & II

- 1:30pm - 2:00pm **TP1-01 Invited**
High Mobility Strained Ge MOSFETs with High-k Gate Dielectric on Si
Joseph P. Donnelly, David Q. Kelly, Sachin Joshi, Sagnik Dey, Davood Shahrjerdi, Issac Wiedeman, Doreen Ahmad and Sanjay K. Banerjee, University of Texas at Austin
- 2:00pm - 2:20pm **TP1-02 Student**
Low Sidewall Damage Plasma Etching with ICP-RIE and HBr Chemistry of Si/SiGe Resonant Interband Tunnel Diode
Si-Young Park, Sung-Yong Chung, Ronghua Yu, and Paul R. Berger, The Ohio State University, Phillip E. Thompson, Naval Research Laboratory
- 2:20pm - 2:40pm **TP1-03 Student**
High Temperature Characterization of Si/SiGe Resonant Interband Tunnel Diodes
David J. Pawlik, Stephen Sudirgo, Santosh K. Kurinec, and Sean L. Rommel, Rochester Institute of Technology, Phillip E. Thompson, Naval Research Laboratory, Paul R. Berger, The Ohio State University
- 2:40pm - 3:00pm **TP1-04 Student**
Monolithic Si/SiGe HBT-RITD Circuit with Controllable Negative Differential Resistance For Voltage Controlled Oscillator Applications
Sung-Yong Chung, Si-Young Park, Jeffrey W. Daulton, Ronghua Yu, and Paul R. Berger, The Ohio State University, Phillip E. Thompson, Naval Research Laboratory
- 3:00pm - 3:20pm **TP1-05 Student***
Si-based Resonant Interband Tunnel Diode with Cutoff Frequency over 20 GHz and Estimated Peak Current Density of 218 kA/cm²
Sung-Yong Chung, Ronghua Yu, Niu Jin, Si-Young Park, and Paul R. Berger, The Ohio State University, Phillip E. Thompson, Naval Research Laboratory
- 3:20pm - 3:40pm **TP1-06**
A New Negative-Differential-Resistance Effect in 350 GHz SiGe HBTs Operating at Cryogenic Temperatures
Qingqing Liang, Ramkumar Krithivasan, Adnan Ahmed, Yuan Lu, and John D. Cressler, Georgia Tech, Ying Li and Guofu Niu, Auburn University, Jae-Sung Rieh, Korea University, Greg Freeman, Dave Ahlgren, and Alvin Joseph, IBM

TP2: Wide Bandgap Power Switching Devices - 1:30pm - 3:20pm

Chairperson: Karl Hobart, NRL

Meeting Room: Versailles III & IV

- 1:30pm - 2:00pm **TP2-01 *Invited***
High-Voltage SiC and GaN Devices for Power Electronics Applications
T. Paul Chow, Rensselaer Polytechnic Institute
- 2:00pm - 2:30pm **TP2-02 *Invited***
High Speed Switching Devices in 4H-SiC – Performance and Reliability
Sei-Hyung Ryu, Sumi Krishnaswami, Brett Hull, Bradley Heath, Mrinal Das, James Richmond, Anant Agarwal, and John Palmour, Cree, Inc., Aivars Lelis, Bruce Geil, Dimosthenis Katsis, and Charles Scozzie, Army Research Laboratory, James Scofield, Air Force Research Laboratory
- 2:30pm - 2:50pm **TP2-03**
1.5 kV Power AlGaIn/GaN HFETs
G. Simin, N. Tipirneni, S. Rai, A. Koudymov, V. Adivarahan, J. Yang and M. Asif Khan, University of South Carolina
- 2:50pm - 3:10pm **TP2-04**
2.1 m Ω -cm², 1.6 kV 4H-Silicon Carbide VJFET for Power Applications
Victor Veliadis, Li-Shu Chen, Eric Stewart, Megan McCoy, Ty McNutt, Steve Van Campen, Chris Clarke, and Gregory DeSalvo, Northrop Grumman Advanced Technology Laboratory
- 3:10pm - 3:30pm **TP2-05**
High Temperature Characterization of SiC BJTs for Power Switching Applications
K. Sheng, L.C. Yu, J. Zhang and J. H. Zhao, Rutgers University

TP3: Si-Based Nanoelectronics - 1:30pm - 3:30pm

Chairperson: Curt Richter, NIST

Meeting Room: Washington

- 1:30pm - 2:00pm **TP3-01 *Invited***
High-power 4- μ m Quantum Cascade Lasers
W.T. Masselink, M. Sementiv, S. Dressler, M. Zieler, Humbolt University, N. Georgiev, T. Dekorsy, and M. Helm, Forschungszentrum Rossendorf
- 2:00pm - 2:30pm **TP3-02 *Invited***
Silicon Nanowire Field Effect Transistor Test Structures Fabricated by Top-down Approaches
Sang-Mo Koo, Qiliang Li, Monica D. Edelstein, Curt A. Richter, and Eric M. Vogel, National Institute of Standards and Technology

- 2:30pm - 2:50pm **TP3-03 Student***
 Large Temperature Dependence of Negative Differential Conductance in Room-Temperature Operating Silicon Single-Electron/Single-Hole Transistor
Masaharu Kobayashi, Kousuke Miyaji, and Toshiro Hiramoto, University of Tokyo, Masumi Saitoh, Toshiba Corporation
- 2:50pm - 3:10pm **TP3-04 Student**
 An Assessment of Single-Electron Effects in Multiple-Gate SOI MOSFETs with 1.6-nm Gate Oxide near Room Temperature
Wei Lee and Pin Su, National Chiao Tung University, Hou-Yu Chen, Chang-Yun Chang, Ke-Wei Su, Sally Liu and Fu-Liang Yang, Taiwan Semiconductor Manufacturing Company
- 3:10pm - 3:30pm **TP3-05 Student**
 Fluoride Resonant Tunneling Diodes on Si Substrates
So Watanabe, Yohei Toriumi, Motoki Maeda, Tsuyoshi Sugisaki and Kazuo Tsutsui, Tokyo Institute of Technology
- 3:30pm - 3:45pm **Coffee Break - Versailles Foyer**

TP4: SiGe HBTs and Strained FETs - 3:45pm - 5:35pm

Chairperson: Paul R. Berger, Ohio State University

Meeting Room: Versailles I & II

- 3:55pm - 4:25pm **TP4-01 Invited**
 SiGe Heterostructure Devices and Applications
Steven J. Koester, IBM T. J. Watson Research Center
- 4:25pm - 4:45pm **TP4-02 Student**
 An Ultrahigh Performance 8 GHz SiGe Power HBT
Guogong Wang, Hao-Chih Yuan, and Zhenqiang Ma, University of Wisconsin-Madison
- 4:45pm - 5:05pm **TP4-03 Student**
 Reverse Active Operation of 200 GHz SiGe HBTs
W.-M.L Kuo, Marco Bellini, Aravind Appaswamy, Ramkumar Krithivasan, and John D. Cressler, Georgia Institute of Technology, Greg Freeman, IBM Microelectronics
- 5:05pm - 5:25pm **TP4-04**
 Strained-Si NMOSFETs on Thin 200 nm Virtual Substrates
Per-Erik Hellström, Jonas Edholm, and Mikael Östling, KTH, Royal Institute of Technology, Sarah Olsen and Anthony O'Neill, University of Newcastle, Klara Lyutovich, Michael Oehme, and Erich Kasper, Universität Stuttgart
- 5:25pm - 5:45pm **TP4-05 Student**
 Calculation of the Electron Mobility in Silicon Inversion Layers: Dependence on Surface Orientation, Channel Direction, and Stress
I.-J. Yang, C.-Y. Peng, and C. W. Liu, National Taiwan University, S.T. Chang, National Chung Hsing University

TP5: ZnO Material and Devices - 3:45pm - 5:45pm

Chairperson: Agis Iliadis, University of Maryland

Meeting Room: Versailles III & IV

- 3:45pm - 4:05pm **TP5-01 Student***
Development of High frequency Love Mode Surface Acoustic Wave
ZnO/SiO₂/Si Devices
Soumya Krishnamoorthy and Agis Iliadis, University of Maryland
- 4:05pm - 4:25pm **TP5-02**
Role of Low O₂ Pressure and Growth Temperature on Electrical Transport of
PLD Grown ZnO Thin Films on Si Substrates
*Ch. Pandis, N. Brilis, and D. Tsamakis, National Technical University of
Athens, H. Ali, S. Krishnamoorthy, and A. A. Iliadis, University of Maryland*
- 4:25pm - 4:45pm **TP5-03 Student**
Structural and Rectifying Junction Properties of Self-assembled ZnO
Nanoparticles in Polystyrene Diblock Copolymers on (100) Si Substrates
*H. A. Ali, A. A. Iliadis, and L. J. Martinez-Miranda, University of Maryland, U.
Lee, Army Research Labs*
- 4:45pm - 5:05pm **TP5-04**
Surface and Interface Analysis of Mg_xZn_{1-x}O Cubic and Hexagonal Phases by
X-Ray Photoelectron and Rutherford Back Scattering Spectroscopies
*S.S. Hullavarad, D.E. Pugel, S. Dhar, I. Takeuchi, and T. Venkatesan,
University of Maryland, R.D. Vispute, Blue Wave Semiconductors*
- 5:05pm - 5:25pm **TP5-05**
Bandgap Engineering of UV-Luminescent Nanomaterials
*Leah Bergman, John L. Morrison, Xiang-Bai Chen, Jesse Huso, and Heather
Hoeck, University of Idaho, Tsvetanka Zheleva, Army Research Lab*

TP6: SOI - 3:45pm - 5:45pm

Chairperson: Marvin White, Lehigh University

Meeting Room: Washington

- 3:45pm - 4:15pm **TP6-01 Invited**
Emerging Reliability Issues of Nano-Scale SOI Technology
*Dimitris P. Ioannou, Rahul Mishra, and Dimitris E. Ioannou, George Mason
University*
- 4:15pm - 4:35pm **TP6-02**
An Experimental Study on the Thermal Stability of Sputtered TiN Gates for
Gate-first FinFETs
*Y. X. Liu, E. Sugimata, T. Matsukawa, M. Masahara, K. Endo, K. Ishii, T.
Shimizu, and E. Suzuki, National Institute of Advanced Industrial Science and
Technology (AIST)*

- 4:35pm - 4:55pm **TP6-03 Student**
Worst Case Stress Conditions for Hot Carrier Induced Degradation of p-Channel SOI MOSFETs
D. P. Ioannou, R. Mishra, and D. E. Ioannou, George Mason University, S. T. Liu and M. Flanery, Honeywell Defense & Space Electronics Systems, H.L. Hughes, Naval Research Laboratory
- 4:55pm - 5:15pm **TP6-04 Student**
Design Guideline of Multi-Gate MOSFETs Considering Body Effect
Toshiharu Nagumo and Toshiro Hiramoto, University of Tokyo
- 5:15pm - 5:35pm **TP6-05 Student***
N-type Thin-Film Transistors Fabricated on Transferred, Elastically Strain-Shared Si/SiGe/Si Membranes
Hao-Chih Yuan, Michelle M. Roberts, Donald E. Savage, Max G. Lagally, and Zhenqiang Ma, University of Wisconsin-Madison
- 7pm - 10:00pm **Symposium Awards Banquet - Versailles Ballroom**

Friday, December 9, 2005

FA1: High Frequency and THz Devices - 8am - 9:40am

Chairperson: *Shayla Sawyer, Rensselaer Polytechnic Institute*

Meeting Room: *Versailles I & II*

- 8:00am - 8:20am **FA1-01**
An Efficient THz Source with a Tuning Range of 71.1-2830 μm (0.106-4.22 THz) Based on Frequency Mixing in a GaP Crystal
Yujie J. Ding and Wei Shi, Lehigh University
- 8:20am - 8:40am **FA1-02 Student**
CMOS & post CMOS on-chip Microwave Pulse Power Detectors
Woochul Jeon and John Melngailis, University of Maryland
- 8:40am - 9:00am **FA1-03 Student**
Degradation of Characteristics and Critical Bit-Flip Errors in Cascaded 3-Stage CMOS Inverters Due to RF Interference
K. Kim and A. A. Iliadis, University of Maryland
- 9:00am - 9:20am **FA1-04 Student**
Study of Dual-Gate SOI MOSFETs as RF Mixers
S. Varadharajan and S. Kaya, Ohio University
- 9:20am - 9:40am **FA1-05 Student***
Growth, Fabrication, and Characterization of In_{0.52}Al_{0.48}As/In_{0.53}Ga_{0.47}As/InAs_{0.3}P_{0.7} Composite Channel HEMTs
Dongmin Liu, Mantu Hudait, Yong Lin, Hyeongnam Kim, Steven A. Ringel, and Wu Lu, The Ohio State University

FA2: Novel Devices I - 8am - 9:40am

Chairperson: *Marc Sherwin, Northrup Grumman Corporation*

Meeting Room: *Versailles III & IV*

- 8:00am - 8:20am **FA2-01 Student**
The Temperature Dependence in the Subthreshold Regime of Fully Depleted Double-Gate FinFETs
Raphael K. Sulley, Dr. William F. Clark, and Dr. Edward J. Nowak, IBM Microelectronic Division
- 8:20am - 8:40am **FA2-02 Student**
Scaling Rules for Tunnel Field-Effect Transistors
Krishna K. Bhuiwala, Mathias Born, Markus Schindler, and Ignaz Eisele, Universität der Bundeswehr München

- 8:40am - 9:00am **FA2-03**
Layout and Geometry Tolerances in COSMOS
A. Al-ahmadi and S. Kaya, Ohio University
- 9:00am - 9:20am **FA2-04 Student***
A Novel High Performance Integrated Phototransistor Photodetector (PTPD) In Standard SiGe BiCMOS Technology
Klaus Y.J. Hsu, Kuang Sheng Li, Ji-Chen Huang, National Tsing Hua University
- 9:20am - 9:40am **FA2-05**
An Experimental 4RTD Logic Gate
A. Yamada, H. Yamada, T. Waho, Sophia University and V. Khorenko, T. Do, W. Prost, University of Duisburg-Essen
- 9:40am - 10:00am **FA2-06**
A CMOS Compatible Single Polysilicon Embedded NVM
J. Bu, C. Parker, H. Prosack, APTD, National Semiconductor Corporation

FA3: Emerging Nanoelectronic Materials and Devices - 8am-10am

Chairperson: Stephen Goodnick, Arizona State University

Meeting Room: Washington

- 8:00am - 8:30am **FA3-01 Invited**
Real-time Detection of Single-electron Tunneling Current
Toshimasa Fujisawa, NTT Corp
- 8:30am - 9:00am **FA3-02 Invited**
Magnetic Logic Devices Based on Field-Coupled Nanomagnets
Alexandra Imre, Lili Ji, Alexei Orlov, Gary H. Bernstein, and Wolfgang Porod, University of Notre Dame and Gyorgy Csaba, Institute for Nanoelectronics
- 9:00am - 9:20am **FA3-03**
Electrical and Structural Characterization of GaN Nanowire Based Devices
G. Koley and L. Lakshmanan, University of South Carolina, Ho-Young Cha and Huaqiang Yu, Cornell University
- 9:20am - 9:40am **FA3-04**
Performance Enhancement of ZnO Nanowire Field-effect Transistors with Self-Assembled Organic Nanodielectrics
Sanghyun Ju, Kangho Lee, and David B. Janes, Purdue University, Myung-Han Yoon, Antonio Facchetti, and Tobin J. Marks, Northwestern University
- 9:40am - 10:00am **FA3-05**
A New Approach for Fabricating Horizontally Grown Semiconductor Nanowires (Case of Zinc Oxide)
Babak Nikoobakht, Mark D. Vaudin, and Stephan J. Stranick, National Institute of Standards and Technology

10:00am - 10:15am *Coffee Break - Versailles Foyer*

FA4: Device Modeling I - 10:15am - 12:05pm

Chairperson: Neil Goldsman, University of Maryland

Meeting Room: Versailles I & II

10:15am - 10:45am **FA4-01** *Invited*

Electrical Conduction in Metallic Nanotubes

M. P. Anantram and Hatem Mehrez, NASA Ames Research Center, Alexei Svizhenko, Stanford University

10:45am - 11:05am **FA4-02** *Student*

An Accurate Model of the C-V Characteristic due to Quantum Mechanical Effects for the Surrounding Gate Transistor

Hideo Haneda, Wataru Sakamoto, Iliya I. Pesic, Hiroki Nakamura, and Fujio Masuoka, Tohoku University, Hiroshi Sakuraba, Miyagi National College of Technology

11:05am - 11:25am **FA4-03** *Student*

A Fully 2-dimensional Poisson-Schrödinger Modeling of the HEMT: Effects of Short Gate Lengths

G. Krokidis, JP Xanthakis and N. Uzunoglu, National Technical University of Athens

11:25am - 11:45am **FA4-04**

I-V Characteristics Modeling and Parameter Extractions for CNT-FETs

Jose M. Marulanda and Ashok Srivastava, Louisiana State University

11:45am - 12:05pm **FA4-05**

Full 3D Process and Device Simulation for FinFET Optimization

M. Nawaz, P. Haibach, E. Landgraf, W. Rösner, M. Städele, and R. J. Luyken, Infineon Technologies AG, A. Gencer, Synopsys Inc.

FA5: Novel Devices II - 10:15am - 12:15pm

Chairperson: Mikael Ostling, KTH - Royal Institute of Technology

Meeting Room: Versailles III & IV

10:15am - 10:35am **FA5-01** *Student*

Breaking the Theoretical Limit of SiC Unipolar Power Device – A Simulation Study

L.C. Yu and K. Sheng, Rutgers University

10:35am - 10:55am **FA5-02**

Study of Leakage-Induced Photon Emission Processes in sub-90 nm CMOS Devices

Yoav Weizman, Arie Margulis, Yefim Fefer, and Ezra Baruch, Freescale Semiconductor Israel Ltd., Moshe Gurfinkel and Yoram Shapira, Tel-Aviv University

- 10:55am - 11:15am **FA5-03**
Silicide/Si Hetero-Nanocrystal Nonvolatile Flash Memory
Jianlin Liu, Dengtao Zhao, and Yan Zhu, University of California, Riverside
- 11:15am - 11:35am **FA5-04 Student**
A Novel Tri-Control Gate Surrounding Gate Transistor (TCG-SGT) Flash Memory Cell
Takuya Ohba, Hiroki Nakamura, and Fujio Masuoka, Tohoku University, Hiroshi Sakuraba, Miyagi National College of Technology
- 11:35am - 11:55am **FA5-05**
Novel Reconfigurable Semiconductor Photonic Bandgap-MEMS Device
Weimin Zhou, David Mackie, Monica Taysing-Lara, Gerard Dang, and Peter G. Newman, U.S. Army Research Laboratory
- 11:55am - 12:15pm **FA5-06 Student**
On-chip 2-Axis Optical Fiber Actuator using Gray-scale Technology
Brian Morgan and Reza Ghodssi, University of Maryland

FA6: Photonics - 10:15am - 12:15pm

Chairperson: Michal Lipson, Cornell University

Meeting Room: Washington

- 10:15am - 10:45am **FA6-01 Invited**
All-Epitaxial Quantum Dot Microcavities for VCSELs and Single Photon Sources
D.G. Deppe, S. Freisem, D. Lu, J. Ahn, D. Gazula, A. Muller and C.K. Shih, The University of Texas at Austin
- 10:45am - 11:15am **FA6-02 Invited**
Where Nanophotonics and Microfluidics Meet
A. Scherer, E. Kartalov, M. Hochberg, T. Baehr-Jones, and G. Wang, Caltech, F. Anderson, University of Southern California, L. Dalton and A. Jen, University of Washington
- 11:15am - 11:35am **FA6-03 Student**
In-plane Indium Phosphide Tunable Optical Filter using Ridge Waveguides
Jonathan McGee, Nathan Siwak, Brian Morgan, and Reza Ghodssi, University of Maryland
- 11:35am - 11:55am **FA6-04 Student**
Room Temperature Lasing of GaAs Quantum Wire Vertical-cavity Surface-emitting Lasers Grown on (775)B GaAs Substrates by Molecular Beam Epitaxy
Y. Higuchi, S. Osaki, T. Kitada, S. Shimomura, and S. Hiyamizu, Osaka University, Y. Takasuka, Shibaura Institute of Technology, K. Komori and M. Ogura, National Institute of Advanced Industrial Science and Technology

11:55am - 12:15pm **FA6-05**
Slope Efficiency Versus Cavity Length in Quantum Dot Lasers
Levon V. Asryan, Virginia Polytechnic Institute and State University

12:15pm - 1:15pm **Lunch (on your own)**

FP1: Device Modeling II - 1:15pm - 3:15pm

Chairperson: Gary Pennington, University of Maryland

Meeting Room: Versailles I & II

1:15pm - 1:35pm **FP1-01**
Non-Quasi-Static Modeling of Field Effect Transistors
Ibrahim M. Abdel-Motaleb and Gauthami Arikatla, Northern Illinois University

1:35pm - 1:55pm **FP1-02 Student**
An Impulse-Response Based Methodology for Modeling Complex Interconnect Networks
Zeynep Dilli, Neil Goldsman, and Akin Akturk, University of Maryland

1:55pm - 2:15pm **FP1-03 Student**
Modeling Voltage-gated KcsA Ion Channels as Solid-State Nanodevices
Santosh Pandey, Akwete Bortei-Doku, and Marvin H. White, Lehigh University

2:15pm - 2:35pm **FP1-04 Student**
Reduction of Lasing Thresholds in Circular Photonic Molecule Microdisk Lasers
Elena I. Smotrova and Alexander I. Nosich, Institute of Radio-Physics and Electronics NASU, Trevor M. Benson and Phillip Sewell, University of Nottingham

2:35pm - 2:55pm **FP1-05 Student**
Modeling the Temperature Dependence and Optical Response of HgCdTe Diodes
A. Akturk and N. Goldsman, University of Maryland, N. Dhar and P.S. Wijewarnasuriya, U.S Army Research Laboratory

2:55pm - 3:15pm **FP1-06 Student**
Three Region Hetero-Material Gate Oxide Stack (TMGOS) Epi-MOSFET: A New Device Structure for Reduced Short Channel Effects
Kirti Goel, Manoj Saxena, Dr. Mridula Gupta, and Professor R.S. Gupta, University of Delhi South Campus

FP2: Advanced Processing and Characterization I - 1:15pm - 3:25pm

Chairperson: Phillip Thompson, NRL

Meeting Room: Versailles III & IV

- 1:15pm - 1:35pm **FP2-01**
Network Analyzer Measurements and Physically Based Analysis of Amplitude and Phase Distortion in SiGeC HBTs
B. Gunnar Malm and Mikael Östling, KTH, Royal Institute of Technology
- 1:35pm - 1:55pm **FP2-02**
Controlled Selective Epitaxy for 3-D LSI
X.X. Zhang, H.S. Cho, W.X. Xianyu, H.X. Yin, and T. Noguchi, Samsung Advanced Institute of Technology (SAIT)
- 1:55pm - 2:15pm **FP2-03 Student**
Selective Epitaxial Growth of Boron Doped SiGe-structures with LPCVD
Markus Schindler, Tanja Stimpel-Linder, and Ignaz Eisele, University of the German Federal Armed Forces Munich, William Taylor, Freescale Advanced Products R&D Labs - Austin, TX
- 2:15pm - 2:35pm **FP2-04**
Process Integration, Characterization, Modeling and Reliability of a 10K Poly Resistor for Low Power Mixed Signal VLSI Applications
Muhammad Anser and Jagdish Prasad, AMI Semiconductor
- 2:35pm - 2:55pm **FP2-05**
New Excimer Laser Annealing Process for Single-Crystal 3-D Stacked Thin-Film Transistors
Wenxu Xianyu, Huaxiang Yin, Hans S. Cho, Xiaoxin Zhang, and Takashi Noguchi, Samsung Advanced Institute of Technology
- 2:55pm - 3:15pm **FP2-06 Student**
Novel Schottky Barrier Strained Germanium PMOS
C.Y. Peng, F. Yuan, C.Y. Yu, M.H. Liao, and C.W. Liu, National Taiwan University, S. Maikap, ERSO/ITRI, S.T. Chang, National Chung Hsing University

FP3: Optoelectronics and LED Lighting - 1:15pm - 3:15pm

Chairperson: Fred Schubert, Rensselaer Polytechnic Institute

Meeting Room: Washington

- 1:15pm - 1:45pm **FP3-01 Invited**
High Power InGaN LEDs and Applications
Michael R. Krames, Lumileds Lighting
- 1:45pm - 2:15pm **FP3-02 Invited**
Development of Deep UV LEDs and LED Based Lamps
Thomas M. Katona, Jianping Zhang, Xuhong Hu, Jianyu Deng, Alex Lunev, Yuri Bilenko, and Remis Gaska, Sensor Electronic Technology Inc., Asif Khan, University of South Carolina

- 2:15pm - 2:35pm **FP3-03 Student***
 Optical and Current Noise of GaN-based Light Emitting Diodes
S. Sawyer, S. L. Rumyantsev, N. Pala, and M. S. Shur, Rensselaer Polytechnic Institute, Yu. Bilenko, J. P. Zhang, X. Hu, A. Lunev, J. Deng, and R. Gaska, Sensor Electronic Technology, Inc.
- 2:35pm - 2:55pm **FP3-04 Student**
 High-power Packages for Phosphor-based White-light-emitting Diode Lamps
Hong Luo, Jong Kyu Kim, Yangang Xi, and E. Fred Schubert, Rensselaer Polytechnic Institute, Jaehee Cho, Cheolsoo Sone, and Yongjo Park, Samsung Advanced Institute of Technology
- 2:55pm - 3:15pm **FP3-05 Student**
 Colloidal Quantum Dot Active Layers for Light Emitting Diodes
Jennifer Pagan, Edward B. Stokes, Michael Ahrens, and Kinnari Patel, The University of North Carolina at Charlotte, Mark O'Steen, Veeco Compound Semiconductor Inc.
- 3:15pm - 3:30pm **Coffee Break - Versailles Foyer**

FP4: Device Modeling III - 3:30pm - 5:30pm

Chairperson: M.P. Anantram, NASA

Meeting Room: Versailles I & II

- 3:30pm - 3:50pm **FP4-01**
 One-Dimensional Sub-Threshold Model for Symmetric Double-Gate MOSFETs
S. Qureshi and Gaurav Chhabra, Indian Institute of Technology
- 3:50pm - 4:10pm **FP4-02 Student**
 Analytical Modeling of Short-Channel Multi-Gate SOI MOSFETs with Special Emphasis on the Partially-Depleted and Fully-Depleted Surrounding Gate Transistor
Iliya Pesic, Hiroki Nakamura, Hideo Haneda, Hiroaki Yamazaki, and Fujio Masuoka, Tohoku University, Hiroshi Sakuraba, Miyagi National College of Technology
- 4:10pm - 4:30pm **FP4-03 Student**
 An Efficient Inclusion of Self-Heating and Quantum Effects in SOI Device Simulations
A. Akturk and N. Goldsman, University of Maryland, G. Metze, Laboratory for Physical Sciences
- 4:30pm - 4:50pm **FP4-04 Student**
 Novel Flash Memory Cell with a Γ Channel Multi-Gate Transistor
W.C. Wang, Y.H. Ko, M. Tang, and S.T. Chang, National Chung Hsing University

- 4:50pm - 5:10pm **FP4-05 Student**
Effects of Channel Doping Profile on Electrical Characteristics of Impact Ionization MOS
Sang Joon Hwang, Jee-Young Yoon, Ey Goo Kang, and Man Young Sung, Korea University
- 5:10pm - 5:30pm **FP4-06**
Investigation of Gate Tunnelling Leakage Current in a Novel Fully Depleted SOI MOSFET with a Thin Oxide
Ehsanollah Fathi, Yousof Mortazavi, and Morteza Fathipour, University of Tehran, Farzan Farbiz, University of Illinois at Urbana-Champaign

FP5: Advanced Processing and Characterization II - 3:30pm - 5:30pm

Chairperson: Martin Peckerar, University of Maryland

Meeting Room: Versailles III & IV

- 3:30pm - 3:50pm **FP5-01 Student***
Impact of Source/Drain Si_{1-y}Cy Stressors on the Strained Si NMOSFETs
Jacky Huang and S.T. Chang, National Chung Hsing University
- 3:50pm - 4:10pm **FP5-02**
Impurity Induced Voiding in Copper Interconnects
M. Kovler, M. Buchbinder, and H. Cohen, Tower Semiconductor Ltd., E. Rabkin, Technion-Israel Institute of Technology, Y. Estrin, Clausthal University of Technology
- 4:10pm - 4:30pm **FP5-03**
Impact of Epitaxial NiSi₂ Source/Drain on Short Channel Effect and Line Edge Roughness in Extremely Scaled MOSFETs
S. Magita, MIRAI-AIST, N.Mise, Y.Watanabe, M. Kadoshima, H. Fujiwara, M. Ohno, H. Takaba, K. Iwamoto, A. Ogawa, T. Nabatame, and H. Satake, MIRAI-ASET, A. Toriumi, The University of Tokyo
- 4:30pm - 4:50pm **FP5-04**
Improved Electrical Characteristics and Retention Time of DRAMs Using HSG-merged-AHO Cylinder Capacitor
S.G. Kim, C.S. Hyun, D. Park, S.J. Kim, T.H. Cho, H.J. Kang, S.H. Lee, J.G. Suk, B.K. Lim, Y.S. Jeon, K.H. Hwang, H.S. Hong, S.G. Jeon, K.Y. Lee, K.S. Oh and D.G. Park, Samsung Electronics Co., Ltd.
- 4:50pm - 5:10pm **FP5-05**
Electrical Characteristic Enhancement of HfTaSiON-Gated Metal-Oxide-Semiconductor Devices Using HfON Buffer Layer
Chin-Lung Cheng, National Formosa University, Kuei-Shu Chang-Liao, Hsin-Chun Chang and Tien-Ko Wang, National Tsing Hua University
- 5:10pm - 5:30pm **FP5-06 Student**
Work Function Tuning Via Ultra Thin Charged Reaction Layers Using AlTa and AlTa_N Alloys
Bei Chen, Rashmi Jha and Veena Misra, North Carolina State University

FP6: Flexible Electronics -3:30pm - 5:20pm

Chairperson: Steve Kilpatrick, ARL

Meeting Room: Washington

- 3:30pm - 4:00pm **FP6-01 Invited**
Polysilicon TFT Technology on Metal Foils for Large Area Flexible Electronics
M.K. Hatalis, M. Troccoli, T.K. Chuang, A. Jamshidi, and G. Reed, Lehigh University
- 4:00pm - 4:30pm **FP6-02 Invited**
The Short and Long Channel Pick-up Stick Transistors: A Promising
Technology for Micro- and Macro-Electronics
M.A. Alam, N. Pimparkar, S. Kumar, and J. Murthy, Purdue University
- 4:30pm - 5:00pm **FP6-03 Invited**
Advanced Laser Crystallization of Si Films for High Performance Thin Film
Transistors
James Im, Columbia University
- 5:00pm - 5:20pm **FP6-04 Student***
High Performance TFT Circuits for On-Board Display Driving on Flexible
Stainless Steel Foils
Matias Troccoli, Abbas Jamshidi, Ta-Ko Chuang, and Miltiadis K. Hatalis, Lehigh University