

**63<sup>rd</sup> Annual**

**DEVICE  
RESEARCH  
CONFERENCE**

University of California  
Santa Barbara, CA

June 20-22, 2005



**ADVANCE PROGRAM**

*Register before June 1 for 15% discount!*

**TMS**



**IEEE**

[www.tms.org/DRC.html](http://www.tms.org/DRC.html)

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# TMS

## **TABLE OF CONTENTS**

Airline Special .....	15
Campus Housing .....	7
Car Rental .....	14
Computer/Network Facilities .....	5
Hotel Reservations .....	10
Invited Speakers .....	18
JEM Publication & Subscription.....	17
Location .....	4
Lunch Packages .....	9
Organizing Committee.....	16
Parking.....	14
Registration Information .....	4
Social Activities.....	12
Student Awards.....	6
Technical Sessions .....	19
Transportation Information .....	13

DRC registration and campus housing forms are in center of brochure. Early registration and housing reservations are advised.

### **INTENDED AUDIENCE**

The Device Research Conference (DRC) is sponsored by IEEE, Electron Devices Society. DRC brings together scientists, engineers, and students to present breakthroughs and advances in device research. Individuals actively engaged or interested in electronic materials research and development find this meeting valuable.

### **DATE AND LOCATION**

The 63rd annual DRC is being held at the University of California in Santa Barbara, California, June 20-22, 2005. This conference is being coordinated with TMS Electronic Materials Conference (EMC) scheduled for June 22-24, 2005 at the same location. Due to the connection between device and electronic materials research, IEEE and TMS coordinate efforts to provide for a fruitful exchange of information between attendees of both conferences.

### **CONFERENCE REGISTRATION**

DRC and EMC badges are being accepted by both conferences on Wednesday, June 22.

#### **DRC Advance Registration Fees**

IEEE and TMS members .....	\$400
Nonmembers .....	\$450
Students .....	\$150

Registering on-site is available at a higher fee.

#### **Registration fee includes:**

- All Technical Sessions
- Coffee Breaks
- Sunday Welcoming Reception
- Monday Poster Session Reception
- Tuesday Conference Picnic
- Tuesday Rump Session
- Wednesday TMS Exhibit

More Than 200 Attendees Anticipated – Register before June 1 to secure your place!

#### **Three Convenient Ways to Register in Advance**

Register online at [www.tms.org/DRC.html](http://www.tms.org/DRC.html), mail the enclosed registration form, or fax it to (724) 776-3770.

For registration questions, contact TMS Meeting Services:

Telephone (724) 776-9000, ext. 243, or e-mail [mtgserv@tms.org](mailto:mtgserv@tms.org).

### **BADGE PICK-UP**

Badges may be picked up in the Multicultural Lounge during the following hours:

Sunday, June 19.....	4 to 9 p.m.
Monday, June 20 .....	7:30 a.m. to 5 p.m.
Tuesday, June 21.....	7:30 a.m. to 5 p.m.
Wednesday, June 22 .....	7:30 a.m. to 3 p.m.

### **REFUND POLICY**

A written request must be sent to TMS Headquarters, 184 Thorn Hill Road, Warrendale, PA 15086, USA, postmarked no later than June 2, 2005. A \$75 processing fee is charged on all cancellations. No refunds are issued after the deadline date.

### **SESSIONS**

DRC technical program commences at 8:30 a.m. on Monday, June 20. All sessions are held on grounds at the University of California. Session and paper titles are included in this brochure.

Building on success in previous years, papers may be presented for poster sessions at DRC 2005. Rump sessions provide a forum for frank discussion of current topics in device research and applications.

For technical program information regarding DRC, contact:

Alan Seabaugh, General Program Chair  
University of Notre Dame  
Telephone (574) 631-4473  
Fax (574) 631-4393  
E-mail [seabaugh.1@nd.edu](mailto:seabaugh.1@nd.edu)

Or

Theresa Mayer, Technical Program Chair  
Pennsylvania State University  
Telephone (814) 863-8458  
Fax (814) 865-7065  
E-mail [tsm2@psu.edu](mailto:tsm2@psu.edu)

### **COMPUTER/NETWORK FACILITIES**

Registrants residing on campus are given Internet access through UCSB's ResNet Ethernet network in the residence halls only. A temporary username and password is provided at check-in.

### **DRESS**

Casual clothing is in order with a sweater or light jacket occasionally needed for the evenings. The university is essentially a pedestrian campus, so wearing comfortable walking shoes is advised.

## **BEST STUDENT PAPER AWARD**

Papers presented by students, based on their own work, are eligible for this annual award. Further information on the award and student travel assistance may be obtained by writing to DRC General Program Chair, Alan Seabaugh, University of Notre Dame, 266 Fitzpatrick Hall, Notre Dame, IN 46556.

## **AMERICANS WITH DISABILITIES ACT**



TMS supports the federal Americans with Disabilities Act (ADA), which prohibits discrimination against and promotes public accessibility for those with disabilities. In support of and in compliance with ADA, we ask those attendees requiring specific equipment or services to indicate their needs on the enclosed housing form or by contacting TMS Meeting Services.

## **POLICY ON AUDIO & VISUAL RECORDING OF TECHNICAL PAPER PRESENTATIONS/SESSIONS**

TMS reserves the right to any audio and video reproduction of presentations at TMS sponsored meetings. Recording of sessions (audio, video, still photography, etc.) intended for personal use, distribution, publication, or copyright without the express written consent of TMS and the individual authors is strictly prohibited. Contact TMS Technical Programming to obtain a copy of the waiver release form.

## **FOR MORE INFORMATION**

Regarding conference logistics, contact:

Michael Packard, CMP  
Manager, TMS Meeting Services  
Telephone (724) 776-9000, ext. 225  
Fax (724) 776-3770  
E-mail packard@tms.org

Regarding meeting registration and pricing, contact:

TMS Meeting Services  
Telephone (724) 776-9000, ext. 243  
Fax (724) 776-3770  
E-mail mtgserv@tms.org

Pertaining to TMS Electronic Materials Conference, contact:

April S. Brown, EMC General Chair  
Telephone (919) 660-5498  
Fax (919) 660-5293  
E-mail abrown@ee.duke.edu

Or

Edward Yu, EMC Program Chair  
Telephone (858) 534-6619  
Fax (858) 822-3425  
E-mail ety@ece.ucsd.edu

## **HOUSING & ACCOMMODATIONS**

### **ON-CAMPUS HOUSING**

**Reserve Early!**

We are pleased to invite DRC attendees to reside on the seaside campus of UCSB. On-campus accommodations are available on a first request basis.

UCSB residence halls and dining facilities are located within a 10 minute walk from the session meeting rooms and the beach. Residence hall accommodations are either single or double occupancy with single rooms reserved on a first request basis. No rooms have private restrooms; restroom and shower facilities are located on each floor. Lodging includes beds made on arrival day and daily room service with washcloth and towel change. Unfortunately, there is no housing on campus for those with children. We recommend a selection from one of the hotel blocks. Check the hotel listings in the off-campus housing section of this brochure.

UCSB offers the following package plans to provide planning flexibility and the option to attend both DRC and EMC. Residence hall plans A, B, and C include full meal service. Residence hall room packages without meals are not available. No adjustments from the chosen package for lodging or meals can be made for late arrival or early departure. Please indicate your plan preference on the enclosed reservation form and return it with your payment to:

Pam Allen  
Campus Conference Services  
P.O. Box 13850  
Santa Barbara, CA 93107  
Fax (805) 893-7287  
E-mail pallen@housing.ucsb.edu

Confirmations are sent by the conference office for reservations received at the university by *May 31, 2005*. Prepayment is required.

### **METHOD OF PAYMENT**

Payment in U.S. dollars may be made by check or money order. Checks must be drawn on a U.S. bank and made payable to "U.C. Regents."

Visa, MasterCard, or American Express credit cards are also accepted.

### **PLAN A**

Includes lodging Sunday through Tuesday night and eight meals:

Sunday ..... dinner

Monday ..... breakfast, lunch, and dinner

Tuesday ..... breakfast and lunch (dinner at beach included with registration; no dining commons meal)

Wednesday... breakfast and lunch

Per person \$267.63/single occupancy; \$220.05/double occupancy

### **PLAN B**

Includes lodging Monday through Tuesday night and six meals:

Monday ..... lunch and dinner

Tuesday ..... breakfast and lunch (dinner at beach included with registration; no dining commons meal)

Wednesday... breakfast and lunch

Per person \$192.02/single occupancy; \$160.30/double occupancy

### **PLAN C**

(for those attending DRC and EMC) Includes lodging Sunday through Thursday night and 13 meals:

Sunday ..... dinner

Monday ..... breakfast, lunch, and dinner

Tuesday ..... breakfast and lunch (no dining commons meal offered Tuesday night due to DRC banquet)

Wednesday... breakfast, lunch, and dinner

Thursday ..... breakfast and lunch (no dining commons meal offered Thursday night due to EMC banquet)

Friday ..... breakfast and lunch

Per person \$429.05/single occupancy; \$349.75/double occupancy

### **EARLY ARRIVAL**

Saturday, June 18, includes sandwich bar, 6 to 8 p.m., and Sunday continental breakfast, 7 to 9 a.m.

Per person \$75.82/single occupancy; \$59.96/double occupancy

### **LATE DEPARTURE (DRC only)**

Wednesday night, June 22, includes dinner and Thursday breakfast

Per person \$75.61/single occupancy; \$59.75/double occupancy

### **LATE DEPARTURE (DRC and EMC)**

Friday night, June 24, includes dinner and Saturday breakfast

Per person \$75.61/single occupancy; \$59.75/double occupancy

### **COMMUTER LUNCH PACKAGE**

Apply Early!

Attendees who plan to make off-campus housing arrangements directly with the hotel/motel may purchase commuter lunch packages for on-campus meals through UCSB:

Three lunches ..... \$30

Five lunches ..... \$50

On-campus housing and commuter lunch reservations may be made online at [http://www.housing.ucsb.edu/conferences/web\\_reg/drc-emc2005.html](http://www.housing.ucsb.edu/conferences/web_reg/drc-emc2005.html).

### **ON-CAMPUS DINING HOURS**

Meals are served in the De La Guerra Dining Hall:

Breakfast ..... 7 to 8 a.m.

Lunch ..... 11:45 a.m. to 1:15 p.m.

Dinner ..... 5:30 to 7 p.m.

Food facilities on campus close at 7 p.m.

No refunds are made for late arrivals, early departures, or missed meals.

## OFF-CAMPUS HOUSING

Blocks of rooms have been reserved at special conference rates for the hotels listed below. Rooms may be released as early as May 31. Thereafter, reservations can be obtained only on a space available basis. Reservations must be made directly with the hotels via mail, telephone, or fax as soon as possible. Rooms are available for DRC and EMC, Sunday through Thursday night. Individuals must identify themselves as attendees of DRC or EMC. Friday and Saturday nights are available if requested at the time reservations are made. However, the special rates below do not apply to weekend rates. Friday and Saturday rates are higher. The following rates do not include tax.

Hotels in Goleta, approximately five miles from campus (within 10 minutes driving time):

### BEST WESTERN SOUTH COAST INN

5620 Calle Real

Goleta, CA 93117

Telephone (805) 967-3200 / Fax (805) 683-4466

*\$113 single; \$123 double (Sunday through Thursday night)*

All rooms have high speed Internet access, refrigerator, coffeemaker, hairdryer, iron and ironing board. Rate includes daily continental breakfast buffet, evening hospitality Monday through Thursday, and complimentary shuttle service to and from the Santa Barbara Airport.

### HOLIDAY INN

5650 Calle Real

Goleta, CA 93117

Telephone (805) 964-6241 / Fax (805) 964-8467

*\$139 single/double (Sunday through Thursday night)*

Full service restaurant, heated pool, and complimentary airport shuttle between 6 a.m. and 10 p.m.

The following hotel is located off the main entrance of campus (three minutes driving time):

### PACIFICA SUITES

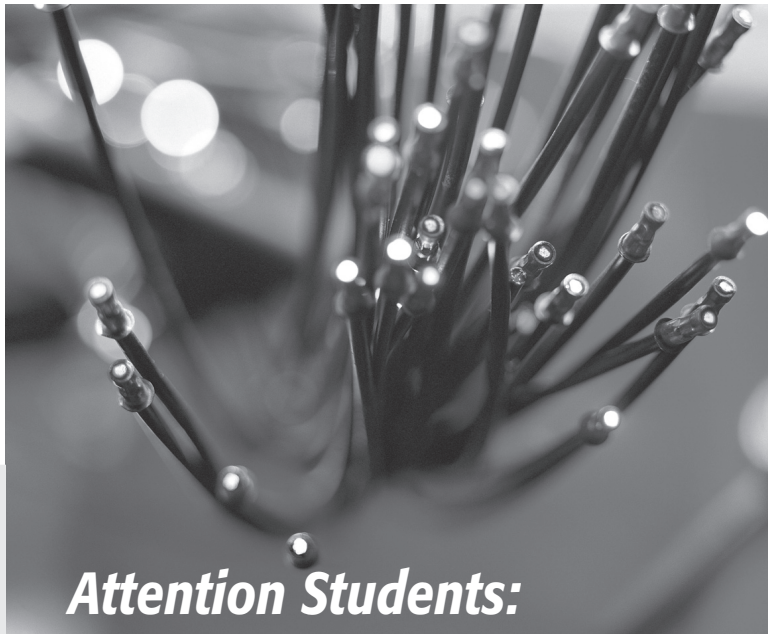
5490 Hollister Avenue

Goleta, CA 93117

Telephone (805) 683-6722 / Fax (805) 683-4121

*\$169 single/double (Sunday through Thursday night)*

Complimentary cooked-to-order breakfast daily, complimentary evening beverages Monday through Saturday, heated pool and spa, and complimentary airport shuttle 7 a.m. to 7 p.m. with 24-hour notice



## Attention Students:

**Join the Material Advantage program for just \$25 and receive membership benefits in three organizations!**

- Access to member Web sites and membership directories of the American Ceramics Society, ASM International, and TMS
- A rotating print subscription to the *American Ceramics Society Bulletin*, *Advanced Materials & Processes*, and *JOM*
- Online versions of *American Ceramic Society Bulletin*, *Advanced Materials & Processes*, *JOM* and *TMS Letters*
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#### Hotels in Santa Barbara:

##### **EL ENCANTO HOTEL AND GARDEN VILLAS**

1900 Lasuen Road

Santa Barbara, CA 93103

Telephone (805) 687-5000 / Fax (805) 687-0943

*\$199 single (Sunday through Thursday night)*

*Charter Member of Historic Hotels of America*

Overlooking the Pacific Ocean, this historic hotel features an elegant dining room with outdoor terraces, and garden villas and cottages, many with wood-burning fireplaces, private patios or balconies.

##### **RADISSON HOTEL SANTA BARBARA**

1111 East Cabrillo Boulevard

Santa Barbara, CA 93103

Telephone (805) 963-0744 / Fax (805) 962-5555

*\$129 single/\$139 double (Sunday through Thursday night)*

Full American breakfast is included in rate. A Mediterranean style property located across from the East Beach, the hotel has 173 guest rooms plus a swimming pool, fitness center and restaurant. All rooms include a coffeemaker, hairdryer, iron, ironing board and data port modem for online access.

## **SOCIAL EVENTS**

### **WELCOMING RECEPTION**

Sunday, June 19, 6 to 8 p.m.

University of California, University Center/Lagoon Plaza

### **POSTER SESSION & RECEPTION**

Monday, June 20, 5:30 to 8:30 p.m.

University of California, University Center/Lagoon Plaza.

Enjoy a reception and discuss individual posters with presenters.

### **CONFERENCE BANQUET**

Tuesday, June 21, 6 to 8 p.m.

#### *On the Beach!*

Relax at a catered cookout on the beach near the University of California campus. The banquet is free to full conference and student attendees. Others may purchase tickets on the enclosed registration form or at the registration desk by June 20 at 5 p.m. The cost is \$45 for adults and \$15 for children 12 and under.

## **RUMP SESSION & LIGHT RECEPTION**

Tuesday, June 21, 8 to 10:30 p.m.

University of California, near the session rooms

### **INFORMAL COFFEE BREAKS**

Intermission of morning and afternoon sessions (approximately 10 to 10:40 a.m. and 3 to 3:40 p.m.)

University of California, University Center/Lagoon Plaza

Enjoy coffee, tea, or sodas.

## **TRANSPORTATION**

### **AIR**

Most people traveling by air land at Los Angeles International Airport (LAX), about two hours from Santa Barbara. From LAX, travelers may fly to Santa Barbara, take the Santa Barbara Airbus, or rent a car and drive to Santa Barbara.

*Flying into Santa Barbara* A free UCSB shuttle bus is available for attendees with on-campus housing for transportation from the Santa Barbara Airport to campus residence halls; however, in order to arrange for pick-up, upon landing, attendees must call the telephone number assigned in their confirmation e-mail. Following the conference, the UCSB shuttle bus transports on-campus participants to the Santa Barbara Airport for departure. Those staying in local hotels are responsible for their own transportation to and from the airport; check the hotel descriptions to determine which hotels provide this service. Alternatives are SuperRide Airport Shuttle, reserve in advance, at (805) 683-9636, Yellow Cab at (805) 965-5111, and Orange Cab at (805) 964-2800.

*Santa Barbara Airbus* provides several daily bus trips from LAX to Santa Barbara. Within U.S./Canada, phone (800) 423-1618; outside U.S./Canada, (805) 964-7759; or fax (805) 683-0307. For those residing on campus, the drop-off site in Goleta must be used. The UCSB shuttle bus provides transportation from Goleta to campus. Upon arrival, attendees must call the assigned number to secure the UCSB shuttle bus; this number is included in the confirmation e-mail sent to attendees. Following the conference, the UCSB shuttle bus returns on-campus participants to the Santa Barbara Airbus drop-off site in Goleta. Those staying in local hotels are responsible for their own transportation from the Santa Barbara Airbus drop-off site.

Taxi service is available from the airport to local hotels not offering free shuttle service.

## VEHICLE

UCSB is easily accessible from US 101.

From the south, take UCSB/Highway 217 exit. Bear to the left when entering campus and follow directional signs to the residence halls.

From the north, take US 101 to the Storke/Glen Annie Road exit. Turn right onto Storke Road and proceed two miles to El Colegio Road. Turn left onto El Colegio Road, proceed through the campus West Gate, and follow directional signs to the residence halls.

For those residing off campus, refer to the UCSB campus map for directions to the University Center.

## TRAIN

Santa Barbara is served by Amtrak Train Service. The Amtrak terminal is located in downtown Santa Barbara and in Goleta. From the terminal, you may reach the campus or the hotel by SuperRide Shuttle or taxi. UCSB campus shuttle cannot provide transportation from the train station for on-campus housing.

## PARKING

Parking is by permit only. On-campus residents receive a complimentary permit at check-in for the duration of their stay.

Off-campus residents are encouraged to purchase permits in advance on the registration form; permits may also be purchased at registration:

DRC Only Parking Permit ..... \$23

DRC/EMC Parking Permit ..... \$37

All attendees must have a temporary parking permit for check-in/registration which can be printed from the following Web site: [http://www.housing.ucsb.edu/conferences/web\\_reg/drc-emc-park.pdf](http://www.housing.ucsb.edu/conferences/web_reg/drc-emc-park.pdf).

Parking citations are issued for cars incorrectly parked or lacking permits. UCSB is a walking campus and parking is limited. Parking assignments may not necessarily be close to assigned residence halls or session locations. Additional parking details are included when confirmations are sent.

## CAR RENTAL SPECIAL



Official Car Rental Company of the 63rd Annual DRC

Advance reservations may be made by booking online at [www.hertz.com](http://www.hertz.com) or calling the Hertz reservations line at (800) 654-2240 in the U.S. or (800) 263-0600 in Canada. International customers should contact the nearest Hertz reservation center. Advance reservations are recommended.

Travelers must identify themselves as attendees of DRC and reference CV#02QJ0013 in order to receive the special rates.

Rates are available from Hertz locations in Southern California.

## Terms and Conditions

- Unlimited mileage allowance on rates
- One-way service fee applies when cars are not returned to renting location.
- Additional daily charges for optional coverage (Loss Damage Waiver, Personal Accident Insurance, Personal Effect Protection, refueling and state tax) are not included in the above rates.
- Drivers must meet standard Hertz age, driver, and credit requirements.
- Hertz is a frequent flyer partner with US Airways, Delta, Northwest, United, and American Airlines. Frequent flyer information may be requested at time of car booking.
- Weekly rentals are from five to seven days. Weekend rentals have a minimum two-day keep, and Thursday pick-up requires a minimum three-day keep.

## SPECIAL AIRFARE



## U-S AIRWAYS

Official Carrier of the 63rd Annual DRC

US Airways is pleased to offer the various discount options listed below.

For travel into Santa Barbara, California, attendees receive a five-percent discount off First Class and any published US Airways round trip fare booked in E, C, D, A, Y, B, M or U class of service. A 10% discount on unrestricted "Y" or B8US/B4AUS fares applies with seven-day advance reservations and ticketing required. Plan ahead and receive an additional five-percent discount by ticketing 60 days or more prior to departure. These discounts are valid provided all rules and restrictions are met and are applicable for travel from all points on US Airways' route system. The above discounts are not combinable with other discounts or promotions and are valid three days before and after the meeting dates. Additional restrictions may apply on international travel.

US Airways also offers zone fairs for attendees who are unable to meet the restrictions of the discounts listed above. Certain restrictions, including advance purchase requirements, may apply.

These special rates are applicable for travel from the continental United States. To obtain these discounts, travelers or their professional travel consultants must call US Airways' Group and Meeting Reservation Office toll-free at (877) 874-7687; Monday through Friday, 8 a.m. to 8 p.m., Saturday and Sunday, 8 a.m. to 6 p.m., Eastern time.

REFER TO GOLD FILE NO. 57153207



## ORGANIZING COMMITTEE

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## INVITED SPEAKERS

Greg Atwood <i>Intel</i>	Kazukiyo Joshin <i>Fujitsu</i>
Alain Cappy <i>IEMN</i>	Philip Kim <i>Columbia University</i>
Larry Coldren <i>University of California, Santa Barbara</i>	Victor Klimov <i>Los Alamos</i>
James Cooper <i>Purdue University</i>	Joachim Knoch <i>Research Center, Juelich</i>

## PUBLICATION INFORMATION

### MANUSCRIPT SUBMISSION

TMS offers two convenient options for publication of manuscripts.

*TMS Letters* is a unique online technical journal that presents cutting-edge research in succinct, informative updates. The journal is peer-reviewed and presents information in two-page technical updates that is not published in any other book or journal.

#### How to Submit a Manuscript to *TMS Letters*:

Presentations to be considered for publication must be submitted electronically at <http://cms.tms.org> in portable document format. Complete author instructions are available at <http://www.tms.org/TMSLetters.html>.

The *Journal of Electronic Materials* (*JEM*), a monthly archival publication of TMS and the Institute of Electrical and Electronics Engineers (IEEE), welcomes the submission of related electronic materials articles. *JEM* articles are reviewed, selected, and edited by peers in the field, most of whom are members of TMS' Electronic Materials Committee or IEEE.

#### How to Submit a Manuscript to *JEM*:

To be considered for publication, authors must submit manuscripts electronically at <http://jem.electronicipc.com>. Detailed manuscript submission guidelines are available at <http://www.tms.org/jem.html>.

## MONDAY AM, JUNE 20

Location: Corwin Pavilion

### PLENARY SESSION

Session Organizer:

Alan Seabaugh, University of Notre Dame

Session Chair:

Theresa S. Mayer, Pennsylvania State University, University Park

8:30 AM Welcoming Remarks

Presentations: IEEE Fellows and Best Student Paper Awards

9:00 AM I.-1 Plenary Paper

Plastic Electronics and Optoelectronics

A. J. Heeger, Department of Physics, University of California, Santa Barbara, Santa Barbara, California, USA

9:50 AM Break

10:10 AM I.-2 Plenary Paper

Quantum Cascade Lasers: Widely Tailorable Light Sources for the Mid- To Far-Infrared and their Applications

F. Capasso, Division of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts, USA

11:00 AM I.-3 Plenary Paper

Nanodevices: A Bottom-Up View

S. Datta, School of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana, USA

## MONDAY PM, JUNE 20

Location: Corwin East

### SESSION II.A. OPTICAL SOURCES

Session Organizer:

Mike Larson, Agility Communication, Inc.

Session Chairman:

Diana Huffaker, University of New Mexico

1:30 PM II.A-1 Invited Paper

Widely-Tunable Transmitters and Photonic Integrated Circuits

L. A. Coldren, J. W. Raring, J. S. Barton, M. Sysak, and L. Johansson  
Electrical and Computer Engineering and Materials Departments,  
University of California at Santa Barbara, Santa Barbara, California,  
USA, and Agility Communications, Inc., Santa Barbara, California,  
USA

2:10 PM II.A-2

**A Novel Tunable Wet Etched Mid-IR Pentenary AllnGaAsSb Junction Laser at 2.34 - 2.44  $\mu\text{m}$**

R. Bugge<sup>1,2</sup> and B.-O. Fimland<sup>1</sup>, <sup>1</sup>Department of Electronics and Telecommunications, Norwegian University of Science and Technology, Trondheim, Norway, and <sup>2</sup>Intopto AS, Trondheim, Norway

2:30 PM II.A-3 Student Paper

**Room-Temperature Self-Organized In<sub>0.5</sub>Ga<sub>0.5</sub>As Quantum Dot Lasers on Silicon**

Z. Mi<sup>1</sup>, P. Bhattacharya<sup>1</sup>, J. Yang<sup>1</sup>, P. K. L. Chan<sup>2</sup>, and K. P. Pipe<sup>2</sup>, <sup>1</sup>Solid State Electronics Lab, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan, USA, and <sup>2</sup>Department of Mechanical Engineering, University of Michigan, Ann Arbor, Michigan, USA

2:50 PM II.A-4 Student Paper

**Electrically Injected Quantum Dot Bottom-Emitting Photonic Crystal Single Mode Microcavity Light Source**

S. Chakravarty, J. Topolancik, S. Chakrabarti, and P. Bhattacharya, Department of Electrical and Computer Engineering, University of Michigan, Ann Arbor, Michigan, USA

3:10 PM Break

3:30 PM II.A-5 Student Paper

**A 110 mW AlGaIn-Based UV Lamp Emitting at 278 nm**

A. Lunev<sup>1</sup>, J. Zhang<sup>1</sup>, Y. Belinko<sup>1</sup>, X. Hu<sup>1</sup>, J. Deng<sup>1</sup>, T. M. Katona<sup>1</sup>, M. S. Shur<sup>1</sup>, R. Gaska<sup>1</sup>, and A. Khan<sup>2</sup>, <sup>1</sup>Sensor Electronic Technology, Inc., Columbia, South Carolina, USA, and <sup>2</sup>Department of Electrical Engineering, University of South Carolina, Columbia, South Carolina, USA

3:50 PM II.A-6 Student Paper

**Tunnel Junctions in GaN/AlN for Optoelectronic Applications**

M. J. Grundmann<sup>1</sup>, J. S. Speck<sup>2</sup>, and U. K. Mishra<sup>1</sup>, <sup>1</sup>Electrical and Computer Engineering Department, University of California, Santa Barbara, California, USA, and <sup>2</sup>Materials Department, University of California, Santa Barbara, California, USA

4:10 PM II.A-7

**Lasing Operation of ZnTe Based Yellow-Green Laser Diodes**

A. Kikuchi, A. Manoshiro, I. Nomura, and K. Kishino, Electrical and Electronics Engineering, Sophia University, Tokyo, Japan

4:30 PM II.A-8

**Late News**

4:50 PM II.A-9

**Late News**

## MONDAY PM, JUNE 20

Location: Corwin West

### SESSION II.B. NONVOLATILE MEMORY

Session Organizer:

Pranav Kalavade, Intel Corporation, Santa Clara

Session Chairman:

Rohit Shenoy, IBM, Almaden

1:30 PM II.B-1 Invited Paper

**Current Status of Chalcogenide Change Memory**

G. Atwood<sup>1</sup> and R. Bez<sup>2</sup>, <sup>1</sup>Intel Corporation, Santa Clara, California, USA, and <sup>2</sup>Central Research and Development, STMicroelectronics, Agrate Brianza, Italy

2:10 PM II.B-2

**Data Retention Behavior in the Embedded SONOS Nonvolatile Memory Cell**

H. S. Chae<sup>1</sup>, Y. S. Jung<sup>1</sup>, S. Seo<sup>1</sup>, J. H. Han<sup>1</sup>, J. W. Hyun<sup>1</sup>, G. W. Park<sup>2</sup>, M. Y. Um<sup>2</sup>, J. H. Kim<sup>2</sup>, B. J. Lee<sup>2</sup>, K. C. Kim<sup>2</sup>, I. W. Cho<sup>2</sup>, G. J. Bae<sup>2</sup>, N. I. Lee<sup>2</sup>, S. T. Kang<sup>2</sup>, and C. W. Kim<sup>1</sup>, <sup>1</sup>Devices Lab, Samsung Advanced Institute of Technology, Nongseo-ri, Kihung-up, Yongin-si, Kyungki-do, Korea, and <sup>2</sup>Advanced Process Development Team, System LSI Business, Samsung Electronics Co., Ltd., Korea

2:30 PM II.B-3

**Nanocrystal Physical Attributes Influencing Nonvolatile Memory Performance**

B. E. Hradsky, R. Muralidhar, R. A. Rao, B. Steimle, S. Straub, B. E. White, M. Sadd, S. Anderson, J. A. Yater, C. T. Swift, B. Acred, J. Peschke, E. J. Prinz, and K. M. Chang, Freescale Semiconductor, Inc., Austin, Texas, USA

2:50 PM II.B-4

**The Impact of Work-Function of Metal Gate and Fixed Oxide Charge of High-k Blocking Dielectric on Memory Properties of NAND Type Charge Trap Flash Memory Devices**

S. Jeon<sup>1</sup>, J. H. Han<sup>1</sup>, J. Lee<sup>1</sup>, J. Hyun<sup>1</sup>, J. H. Kim<sup>2</sup>, Y. S. Jeong<sup>1</sup>, H. S. Chae<sup>1</sup>, S. D. Chae<sup>2</sup>, M. K. Kim<sup>1</sup>, J.-W. Lee<sup>1</sup>, S. Choi<sup>3</sup>, M. Jang<sup>3</sup>, H. Hwang<sup>3</sup>, and C. Kim<sup>1</sup>, <sup>1</sup>Devices Lab, <sup>2</sup>NFC, Samsung Advanced Institute of Technology, Kihung-up, Yongin-si, Kyungki-do, Korea, and <sup>3</sup>Department of Materials Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Korea

3:10 PM Break

3:30 PM II.B-5 Student Paper

**Tunnel Oxide Thickness Dependence of Activation Energy for SiGe Quantum Dot Flash Memory**

Y. Liu<sup>1</sup>, S. Tang<sup>1</sup>, D. Yu<sup>2</sup>, G. Hwang<sup>2</sup>, and S. Banerjee<sup>1</sup>,

<sup>1</sup>Microelectronics Research Center, R9950, The University of Texas at Austin, Austin, Texas, USA, and <sup>2</sup> Department of Chemical Engineering, The University of Texas at Austin, Austin, Texas, USA

3:50 PM II.B-6 Student Paper

**Multiple Drain Transistors for Reconfigurable Applications**

A. E. Carlson and T.J. King, Electrical and Computer Engineering Department, University of California at Berkeley, Berkeley, California, USA

4:10 PM II.B-7 Student Paper

**Reversible Resistance Switching of the Non-Stoichiometric ZrO<sub>x</sub> and SrTiO<sub>x</sub> for Nonvolatile Memory Applications**

D. Lee, D. Choi, H. Choi, H. Sim, and H. Hwang, Department of Materials Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Korea

4:30 PM II.B-8 Student Paper

**Germanium Sulfide-Based Solid Electrolytes for Nonvolatile Memory**

M. Balakrishnan, M. N. Kozicki, C. Gopalan, and M. Mitkova, Center for Solid State Electronics Research, Arizona State University, Tempe, Arizona, USA

4:50 PM II.B-9 Student Paper

**Dynamics of Write and Erase Mechanisms in a Novel Organic Memory With Extremely Low ON Resistance**

T. L. Graves-Abe and J C. Sturm, Princeton Institute for the Science and Technology of Materials, Princeton University, Princeton, New Jersey, USA

**MONDAY PM, JUNE 20, 7:00 – 9:00 PM**

Location: University Center, Lagoon Plaza

**SESSION III.  
POSTER SESSION**

Session Organizers:

Lynn Loo, University of Texas at Austin, and  
Jing Guo, University of Florida

III-1

**Gallium Nitride Based Ballistic Electron Acceleration Negative-Differential-Conductivity Diodes for Potential THZ Applications**

H.Y. Cha<sup>1</sup>, X. Chen<sup>1</sup>, W. J. Schaf<sup>1</sup>, M. G. Spencer<sup>1</sup>, L. F. Eastman<sup>1</sup>, B. K. Ridley<sup>2</sup>, J. Pomeroy<sup>3</sup>, M. Kuball<sup>3</sup>, <sup>1</sup>School of Electrical and Computer Engineering and Cornell Nanoscale Science and Technology Facility, Cornell University, Ithaca, New York, USA <sup>2</sup>Department of Electronic Systems Engineering, University of Essex, Colchester, United Kingdom, and <sup>3</sup>Department of Physics, University of Bristol, Bristol, United Kingdom

III-2

**Technology, Properties and Limitations of State-of-the-Art InAlN/GaN HEMTs**

J. Kuzmik<sup>1</sup>, J.-F. Carlin<sup>2</sup>, T. Kostopoulos<sup>3</sup>, G. Konstantinidis<sup>3</sup>, A. Georgakilas<sup>3</sup>, D. Pogany<sup>1</sup>, <sup>1</sup>Institute for Solid State Electronics TU Vienna, Vienna, Austria, <sup>2</sup>Institute of Quantum Electronics and Photonics, Swiss Federal Institute of Technology/Ecole Polytechnique Fédérale, Lausanne EPFL, Switzerland, and <sup>3</sup>Microelectronic Research Group, FORTH-IESL and University of Crete, Department of Physics, Heraklion, Crete, Greece

III-3 Student Paper

**Vertical-Structured Ni/n-GaN Schottky Diode with Electroplating Nickel Substrate**

S. J. Wang<sup>1</sup>, S. C. Chang<sup>1</sup>, K. M. Uang<sup>1,2</sup>, B. W. Liou<sup>3</sup>, <sup>1</sup>Institute of Microelectronics, Department of Electrical Engineering, National Cheng Kung University, Taiwan, ROC, <sup>2</sup>Department of Electrical Engineering, Wu-Feng Institute of Technology, Chia-yi, Taiwan, ROC, and <sup>3</sup>Department of Computer Science and Information Engineering, Technology, Wu-Feng Institute of Technology, Chia-yi, Taiwan, ROC

III-4

**Field-Plated AlGaN/GaN HEMTs With Power Density of 9.1 W/mm at 18 GHz**

V. Kumar<sup>1</sup>, G. Chen<sup>1</sup>, S. Guo<sup>2</sup>, B. Peres<sup>2</sup>, and I. Adesida<sup>1</sup>, <sup>1</sup>Micro and Nanotechnology Laboratory and Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA and <sup>2</sup>Emcore Corporation, Somerset, New Jersey, USA

III-5

**Fabrication and Characterization of N-Face AlGaIn/GaN/AlGaIn HEMTs**

A. Chini<sup>1</sup>, S. Rajan<sup>2</sup>, M. H. Wong<sup>2</sup>, Y. Fu<sup>2</sup>, J. S. Speck<sup>3</sup>, U. K. Mishra<sup>2</sup>,  
<sup>1</sup>Universita di Modena e Reggio Emilia, Modena, Italy, <sup>2</sup>Electrical and Computer Engineering Department, University of California Santa Barbara, Santa Barbara, California, USA, and <sup>3</sup>Materials Department, University of California Santa Barbara, Santa Barbara, California, USA

III-6 Student Paper

**Small-Signal Intrinsic Base Resistance Effect on InP-InGaAs, InGaP-GaAs, and SiGe HBTs**

Y. S. Lin<sup>1</sup>, H. B. Liang<sup>1</sup>, C. C. Chen<sup>1</sup>, J. L. Chen<sup>1</sup>, and S. S. Lu<sup>2</sup>,  
<sup>1</sup>Department of Electrical Engineering, National Chi-Nan University, Puli, Nantou Hsien Taiwan, and <sup>2</sup>Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan

III-7

**Circularly Polarized Light Emission From Microcavity Light Emitting Devices Based on Sculptured Chiral Reflectors**

J. Xu<sup>1</sup>, A. Lakhtakia<sup>1</sup>, J. Liou<sup>1</sup>, D. Cui<sup>1</sup>, M. Gerhold<sup>2</sup>, <sup>1</sup>Penn State University, University Park, Pennsylvania, USA, and <sup>2</sup>U.S. Army Research Office, Research Triangle Park, North Carolina, USA

III-8 Student Paper

**A Novel Technique to Reduce Leakage in Metal-Semiconductor-Metal Photodetectors**

A. K. Okyay, C. O. Chui, and K. C. Saraswat, Center for Integrated Systems, Department of Electrical Engineering, Stanford University, Stanford, California, USA

III-9 Student Paper

**Broad-Band Superluminescent Light Emitting Diodes Incorporating Quantum Dots in Compositionally Modulated Quantum Wells**

S. K. Ray, K. M. Groom, H. Y. Liu, M. Hopkinson, R. A. Hogg, EPSRC National Centre for III-V Technologies, Department of Electronic and Electrical Engineering, University of Sheffield, Sheffield, United Kingdom

III-10 Student Paper

**Effect of Surface Treatment on the Performance of Vertical-Structured GaN-Based LEDs With Electroplating Metallic Substrate**

S. J. Wang<sup>1</sup>, S. L. Chen<sup>1</sup>, K. M. Uang<sup>1,2</sup>, Y. C. Yang<sup>1</sup>, T. M. Chen<sup>1,2</sup>, and B. W. Liou<sup>3</sup>, <sup>1</sup>Institute of Microelectronics, Department of Electrical Engineering, National Cheng Kung Univ., Tainan, Taiwan, <sup>2</sup>Department of Electrical Engineering, Wu-Feng Institute of Technology, Chia-yi, Taiwan, and <sup>3</sup>Department of Computer Science and Information Engineering, Wu-Feng Institute of Technology, Chia-yi, Taiwan

III-11 Student Paper

**MBE Grown Mid-Infrared HgCdTe Avalanche Photodiodes on Si Substrates**

S. Mallik<sup>1</sup>, K. A. Hultquist<sup>1</sup>, S. Ghosh<sup>1</sup>, S. Velicu<sup>2</sup>, H. Jung<sup>2</sup>,  
<sup>1</sup>Department of Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, Illinois, USA, and <sup>2</sup>EPIR Technologies, Bolingbrook, Illinois, USA

III-12 Student Paper

**Modeling of Low-Frequency Noise in Single- and Double-Gate MOSFETs Using Quantum Mechanical Approach**

S. S. Rai and S. S. Islam, Semiconductor Device Research Laboratory, Department of Electrical Engineering, Rochester Institute of Technology, Rochester, New York, USA

III-13

**Long Term Transients in MOSFET I/f Noise Under Switched Bias Conditions**

M. Y. Louie, D. A. Miller, M. E. Jacob, and L. Forbes, School of Electrical and Computer Engineering and Computer Science, Oregon State University, Corvallis, Oregon, USA

III-14 Student Paper

**Monte Carlo Study of Germanium N- and P- MOSFETs**

B. Ghosh, X. F. Fan, L. F. Register, and S. K. Banerjee, Microelectronics Research Center and Department of Electrical and Computer Engineering, University of Texas at Austin, Austin, Texas, USA

III-15 Student Paper

**Interface and Gate Line Edge Roughness Effects on Intra Die Variance in MOS Device Characteristics**

N. Gunther<sup>1</sup>, E. Hamadeh<sup>1</sup>, D. Niemann<sup>1,2</sup>, and M. Rahman<sup>1</sup>,  
<sup>1</sup>Electron Devices Laboratory, Santa Clara University, Santa Clara, California, USA, and <sup>2</sup>Applied Micro Circuits Co., Sunnyvale, California, USA

III-16 Student Paper

**Improved Reliability Characteristics of Ultra-Thin High-k MOSFET with TiN Gate by Employing Two Step Post Deposition Annealing Process**

M. S. Rahman<sup>1</sup>, H. Park<sup>1,4</sup>, M. Chang<sup>1</sup>, R. Choi<sup>2</sup>, B. H. Lee<sup>2,3</sup>, J. C. Lee<sup>4</sup>, and H. Hwang<sup>1</sup>, <sup>1</sup>Department of Materials Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Korea, <sup>2</sup>SEMATECH, Austin, Texas, USA, <sup>3</sup>IBM, USA, and <sup>4</sup>Advanced Materials Research Center, The University of Texas at Austin, Austin, Texas, USA

III-17

**Molecular Beam Epitaxy of Pr<sub>2</sub>O<sub>3</sub> on Si(001) for CMOS Applications**

B. P. Tinkham, X. X. Guo, W. Braun, A. Trampert, and K. H. Ploog, Paul Drude Institute for Solid State Electronics, Berlin, Germany

III-18 Student Paper

**High Mobility Ge pMOS Fabricated Using a Novel Heteroepitaxial Ge on Si Growth Method**

A. Nayfeh, C. O. Chui, T. Yonehara, and K. C. Saraswat, Department of Electrical Engineering, Stanford University, Stanford, California, USA

III-19 Student Paper

**Simulation of Hole Transport in p-Channel Si MOSFETs**

S. Krishnan<sup>1</sup>, D. Vasileska<sup>1</sup>, M.V. Fischetti<sup>2</sup>, <sup>1</sup>Dept of Electrical Engineering, Arizona State University, Tempe, Arizona, USA, and <sup>2</sup>Department of Electrical and Computer Engineering, University of Massachusetts, Amherst, Massachusetts, USA

III-20 Student Paper

**Device Scaling in COSMOS Architecture**

A. Al-Ahmadi and S. Kaya, School of Electrical Engineering and Computer Science, Ohio University, Athens, Ohio, USA

III-21 Student Paper

**Incorporation of Supply Voltage and Process Variations in the Power Optimization for Future Transistors**

A. K. Chao, P. Kapur, R. S. Shenoy, Y. Nishi, and K. C. Saraswat, Department of Electrical Engineering, Stanford University, Stanford, California, USA

III-22

**Metal Nanocrystal/Nitride Heterogeneous-Stack Floating Gate Memory**

C. Lee, T. H. Hou and E. C. Kan, School of Electrical and Computer Engineering, Cornell University, Ithaca, New York, USA

III-23 Student Paper

**Fast High-k AlN MONOS Memory With Large Memory Window and Good Retention**

C. H. Lai<sup>1</sup>, C. C. Huang<sup>1</sup>, K. C. Chiang<sup>1</sup>, H. L. Kao<sup>1</sup>, W. J. Chen<sup>2</sup>, A. Chin<sup>1</sup>, and C. C. Chi<sup>3</sup>, <sup>1</sup>Nano Science Technology Center, Department of Electronics Engineering, National Chiao-Tung University, University System of Taiwan, Hsinchu, Taiwan, ROC, <sup>2</sup>Graduate Institute of Materials Engineering, National Pingtung University of Science and Technology, Taiwan ROC, and <sup>3</sup>Department of Physics, National Tsing Hua University, Hsinchu, Taiwan, ROC

III-24 Student Paper

**Self-Aligned TiSi<sub>2</sub>/Si Hetero-Nanocrystal Nonvolatile Memory**  
Y. Zhu, D. Zhao, R. Li, and J. Liu, Quantum Structures Laboratory, Department of Electrical Engineering, University of California at Riverside, Riverside, California, USA

III-25

**Cold and Hot Carrier Effects on HfO<sub>2</sub> and HfSiO NMOSFETS With TiN Gate Electrode**

J. H. Sim<sup>1,3</sup>, S. C. Song<sup>1</sup>, R. Choi<sup>1</sup>, C. D. Young<sup>1</sup>, G. Bersuker<sup>1</sup>, S. H. Bae<sup>1,3</sup>, D. L. Kwong<sup>3</sup>, and B. H. Lee<sup>2</sup>, <sup>1</sup>SEMATECH, Austin, Texas, USA, <sup>2</sup>IBM Assignee, and <sup>3</sup>The University of Texas at Austin, Austin, Texas, USA

III-26

**Cobalt Silicide Nanocrystal Memory**

D. Zhao, Y. Zhu, R. Li, and J. Liu, Department of Electrical Engineering, University of California at Riverside, Riverside, California, USA

III-27 Student Paper

**Energy Level Consideration of Source/Channel/Drain for Performance Enhancements of N- and P-Channel Organic FETs**  
T. Yokoyama, T. Nishimura, K. Kita, K. Kyuno, A. Toriumi, Department of Materials Science, School of Engineering, The University of Tokyo, Hongo, Bunkyo, Tokyo, Japan

III-28 Student Paper

**A New Four-Terminal Hybrid Silicon/Organic Field-Effect Sensor Device**

D. Sharma, D. Fine, A. Dodabalapur, Microelectronics Research Center, University of Texas at Austin, Austin, Texas, USA

III-29 Student Paper

**Electronic Polarization Effects on Capacitance-Voltage Characteristics of Metal-SiO<sub>2</sub>-Thin Film Organic Semiconductor Devices**

N. Gunther, D. Niemann, M. Barycza, C. Kwong, M. Rahman, Electron Devices Laboratory, Santa Clara University, Santa Clara, California, USA

III-30

**Demonstration of a High Performance 40-nm-Gate Carbon Nanotube Field-Effect Transistor**

Y. M. Lin<sup>1</sup>, J. Appenzeller<sup>1</sup>, Z. Chen<sup>1</sup>, Z. G. Chen<sup>2</sup>, H. M. Cheng<sup>2</sup>, and P. Avouris<sup>1</sup>, <sup>1</sup>IBM T. J. Watson Research Center, Yorktown Heights, New York, USA, and <sup>2</sup>Shenyang National Laboratory for Materials Science, Institute of Metal Research, Shenyang, China

III-31

**Application of Carbon Nanotubes in Nano-Lithography and Nano-Electronics**

Y. Abdi<sup>1</sup>, S. Mohajerzadeh<sup>1</sup>, H. Hosseinzadegan<sup>1</sup>, D. Shahrjerdi<sup>1</sup>, M. Robertson<sup>2</sup>, and J. C. Bennett<sup>2</sup>, <sup>1</sup>Thin Film Laboratory, Electrical and Computer Engineering Department, University of Tehran, Tehran, Iran and <sup>2</sup>Department of Physics, Acadia University, Wolfville, Nova Scotia, Canada

III-32 Student Paper

**Two-Input Exclusive-OR Gate With a Single-Electron Transistor in Single-Wall Carbon Nanotubes**

D. Tsuya<sup>1,2</sup>, M. Suzuki<sup>1,3</sup>, Y. Aoyagi<sup>2</sup>, and K. Ishibashi<sup>1,3</sup>, <sup>1</sup>Advanced Device Laboratory, The Institute of Physical and Chemical Research, Hirosawa, Wako, Saitama, Japan, <sup>2</sup>Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, Nagatsuta, Midori-ku, Yokohama, Japan, and <sup>3</sup>CREST, Japan Science and Technology, Kawaguchi, Saitama, Japan

III-33

**Large Magnetic Field Induced by Carbon Nanotube Current – Proposal of Carbon Nanotube Inductors**

K. Tsubaki<sup>1</sup>, H. Shioya<sup>1</sup>, J. Ono<sup>1</sup>, Y. Nakajima<sup>1</sup>, T. Hanajiri<sup>1</sup>, H. Yamaguchi<sup>2</sup>, <sup>1</sup>Department of Electrical and Electronic Engineering, Toyo University, Kawagoe, Japan, and <sup>2</sup>NTT Basic Research Laboratories, NTT Corporation, Atsugi, Japan

III-34 Student Paper

**Fanout in Quantum Dot Cellular Automata**

K. K. Yadavalli<sup>1</sup>, A. O. Orlov<sup>1</sup>, R. K. Kummamuru<sup>2</sup>, C. S. Lent<sup>1</sup>, G. H. Bernstein<sup>1</sup>, and G. L. Snider<sup>1</sup>, <sup>1</sup>Department of Electrical Engineering Department, University of Notre Dame, Notre Dame, Indiana, USA, and <sup>2</sup>Department of Physics and Astronomy, Dartmouth College, Hanover, New Hampshire, USA

III-35 Student Paper

**Power Dissipation in Clocked Quantum-Dot Cellular Automata Circuits**

M. Liu and C. S. Lent, Department of Electrical Engineering, University of Notre Dame, Notre Dame, Indiana, USA

III-36 Student Paper

**Optimization of a Redox Protein-Carbon Nanotube Conjugate Biosensor by Site-Selective Binding**

G. D. Withey, A. D. Lazareck, M. B. Tzolov, A. Yin, P. Aich, J. I. Yeh, J. M. Xu, Division of Engineering, Brown University, Providence, Rhode Island, USA, and University of Saskatchewan, Saskatoon, Saskatchewan, Canada

III-37 Student Paper

**Electrochromonics: Highly Functional Devices Operating in Three Realms**

S. P. McGarry, N. G. Tarr, Department of Electronics, Carleton University, Ottawa, Ontario Canada

III-38 Student Paper

**Bilayer Artificial Muscle Valves for Drug Delivery Devices**

H. K. A. Tsai, J. Zoval, and M. Madou, Department of Mechanical and Aerospace Engineering, University of California, Irvine, California, USA

III-39

Late News

III-40

Late News

**TUESDAY AM, JUNE 21**

Location: Corwin East

**SESSION IV.A.**

**THIN FILM AND FLEXIBLE ELECTRONICS**

Session Organizers:

Alberto Salleo, Palo Alto Research Center, Palo Alto, and Paul Baude, 3M Company, St. Paul

Session Chairman:

Lynn Loo, University of Texas at Austin

8:30 AM IV.A-1 Invited Paper

**Phosphorescent OLEDs: A Flat Panel Display Technology Today With a Flexible Future**

J. J. Brown, Universal Display Corporation, Ewing, New Jersey, USA

9:10 AM IV.A-2 Student Paper

**All-Organic Active Matrix OLED Display**

L. Zhou<sup>1</sup>, S. Park<sup>1</sup>, B. Bo<sup>1</sup>, J. Sun<sup>1</sup>, S.-C. Wu<sup>1</sup>, T. N. Jackson<sup>1</sup>, S. F. Nelson<sup>2</sup>, D. Freeman<sup>2</sup>, and Y. Hong<sup>2</sup>, <sup>1</sup>The Pennsylvania State University, University Park, Pennsylvania, USA, and <sup>2</sup>Eastman Kodak Company, Rochester, New York, USA

9:30 AM IV.A-3 Student Paper

**Time and Temperature Dependence of the Drain Current of PF-Based OFETs**

M. C. Hamilton and J. Kanicki, Organic and Molecular Electronics, Department of Electrical and Computer Engineering, University of Michigan, Ann Arbor, Michigan, USA

9:50 AM IV.A-4 Student Paper

**Increased Reliability of a-Si TFTs Deposited on Clear Plastic Substrates at High Temperatures**

K. Long, A. Kattamis, I. C. Cheng, H. Gloskova, S. Wagner, and J. C Sturm, Princeton Institute for Science and Technology of Materials, Princeton University, Princeton, New Jersey, USA

10:10 AM Break

10:30 AM IV.A-5 Invited Paper

**Harvesting Excitons and Improving Charge Transport in Organic-Inorganic Hybrid Photovoltaic Cells**

M. D. McGehee<sup>1</sup>, Y. Liu<sup>2</sup>, C. Goh<sup>1</sup>, V. Gowrishankar<sup>1</sup>, B. Srinivasan<sup>1</sup>, and S. Scully<sup>1</sup>, <sup>1</sup>Department of Materials Science and Engineering, Stanford University, Stanford, California, USA and <sup>2</sup>Department of Chemistry, Stanford University, Stanford, California, USA

11:10 AM IV.A-6 Student Paper

**Polythiophene Thin-Film Transistor Array for Gas Sensing**

J. B. Lee<sup>1</sup>, M. Heeney<sup>2</sup>, S. Tierney<sup>2</sup>, I. McCulloch<sup>2</sup>, A. Murphy<sup>3</sup>, J. Liu<sup>3</sup>, J. Frechet<sup>3</sup>, and V. Subramanian<sup>1</sup>, <sup>1</sup>Department of Electrical Engineering and Computer Sciences, University of California at Berkeley, Berkeley, California, USA, <sup>2</sup>Department of Chemistry, University of California at Berkeley, Berkeley, California, USA, and <sup>3</sup>Merck Chemicals Ltd., Chilworth, Southampton, Hants, UK

11:30 AM IV.A-7 Student Paper

**Organic Semiconductor Strain Sensors**

S. Jung and T. N. Jackson, Department of Electrical Engineering, Penn State University, University Park, Pennsylvania, USA

## TUESDAY AM, JUNE 21

Location: Corwin West

### SESSION IV.B. NANOTUBES AND NANOWIRES I

Session Organizer:

Jing Guo, University of Florida, Gainesville

Session Chairman:

Ali Javey, Stanford University

8:30 AM IV.B-1 Invited Paper

**A Novel Concept for Field-Effect Transistors - The Tunneling Carbon Nanotube FET**

J. Knoch<sup>1</sup> and J. Appenzeller<sup>2</sup>, <sup>1</sup>Institute for Thin Films and Interfaces, ISG1-IT, Forschungszentrum Julich, Julich, Germany, and <sup>2</sup>IBM T. J. Watson Research Center, Yorktown Heights, New York, USA

9:10 AM IV.B-2

**Vertical High Mobility Wrap-Gated InAs Nanowire Transistor**

T. Bryllert<sup>1,2</sup>, L. Samuelson<sup>1,3</sup>, L. E. Jensen<sup>1</sup>, L. E. Wernersson<sup>1,3</sup>, <sup>1</sup>Department of Solid State Physics, Lund University, Lund, Sweden, <sup>2</sup>Department of Microtechnology and Nanoscience, Microwave Electronics Laboratory, Chalmers, University of Technology, Goteborg, Sweden, and <sup>3</sup>QuMat Technologies AB, Lund, Sweden

9:30 AM IV.B-3 Student Paper

**Top-Gated Field Effect Devices Using Oxidized Silicon Nanowires**

Y. Wang<sup>1</sup>, K. K. Lew<sup>2</sup>, J. Mattzela<sup>1</sup>, J. M. Redwing<sup>2</sup>, and T. S. Mayer<sup>1</sup>, <sup>1</sup>Department of Electrical Engineering, The Pennsylvania State University, University Park, Pennsylvania, USA, and <sup>2</sup>Department of Material Science and Engineering, The Pennsylvania State University, University Park, Pennsylvania, USA

9:50 AM IV.B-4 Student Paper

**Analytic Expression and Approach for Low Subthreshold-Swing Tunnel Transistors**

Q. Zhang, W. Zhao, and A. Seabaugh, Department of Electrical Engineering, University of Notre Dame, Notre Dame, Indiana, USA

10:10 AM Break

10:30 AM IV.B-5 Student Paper

**High Performance Logic Devices Based on Single Crystalline ZnO Nanorods**

W. I. Park, J. S. Kim, J. Yoo, and G. C. Yi, Department of Materials Science and Engineering, Pohang University of Science and Technology, Pohang, Kyungbuk, Korea

10:50 AM IV.B-6

**A Single Nanoparticle Silicon Transistor**

Y. P. Ding, A. Bapat, Y. Dong, C. R. Perrey, U. R. Kortshagen, C. B. Carter, and S. A. Campbell, Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, Minnesota, USA

11:10 AM IV.B-7

**Enhanced Electroluminescence in Suspended Carbon Nanotube Transistors**

J. Chen<sup>1</sup>, M. Freitag<sup>1</sup>, J. Tsang<sup>1</sup>, Q. Fu<sup>2</sup>, J. Liu<sup>2</sup>, P. Avouris<sup>1</sup>, <sup>1</sup>IBM T. J. Watson Research Center, Yorktown Heights, New York, USA, and <sup>2</sup>Department of Chemistry, Duke University, Durham, North Carolina, USA

11:30 AM IV.B-8 Student Paper

**Optimal Design and Coulomb Blockade Suppressed Leakage of Carbon Nanotube Transistors**

K. Alam and R. K. Lake, Department of Electrical Engineering, University of California at Riverside, Riverside, California, USA



## TUESDAY PM, JUNE 21

Location: Corwin East

### SESSION V.A WIDEBANDGAP ELECTRONICS

Session Organizer:

John Zolper, DARPA/MTO, and  
Yifeng Yu, CREE Santa Barbara Technology Center

Session Chairman:

Paul Saunier, Triquint Semiconductor, Inc.

1:30 PM V.A-1 *Invited Paper*

#### High Power AlGaIn/GaN HEMTs for Wireless Base Station Applications

K. Joshin and T. Kikkawa, Fujitsu Laboratories, Ltd., Atsugi, Japan

2:10 PM V.A-2

#### High-Power Stable Field-Plated AlGaIn-GaN MOSHFETs

V. Adivarahan<sup>1</sup>, A. Koudymov<sup>1</sup>, S. Rai<sup>1</sup>, J. Yang<sup>1</sup>, G. Simin<sup>1</sup>, A. Khan<sup>1</sup>, Q. Fareed<sup>2</sup>, and R. Gaska<sup>2</sup>, <sup>1</sup>Department of Electrical Engineering, University of South Carolina, Columbia, South Carolina, USA, and <sup>2</sup>Sensor Electronic Technology, Inc., Columbia, South Carolina, USA

2:30 PM V.A-3

#### Self-Aligned Enhancement-Mode AlGaIn/GaN HEMTs Using Fluoride-Based Plasma Treatment

Y. Cai, Y. Zhou, K. J. Chen, and K. M. Lau, Department of Electrical and Electronic Engineering, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong

2:50 PM V.A-4 *Student Paper*

#### AlGaIn/GaN HEMTs With an InGaIn-Based Back-Barrier

T. Palacios, A. Chakraborty, S. Keller, S. P. DenBaars, U. K. Mishra, Department of Electrical and Computer Engineering, University of California at Santa Barbara, Santa Barbara, California, USA

3:10 PM V.A-5

#### Vertically-Scaled 100nm T-Gate AlGaIn/GaN HEMTs with 125GHz $f_T$ and 174GHz $f_{MAX}$

K. S. Boutros, W. B. Luo, and K. Shinohara, Rockwell Scientific Company, Thousand Oaks, California, USA

3:30 PM *Break*

3:50 PM V.A-6 *Invited*

#### Device Options for High-Voltage SiC Power Switching Devices

J. A. Cooper, Y. Sui, X. Wang, and G. G. Walden, School of Electrical and Computer Engineering and Brick Nanotechnology Center, Purdue University, West Lafayette, Indiana, USA

4:30 PM V.A-7

#### 2100 W at 425 MHz with SiC RF BJTs

A. K. Agarwal<sup>1</sup>, J. Haley<sup>2</sup>, H. Bartlow<sup>3</sup>, B. McCalpin<sup>2</sup>, C. Capell<sup>1</sup>, and J. W. Palmour<sup>1</sup>, <sup>1</sup>Cree Inc., Durham, North Carolina, USA, <sup>2</sup>dBm Engineering, Inc., Boulder, Colorado, USA, and <sup>3</sup>HdB Engineering, USA

4:50 PM V.A-8 *Student Paper*

#### Switching Characteristics of High Breakdown Voltage AlGaIn/GaN HEMTs

Y. Dora<sup>1</sup>, C. S. Suh<sup>1</sup>, A. Chakraborty<sup>1</sup>, S. Heikman<sup>1</sup>, S. Chandrasekaran<sup>2</sup>, V. Mehrotra<sup>2</sup>, U. K. Mishra<sup>1</sup>, <sup>1</sup>Department of Electrical and Computer Engineering, University of California at Santa Barbara, Santa Barbara, California, USA, and <sup>2</sup>Rockwell Scientific Company, Thousand Oaks, California, USA

## TUESDAY PM, JUNE 21

Location: Corwin West

### SESSION V.B HIGH PERFORMANCE SI, SIGE, AND GE DEVICES

Session Organizer:

Andy Bryant, IBM, Essex Junction

Session Chairman:

TBA

1:30 PM V.B-1 *Invited Paper*

#### High-Performance Silicon-Germanium Technology

S. Subbanna<sup>1</sup>, G. Freeman<sup>1</sup>, S. Koester<sup>2</sup>, K. Rim<sup>1</sup>, A. Joseph<sup>1</sup>, and D. Hareme<sup>1</sup>, <sup>1</sup>IBM Systems and Technology Group, and <sup>2</sup>IBM Research Division, Hopewell Junction, New York, USA

2:10 PM V.B-2

#### Sub-10 nm Gate Length Metal/High-k SOI MOSFETs With NiSi<sub>2</sub>/Si (111)-Faceted Full Silicide S/D

Y. Watanabe<sup>1</sup>, S. Migita<sup>2</sup>, N. Mise<sup>1</sup>, T. Nabatame<sup>1</sup>, H. Satake<sup>1</sup>, and A. Toriumi<sup>2,3</sup>, <sup>1</sup>MIRAI-ASET, AIST Tsukuba West, Tsukuba, Japan, <sup>2</sup>MIRAI-ASRC, AIST Tsukuba, Tsukuba, Japan, and <sup>3</sup>The University of Tokyo, Tokyo, Japan

2:30 PM V.B-3 *Student Paper*

#### Impact of Uniaxial Strain on the Gate Leakage Currents of PD-SOI MOSFETs and Ring Oscillators

W. Zhao<sup>1</sup>, A. Seabaugh<sup>1</sup>, B. Winstead<sup>2</sup>, D. Jovanovic<sup>2</sup>, and V. Adams<sup>2</sup>, <sup>1</sup>Department of Electrical Engineering, University Of Notre Dame, Notre Dame, Indiana, USA, and <sup>2</sup>Freescale Semiconductor, Inc., Austin, Texas, USA

2:50 PM V.B-4 Student Paper

**Effect of Tensile Capping Layer on 3-D Stress Profiles in FinFET Channels**

K. Shin<sup>1</sup>, T. Lauderdale<sup>2</sup>, T. J. King<sup>1</sup>, <sup>1</sup>Department of Electrical Engineering, University of California at Berkeley, Berkeley, California, USA, and <sup>2</sup>Department of Mechanical Engineering, University of California at Berkeley, Berkeley, California, USA

3:10 PM V.B-5 Student Paper

**Mobility and Subthreshold Characteristics in High-Mobility Dual-Channel Strained Si/Strained SiGe p-MOSFETs**

C. N. Chleirigh, O. O. Olubuyide, and J. L. Hoyt, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

3:30 PM Break

## TUESDAY PM, JUNE 21

Location: Corwin West

### SESSION V.C SPINS

Session Organizer:

Nitin Samarth, The Pennsylvania State University,  
University Park

Session Chairman:

TBA

3:50 PM V.C-1 Invited Paper

**Unipolar and Bipolar Spin Transistors**

M. E. Flatte<sup>1</sup>, M. Deutsch<sup>2</sup>, and G. Vignale<sup>2</sup>, <sup>1</sup>Department of Physics and Astronomy and OSTC, University of Iowa, Iowa City, Iowa, USA, and <sup>2</sup>Department of Physics and Astronomy, University of Missouri, Columbia, Missouri, USA

4:30 PM V.C-2

**Spin MOSFETs Using Ferromagnetic Schottky Barrier Contacts for the Source and Drain**

S. Sugahara<sup>1,2</sup> and M. Tanaka<sup>1</sup>, <sup>1</sup>Department of Electronic Engineering, The University of Tokyo, Hongo, Bunkyo-ku, Tokyo, Japan, and <sup>2</sup>PRESTO, Japan Science and Technology Agency, Honcho, Kawaguchi, Saitama, Japan

4:50 PM V.C-3 Student Paper

**Electrically-Injected, Spin-Polarized, Quantum Well Vertical-Cavity Surface-Emitting Lasers**

M. A. Holub, J. Shin, S. Chakrabarti, and P. Bhattacharya, Solid-State Electronics Laboratory, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan, USA

## TUESDAY PM, JUNE 21

### RUMP SESSIONS

8:30 PM R-1

**Photonic Integration: Wave of the Future or False Hope?**

Location: Corwin East

Session Organizer: Mike Larson, Agility Communication, Inc.

Panelists: TBA

8:30 PM R-2

**Low-Power Electronics: Where Do We Put the Power?**

Location: Corwin West

Organizer: Lars-Erik Wernersson, Lund University

Panelists: TBA

8:30 PM R-3

**GaNspensive and GaNreliable**

Location: Multicultural Theater

Organizer: Yifeng Wu, CREE Santa Barbara Technology Center

Panelists: TBA

## WEDNESDAY AM, JUNE 22

Location: Corwin Pavilion

### JOINT DRC/EMC PLENARY SESSION

8:20 AM

**A Genetic Toolkit for the Synthesis and Assembly of Electronic Materials**

A. Belcher, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

9:20 – 10:00 AM Break

### SESSION VI.A

Location: Corwin West

### HIGH-K, METAL GATE, AND NOVEL DEVICES

Session Chairman:

Andy Bryant, IBM, Essex Junction

Session Chairman:

TBA

10:00 AM VI.A-1 Student Paper

**Structural Optimization and Electrical Characteristics of Ultra-Thin Gadolinium (Gd<sub>2</sub>O<sub>3</sub>) Incorporated HfO<sub>2</sub> n-MOSFETs**

S. J. Rhee, H. S. Kim, C. Y. Kang, C. H. Choi, M. S. Akbar, M. Zhang, T. Lee, I. Ok, F. Zhu, S. A. Krishnan, and J. C. Lee, Microelectronics Research Center, Department of Electrical and Computer Engineering, The University of Texas at Austin, Austin, Texas, USA

10:20 AM VI.A-2 Student Paper

**Higher k HfTaTiO Gate Dielectric With Improved Material and Electrical Characteristics**

N. Lu<sup>1</sup>, H. J. Li<sup>2</sup>, M. Gardner<sup>2</sup>, D. L. Kwong<sup>1</sup>, <sup>1</sup>Microelectronics Research Center, the University of Texas at Austin, Austin, Texas, USA, <sup>2</sup>SEMATECH, Austin, Texas, USA

10:40 AM VI.A-3

**Effects of TiN Overlayer on ALD TaCN Metal Gate/High-k MOSFET Characteristics**

Z. Zhang<sup>2</sup>, S.C. Song<sup>1</sup>, K. Choi<sup>1</sup>, J. H. Sim<sup>1</sup>, P. Majhi<sup>3</sup>, and B. H. Lee<sup>4</sup>, <sup>1</sup>SEMATECH, Austin, Texas, USA, <sup>2</sup>Texas Instruments Assignee, <sup>3</sup>Intel Assignee, and <sup>4</sup>IBM Assignee, Austin Texas, USA

11:00 AM VII.A-4

**Phonon Modification in SOI Structures and its Impact on Electron Transport**

S. Uno<sup>1</sup> and N. Mori<sup>2</sup>, <sup>1</sup>School of Mathematical Sciences, Claremont Graduate University, Claremont, California, USA, and <sup>2</sup>Department of Electronic Engineering, Osaka University, Suita, Osaka, Japan

11:20 AM VI.A-5

**Underlap DGMOS for Ultra-Low Power Digital Subthreshold Operation**

B. C. Paul, A. Bansal, and K. Roy, School of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana, USA

11:40 AM VI.A-6

**"All-Diamond-Inkjet" for Dispensation of Aggressive Liquids**

R. Müller, W. Berger, K. Janischowsky, and E. Kohn, Department of Electron Circuits and Devices, University of Ulm, Ulm, Germany

**WEDNESDAY AM, JUNE 22**

Location: GSA Lounge

**SESSION VI.B**

**NANOTUBES AND NANOWIRES II**

Session Organizer:

Joerg Appenzeller, IBM T. J. Watson Research Center

Session Chairman:

TBA

10:00 AM VI.B-1 Invited Talk

**Ultra-Small Single-Wall Carbon Nanotubes Produced Using Micro-Pyrolysis in the Channels of AlPO<sub>4</sub>-5 Single Crystals**

Z. K. Tang, Department of Physics, Hong Kong University of Science & Technology, Clear Water Bay, Kowloon, Hong Kong, China

10:40 AM VI.B-2

**Integration of III-V Nanowires in Si Technology**

O. Wunnicke, S. N. Serafin, M. P. van Kouwen, A. L. Roest, and E. Bakkers, Philips Research Laboratories, Eindhoven, The Netherlands

11:00 AM VI.B-3

**Impact of the Nanotube Diameter on the Performance of CNFETs**

Z. Chen<sup>1</sup>, J. Appenzeller<sup>1</sup>, J. Knoch<sup>2</sup>, Y. M. Lin<sup>1</sup>, and P. Avouris<sup>2</sup>, <sup>1</sup>IBM T.J. Watson Research Center, Yorktown Heights, New York, USA, and <sup>2</sup>Institute for Thin Films and Interfaces, Forschungszentrum Juelich, Juelich, Germany

11:20 AM VI.B-4 Student Paper

**Electrical Characterization of Individual GaN Nanowires**

E. D. Stern<sup>1</sup>, G. Cheng<sup>2</sup>, E. Cimpoiasu<sup>2</sup>, R. Klie<sup>3</sup>, J. F. Klemic<sup>2</sup>, I. Kretzschmar<sup>2</sup>, J. T. Hyland<sup>2</sup>, A. W. Sanders<sup>2</sup>, R. Munden<sup>2</sup>, and M. A. Reed<sup>2</sup>, <sup>1</sup>Department of Biomedical Engineering, Yale University, New Haven, Connecticut, USA, <sup>2</sup>Department of Electrical Engineering and Applied Physics, Yale University, New Haven, Connecticut, USA, and <sup>3</sup>Brookhaven National Laboratory, Center for Functional Nanomaterials, New York, USA

11:40 AM VI.B-5 Student Paper

**Channel Material Optimization for the Ultimate Planar and Nanowire MOSFETs: A Theoretical Exploration**

J. Wang and M. Lundstrom, School of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana, USA

**WEDNESDAY PM, JUNE 22**

Location: Lotte Lehmann

**SESSION VII.A**

**JOINT DRC/EMC INVITED SESSION**

Session Organizer:

Theresa S. Mayer, The Pennsylvania State University, University Park

Session Chairman:

TBA

1:30 PM VII.A.-1 Invited Paper

**Semiconductor Nanowires as a Novel Electronic Materials Technology for Future Electronic Devices**

Lars Samuelson, The Nanometer Structure Consortium, Department of Solid State Physics, Lund University, Lund, Sweden

2:10 PM VII.A.-2

**Nanocrystal Lasing in the Single Exciton Regime Using Engineered Exciton-Exciton Interactions**

V. I. Klimov, S. Ivanov, J. Nanda, I. Bezel, M. Achermann, and L. P. Balet, Chemistry Division, Los Alamos National Laboratory, Los Alamos, New Mexico, USA

2:50 PM VII.A.-3 *Invited Paper*

**Electric Field Effect Transport in Mesoscopic Graphite and Graphene**

P. Kim, Department of Physics, Columbia University, New York, New York, USA

3:30 PM *Break*

3:50 PM VII.A.-4 *Late News*

4:10 PM VII.A.-5 *Late News*

4:30 PM VII.A.-6 *Late News*

4:50 PM VII.A.-7 *Late News*

## WEDNESDAY PM, JUNE 22

Location: Corwin West

### SESSION VII.B HIGH SPEED III-V TRANSISTORS

Session Organizer:

Tetsuya Suemitsu, NTT Photonics Laboratories

Session Chairman:

Kevin J. Chen, Hong Kong University of Science and Technology

1:30 PM VII.B-1 *Invited Paper*

**New HEMT Structures for THz Applications**

A. Cappy<sup>1</sup>, N. Wichmann<sup>1</sup>, S. Bollaert<sup>1</sup>, X. Wallart<sup>1</sup>, and W. Knap<sup>2</sup>,

<sup>1</sup>IEMN-DHS, UMR CNRS 8520 – Cite Scientifique, Villeneuve d'Ascq, France, and <sup>2</sup>GES CNRS Montpellier, Universite de Montpellier, Montpellier, France

2:10 PM VII.B-2

**260 GHz  $f_{VT}$ , 280 GHz  $f_{MAX}$  AlSb/InAs HEMT Technology**

R. S. Tsai, M. Lange, L. S. J. Lee, P. Nam, C. Namba, P. H. Liu, R. Sandhu, R. Grundbacher, W. Deal, and A. Gutierrez, Northrop Grumman, Redondo Beach, California, USA

2:30 PM VII.B-3 *Student Paper*

**Enhancement-Mode InAlAs/InGaAs/InP HEMTs With Ir-Based Gate Metallization**

S. Kim<sup>1</sup>, I. Adesida<sup>1</sup>, and H. Hwang<sup>2</sup>, <sup>1</sup>Micro and Nanotechnology Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA, and <sup>2</sup>Department of Materials Science and Frederick Seitz Materials Research Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA

2:50 PM VII.B-4

**Planar Tunneling-Coupled Field-Effect Transistor for Low-Power Mixed-Signal Applications**

J. Moon, K.C. Wang, R. Rajeval, S. Bui, D. Wong, D. Chow, and J. Jensen, HRL Laboratories, LLC, Malibu, California, USA

3:30 PM *Break*

3:10 PM VII.B-5

**Optimization of Sb-Heterostructure Diode for Low Noise Detection**

H. P. Moyer, T. Y. Hsu, R. L. Bowen, Y. K. Boegeman, P. W. Deelman, S. Thomas III, A. T. Hunter, and J. N. Schulman, HRL Laboratories, LLC, Malibu, California, USA

3:50 PM VII.B-6

**InGaAs/InP Type-I DHBTs Having 450 GHz  $f_i$  and 490 GHz  $f_{max}$  With  $C_{cb}/I_c = 0.38$  ps/V**

Z. Griffith<sup>1</sup>, M. Rodwell<sup>1</sup>, X.-M. Fang<sup>2</sup>, D. Loubychev<sup>2</sup>, Y. Wu<sup>2</sup>, J. Fastenau<sup>2</sup>, and A. Liu<sup>2</sup> <sup>1</sup>Department of Electrical and Computer Engineering, University of California at Santa Barbara, Santa Barbara, California, USA, and <sup>2</sup>IQE Inc., Bethlehem, Pennsylvania, USA

4:10 PM VII.B-7

**High Performance Low Power 6.0 Å HBT Devices and Circuits**

C. Monier, A. Cavus, R. Sandhu, D. Li, P. Nam, B. Chan, A. Oshiro, D. Matheson, and A. Gutierrez-Aitken, Northrop Grumman Space Technology, Redondo Beach, California, USA

4:30 PM VII.B-8

**Late News**

4:50 PM VII.B-9

**Late News**

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