

2008 LESTER EASTMAN CONFERENCE ON HIGH PERFORMANCE DEVICES



IEEE



5–7 August 2008 (Tuesday-Thursday)

Clayton Hall on Laird Campus at the University of Delaware

Conference Registration Opens at 7:30 Each Morning

Tuesday 5 August 2008

Session I-A.	Conference Introduction	8:25 – 8:30
	Plenary	8:30 – 10:00
	Break	10:00 – 10:30
Session I-B.	Plenary	10:30 – 11:15
Session II-A.	UV and Visible Optoelectronics	11:15 – 12:00
	Lunch	12:00 – 1:30
Session II-B.	UV and Visible Optoelectronics	1:30 – 2:45
	Break	2:45 – 3:15
Session III.	Advanced III–V Electronics	3:15 – 5:15
	Free Time	5:15 – 6:00
Session IV.	Conference Reception	6:00 – 8:00
	Poster Session	6:00 – 8:00

Wednesday 6 August 2008

Session V.	Thin Film Transistors	8:00 – 9:45
	Break	9:45 – 10:15
Session VI.	Advanced Si Electronics	10:15 – 12:00
	Lunch	12:00 – 1:30
Session VII.	Advanced III–N Electronics	1:30 – 3:45
	Break	3:45 – 4:15
Session VIII.	Power Electronic Devices	4:15 – 5:45
	Free Time	5:45 – 6:30
	Conference Dinner	6:30 – 8:30

Thursday 7 August 2008

Session IX.	Carbon Based Electronics	8:00 – 9:45
	Break	9:45 – 10:15
Session X.	Terahertz Technology	10:15 – 12:30
	Closing Remarks	12:30 – 12:40

2008 LESTER EASTMAN CONFERENCE ON HIGH PERFORMANCE DEVICES



Tuesday 5 August 2008

8:25–8:30 CONFERENCE INTRODUCTION Michael Shur

Session I: Plenary Session
Session Organizer and Chair: Michael Shur

8:30–9:15 <i>(Invited)</i>	Overview of Wide Bandgap Technology R. Chris Clarke Northrop Grumman Electronic Systems
9:15–10:00 <i>(Invited)</i>	Achieving a Solar Cell of Greater than 50 Percent: Physics, Technology, Implementation and Milestones/Opportunities and Challenges in Advanced Concept and Nanostructured Photovoltaics Christiana Honsberg and Allen Barnett University of Delaware
10:00–10:30	BREAK
10:30–11:15 <i>(Invited)</i>	Progress in the Growth, Characterization, and Device Performance for Nonpolar and Semipolar GaN-based Materials James S. Speck University of California at Santa Barbara

Session IIA: UV and Visible Optoelectronics
Session Organizer and Chair: Michael Wraback and Leo Schowalter

11:15–11:30	GaN Vertical-Structure Light-Emitting Diodes on Bulk GaN Substrate with Optical Enhancement Techniques: Omnidirectional Reflectors and Surface Texture Treatment Roya Mirhosseini, Ahmed Noemaun, C. Sone, Y. Park, Jong Kyu Kim, and E. F. Schubert Rensselaer Polytechnic Institute
11:30–11:45	Fabrication of Double Heterostructure Ultraviolet Light Emitting Diodes with Nanometer Scale Compositionally Inhomogeneous Active Regions Combining PA-MBE and MOCVD Growth Techniques A.V. Sampath, M.L Reed, C. Moe, G.A. Garret, W.L. Sarney, H. Shen, and M. Wraback US Army Research Laboratory
11:45–12:00	The Effect of Hole-Injection Efficiency on Efficiency Droop of GaN-based Light Emitters Investigated by Light-Emitting Triodes Jiuru Xu, Martin F. Schubert, Jong Kyu Kim, and E. Fred Schubert Future Chips Constellation, Rensselaer Polytechnic Institute

12:00–1:30 LUNCH

Session IIB: UV and Visible Optoelectronics

Session Organizer and Chair: Michael Wraback and Leo Schowalter

1:30–2:00 <i>(Invited)</i>	<i>GaN Deep-Ultraviolet Avalanche Photodiodes Grown on Free-Standing GaN Substrates for Linear and Geiger Mode Operations</i> Russell D. Dupuis, Shyh-Chiang Shen, Yun Zhang, Hee Jin Kima, Suk Choi, Bravishma Narayan, Jae-Hyun Ryou, Xiaogang Bai, and Joe C. Campbell Georgia Institute of Technology and University of Virginia
2:00–2:15	<i>Solar-Blind Single-Photon 4H-SiC Avalanche Photodiodes</i> A.Vert, S. Soloviev, J. Fronheiser, and P. Sandvik General Electric Global Research Center
2:15–2:30	<i>Surface Acoustic Wave Propagation in GaN-on-Sapphire Under Pulsed Sub-band Ultraviolet Illumination</i> Venkata S. Chivukula, Daumantas Ciplys, Kai Liu, Michael Shur, and Remis Gaska Rensselaer Polytechnic Institute, Vilnius University, and Sensor Electronic Technology, Inc
2:30–2:45	<i>Characterization of Pseudomorphic Alloy Layers of AlN and GaN on Bulk AlN Substrates</i> Leo John Schowalter, Joseph A. Smart, James R. Grandusky, Robert Bondokov, Kenneth E. Morgan, Greg A. Garret, Anand V. Sampath, H. Shen, and Michael Wraback Crystal IS, Inc and US Army Research Laboratory

2:45–3:15 **BREAK**

Session III: Advanced III-V Electronics

Session Organizer and Chair: Matthias Passlack

3:15–3:45 <i>(Invited)</i>	<i>III-V MOSFETs for CMOS Applications - Current Status and Future Trends</i> I.G. Thayne, R.J.W. Hill, M.C. Holland, D.A.J. Moran, X. Li, H.Zhou, D.S. Macintyre, S. Thoms, K. Kalna, C.R. Stanley, A. Asenov, R.Droopad, and M. Passlack University of Glasgow (Scotland), Texas State University (San Marcos), UCSD (San Diego)
3:45–4:15 <i>(Invited)</i>	<i>Monolithic III-V/Si Integration</i> Eugene A. Fitzgerald Massachusetts Institute of Technology
4:15–4:30	<i>Monte Carlo Simulations of In_{0.75}Ga_{0.25}As MOSFETs at 0.5 V Supply Voltage for High-Performance CMOS</i> Jason Scott Ayubi-Moak, Karol Kalna, and Asen Asenov University of Glasgow (Scotland)
4:30–4:45	<i>Performance Comparison of Scaled III-V and Si Nanowire MOSFET</i> Lingquan Wang, Bo Yu, Peter Asbeck, Yuan Taur, and Mark Rodwell University of California - San Diego and University of California - Santa Barbara
4:45–5:00	<i>High-Performance 50-nm Metamorphic High Electron-Mobility Transistors with High Breakdown Voltages</i> Dong Xu, Wendell M.T. Kong, Xiaoping Yang, P. Seekell, L. Mohnkern, H. Karimy, K.H.G. Duh, P.M. Smith, and P.C. Chao BAE Systems
5:00–5:15	<i>The First 70nm 6-inch GaAs PHEMT MMIC Process</i> H.F. Karimy, L. Gunter, D. Dugas, P.C. Chao, W. Kong, S. Yang, and P. Seekell BAE Systems

5:15–6:00 **FREE TIME**

6:00–8:00 **CONFERENCE RECEPTION and POSTER SESSION
(Hors D'oeuvres Served)**

Session IV: Poster Session

Session Organizers and Chairs: Keith Goossen, Michael Shur, and Greg DeSalvo

	<p><i>Miniaturized Antennas with Multilayer Self-biased Ferrite Films at GHz</i> G. M. Yang, X. Xing, A. Daigle, O. Obi, S. Stoute, M. Liu and N. X. Sun Northeastern University</p>
	<p><i>Novel FeGaB thin films and giant microwave tunability in FeGaB/PMN-PT multiferroic composites</i> Jing Lou, David Reed, Carl Pettiford, Ming Liu, and Nian X. Sun Northeastern University</p>
	<p><i>Electrostatically tunable (011)YIG/(011) PMN-PT microwave multiferroic composites with large tunable frequency range</i> Jing Lou, Ming Liu, David Reed, Carl Pettiford, Pengdi Han, and Nian X. Sun Northeastern University and H.C. Materials Corporation</p>
	<p><i>MBE Growth and Characterization of Mg-doped III-Nitrides on Sapphire</i> X. Chen, K.D. Matthews, D. Hao, W.J. Schaff, L.F. Eastman, W. Walukiewicz, J.W. Ager, and K.M. Yu Cornell University and Lawrence Berkeley National Laboratory</p>
	<p><i>A Room Temperature Ballistic Deflection Transistor for High Speed Applications</i> Quentin Diduck and Martin Margala Cornell University</p>
	<p><i>Design of Graded Refractive Index Micro-Patterns to enhance light-extraction efficiency in GaInN blue light-emitting diodes</i> Ahmed N Noemaun, Frank Mont, David Poxson, Jong Kyu Kim, and E. Fred Schubert Rensselaer Polytechnic Institute</p>
	<p><i>InAlN/GaN MOSHEMT with thermally grown oxide</i> M. Alomari, F. Medjdoub, J.-F. Carlin, N. Grandjean, C. Gaquière, M-A. di Forte-Poisson, S. Delage, and E. Kohn University of Ulm (Germany), IPEQ-LASPE EPFL (Switzerland), IEMN, U.M.R.-C.N.R.S. (France), and Alcatel-Thales III-V Laboratory (France)</p>
	<p><i>High current/high voltage AlGaIn/GaN HFETs on sapphire</i> Junxia Shi, M. Pophristic, and L. F. Eastman Cornell University and Velox Semiconductor Corporation</p>
	<p><i>High Field Characteristics of 2D Graphene FETs</i> X. Luo, K. Tahy, G. Snider, H. Xing, and D. Jena University of Notre Dame</p>
	<p><i>Bi-directional Scalable Solid-State Circuit Breakers for Hybrid-electric Vehicles</i> Damian Urciuoli</p>
	<p><i>Stability of 1200V 4H-SiC Power DMOSFETs</i> Ronald Green, Aivars Lelis, Aderinto Ogunniyi, Mark Morgenstern, Tom Salem, and Brett Hull US Army Research Laboratory and Cree Incorporated</p>
	<p><i>Effect of Gate Oxide Processes on 4H-SiC MOSFETs on (000-1) Oriented Substrate</i> H. Naik, K. Tang, and T.P. Chow Rensselaer Polytechnic Institute</p>
	<p><i>Packaging and Wide-Pulse Switching of 4 mm by 4 mm Silicon Carbide GTOs</i> Heather O'Brien and M. Gail Koebke US Army Research Laboratory</p>
	<p><i>High Power Nanocrystalline Diamond RF-MEMS</i> S.Balachandran, J.Kusterer, D.Maier, M. Dipalo, A.Kumar, T.M.Weller, and E.Kohn University of South Florida and University of Ulm (Germany)</p>
	<p><i>5-terminal THz GaN based transistor with field- and space-charge control electrodes</i> Grigory Simin, Michael S. Shur, and Remis Gaska University of South Carolina, Rensselaer Polytechnic Institute, and Sensor Electronic Technology, Inc.</p>

Wednesday 6 August 2008

Session V: Thin Film Transistors

Session Organizer and Chair: Yue Kuo

8:00–8:30 <i>(Invited)</i>	<i>Fabrication of Amorphous Silicon Thin-Film Transistors on Clear Plastic Foil Substrates at 300°C</i> S. Wagner, K. H. Cherenack, B. Hekmatshoar, A. Z. Kattamis and J.C. Sturm Princeton University
8:30–9:00 <i>(Invited)</i>	<i>A Simple, Single Doping-type, High Performance FET for Thin Films, Nanowires, and Nanoribbons</i> Steve Fonash Penn State University
9:00–9:30 <i>(Invited)</i>	<i>Advanced Compact Modeling Techniques of Nanoscale Multi-Gate MOSFETs</i> Benjamin Iniguez, Antonio Lazaro, Oana Moldovan, and Bogdan Nae Universitat Rovira I Virgili (Tarragona, Spain)
9:30–9:45	<i>Reliability of Copper Lines for Flexible TFT Array Applications</i> Yue Kuo and Guojun Liu Texas A&M University

9:45–10:15 **BREAK**

Session VI: Advanced Si Electronics

Session Organizer and Chair: Gennadi Bersuker

10:15–10:45 <i>(Invited)</i>	<i>In Pursuit of Silicon Lasers - Overview of Si Photonics</i> Jimmy Xu Brown University
10:45–11:15 <i>(Invited)</i>	<i>Advanced CMOS Circuits for High Speed Serial Links up to 100 Gb/s</i> Manfred Berroth, Markus Grözing, Damir Ferenci, and Thomas Veigel
11:15–11:45	<i>Is Hafnia the New Silica?</i> Alexander Demkov The University of Texas at Austin
11:45–12:00	<i>Charge Trapping Detrapping Mechanisms of nc-RuO Embedded Zr-doped HfO₂ High-k Nonvolatile Memories</i> Chen-Han Lin and Yue Kuo Texas A&M University

12:00–1:30 **LUNCH**

Session VII: Advanced III-N Electronics

Session Organizers and Chairs: P.C. Chao and Paul Saunier

1:30–2:00 <i>(Invited)</i>	<i>InAlN HEMTs: Design-Technology-Performance</i> E. Kohn, M. Alomari, F Medjdoub, N. Sarazin, S. Delage, M-A. di Forte-Poisson, N. Grandjean, J.-F. Carlin, A. Konstantinidis, C. Giesen, M. Heuken, and C. Gaquiere Univ. of Ulm (Germany), Thales III-V Labs (France), IPEQ-LASPE EPFL (Switzerland), FORTH (Greece), Aixtron AG (Germany), and IEMN (France)
2:00–2:15	<i>The Reliability Physics of GaN HFETs: Comparison With GaAs Based HEMTs</i> S. Salemi and Aris Christou University of Maryland
2:15–2:30	<i>4 nm-AlN-Barrier All Binary HFET with SiN_x Gate Dielectric</i> T. Zimmermann, Y. Cao, P. Saunier, D. Jena, and H.G. Xing University of Notre Dame and Triquint Semiconductors
2:30–2:45	<i>Performance of MOSFETs on Reactive-Ion-Etched GaN Surfaces</i> K. Tang, W. Huang, and T.P. Chow Rensselaer Polytechnic Institute
2:45–3:15 <i>(Invited)</i>	<i>GaN Technology for Power Applications</i> Milan Pophristic, Linlin Liu, Michael Murphy, Marek Pabisz, Xiaobin Xin and Boris Peres Velox Semiconductor Corporation
3:15–3:45 <i>(Invited)</i>	<i>GaN Power Devices - An Overview of Recent Advances</i> Tetsuzo Ueda, Yasuhiro Uemoto, Tsuyoshi Tanaka, and Daisuke Ueda Matsushita Electric - Panasonic

3:45–4:15 **BREAK**

Session VIII: Power Electronic Devices

Session Organizer and Chair: Paul Chow

4:15–4:45 <i>(Invited)</i>	<i>Recent Advances in SiC Power Switching Devices</i> Anant Agarwal Cree Incorporated
4:45–5:00	<i>1000 Volt, 70 mOhm SiC DMOSFETs</i> Kevin Matocha, Peter Losee, Stephen Arthur, and Eladio Delgado GE Global Research
5:00–5:15	<i>SiC Power MOSFET Gate-Bias Stress Threshold-Voltage Instability</i> A.J. Lelis, D. Habersat, R. Green, and N. Goldsman US Army Research Laboratory and University of Maryland
5:15–5:30	<i>Characterization and Modeling of Integrated Diode in 1.2 kV 4H-SiC Vertical Power MOSFET</i> H. Naik, Y. Wang, and T.P. Chow Rensselaer Polytechnic Institute
5:30–5:45	<i>High-Temperature Performance of 4H-SiC VJFET Switches for 200 A / 600 V Power Module Application</i> L. Cheng, M.S. Mazzola, G.M. Molen, R.L. Kelly, D. Sheridan, V. Bondarenko, G. Tian, C.J. Parker, J.R. Gafford, and J.D. Scofield Mississippi State University, SemiSouth Laboratories, Inc., and Air Force Research Laboratory

5:45–6:30 **FREE TIME**

6:30–8:30 **CONFERENCE DINNER**

Patents in the Compound Semiconductor Industry – From Invention to Litigation

David Radulescu

Weil, Gotshal, & Manges LLP

Thursday 7 August 2008

Session IX: Carbon Based Electronics

Session Organizers and Chairs: Peter Burke and Michael Fuhrer

8:00–8:30 <i>(Invited)</i>	<i>High Linearity, Low Power Carbon Nanotube FETs</i> Hong Zhang Northrop Grumman Electronic Systems
8:30–9:00 <i>(Invited)</i>	<i>Multilayered Epitaxial Graphene - a New Material for Electronics</i> Claire Berger, Xiaosong Wu, Xuebin Li, Fan Ming, Mike Sprinkle, Joanna Hass, Edward Conrad, Milan Orlita, Marek Potemski, and W.A. de Heer Georgia Institute of Technology, CNRS-Institut Néel (France), and Charles University (Czech Republic)
9:00–9:15	<i>Intrinsic and Extrinsic Limits of Charge Carrier Mobility in Graphene</i> Michael S. Fuhrer University of Maryland at College Park
9:15–9:30	<i>Thin Films of Reduced Graphene Oxide for Macro-Electronics Applications</i> Goki Eda, Giovanni Fanchini, and Manish Chhowalla Rutgers University
9:30–9:45	<i>Wafer-Scale Films of Chemically Modified Graphene for Electromechanical Devices</i> J.T. Robinson, M. Zalalutdinov, J.W. Baldwin, E.S. Snow, Z. Wei, P. Sheehan, B.H. Houston Naval Research Laboratory

9:45–10:15 **BREAK**

Session X: Terahertz Technology

Session Organizers and Chairs: Imran Mehdi and Jack East

10:15–10:45 <i>(Invited)</i>	<i>Integrated Terahertz Oscillators: Charge Density Waves in Free Space and in Nanostructures</i> Farhan Rana, Paul A. George, Christina Manolatu, Akintunde I. Akinwande Cornell University and Massachusetts Institute of Technology
10:45–11:15 <i>(Invited)</i>	<i>Emission and Intensity Modulation of Terahertz Electromagnetic Radiation Utilizing 2-Dimensional Plasmons in Dual-Grating-Gate HEMT's</i> Taiichi Otsuji Tohoku University (Japan)
11:15–11:45 <i>(Invited)</i>	<i>Components and Circuits in CMOS for Millimeter-wave and THz Operation</i> Kenneth O University of Florida
11:45–12:15 <i>(Invited)</i>	<i>THz Quantum Cascade Lasers</i> Michael C. Wanke
12:15–12:30	<i>Simulation Results of a Novel GaN Based 1.48 THz Transit Time Oscillator</i> Barbaros Aslan and L.F. Eastman Cornell University

12:30–12:40 **Closing Remarks**

Michael Shur