

**Participating
Schools**

University of Connecticut

Trinity College

Yale University

University of Bridgeport

Western Connecticut State
University

Southern Connecticut State
University

University of New Haven

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Corporations**

Entegris

Anderson Laboratories

Ensign Bickford Aerospace

General DataComm

General Dynamics

UTC Aerospace

Perkin-Elmer

Phonon Corporation

Photonics

Pitney Bowes

United Technologies
Research Center

Sunstrand

Coherent-DEOS

Lumentum

C-Cor

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Nufern



Connecticut Symposium on Microelectronics & Optoelectronics

TWENTY SIXTH ANNUAL SYMPOSIUM:

Nanotechnology in Electronics, Photonics, Biosensors, and Energy Systems.

University of Connecticut

Thomas Dodd Research Center, Konover Auditorium,

405 Babbidge Road,

Storrs, Connecticut 06269-1205

April 5, 2017

Sponsored by The Connecticut Microelectronics & Optoelectronics Consortium, SPIE-UConn Chapter, the University of Connecticut's Center for Continuing Studies, and the Yale Center for Microelectronic Materials and Structures.

Invited Keynote Talks

- Jessie Rosenberg, Si Photonics for Optical Interconnects, Thomas J. Watson IBM Research Center, Yorktown Heights, NY.
- Rajit Manohar, Neuromorphic Computing, Yale University, New Haven, CT.
- Invited Technical Presentations from industrial and academic experts.

Technical Sessions: Oral and Poster presentations on topics including Materials, Devices, Applications, Bio-sensing/Nano-Biosystems, and Emerging Technologies.

Discover R&D resources in Connecticut and neighboring states.

Network with internationally renowned experts and learn about the R & D activities in micro- and nano-technologies applied to electronics, photonics, biosensors and energy applications.

CMOC Home Page: <http://www.ee.uconn.edu/cmoc>

Online registration: <https://www.regonline.com/cmoc2017>

**Connecticut
Microelectronics
&
Optoelectronics
Consortium**

The principal purpose of the 26th Connecticut Symposium on Microelectronics and Optoelectronics is to strengthen cooperation and sharing of resources between Connecticut industries and universities in the areas of microelectronics, optoelectronics, biosensors, energy and emerging technologies.

Another goal is to expose Connecticut industries to new technologies, trends, and current issues through invited presentations by nationally and internationally recognized experts.

The symposium will act as a forum to disseminate, to state government leaders and the public at large, information

about current directions and developments in these key areas.

Finally, the symposium will seek to identify resources that encourage cooperative entrepreneurship among Connecticut industries and universities in the areas of microelectronics and optoelectronics.

Connecticut Microelectronics and Optoelectronics Symposium Program

Wednesday April 5, 2017

Morning Session

- 8:00am** **Registration and Refreshments**
- 8:45 – 10:00 Session I: Materials
- 10:00 – 10:15 Welcome: Lawrence Silbart, Vice Provost
CMOC Mission
- 10:15 – 11:30 Session II: Devices
- 11:30 – 12:10 J. Rosenberg., “Si Photonics for Optical
Interconnects”, IBM TJ Watson Research
Center, Yorktown Heights, NY”.
- 12:10 – 1:20 Lunch / Poster Session

Afternoon Sessions

- 1:20 – 2:50 Session III: Applications,
- 2:50 – 3:30 R. Manohar, “Neuromorphic Computing”,
Yale University.
- 3:30 – 4:45 Session IV: Biosensing/Nano-Biosystems
- 4:45 – 6:00 Session V: Clean Energy / Storage /
Emerging Technologies
- 6:00 – 7:00 Poster Session

Evening Session

- 7:00 – 8:00 Reception and Awards

The CMOC is pleased to offer our twenty fifth annual symposium developed for professionals including:

- Industrial / Academic R&D Personnel
- Engineering and Science Students
- Research and Application Technologists
- Entrepreneurs in the Micro/Optoelectronics
- Chief Executive Officers/Directors of Engineering.

SESSION I: Materials & Characterization 8:45-10:00

- Kanakkithodi, Arun Kumar Mannodi, Huan Tran Doan, Ghanshyam Pilania, Chiho Kim, Rampi Ramprasad. Rational Design of Polymer Dielectrics Using First Principles Computations and Machine Learning, *UCONN (Invited)*.
- John Zeller et al, Development of Germanium Photodetectors on 300 mm Silicon Wafers for Near-Infrared Sensing, *Magnolia Optical*, Albany, NY (*Invited*).
- Erandika Karunaratne, Mehdi Mollahosseini, Jose A. Gascón, and Fotios Papadimitrakopoulos, Flavine-C60 Complex Assisted Photo induced Charge Transfer of Single-Walled Carbon Nanotubes, *UCONN*.
- A. Rivera, A. Mazady and M. Anwar, Memristors: From Devices to systems, *UCONN*.
- A. Gokirmak, Electro-thermal processes and phase-change memory and logic; *UCONN (Invited)*.

SESSION II: Devices (10:15-11:30am)

- H. Jung and H. Tang, Frequency Comb Generation in AlN Microring Resonator, Yale University (*Invited*)
- M. Bhuyian, H. Zhou, R. Jiang, H.Gong, E.X. Zhang, R.A. Reed, D.M. Fleetwood, P. Ye, T.P. Ma, Total ionizing dose effects on GaN-based HEMTs and MOSHEMTs: Effects of channel thickness and epitaxial MgCaO as gate dielectric, Yale, Purdue, and MIT.
- P. Sengupta and J. Shi, Polarization controlled valley Hall current in mono-layer transition metal dichalcogenides, University of Illinois, Chicago.
- Z. Liu, N. Gong, T.P. Ma, Clock-delayed Dynamic Unipolar CMOS Logic Scheme for Post-silicon Logic Circuits, Yale.
- X. Zhang and N. Dutta, All-Optical Logic Gates Based on Quantum-Dot Semiconductor Optical Amplifier, *UCONN*.

SESSION III: Applications (1:20-2:50pm)

- Luigi Frunzio, Quantum Computing, *Yale (Invited)*.
- J. Chandy, Cyber Hardware Security, *UCONN (Invited)*.
- V. Mutalik, Moving the Nation from HFC to FTTH: Technologies for the Long Transition, *Arris (Invited)*
- Siwei Zhao, Fiorenzo Omenetto and David Kaplan, Silk Based Dissolvable and Implantable Electronics, Tufts University (*Invited*).
- D. Hondongwa and E. Fossum, Temporal oversampling CMOS based X-ray photon counting, Dartmouth, NH.
- M. Erfanzadeh, Q. Zhu, Low-cost and fast laser scanning photoacoustic microscopy system with a high power pulsed laser diode excitation source, *UCONN* and U. Washington, St. Louis, Mo..

SESSION IV: Biosensing/Nano-Biosystems (3:30-4:45pm)

- M. Choma, Coherence engineering for biomedical microscopy, *Yale University, Invited*
- B. Wu, X. Gao, J. Smith, J. Bailin. Optical Biopsy for Prostate Cancer Diagnosis Using Fluorescence Spectroscopy, *SCSU*.
- A. Legassey, A. Costa, F. Papadimitrakopoulos, F. Jain, & M. Kastellorizios Biorasis Inc. and *UCONN. (Invited)*.
- Y. Lei, Biosensor for organophosphorus pesticides monitoring, *UCONN*.
- A. Tadimety, Y. Zhang, T. Palinkski, K. Kready, J. X.J. Zhang, Nanopatterned Plasmonic Arrays for Circulating Tumor DNA Capture and Detection, Dartmouth, NH.

SESSION V: Emerging Technologies (4:45-6:00pm)

- M. Tentzeris, Flexible Electronics, Georgia Tech (*Invited*).
- J. Jagtiani, C. Bach, C. Huntley, Methods to Increase the Application & Transferability of Systems & Applications Related Research By Using Open Source Data, *UB*.
- R. Fan, BioMEMS industry and technology innovation, in the state of Connecticut. *Yale University (Invited)*.
- R. Dahal, J-W Wu, A. Weltz², M. Koirala, James J.-Q. Lu, Y. Danon, and I. Bhat, Boron-10 nanoparticles filled 3D silicon microstructure solid state thermal neutron detector with high efficiency, *RPI (Invited)*
- S. B. Sukhavasi, S. B. Sukhavasi, K. Elleithy, Implementation of CMOS Quasi-digital Temperature Sensor, *UB*.

POSTER SESSION: (LUNCH and 6:00-7:00pm)

Over 35 Poster Papers (see page 4).

RECEPTION AND AWARDS: (7:00-8:00pm)

Organizing Committee

D. J. Ahlgren, **Trinity College**
J. Han, **Yale University**
C. Broadbridge, **SCSU**
R. Zeitler, **IEEE Connector (Phonon)**
R. LaComb, **NUWC (Newport, RI)**
A. Fish, **University of New Haven**

S. Grodzinsky (Emeritus), **University of Bridgeport**
E. Murphy, **Lumentum**
H. Bajwa, **University of Bridgeport**
A. DeMaria, **Coherent-DEOS**
F. Jain, **University of Connecticut**
M. Gherasimova, **University of Bridgeport**
T. Schwendemann, **SCSU**

T. P. Ma, **Yale University**
J. Orszak, **OES**
C. Valerio, **Phonon Corp.**
J. F. Zheng, **Entegris**
R. C. Barker (Emeritus), **Yale University**
Y.-F. Yen, **WCSU**

REGISTRATION INFORMATION Prof. M. Gherasimova

Fees: The registration fee of \$199 includes all costs of presentation materials, refreshments, lunch, and reception on April 5, 2017. **Registration must be received by Monday, March 30, 2016**, in order to ensure a place at reception. **Students registration is free via email to Dr. Gherasimova at mgherasi@bridgeport.edu by March 31, 2017.**

Online Registration: <https://www.regonline.com/cmoc2017>

For Hotel accommodations. Please contact (860) 427-7888 for **Nathan Hale Inn, 855, Bolton Road, Storrs, CT 06268.**

Parking: Please *park in the South Garage (across from Gampel Pavilion Dome), 505, Jim Calhoun Way (off Hillside), Storrs, CT 06269-3204*

For information regarding symposium contents: Contact F. Jain at (860) 486-3752. <http://www.ee.uconn.edu/cmoc>

For information regarding symposium logistics: Contact University Events and Conference Services at (860) 486-1038.

Symposium Location: **University of Connecticut**
Thomas Dodd Research Center, 405 Babbidge Road ,
Storrs, CT

Local Arrangements: University and Conf. Services: 860-486-1038

Symposium Parking : South Garage adjacent to UCONN Co-Op
Jim Calhoun Way (off Hillside Road)

Refunds and Cancellations:

The registration fee is refundable less a \$35 processing fee, prior to the first day of the program. Participant substitutions may be made at any time.

The University of Connecticut supports all federal and state laws that promote equal opportunity and prohibit discrimination. This is a self-supporting program.

Registration Form for Paying Participants: (not for student use)

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At UCONN, Thomas Dodd Research Center, Konover Auditorium, 405 Babbidge Road, **Storrs, CT 06269-1205**

Registration Fee: \$199

Registration is free for graduate and undergraduate students (Inform Dr. M. Gherasimova by email: mgherasi@bridgeport.edu)

To Register:

Online: <https://www.regonline.com/cmoc2017>

Method of Payment: Credit Card

In an effort to increase security and prevent identity theft, we have changed our payment methods. Please choose one of the methods below:

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IN PERSON: At the conference site at UCONN.

Please indicate below if you have any special needs we should know about.

PAPERS FOR POSTER PRESENTATIONS

- P1.** Althowibi, F. A., Ayers, J. E., Dynamical X-ray Diffraction Analysis of a GaAs/In_{0.3}Ga_{0.7}As/GaAs Single Quantum Well Grown on a GaAs (001) Substrates, UCONN.
- P2.** Md Tanvirul Islam, Xinkang Chen, Tedi Kujofsa, J. E. Ayers, Chirped Superlattices as Adjustable Strain Platforms for Metamorphic Semiconductor Devices, UCONN.
- P3.** Abul Hasan Fazulullah, Purva Vansia, Kartavi Patel, Dipesh Patel, A. Abuzneid, Secure Transmission with Data Encryption and Data Compression Mechanism, University of Bridgeport.
- P4.** Ajay Menon Muralidhar, Muhammad Bahauddin Khan, Nitish Makam Prashanth, Neha Nomula, Prachi Pathak, Shakour Abuzneid, Heating Oil Level Detection and Assistance Using Amazon Alexa, University of Bridgeport.
- P5.** Alexander W. Bruch, Kanglin Xiong, Hojoong Jung, Xiang Guo, Jung Han, Hong Tang, Low-Loss AlGa_N Waveguides for Near-Visible Integrated Photonics, Yale University.
- P6.** Yuntao Xu, Wei Fu, Zhen Shen, Changling Zou, Hong Tang, High Q Ga_N Surface Acoustic Wave Phononic Crystal Resonator, Yale.
- P7.** Juanjuan Lu, Alexander Bruch, Hong Tang, Hybrid Fiber/Free-space Coupling to Integrated Photonic Circuits, Yale University.
- P8.** Sihao Wang, Risheng Cheng, Hongxing Tang, Design of Broadband NbTi_N Superconducting Nanowire Single Photon Detector for Ultra-Low Transport Jitter, Yale University.
- P9.** Mingrui Xu, Xu Han, Hong X. Tang, Tunable microwave superconducting resonator via kinetic inductance, Yale University.
- P10.** B. Saman, A. Aziz, K. Alomari E. Heller, F.C Jain, Noise tolerant SRAMs: conventional 20 nm CMOS vs n-SWS-FET cells, UCONN.
- P11.** B. Parthasarathy, P. Mirdha, J. Kondo, M. Lingalugari, F. Jain, Germanium and Silicon Dual Quantum Dot Super Lattice, UCONN.
- P12.** P. Mirdha, B. Parthasarathy, E. Heller, F. Jain, Absorption Spectrum Of Si & Ge Quantum Dots, UCONN.
- P13.** P. Mirdha, B. Parthasarathy, E. Heller, F. Jain, Compact Model of Quantum Dot Superlattice Based Transistor, UCONN.
- P14.** J. Kondo, P. Mirdha, B. Parthasarathy, P-Y. Chan, E. Heller, F. Jain, Modeling and Fabrication of GeO_x-Ge Cladded Quantum Dot Channel (QDC) FETs on Poly-Silicon, UCONN.
- P15.** N. Gong, T.P. Ma, A Study of Depolarization Field and Related Retention in HfO₂-based Ferroelectric Field Effect Transistors, Yale.
- P16.** Razan Abdulhammed, Miad Faezipour, Khaled Elleithy, Detecting Malicious Behavior in Medical Devices through Monitoring: A Hardware Approach, University of Bridgeport.
- P17.** Adwan Alanazi, Khaled Elleithy, Energy Efficient QoS Routing Protocol for Handling Hidden Nodes in in Wireless Multimedia Sensor Networks, University of Bridgeport.
- P18.** Abdulbast Abushgra, Khaled Elleithy, SSK Initiated by Third Party and Superposition Submissions, University of Bridgeport.
- P19.** Wafa Elmannai, Khaled Elleithy, An Accurate Data Fusion System for Visually Impaired, University of Bridgeport.
- P20.** Muneer Alshowkan, Khaled Elleithy, Reconfigurable and Dynamic Backbone nodes for EPR Pairs Distribution in Metropolitan Optical Networks Networks, University of Bridgeport.
- P21.** Xiang Zhang, Niloy K. Dutta, High-Speed Pulsed Fiber Laser Using Photonic Crystal Fiber, UCONN.
- P22.** A. Teber, K.Cil, T. Yilmaz, B. Eraslan, D. Uysal, G. Surucu, A. Baykal, R. Bansal, Manganese/Zinc Spinel Ferrites Blended with Multi-walled Carbon Nanotubes (MWCNTs) as Microwave Absorbing Materials, UCONN.
- P23.** Adimali Piyadasa, Yanbing Guo, Pu-Xian Gao, Design and Fabrication of piezoresistive silicon micro column flow rate sensor, UCONN.
- P24.** Timothy J. Palinski, Amogha Tadimety, John X.J. Zhang, Nanoplasmonic antennas for sensitive, portable gas-phase biosensing, Dartmouth College.
- P25.** Eugene P. Gerety, Khaled M. Elleithy, Code-Independent Technique with Alias Disambiguation for Data-Extraction from Extreme-High-Density 2D Printed Bit Field Images, University of Bridgeport.
- P26.** Ramadhan J. Mstafa, Khaled M. Elleithy, Efficient and Robust Video Steganography Algorithms for Secure Data Communication, University of Bridgeport.
- P27.** Zakareya Lasefr, Sai Shiva VNR Ayyalasomayajula, Rakesh R Ramasani, Khaled Elleithy, An Efficient Automated Technique and Smartphone Application for Epilepsy Seizure Detection Using EEG signals, University of Bridgeport.
- P28.** Reem Mahjoub, Khaled Elleithy, Recovery of Lost Connectivity in Wireless Sensor and Actor Network using Grid-based Model, University of Bridgeport.
- P29.** Tedi Kujofsa and John E. Ayers, Metamorphic Buffer Layers with Bi-parabolic Compositional Profiles, UCONN.
- P30.** Ridvan Umaz, Lei Wang, An Energy Combiner Design for Multiple Microbial Energy Harvesting Sources, UCONN.
- P31.** Jason Smith, Jacob Bailin, Binlin Wu, Characterization and discrimination of basal cell carcinoma and normal human skin tissues using resonance Raman spectroscopy, SCSU.
- P32.** Tyler Lyon, Daniel Wohlmuth, Mohammed Ameen, Mohammed Alqahtani, B. Parthasarathy, P. Mirdha, J. Kondo, and F. Jain, Quantum Dot Channel (QDC)-FETsECE Department, UCONN.
- P33.** Abdiel Rivera, Anas Mazady, Mehdi Anwar, Zinc Oxide: From Material to Devices Advancing the State of the Art, UCONN.
- P34.** Abdiel Rivera, Anas Mazady, Mehdi Anwar, Variation of ZnMgO Properties in THz Spectrum – Dependence upon Growth, UCONN.
- P35.** Lhacene Adnane, Ali Gokirmak, Helena Silva, Simultaneous Seebeck Coefficient and Electrical Resistivity Characterization of Ge₂Sb₂Te₅ Thin Films, UCONN.
- P36.** Husien Salama, B. Saman, N. Merabtine, K. Alomari, E. Heller, and F. C. Jain, 1-Bit Full Adder Cell Implemented Using n-SWS-FET, UCONN.

