

LEC 2014 Program Schedule (subject to change)

Philips Hall 101 & Duffield Hall Atrium, Cornell University

Monday, August 4, 2014

Arrival at Ithaca (free time)

Tuesday, August 5, 2014, Philips Hall 101 & Duffield Hall Atrium

7:30 AM **Registration & Breakfast buffet**

Location: Duffield Hall Atrium (outside the auditorium: Philips Hall 101)

8:15 AM **Welcome and Announcements**, PC Chao (General Chair)/Grace Xing (Program Chair)

Location: Philips Hall 101 (the auditorium next to the Duffield Hall Atrium)

Session 1: Plenary talks dedicated to Prof. Lester Eastman, Co-Chairs: Leda Lunardi/Michael Shur

8:30 AM S1-P1: **April Brown** (Duke University)

InAs-based Electronic Sensors: Untangling the Relationships between Surface Electronic Properties and Surface Chemistry

9:00 AM S1-P2: **Hideo Ohno** (Tohoku University)

From compound semiconductors to spintronics

9:30 AM S1-P3: **Mike Spencer** (Cornell University), J. Hwang, J. Kwak, B. Calderon, and M. Kim

Heterojunctions in Two Dimensional Materials

10:00 AM **Coffee Break**

10:30 AM S1-P4: **Paul Maki** (ONR)

From GaAs to GaN, a journey with Lester Eastman in high speed microwave devices

11:00 AM S1-P5: **Umesh Mishra** (UCSB)

TBA

11:30 AM S1-P6: **Debdeep Jena** (Notre Dame)

The Eastman 2nd Generation Legacy - in III-V Heterostructure, Oxide, and 2D Crystal Materials and Devices

12:00 PM **Panel discussion on the future of high performance devices**

(moderators: Leda Lunardi/Michael Shur)

12:20 PM **Clif Pollock (ECE Chair, Cornell)**

Eastman and Cornell

12:30 PM **Lunch buffet (Ballroom @ Statler Hotel)**

Session 2: Thermal Management, Co-Chairs: Jonathan Felbinger/Avinash Kane

S2-T1: **Daniel Twitchen (Element 6)1, Invited**, Felix Ejeckam1, Daniel Francis1, Firooz Faili1, Dubravko Babic2, Jonathan Felbinger3, and Bruce Bolliger1; 2Univ. Zabreg;

1:30 PM 3DoD/AAAS

GaN-on-Diamond : A brief history

2:00 PM S2-T2: **John Blevins (AFRL), Invited**

History of GaN-on-Diamond Development at Air Force Research Laboratory

2:30 PM	S2-T3: Matthew Tyhach (Raytheon), D. Altman ¹ , S. Bernstein ¹ , R. Korenstein ¹ , D. Francis ² , F. Faili ² , F. Ejeckam ² , J. Cho ³ , K. Goodson ³ , S. Kim ⁴ , S. Graham ⁴ Next Generation GaN HEMTs Enabled by Diamond Substrates
2:45 PM	S2-T4: Kenneth Chu (BAE Systems), P.C. Chao, J.A. Diaz, C.T. Creamer, S. Sweetland, R.L. Kallaher ¹ and C. McGray ¹ , 1 Modern Microsystems Low-Temperature Substrate Bonding Technology for High Power GaN-on-Diamond HEMTs
3:00 PM	S2-T5: Deep Dumka , T. M. Chu (TriQuint) GaN-on-Diamond HEMTs: Road to Maximum Utilization of RF Power Capabilities of GaN
3:15 PM	Coffee Break
3:45 PM	S2-T6: Carlton Creamer (BAE Systems), K.K. Chu, P.C. Chao, B. Schmanski, T. Yurovchak, S. Sweetland, Microchannel Cooled, High Power GaN-on-Diamond MMIC
4:00 PM	S2-T7: Vincent Gambin (NGAS), Benjamin Poust, Monte Watanabe, Ioulia Smorchkova, Dino Ferizovic, Gregg Lewis, Rajinder Sandhu, Mike Wojtowicz, Aaron Oki Impingement Cooled Embedded Diamond GaN HEMTs
4:15 PM	S2-T8: Travis Anderson (NRL), Invited , K.D. Hobart, M.J. Tadjer, A.D. Koehler, T.I. Feygelson, B.B. Pate, J.K. Hite, F.J. Kub, C.R. Eddy, Jr. Advances in Diamond Integration for Thermal Management in GaN Power HEMTs
4:45 PM	S2-T9: Erhard Kohn (Ulm), Invited , M. Alomari, Z. Gao, S. Rossi; A. Dussaigne, J.-F. Carlin, N. Grandjean (EPFL); K. Aretouli, A. Adikimenakis, G. Konstantinidis, A. Georgakilas (U Crete); Y. Zhang, J.M.R. Weaver (U Glasgow); J. A. Calvo, M. Kuball (U Bristol); S. Bychikhin, J. Kuzmik*, D. Pogany (U Vienna); L. Toth, B. Pecz (Hungary Aca. of Sci.); A. Kovacs (Peter Grunberg Institute, Julich) Direct Integration of Diamond Heat Spreader with GaN-Based HEMT Device Structures
5:15 PM	Panel discussion on on-chip thermal engineering for enhanced device performance (moderators: Jonathan Felbinger/Avinash Kane)

5:45 PM **Free time**

Session 3: Posters, Chair: Joe Smart; 6:00:00 PM-8:00 PM, Atrium, heavy Hors D'oeuvre's provided

S3-P1	Ken Kitamura ¹ , J. R. Grandusky ¹ , C. G. Moe ¹ , J. Chen ¹ , M. C. Mendrick ¹ , Y. Li ¹ , M. Toita ^{1,2} , K. Nagase ² , T. Morishita ³ , H. Ishii ³ , S. Yamada ³ and L. J. Schowalter ¹ ; 1Crystal IS, 2Asahi Kasei, 3Asahi Kasei Microdevices Reliability and Lifetime of Pseudomorphic UV-C LEDs on AlN Substrate Under Various Stress Condition
S3-P2	I. V. Rozhansky (Ioffe), V. Yu. Kachorovskii (Ioffe), Michael Shur (RPI) Ratchet effect enhanced by plasmons
S3-P3	Dong Xu (BAE), Kanin Chu, J. Diaz, L. Mt. Pleasant, R. Lender, B. Schmanski, M. Ashman, J. Hulse, M. Gerlach, W. Zhu, P. Seekell, L. Schlesinger, R. Isaak, K. Nichols, J.J. Komiak, X.P. Yang, K.H.G. Duh, P.M. Smith and P.C. Chao Advanced No-Field-Plate AlGaIn/GaN HEMTs for Millimeter-Wave MMIC Applications
S3-P4	Tomohiro Yoshida (Tohoku)*, M. Oyama**, K. Watanabe**, Y. Umeda**, T. Otsuji*, T. Suemitsu*; * Tohoku, **Tokyo University of Science Impact of Drain Conductance in InGaAs-HEMTs Operated in a Class-F Amplifier

S3-P5	Walid Hadi, Michael Shur, Stephen O'Leary, Univeristy of British Columbia Is zinc-oxide a material for future high-speed electron device applications?
S3-P6	Phuoc Tran, International University, HoChiMinh City, Vietnam A Generalized Model for Characteristics of Graphene FETs in Various Gate Biasing Configurations with Mobility up to 24000 cm ² /Vs
S3-P7	Anas Mazady, Mehdi Anwar, University of Connecticut Material Implications on Switching Delays of Memristors
S3-P8	Albert Colon, Junxia Lucy Shi, UI Chicago Thermal and Frequency Dependent Interface Trap Density Characterization for High-k Dielectrics on AlGaN/GaN
S3-P9	Z. Wan (Georgia Tech), H. Xiao, Y. Joshi*, S. Yalamanchili Study of On-chip Microfluidic Cooling Design on the Thermal and Electric Performance of 3D ICs with Non-uniform Power Dissipation
S3-P10	John Ditri (Lockheed Martin), Michael McNulty, Suzanne Igoe Highly Integrated Microfluidic Cooling of High Heat Flux Electronic Components
S3-P11	Nicolas Michel Thin-film coatings for improved thermal performances of GaN-based HEMTs
S3-P12	Chitrleema Chakraborty (Rochester) ¹ , Ryan Beams ² , Kenny Goodfellow ² , Gary Wicks ^{1, 2} , Lukas Novotny ^{2, 3} and Nick Vamivakas ^{1, 2} ; ^{1,2} Rochester, ³ ETH Zurich Optical antenna enhanced atomically thin photodetectors
S3-P13	Optimization of Back-Barrier Doping in Graded AlGaN N-Face MISHEMTs S. Wienecke, M. Guidry, H. Li, E. Ahmadi, K. Hestroffer, X. Zheng, S. Keller, U. K. Mishra, Department of Electrical and Computer Engineering, University of California, Santa Barbara, CA 93106 USA
S3-P14	Quantum yield of bi-modular relaxation in InGaN films and wires V. Protasenko, M. Islam, J. Verma, K. Goodman, D. Jena, and G. Xing University of Notre Dame, Electrical Engineering, Notre Dame IN
S3-P15	Extraction of Correlation Lengths and RMS Roughness of Composition Fluctuations in Ternary Alloys Employed in High Electron Mobility Transistors Ravi Shivaraman, Elahe Ahmadi, Umesh Mishra, James Speck, University of California Santa Barbara, Santa Barbara CA 93106

Wednesday, August 6, 2014, Philips Hall 101 & Duffield Hall Atrium

7:30 AM **Registration & Breakfast buffet**

Location: Duffield Hall Atrium (outside the auditorium: Philips Hall 101)

Session 4: Power Electronics etc, Co-Chairs: Patrick Fay/Lucy Shi

8:30 AM S4-P1: Paul Chow (RPI), Invited Wide and Extreme Bandgap Semiconductor Devices for Power Electronics Applications
9:00 AM S4-P2: Isik Kiziyalli (Avogy), Invited , D. P. Bour Vertical Power Semiconductor Devices Based on Bulk GaN Substrates
9:30 AM S4-P3: Karim Boutros (HRL), Invited GaN Power Electronics for Automotive Applications

10:00 AM	S4-P4: Michael Shur (RPI) ¹ , M. Gaevski ² , J. Deng ² , R. Gaska ² , H. Wong ³ , N. Braga ³ , V. Mickevicius ³ , and G. Simin ⁴ ; ¹ RPI, ² SET, ³ Synopsys, ⁴ South Carolina Superior Frequency Characteristics of Perforated Channel HFET
10:15 AM	S4-P5 (Student): Zongyang Hu (Notre Dame), Erhard Kohn, Debdeep Jena and Grace (Huili) Xing Impact of F plasma treatment on DIBL and breakdown voltages of InAlN/AlN/GaN MOSHEMTs
10:30 AM	Coffee Break
11:00 AM	S4-P6 (Student): Mingda Zhu (Notre Dame), Bo Song, Zongyang Hu, Erhard Kohn, Debdeep Jena and Huili (Grace) Xing Low Leakage Current AlGaIn/GaN Based Recessed Schottky Barrier Diode by O ₂ Plasma Treatment
11:15 AM	S4-P7 (Student): Jia-Woei Wu (RPI), Wu, S. Chowdhury, H. Naik, J. Picard, N. Lee, C. Hitchcock, J. J.-Q. Lu, and T. P. Chow Low-Temperature Hydrophobic Wafer Bonding for 1200V, 25A Bi-Directional Si UMOS IGBTs
11:30 AM	S4-P8: Christopher Stender (Microlink Devices), Invited , C. Youtsey, F. Tuminello, M. Osowski, J. Adams, V. Elarde, H. Miyamoto, A. Wibowo, G. Hillier, R. Tatavarti, N. Pan Applications for Epitaxial Lift-Off of III-V Materials
12:00 PM	Panel discussion on Power Electronics etc. (moderators: Patrick Fay/Lucy Shi)

12:30 PM **Lunch buffet (Ballroom @ Statler Hotel)**

Session 5: High speed electronics, Co-Chairs: Erik Lind/Uttam Singisetti

1:30 PM	S5-H1: Michael Shur (RPI), Invited Ballistic Transport in Short Semiconductor Devices
2:00 PM	S5-H2: Martin Margala (UMass, Lowell), Invited ; H. Wu, and Roman Sobolewski, Rochester Ballistic Deflection Transistors and Their Digital and Analog Applications
2:30 PM	S5-H3 (Student): Zhichao Yang (OSU), D. N. Nath, Y. Zhang and S. Rajan Common Emitter Current and Voltage Gain in III-Nitride Tunneling Hot Electron Transistors
2:45 PM	S5-H4 (Student): Pei Zhao (Notre Dame), Amit Verma, Jai Verma, Grace Huili Xing, Chris G. Van de Walle (UCSB), and Debdeep Jena Observation of Negative Differential Resistance (NDR) in a GaN Negative Effective Mass Oscillator
3:00 PM	S5-H5 (Student): Jimmy Encomendero (Notre Dame), Berardi Sensale-Rodríguez (Utah), Patrick Fay, Huili Grace Xing. RTD-gated HEMT non-linear circuit model for THz amplification
3:15 PM	Coffee Break
3:45 PM	S5-H6 (Student): Cheng-Ying Huang (UCSB), Sanghoon Lee ¹ , Varistha Chobpattana ² , Susanne Stemmer ² , Arthur C. Gossard ^{1,2} , and Mark J. W. Rodwell ¹ , ¹ Electrical and Computer Engineering, ² Materials Department, Leakage Current Suppression in InGaAs-Channel MOSFETs: Recessed InP Source/Drain Spacers and InP Channel Caps

4:00 PM	S5-H7: Kozo Makiyama (Fujitsu), S. Ozaki, N. Okamoto, T. Ohki, Y. Niida, Y. Kamada, K. Joshin, K. Watanabe GaN-HEMT Technology for High Power Millimeter-Wave Amplifier
4:15 PM	S5-H8: James Hwang (Lehigh), Invited , Kenneth Goretta (AFOSR), Anupama Kaul (NSF) 2D Materials and Devices Beyond Graphene
4:45 PM	S5-H9: Jose Siles (JPL), Invited Advanced Schottky Diode Based Devices and Silicon Micromachining for Next Generation Ultra-Compact Terahertz Frontends
5:15 PM	Panel discussion on high speed electronics (moderators: Erik Lind/Uttam Singisetie)

5:45 PM **Free Time**

6:00 PM - 9:00 PM Conference Dinner, Boatyard Restaurant, Hosts: Michael Shur/PC Chao

6:00 PM & 6:15 PM: Bus to Boatyard (2 trips)

6:15 PM to 7:00 PM: Bar (Boatyard)

7:00 PM Dinner & Tribute to Les Eastman

Thursday, August 7, 2014, Philips Hall 101 & Duffield Hall Atrium

7:30 AM **Registration & Breakfast buffet**

Location: Duffield Hall Atrium (outside the auditorium: Philips Hall 101)

Session 6: Green Photonics, Chair: Kei May Lau, Paul Chow

8:30 AM	S6-G1: Kei May Lau (HKUST), Invited III-V nitride LED Micro-displays
9:00 AM	S6-G2: Tetsuya Takeuchi (Meijo), Invited , M. Iwaya ¹ , S. Kamiyama ¹ , and I. Akasaki ^{1,2} ; ¹ Meijo, ² Akasaki Research Center, Nagoya University, Nitride-based optoelectronic devices utilizing tunnel junctions
9:30 AM	S6-G3 (Student): Fatih Akyol (OSU), Sriram Krishnamoorthy, and Siddharth Rajan Cascading Nitride Light Emitting Diodes using low-resistance InGaN Tunnel Junctions
9:45 AM	S6-G4: Guang-Bo Lin (RPI), avid S. Meyaard ¹ , Jaehee Cho ¹ , E. Fred Schubert ¹ , Hyunwook Shim ² , Min-Ho Kim ² , and Cheolsoo Sone ² ; ¹ RPI, ² Samsung High Injection and Efficiency Droop in GaInN Light-Emitting Diodes
10:00 AM	S6-G5 (Student): SM Islam (Notre Dame), Vladimir Protasenko, Huili (Grace) Xing, Debdeep Jena and Jai Verma PAMBE Growth and Characterization of High Efficiency Ultrathin GaN/AlN Quantum Structures for Deep-UV Optoelectronics
10:15 AM	S6-G6: James Grandusky (Crystal IS), C. G. Moe, R. T. Bondokov, J. Chen, K. Kitamura, M. Toita, and L. J. Schowalter Effect of Defects on Pseudomorphic Ultraviolet Light Emitting Diodes on Aluminum Nitride Substrates
10:30 AM	S6-G7: Marc Hoffman (NCSU), A. Franke ¹ , M. Bobea ¹ , J. Tweedie ¹ , I. Bryan ¹ , Z. Bryan ¹ , F. Kaess ¹ , R. Kirste ¹ , R. Collazo ¹ , Z. Sitar ¹ , and M. Gerhold ² ; ¹ NCSU, ² ZARO

AlN/AlGaIn Distributed Bragg Reflectors for Deep UV Microcavity Lasers

10:45 AM **Coffee Break**

11:15 AM S6-G8: **Gary Wicks (Rochester), Invited**

Unipolar barrier photodetectors

11:45 AM S6-G9: **Rajeev Ram (MIT), Invited**

CMOS photonics for low-energy optical interconnects

12:15 PM **Panel discussion on Green Photonics**

(moderators: Kei May Lau)

12:45 PM **Lunch buffet (Ballroom @ Statler Hotel)**

Session 7: Next Generation, Co-Chairs: Debdeep Jena/Shriram Shivaraman

2:00 PM S7-N1: **Jacob Khurgin (John Hopkins), Invited**, I. Vurgaftman (NRL)

III-V and II-VI Quantum wells and wires with vanishing band gap - comparison with graphene and carbon nanotubes.

S7-N2: **Taichi Otsuji (Tohoku)**¹, Vladimir Ya. Aleshkin², Alexander A. Dubinov², Maxim Ryzhii³, Vladimir Mitin⁴, Michael S. Shur⁵, and Victor Ryzhii^{1,6}; ¹Tohoku, ²U. Nizhny

2:30 PM Novgorod, ³U. Aizu, ⁴U Buffalo, ⁵RPI, ⁶GRAS

Terahertz Lasing and Detection in Double-Graphene-Layer Structures

2:45 PM S7-N3: **Peide Ye (Purdue), Invited**

Phosphorene as a new 2D material for electronic and optoelectronic applications

3:15 PM S7-N4 (**Student**): **Rusen Yan (Notre Dame)**, Vladimir Protasenko, and Huili Grace Xing

Enhanced Photoresponse at MoS₂/Metal, MoS₂/Graphene and MoS₂/MoS₂ Junctions

3:30 PM S7-N5 (**Student**): **Prachi Sharma (RPI)**, Shayla Sawyer

An SnO₂ Colloidal Nanoparticles Based Ultraviolet Photodetector with High Signal to Noise Ratio

S7-L1 (**Student**): **Suresh Vishwanath (ND)**, Xinyu Liu¹, Sergei Rouvimov¹, Angelica Azcatl², Stephen McDonnell², Tatyana Orlova¹, Ning Lu², Guoda Lian², Xin Peng², Jacek K. Furdyna¹, Moon Kim², Debdeep Jena¹ and Huili Grace Xing¹. ¹Notre Dame, ²UT

3:45 PM Dallas

MBE growth of SnSe₂ and MoTe₂ on different substrates

4:00 PM **Coffee Break**

S7-N6: **Kelin Kuhn (Intel/Cornell), Invited**, A. Sanchez², C. George³, R. Rios³, J. Clarke³,

4:15 PM J. Greer²; ¹Cornell, ²Tyndall, ³Intel.

Semiconductors Stand Aside, the Age of Metals is here!

4:45 PM S7-N7: **Shriram Ramanathan (Harvard), Invited**

Mott transition electronics

5:15 PM **Panel discussion on Next Generation high performance devices**

(moderators: Debdeep Jena/Shriram Shivaraman)

5:45 PM Wrap up & Award Announcement, Co-Chairs: PC Chao/Greg DeSalvo