COMMUNITY MEETING

The University of Illinois Center for Nanoscale Science and Technology (CNST) in collaboration with the Micro and Nanotechnology Laboratory (MN) at the University of Illinois at Urbana-Champaign will host the 13th Annual CNST Nanotechnology Workshop. The event will be held on May 7-8, 2015, at the University of Illinois at Urbana-Champaign.

May 7 - 8, 2015

University of Illinois
Center for Nanoscale Science and Technology
Micro and Nanotechnology Laboratory
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CNST 13TH ANNUAL NANOTECHNOLOGY WORKSHOP

May 7-8, 2015
University of Illinois at Urbana-Champaign

SPONSORS

• Center for Nanoscale Science and Technology (CNST)
• NSF IGERT - Cellular and Molecular Mechanics and BioNanotechnology (CMMB)
• NIH/NCI Midwest Cancer Nanotechnology Training Center (M-CNTC)
• Emergent Behaviors of Integrated Cellular Systems (EBICS)
ABOUT THE UNIVERSITY OF ILLINOIS CENTER FOR NANOSCALE SCIENCE AND TECHNOLOGY

The Center for Nanoscale Science and Technology (CNST) works as a collaboratory toward seamless integration of interdisciplinary research from atoms and materials to devices and systems. Campus faculty members, graduate and undergraduate students, industry partners and collaborating scientists from government laboratories and higher education institutions around the world come together through the Center, a leader in groundbreaking nanotechnology research. The CNST also has ongoing linkages with The University Research Park, the Illinois Science and Technology Coalition, state legislature, and private industry.

Developed by the CNST, curriculum for nanotechnology education and training reaches across a number of campus departments and units. Exceptional students with interest in nanotechnology projects have been awarded fellowships, collaborations have been fostered, and several promising projects have been seeded.

CNST has led nationwide and global partnerships with projects in nanomedicine, nanofabrication, and training of the next-generation workforce.
WORKSHOP AGENDA

Thursday, May 7, 2015
Venue: Micro and Nanotechnology Laboratory

11:00-12:45 POSTER SESSION MNTL Atrium
CNST Graduate Students Initiative/IGERT-CMMB/M-CNTC/EBICS Students
Lunch and Registration

12:45-1:00 GROUP PHOTO MNTL Atrium

Plenary and Technical Sessions in 1000 MNTL

Plenary Session

1:00-2:30 Session Chair: Brian Cunningham, Director, Micro and Nanotechnology Laboratory

1:00 INTRODUCTORY REMARKS

1:05 WELCOME REMARKS

Andreas Cangellaris, Dean, College of Engineering
Brian Cunningham, Director, Micro and Nanotechnology Laboratory
nano@Illinois: Center for Nanoscale Science and Technology (CNST)
Irfan Ahmad, Executive Director, CNST, and Agricultural and Biological Engineering
1:30  Keynote:
Nanotechnology Meets Biology in the Cancer Cell: Applications in Medicine, Drug Delivery, and Determining Drug Efficacy

Mostafa A. El-Sayed
Regents’ Professor and Julius Brown Chair
Georgia Institute of Technology

2:30-2:45  BREAK  MNTL Atrium

Technical Session

2:45-5:35  Nanoelectronics/Nanophotonics/Nanomaterials/
Nanomanufacturing/Nanocomputation/Nanomedicine
Session Chair: Ioannis Chasiotis, Aerospace Engineering

2:45  Piezoelectric N/MEMS Devices for RF Front Ends and Computing
Songbin Gong, Electrical and Computer Engineering

3:05  Two-dimensional Material Electronics and Photonics
Wenjuan Zhu, Electrical and Computer Engineering
3:25  Vertical Thinking in Light Emitting Diodes  
Can Bayram, Electrical and Computer Engineering

3:45  Thermal, Optical, and Electronic Properties of 2D Nanostructured Materials: Design by Computation  
Elif Ertekin, Mechanical Science and Engineering

4:05-4:15  BREAK MNTL Atrium

4:15  Electrostatic Force Balance Microscopy  
Yemaya Bordain, Electrical and Computer Engineering

4:35  Applications of High-Throughput Cell Microenvironment Engineering  
Gregory Underhill, Bioengineering

4:55  Model Extracellular Matrices to Coordinate Cell Programming and Re-programming  
Kristopher Kilian, Materials Science and Engineering

5:15  Opportunities in Cancer Theranostics  
Bulent Aydogan, Pritzker School of Medicine, University of Chicago

5:35-6:15  Reception in MNTL Atrium

6:30-9:00  DINNER (by Invitation Only)
IGERT-CMMB AND M-CNTC ANNUAL SYMPOSIUM AGENDA

Friday, May 8, 2015
Venue: Micro and Nanotechnology Laboratory

8:00-9:00 BREAKFAST MNTL Atrium

Plenary and Technical Sessions in 1000 MNTL

Plenary Session

9:00-10:30 Session Chair: Rashid Bashir, Head, Department of Bioengineering

9:00 OPENING REMARKS

9:15 Keynote:
Rare Events with Large-Impact:
Bioengineering & Clinical Applications of Circulating Tumor Cells

Mehmet Toner
Helen Andrus Benedict Professor of Biomedical Engineering
Massachusetts General Hospital, Harvard Medical School
Harvard-MIT Health Sciences & Technology

10:15 EVALUATION REPORT
Lizanne DeStefano, I-STEM Education Initiative
Ayesha Tillman, I-STEM Education Initiative
10:30-11:00 GROUP PHOTOS AND BREAK  MNTL Atrium

Technical Session I

11:00-12:00 IGERT-CMMB Research Highlights
Session Chair: Martha Gillette, Cell and Developmental Biology

Probing the Effects of Cellular Organization on 3D Printed Scaffolds for in vitro Breast Tumor Models
Rohit Bhargava and Mark Gryka, Bioengineering

Quantitative and Computational Analysis of Novel VEGF-PDGF Cross-family Binding Kinetics in Angiogenic Cell Signaling
Princess Imoukhuede and Spencer Mamer, Bioengineering

Structural and Functional Properties of Neurons in Engineered 3D Microenvironments vs. Brain Slices
Martha Gillette, Cell and Developmental Biology and Ghazal Naseri, Neuroscience

Matrix Softness Regulates Plasticity of Tumour-repopulating Cells via H3K9 Demethylation and Sox2 Expression
Ning Wang and Rishi Singh, Mechanical Engineering

12:00–1:00 LUNCH AND POSTER SESSION  MNTL Atrium
**Technical Session II**

*1:00-2:15*

**M-CNTC RESEARCH HIGHLIGHTS**

Session Chair: Ryan Bailey, Chemistry

*Dimeric Drug Polymeric Nanoparticles with Exceptionally High Drug Loading and Quantitative Loading Efficiency*

Jianjun Cheng and Kaimin Cai, Materials Science and Engineering

*Molecular Assembly of Nanoparticle-Coated Polymeric Microbubbles for Ultrasound Imaging and Vascular Drug Delivery*

Hyunjoon Kong and Jinrong Chen, Chemical and Biomolecular Engineering

*Facilitating the Detection of Eso-plex miRNA Panels Relevant to Glioblastoma Multiforme using Silicon Photonic Microring Resonator Arrays*

Ryan Bailey and Richard Graybill, Chemistry

*Oncogenic RAS Modulates Glutamine’s Contribution to Mitochondrial Redox Homeostasis*

Rex Gaskins, Animal Sciences and Matthew Leslie, Pathobiology

*Integration of Quantum Dot Nanoparticles with Multimodal Microspheres for PET and Cerenkov Luminescence Imaging of Cancer*

Stephen Boppart and Joanne Li, Bioengineering
Point of Care Biosensor for Early Sepsis Screening
Rashid Bashir and Bobby Reddy, Bioengineering

2:15–2:30 BREAK MNTL Atrium

2:30–3:00 CLOSING SESSION

• Poster Awards
• Presentation of Trainee Certificates
• Student Leadership Council Recognition
• Program Summary Slide Show
• Concluding Remarks
Annual Workshop and Symposium Co-sponsored by:

- Micro and Nanotechnology Laboratory (MNTL)
- Beckman Institute for Advanced Science and Technology (BI)
- Department of Bioengineering (BioE)
- Coordinated Science Laboratory (CSL)
- Frederick Seitz Materials Research Laboratory (FSMRL)
- Institute for Genomic Biology (IGB)
- nanoBIO Node (nBN)
- nano@illinois Research Experiences for Teachers (RET)
- nano@illinois Research Experiences for Undergraduates (REU)
- Nanoscale Science and Technology Resources for Community Teaching (NanoSTRuCT)
- National Center for Supercomputing Applications (NCSA)
- NSF I/UCRC Center for Innovative Instrumentation Technology (CiiT)
KEYNOTE SPEAKERS

DR. MOSTAFA A. EL-SAYED
Regents’ Professor and Julius Brown Chair, Georgia Institute of Technology

Dr. Mostafa El-Sayed received his B.Sc. from Ain Shams University in Cairo, and Ph.D. from Florida State University. He was a Postdoctoral Fellow at Yale University, Harvard University and the California Institute of Technology. From 1961-94, he served as a faculty member in the Department of Chemistry and Biochemistry at the University of California Los Angeles, and is currently Julius Brown Chair and Regents’ Professor in the Department of Chemistry at the Georgia Institute of Technology.

Professor El-Sayed received the 2007 U.S. National Medal of Science in Chemistry from the President of the United States (2008) and the Medal of the Egyptian Republic of the First Class from the President of Egypt (2009). He was nominated to the U.S. National Medal of Science in Chemistry Committee in 2014, and served a two-year term. Professor El-Sayed is an Elected Member of the U.S. National Academy of Sciences (1980), an Elected Fellow of the American Academy of Arts and Sciences (1986), an
Elected Associate Member of the Third World Academy of Sciences (1984); he is an Inaugural Fellow of the American Chemical Society, the American Physical Society and an Elected Fellow of the American Association for the Advancement of Sciences. He is an Honorary Fellow of the Indian Chemical Society and the Chinese Chemical Society. He received the King Faisal International Prize in the Sciences (Chemistry) in (1990); Doctor Honoris Causa from the Hebrew University, and honorary Doctor Degrees from the Colleges of Medicine of both Mansoura and Alexandria Universities in Egypt. He has received a number of national awards such as the Fresenius, the Tolman, the Richard’s medal, the Lindeman’s medal, the Seaborg’s medal as well as other numerous local ACS section awards. In 2002, he received the ACS-APS Langmuir National Award in Chemical Physics and in 2007 was awarded the Georgia Tech’s highest award, the Distinguished Professor of the year.

Professor El-Sayed was an Alexander von Humboldt Senior Fellow, Germany (1982), a Visiting Professor at the University of Paris, an Alfred P. Sloan, as well as a Guggenheim Foundation Fellow, a Fairchild Fellow at the California Institute of Technology and a Miller Visiting Professor at University of California, Berkeley.
Dr. Mehmet Toner is the Helen Andrus Benedict Professor of Biomedical Engineering at the Massachusetts General Hospital (MGH), Harvard Medical School (HMS), and is the co-founding director of the NIH BioMicro Electro Mechanical Systems (BioMEMS) Resource Center at the MGH. He received his BS degree from Istanbul Technical University and MS degree from the Massachusetts Institute of Technology (MIT), both in Mechanical Engineering. Subsequently he completed his PhD degree in Medical Engineering at Harvard-MIT Division of Health Sciences and Technology in 1989. He joined the faculty at the MGH and HMS as an Assistant Professor of Biomedical Engineering in 1989, and was promoted to Associate Professor in 1996, and to Professor in 2002. Dr. Toner holds a joint appointment as a Professor of Health Sciences and Technology at the Harvard-MIT Division of HST.
Dr. Toner is internationally recognized for his work at the interface of bioengineering and life sciences especially in the detection of rare circulating tumor cells.

Dr. Toner has published over 350 original papers including in *Nature*, *Science*, *New England Journal of Medicine*, *Science Translational Medicine*, *Nature Biotechnology*, and *PNAS*. He has also delivered over 400 invited, keynote and plenary presentations.

In 1998, Dr. Toner was selected to become a Fellow of the American Institute of Medical and Biological Engineering. In 2007, he became a Fellow of the American Society of Mechanical Engineers. In 2012, he was selected to become a Fellow of the Society for Cryobiology. In 2013, he received the H.R. Lissner Medal from the American Society of Mechanical Engineering. He served on the Board of Advisors of the National Science Foundation from 2010-2013.

Dr. Toner serves on the Scientific Advisory Board of multiple biotechnology and medical device companies, and has been involved as a scientific founder of multiple startup companies.
Website:
nano.illinois.edu/nanoworkshop2015

CNST Workshop Organizing Committee Members:
• Brian Cunningham, Director, Micro and Nanotechnology Laboratory, Chair
• Irfan Ahmad, CNST/Agricultural and Biological Engineering, Co-Chair
• Rashid Bashir, Head, Department of Bioengineering, Co-Chair
• Lizanne DeStefano, I-STEM Education Initiative
• Milton Feng, Electrical and Computer Engineering
• John Rogers, Materials Science and Engineering/FS Materials Research Lab
• Sameh Tawfick, Mechanical Science and Engineering
• Carrie Kouadio, CNST/Emergent Behaviors of Integrated Cellular Systems
• Laura Miller, IGERT-CMMB/M-CNTC
• Andrew Smith, Bioengineering
• Wenjuan Zhu, Electrical and Computer Engineering

Images courtesy: Professor Hyunjoon Kong, Cartney Smith, and Professor John Rogers
Design: Craig Towsley, Center for Nanoscale Science and Technology
Susan McKenna, Associate Director of Communications, Bioengineering