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Connecticut Symposium on Microelectronics & Optoelectronics

32nd ANNUAL SYMPOSIUM: Virtual

Nanoelectronics, Nanophotonics, Quantum and Emerging Technologies.

University of Connecticut
Storrs, CT 06269

February 28, 2024

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

Invited Keynote Talk

- L. Frunzio, Improving the Coherence of Superconducting Quantum Circuits through Loss Characterization and Design Optimization, Yale University
- Invited Technical Presentations from industrial and academic experts.

Technical Sessions: Oral and Poster presentations on Quantum Materials, Devices, Quantum Computing, 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 applied Nano/Micro/Opto/Bio/Energy/AI applications.

Paper submission link: s.uconn.edu/cmoc2024submissions

WebEx Event join link: s.uconn.edu/cmoc2024

CMOC Website and Information link: ait.uconn.edu/cmoc-symposium-2024/

**Connecticut
Microelectronics
&
Optoelectronics
Consortium**

The principal purpose of the 32nd Connecticut Symposium on Microelectronics and Optoelectronics is to strengthen cooperation and sharing of resources between Connecticut industries and universities in the areas of quantum materials, quantum computing, nano-electronics, 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 information to state government leaders and the public at large

about current directions and developments in these key areas.

Finally, the symposium will seek to identify resources that encourage co-operative entrepreneurship among Connecticut industries and universities in the areas of nano/microelectronics, opto-electronics and other applied technologies.

Connecticut Microelectronics and Optoelectronics Symposium

Program Wednesday February 28, 2024

Morning Session

- 9:50 – 10:00 Virtual Check-in
- 10:00 – 10:10 Welcome: President Maric, UConn
- 10:10-10:20 QuantumCT: Pamir Alpay, OVP, UConn
- 10:20 – 10:30 CMOC Mission
- 10:30 – 11:30 Session I Quantum Materials
- 11:30–12:10 Keynote presentation: Luigi Frunzio, Improving the Coherence of Superconducting Quantum Circuits through Loss Characterization and Design Optimization, Yale University
- 12:10 – 12:50 Poster Viewing/Lunch Break

Afternoon Session

- 12:50 – 1:50 Session II Devices
- 1:50 – 2:30 Session III Applications
- 2:30 – 3:10 Session IV Biosensing/Nano-Biosystems
- 3:10 – 4:20 Session V Emerging Technologies
- 4:20 – 5:00 Poster Session
- 5:00 – 5:15 Closing

PURPOSE: The 32nd Symposium is developed for:

- Industrial / Academic R&D Personnel
- Engineering and Science Students
- Research and Application Technologists
- Entrepreneurs in the Nano/Micro/Opto/Bio/AI

SESSION I: Quantum Materials (10:30-11:30am)

Session Chairs: C. Broadbridge and M. Gherasimova

- S. Ismail-Beigi, Yale's NSF NRT grant on Quantum Materials Science and Engineering, Yale U. (INVITED)
- K.M. Abu Hurayra Lizu, K D. Cid-Ledezma, B. D. Huey, Thickness-dependent Study on Ferroelectric Domains in Epitaxial & Polycrystalline Thin films, UConn
- Z. Wang, C. Zhu, B. Zhao, F. Liu, C. Deng, J. Sun, P. Gao, Ambient environment Pretreatment Effect on Ni doped Co₃O₄ Nanocatalysts for low temperature CO oxidation, UConn (INVITED)
- J. Grasso, R. Raman, and B. G. Willis, Highly Responsive Interconnected Plasmonic Nanogap Antennas for Sub-Bandgap Photodetection via Hot Carrier Injection, UConn (INVITED)
- H. Silva, H. Talukder, R. Khan, Md T. B. Kashem, F. Dirisaglik and A. Gokirmak, Resistance Drift, Acceleration, and Stoppage in Amorphous Ge₂Sb₂Te₅ Phase Change Memory Cells, UConn.

12:10-12:50pm Lunch Break/Poster Viewing

The support of UConn OVP is gratefully acknowledged for Best Student Poster & Oral Paper Awards.

SESSION II: Quantum NanoDevices (12:50-1:50pm)

Session Chairs: W. Zhu and H. Silva

- P. Ye, Atomic-layer-deposited atomically thin In₂O₃ transistors for BEOL logic and memory, Purdue U. (INVITED)
- N. Dutta, Recent Advances and Applications of Semiconductor Optical Amplifiers, UConn (INVITED)
- Z. Zhao, K. Xu, T. Low*, S. Rakheja, and W. Zhu, Van der Waals Ferroelectric Materials for Electronics and Photonics, U. Illinois and U. Minnesota* (INVITED)
- J. I. Kyymissis, Non-display applications for microLEDs, ECE, Columbia U. (INVITED)
- G. Fernando, Correlation Driven Magnetic Frustration and Insulating Behavior of TiF₃Physics, UConn (INVITED)

SESSION III: Quantum Computing (1:50-2:30pm)

Session Chair: J. Chandy

- L. Ferreira dos Santos, Driving superconducting qubits into chaos, UConn (INVITED)
- V. Batista, Simulations of Molecular Systems on Quantum Computers, Yale U. (INVITED)
- S. Xie, Monolayer transition metal dichalcogenide superlattices with coherent lattices, Princeton U. (INVITED)

SESSION IV: Biosensing/Nano-Biosystems (2:30-3:10pm)

Session Chairs: C. Valerio and A. Fish

- Y. Zhang, Implantable bioelectronics and microfluidics to unlock brain chemistry, UConn (INVITED)
- S. Abdulmalik, L. Vobbenini, S. Kumbar., Ionically Conductive Polymeric Implants: Applying Electrical and Chemical Stimulation for Soft Tissue Wound Healing, UConn (INVITED)
- B. Smaani, M. S. Benlatreche, S. Labiod, R. Yadav, and H. Salama, Temperature effect assessment on the gate-all-around junctionless FET for bio-sensing applications, U. Algeria, UConn.

SESSION V: Clean Energy, Quantum and Emerging Technologies (3:10-4:20pm)

Session Chairs: J. Orszak & M. Enjalran

- R. Manohar, Neuromorphic Computing, Yale U. (INVITED)
- T. Bhosale, S. Sahoo, S. Suib, Low temperature ceria-based catalyst design for clean hydrogen production through water-gas shift reaction: A promising path to sustainable energy, UConn. (INVITED)
- T. W. Callis and E. Tentzeris, Additively Manufactured, Flexible 5G Electronics and Sensors for MIMO, IoT, Digital Twins, Smart Cities, Chemical Sensing, and AR/VR Applications, GA Tech (INVITED)
- J. Zhao, CyberCARED: Northeast University Cybersecurity Center for Advanced and Resilient Energy Delivery, UConn (INVITED)
- V. Mutalik, Coherence after Turbulence, Comcast (INVITED)
- S-H. Lu, H. Wang, Soft, flexible conductivity sensors for ocean salinity monitoring, UConn

Poster SESSION (4:20-5:00pm)

Poster authors are available for Q & A

Closing Remarks

Organizing Committee

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

S. Grodzinsky (Emeritus), **University of Bridgeport**
E. Murphy, **CMOC**
B. Wu, **SCSU**
A. DeMaria, (Emeritus), **University of Connecticut**
F. Jain, **University of Connecticut**
M. Gherasimova, **University of Bridgeport**
T. Schwendemann, **SCSU**

F. Xia, **Yale**
J. Orszak, **CONNSTEP**
C. Valerio, **CMOC**
J. F. Zheng, **Entegris**
Q. Xia, **UMass, Amherst**
H. Jiang, **Micron**
M. Enjalran, **SCSU**

REGISTRATION INFORMATION

Fees: NONE

Event Manager: Dan Jakubiak
(UConn-ITS), daj@uconn.edu

CMOC Information/Submission:
ait.uconn.edu/cmoc-symposium-2024/

Symposium Location:

WebEx join link
s.uconn.edu/cmoc2024

Local Arrangements: NA

Symposium Parking : NA

For information regarding symposium contents: Contact F. Jain at (860) 881-7355. fcj@enr.uconn.edu

Refunds and Cancellations: N/A

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

Registration Form for Participants:

February 28, 2024

Connecticut Symposium on Microelectronics & Optoelectronics

Virtual,
Registration Fee: N/A

WebEx join link: s.uconn.edu/cmoc2024

CMOC paper submission link: s.uconn.edu/cmoc2024submissions

Registration for graduate and undergraduate students (not authors/coauthors): Please inform: rajahari823@gmail.com

PAPERS FOR POSTER PRESENTATIONS*

- P1. V. Nagarajan, B. Chaudhuri, T. Duran, T. Mehta, Y. Luo, Y. Wang, B. Minatovicz, L. Fontana, Development of Experimentally Validated Machine Learning (ML) Based Model to Predict the Thawing Time of Biologics during Large Scale Freeze-Thawing Cycles, UConn.
- P2. Md D. Hossain, J. Grasso, B. G. Willis, Explosives detection using octanethiol nanoparticle ink printing devices, UConn.
- P3. A. A. Kausani, C. Ding, M. Anwar, Performance Improvement of Degrading Memristor-bridge Based Multilayer Neural Network with Refresh Pulses, UConn.
- UG-P4. C. Sayers, T. Sadowski, C. Broadbridge, Advancing Carbon Capture Capabilities: A Density Functional Theory Approach to Nanoscale Porous Material Characterization, SCSU.
- P5. S. Fan and N. K. Dutta, Binary Addition, Subtraction and Parity Checker based on Optical Logic Gates, UConn.
- P6. R. H. Gudlavalleti, A. Almaliki, A. Legassey, R. LaComb, J. Chandy, E. Heller, F. Papadimitrakopoulos, F. Jain, Ge Quantum Dot Spatial Wavefunction Switched Field Effect Transistor, UConn.
- P7. B. Khan, R. Mays, R. Gudlavalleti, E. Heller, F. Jain, Fabrication and Characterization of Four-State Inverter utilizing Quantum Dot Gate Field-Effect Transistors (QDGFETs), UConn.
- P8. Y. Zhao, F. Jain, L. Wang, An In-Memory-Computing structure with Quantum-Dot Transistor towards Neural Network, UConn.
- P9. A. Husawi, R. Gudlavalleti, A. Almalki and F.C. Jain, A Comprehensive Study and Comparison of 2-Bit 7T-10T SRAM Configurations with 4-state CMOS-SWS Inverters, UConn.
- P10. Z. Li and Lei Wang, Study of Soft Errors in Spiking Neural Network Hardware Systems, UConn.
- P11. Z. Li, F. Jain, and L. Wang, Quantum Dot Transistor Based Spiking Neurons for Hardware SNNs, UConn.
- P12. A. Almalki, B. Saman, R. H. Gudlavalleti, J. Chandy, E. Heller, and F.C. Jain, Simulation and Comparative Study of Propagation Delay in Multi-channel SWS-CMOS based Inverters Using II-VI Gate Insulator, UConn.
- P13. A. Akoma, K. M Abu, H. Lizu, B. D. Huey, Novel Nanoscale Investigation of Niobium-doped Strontium Titanate using Tomographic AFM, UConn.
- P14. E. Parent, R. Gudlavalleti, A. Almalki, and F. Jain, Simulation of Inverters using Quantum dot gate FETs, UConn.
- P15. W. Stark, S. Chen, L. Wang, and Y. Luo, Reverse Engineering Protection using Obfuscation, UConn.
- UG-P16. D. Rojas, E. Parent, A. Almalki, F. Jain, D. Rojas, S. Ruiz, C. Lin, Kevin Medeiros, E. Parent, A. Almalki, R. Gudlavalleti, A. Legassey, R. LaComb, J. Chandy, E. Heller, F. Papadimitrakopoulos and F. Jain, UConn.
- P17. W. Alamoudi, B. Saman, R. H. Gudlavalleti, A. Almalki, A. Husawi, J. Chandy, E. Heller, and F. Jain, Threshold Quantizer Inverter based 2-bit Comparator using Spatial Wavefunction Switched (SWS) FETs: Power Dissipation Analysis, UConn
- P18. A. Rahman and N. K. Dutta, Mid-infrared supercontinuum generation in highly nonlinear chalcogenide tapered fiber and planar waveguides, UConn.
- P19. Md M. Hossain, S. Singha, T. Titirsha and S. K. Islam, Optimizing TCAD Model for Aluminum Nitride (AlN) Schottky Diode: Exploring Forward Diode Characteristics with Different Schottky Metals, Univ. of Missouri.
- P20. F. Nasri and H. Salama, Nano thermal simulation of Graphene Field Effect Transistor based on Ballistic Diffusive model, Center for Res in Microel and Nanotech, Tunisia.
- P21. B. Saman, R. Gudlavalleti, J. Chandy, F. C. Jain, The Noise margin-of quaternary SRAM using spatial wavefunction switched (SWS)-FETs, UConn.
- P22. A. Fish, TBA, U. New Haven
- P23. B. Zhao, C. Zhu, Y. Yu, F. Liu, J. Liu, P-X. Gao, Zeolite Encapsulated Nanoarray Structures: A Robust High-temperature Catalyst Design, UConn.
- UG-P24. X. Borst, P. Rousey, C. Stasko, S. Quadir, Creating a Physical Unclonable Function using Multiplexers, Counters, Comparators, and a Ring Oscillator Chain, Monmouth College.
- UG-P25. M. Martone, V. Adamski, J. Turpin, A. Grynyk, K. Roman, T. Sadowski, R. Singhal, C. Broadbridge, The Effect of Biochar Concentration on Electrical and Structural Properties of Biochar-MnO₂ Hybrid Capacitors, SCSU.
- UG-P26. A. Fleming, L. Dagostino, T. Bliznakov, R. Gudlavalleti, A. Legassey, J. Kondo, F. Papadimitrakopoulos, F. Jain, Optimization of Microfluidic Test System for Biosensors, UConn.
- P27. J. J. Lee, A. Levi, D. Naveh, F. Xia, Mid-infrared spectrometer based on tunable photoresponses in PdSe₂, Yale U., Bar Ilan Univ. Israel.
- P28. H. Wang, J. Zhao, Y. Yao, F. Ding, Y. Liang, A Measurement-Based Adaptive Voltage Regulation Method Considering Topology Changes, UConn.
- P29. T. Su, J. Zhao, Safe Reinforcement Learning-Based Chance-Constrained Transient Stability Emergency Control for Islanded Microgrids, UConn.
- P30. S. Vahedi, J. Zhao, J. Dong, B. Wang and J. Lian, Resilience Assessment for Distribution Systems during Hurricanes: A Learning-Based Framework, UConn, Oak Ridge, UC Berkeley.

*Presenters, please upload poster PDF and a 2 min audio file by 5:00pm on Monday, 2/26
Prepare to be present for a Q & A session on WebEx on Wednesday 2/28 around 4:20-5:00pm