

Center for Nanoscale Science and Technology

The University of Illinois Center for Nanoscale Science and Technology (CNST) is the premier center for nanotechnology research, education, and outreach activities. CNST draws its strength from working as a collaboratory involving the Beckman Institute for Advanced Science and Technology, Biotechnology Center, Coordinated Science Laboratory, Frederick Seitz Materials Research Laboratory, Institute for Genomic Biology, Micro and Nanotechnology Laboratory, Center for Nanoscale Chemical, Electrical, Mechanical, Manufacturing Systems, National Center for Supercomputing Applications, and the School of Chemical Sciences. The Center is working towards seamless integration of interdisciplinary research from atoms and materials to devices and systems. CNST is uniquely located to harness the entrepreneurial and technical spirit in the Midwest, with ongoing industrial linkages as it prepares tomorrow's workforce. The CNST thrives on its cutting-edge research in bionanotechnology, computational nanotechnology, nanocharacterization, nanoelectromechanical systems, nanoelectronics, nanofabrication, nanomaterials, nanomanufacturing, nanomedicine, and nanophotonics. *Ilesanmi Adesida, Director; Irfan Ahmad, Associate Director.* www.cnst.illinois.edu

Micro and Nanotechnology Laboratory

The Micro and Nanotechnology Laboratory (MNTL) at the College of Engineering, University of Illinois at Urbana-Champaign, with 147,347 sqft space is one of the nation's largest and most sophisticated university-based facilities for semiconductor, nanotechnology, and biotechnology research. The laboratory is a user facility that is available for use by university and industry from across the nation. It contains over 8,000 square feet of class 100 and class 1000 clean room laboratories, a new 3,000 square-foot laboratory complex specifically designed for bionanotechnology, and state-of-the-art ultra-high-speed optical and electrical device and circuit measurements. The bionanosystems area focuses on utilizing the various technologies developed in materials, nanofabrication, devices, MEMS and NEMS to study and solve biological issues. Biomolecular flow patterns in nanoscale channels, integration of lasers onto biochips for real-time fluorescence study of bioreactions, and implantation of active devices in cells to study cellular biochemistry are examples of research activities being carried out. An \$18 million state funded expansion of the MNTL was recently completed, which includes bionanotechnology and additional space for researchers. *Rashid Bashir, Director.* www.mntl.uiuc.edu

Workshop Organizing Committee

Rashid Bashir, Professor, Director, MNTL/ECE/ Event Chair
Irfan Ahmad, Associate Director, CNST/ABE (co-Chair)
James Coleman, Professor, ECE/MNTL
Brian Cunningham, Associate Professor, ECE/MNTL
Lynford Goddard, Assistant Professor, ECE/MNTL
Jimmy Hsia, Professor, Mechanical Science and Engineering/CCM
Iwona Jasiuk, Professor, Mechanical Science and Engineering
Jennifer Lewis, Director, FSMRL/MatSE
Xiuling Li, Assistant Professor, ECE/MNTL
Munir Nayfeh, Professor, Physics
Graciela Padua, Associate Professor, Food Science and Human Nutrition
Eric Pop, Assistant Professor, ECE/MNTL
John Rogers, Professor, MatSE/FSMRL/Nano-CEMMS
Mark Shannon, Director WATER CAMPWS/MechSE
Nahil Sobh, Site Lead, NCN/NanoHub at Illinois
Kenneth Watkin, Professor, College of Applied Health Sciences/Beckman/CSL

Multidisciplinary Research: Collaboratory

Center for Nanoscale Science and Technology
2000 Micro and Nanotechnology Laboratory
208 N. Wright Street
Urbana, IL 61801

Ilesanmi Adesida, Director
Irfan Ahmad, Associate Director
(217) 333-3097
www.cnst.illinois.edu

Advanced Materials for Purification of Water with Systems (Water CAMPWS) Center
2127 Mechanical Engineering Laboratory
1206 West Green St.
Urbana, IL 61801

Mark A. Shannon, Director
(217) 333-2633
www.watercampws.uiuc.edu

Center for the Design of Biomimetic Nanoconductors
3217 Beckman Institute
405 N. Mathews Avenue
Urbana, IL 61801

Eric Jakobsson, Director
www.nanoconductor.org

Coordinated Science Laboratory
202 Coordinated Science Laboratory
1308 W. Main Street
Urbana, IL 61801

William Sanders, Director
(217) 333-2511
www.csl.uiuc.edu

Frederick Seitz Materials Research Laboratory
2015 Frederick Seitz Materials Research Laboratory
104 S. Goodwin Avenue
Urbana, IL 61801

Jennifer Lewis, Director
(217) 333-1370
www.mrl.uiuc.edu

Hyper-Uniform Nanophotonic Technology Center
2112 Micro and Nanotechnology Laboratory
208 N. Wright Street
Urbana, IL 61801

K.Y. Cheng, Director
(217) 333-6642
www.micro.uiuc.edu/people/profile.asp?kycheng

Institute for Genomic Biology
Institute for Genomic Biology
1206 W. Gregory Drive
Urbana, IL 61801

Harris Lewin, Director
(217) 244-2999
www.igb.uiuc.edu

Micro and Nanotechnology Laboratory
2000 Micro and Nanotechnology Laboratory
208 N. Wright Street
Urbana, IL 61801

Rashid Bashir, Director
(217) 333-3097
www.mntl.illinois.edu

Nanoscale Chemical-Electrical-Mechanical Manufacturing Center
4410 Mechanical Engineering Laboratory
105 S. Mathews Avenue
Urbana, IL 61801

Placid Ferreira, Director
(217) 265-0093
www.nano-cemms.uiuc.edu

National Center for Supercomputing Applications
NCSA Building
1205 West Clark Street
Urbana, IL 61801

Thom H. Dunning, Jr., Director
(217) 244-0072
www.ncsa.uiuc.edu

Network for Computational Nanotechnology
2104 Micro and Nanotechnology Laboratory
208 N. Wright Street
Urbana, IL 61801

Nahil Sobh, Site Lead
Umberto Ravaioli, Faculty Lead
(217) 244-9481
www.nanohub.org

Siteman Center of Cancer Nanotechnology Excellence (SCCNE) (Illinois co-location)
2104 Micro and Nanotechnology Laboratory
208 N. Wright Street
Urbana, IL 61801

Rashid Bashir, PI
Irfan Ahmad, Project Coordinator/co-PI
(217) 333-2015
www.cnst.illinois.edu/sccne-uiuc.htm



Nanotechnology Workshop

September 4-5, 2008

University of Illinois at Urbana-Champaign
Beckman Institute for Advanced
Science and Technology; and
Micro and Nanotechnology Laboratory

Sponsored by:

The Center for Nanoscale Science and Technology (CNST)
at the University of Illinois at Urbana-Champaign

Co-sponsors:

- Micro and Nanotechnology Laboratory
- Siteman Center of Cancer Nanotechnology Excellence at Washington University in Saint Louis, and University of Illinois at Urbana-Champaign



CNST

Workshop Premise

The broad objective of the workshop is to showcase University of Illinois research in bionanotechnology, nanomedicine, nanoelectronics/nanophotonics, and nanomaterials/ nanomanufacturing.

The general framework of the nanotechnology workshop will be similar to those held on campus in May 2003-07; which were well attended by industry and academia. Some of those interactions have since then led to industry and cross-campus collaborations.

The workshop will provide a forum for industry interactions and collaborations. The workshop will bring together campus community (faculty, graduate and under-graduates, administration) from UIUC and other institutions, and industry engaged in cutting-edge research. A workshop panel will discuss the roadmap to future direction of research and development in nanotechnology.

Workshop Information & Registration

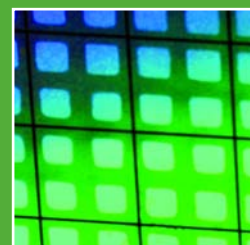
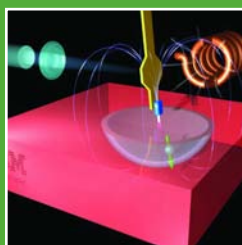
For information on registration, poster signup, hotels, and parking visit www.cnst.illinois.edu/NanoWorkshop2008.htm. There is no registration fee for UI affiliates, but pre-registration is required. Seating is limited.

Workshop Location

Beckman Institute for Advanced Science and Technology, and
Micro and Nanotechnology Laboratory

For More Information

Contact the Center for Nanoscale Science and Technology
University of Illinois, (217) 333-3097, nano@uiuc.edu, www.cnst.illinois.edu.



AGENDA

Thursday, Sept. 4, 2008

7:30 – 8:00 a.m.
Registration
Beckman Auditorium

Breakfast
Beckman Café

8:00 – 11:00 a.m.
Micro and Nanotechnology Laboratory
Building Dedication and CNST Workshop Joint
Plenary Session at Beckman Auditorium

8:15 – 11:00 a.m.
Plenary Session
Chair – Rashid Bashir
Micro & Nanotechnology
Laboratory (MNLT), Illinois

8:15 a.m.
Welcome Remarks
Richard Herman, Chancellor,
University of Illinois

Linda Katehi, Provost and Vice Chancellor for
Academic Affairs, University of Illinois

MNLT Overview
Ilesanmi Adesida, Dean, College of
Engineering; Director, Center for Nanoscale
Science and Technology, University of Illinois

Rashid Bashir, Director, Micro and
Nanotechnology Laboratory, University
of Illinois

**Video on Micro and Nanotechnology
Laboratory: Contributions**

9:00 a.m.
Life in the Nano World
Arden Bement Jr., Director,
National Science Foundation

10:00 a.m.
**Prospects for the Future of Microsystems
Technology on the Occasion of the Dedication
of the University of Illinois Micro and
Nanotechnology Laboratory**
Robert Leheny, Deputy Director, Defense
Advanced Research Projects Agency

11:00 a.m.
Coffee Break
Beckman Café

11:30 a.m.
Micro and Nanotechnology Laboratory
Building Dedication/Ribbon Cutting
(MNLT building, north end)

11:30 a.m.
Welcome Remarks
B. Joseph White; President, Richard Herman,
Chancellor; Ilesanmi Adesida, College of
Engineering Dean, Rashid Bashir, MNLT Director;
University of Illinois; Representatives from the
State of Illinois, Capital Board, and Board of
Trustees

11:50 a.m.
MNLT Ribbon Cutting

12:15 – 1:30 p.m.
Lunch, Lab Tours, and Poster Session
Micro and Nanotechnology Laboratory

NANOELECTRONICS/ NANOPHOTONICS

(Micro and Nanotechnology
Laboratory, Room 1000)

1:30 – 3:50 p.m.
Session I
Chair – Joseph Lyding
Electrical & Computer Engineering/Beckman,
Illinois

1:30 p.m.
**The Reason for, and the Path Toward,
Fabricating Complex Nanoscale Systems
in 2 and 3 Dimensions**
Henry Smith, Electrical Engineering
and Computer Science, MIT

2:00 p.m.
**Nanopatterned Quantum Dot
Semiconductor Lasers**
James Coleman, Electrical and Computer
Engineering/MNLT, Illinois

2:20 p.m.
**Progress in Evolutionary and Revolutionary
Nanoelectronics from Device and Process
Point of View**
Yoshio Nishi, Electrical Engineering, Stanford

2:50 p.m.
**From Bardeen's Transistor and Holonyak's
LED/Laser to Invention of Transistor Laser**
Milton Feng, Electrical and Computer
Engineering/MNLT, Illinois

3:10 p.m.
**Nanotechnology: A Look into the Future,
Think-Small**
Andrew Skipor, Motorola

3:30 p.m.
Stretchable Electronics and Artificial Eye Cameras
John Rogers, Materials Science and
Engineering/FSMRL/Nano-CEMMS, Illinois

3:50 p.m.
Coffee Break

ACADEMIA PANEL ON RESEARCH AND DEVELOPMENT IN NANOTECHNOLOGY AND FUTURE

4:00 – 5:30 p.m.
Session II
Moderator – Ravi Iyer
Vice Chancellor for Research, Illinois

4:00 p.m.
Panelists: *Earl Travis, OSTP; Harold
Craighead, Cornell; Henry Smith, MIT;
Yoshio Nishi, Stanford; Mostafa Analoui,
Livingston Group; Andrew Skipor, Motorola;
Mark Shannon, WATER CAMPWS, Illinois*

5:30 – 7:00 p.m.
Poster Session and Reception
Micro and Nanotechnology Atrium

7:30 p.m.
Dinner/Lecture (by invitation)
I-Hotel, University of Illinois Research Park
www.stayatthei.com and www.tech.com

Friday, Sept. 5, 2008

(Micro and Nanotechnology
Laboratory)

7:30 – 8:30 a.m.
Continental Breakfast
Micro and Nanotechnology Atrium

BIONANOTECHNOLOGY AND NANOMEDICINE

8:30 a.m. – 12:20 p.m.
Session III
Chair – Edwin Hahn
College of Veterinary Medicine, Illinois

8:30 a.m.
**Nanostructures for Molecular
Sorting and Analysis**
Harold Craighead, Cornell

9:00 a.m.
Nanotechnology in Medicine
Mauro Ferrari, University of Texas, Houston

9:30 a.m.
**Ultra Precision Manufacturing:
The Quest for Perfection**
John Randall, Zyvex

10:00 a.m.
**Micro-shockwave Generator for
Gene/Nanoparticle Delivery**
Shubhra Gangopadhyay, Electrical and Computer
Engineering, University of Missouri

10:30 a.m.
Coffee Break

10:40 a.m.
**Applications of Nanotechnology in Medicine:
Stretching Genes with a Synthetic Nanopore**
Gregory Timp, Electrical and Computer
Engineering/Beckman, Illinois

11:00 a.m.
**Applying Microtechnology to
Global Health Diagnostics**
William Rodriguez, Harvard

11:30 a.m.
BioMEMS for Pharmaceutical Applications
Rashid Bashir, Micro and Nanotechnology
Laboratory/Electrical and Computer Engineering

11:50 a.m.
Nanomedicine at GE
Judith Stein, GE

12:20 a.m.
**High-throughput Detection
of Food-borne Pathogen**
Myung Kim, Kim Laboratories (local startup)

12:40 p.m.
Box Lunch and Poster Session
MNLT Atrium/Lab Tours

2:15 – 4:15 p.m.
Session IV
Chair – Sean Murdock, Nanobusiness Alliance

**Industry Panel: Research and Development
in Nanotechnology and Future**
Judith Stein, GE; **Murty Vyakarnam**, Johnson
and Johnson; **Mark Bohr**, Intel; **John Randall**,
Zyvex; **Myung Kim**, Kim Labs; **Munir Nayfeh**,
NanoSi Advanced Technology

4:00 p.m.
Closing Remarks
Irfan Ahmad, Center for Nanoscale
Science and Technology

4:15 p.m.
Adjourn

4:20 – 5:30 p.m.
Micro and Nanotechnology Laboratory Tours
Tours are available on request, signup online,
www.cnst.illinois.edu. Tour duration: 20mins;
tours start at 20 minute intervals from 4:20 p.m.
(Explore MNLT at: www.mnlt.illinois.edu)

Plenary Session Speaker



Arden Bement, Jr., Ph.D.

Director, National Science Foundation

Arden Bement Jr. became the twelfth director of the National Science Foundation (NSF) in 2004 after serving as acting director the previous nine months. Bement heads the only federal agency that funds research and education in all fields of science and engineering. He directs a budget of more than \$6 billion; hundreds of programs that support roughly 200,000 scientists, engineers, educators, and students across the country; and the development of world-class facilities and infrastructure. He oversees a robust international research program in the polar regions and several international partnerships to build sophisticated research and experimental facilities.

Since the White House launch of the American Competitiveness Initiative in 2006, Bement has overseen numerous initiatives that strengthen the U.S. innovation base and economic position and intensify the training of the American workforce to operate in a high-tech, global economy. His top priorities have included increasing the size and duration of NSF funding awards; implementing electronic proposal and grant processing at NSF; developing cyber-infrastructure that advances research and education through expanded capabilities for networking, data processing and storage, modeling, and simulation; and broadening international collaborations to leverage NSF investments. He has expanded NSF's centers of excellence program to encompass dozens of science and engineering disciplines partnering with industries and educators.

The diverse government advisory roles in which Bement has served include head of the NIST Visiting Committee on Advanced Technology; head of the advisory committee for NIST's Advanced Technology Program; and chair of the Commission for Engineering and Technical Studies and the National Materials Advisory Board of the National Research Council.

Bement holds metallurgical engineering degrees from the Colorado School of Mines (bachelor's), the University of Idaho (master's), and the University of Michigan (doctoral). He is a retired Lieutenant Colonel of the U.S. Army Corps of Engineers and a recipient of the Distinguished Service Medal of the Department of Defense.

Plenary Session Speaker



Robert Leheny, Ph.D.

Deputy Director, Defense Advanced
Research Projects Agency

Dr. Robert Leheny presently is Deputy Director of DARPA, the Defense Advanced Research Projects Agency, VA. He joined DARPA in October 1993 as a Program Manager in the area of optoelectronics. Since joining DARPA, his program interests have focused primarily on the application of photonics, microelectronics and MEMS technologies to communication and RF systems and related materials and device technologies for information processing systems applications.

Prior to joining DARPA, from 1987 to 1993 Dr. Leheny was an Executive Director for Network Technology Research in the Applied Research Laboratory of Bell Communications Research, Inc. (Bellcore, now known as Telcordia Technologies, Inc), Red Bank, NJ. In this position he was responsible for managing an organization researching materials and device designs for communication systems. From 1984 to 1987, he was Director of the Electronic Device Research Group in the same Laboratory at Bellcore. From 1967 to 1983 he was a member of technical staff in Electronics Research Lab at Bell Laboratories, Inc, Holmdel, NJ. From 1962 to 1967, he was a graduate student at Columbia University and from 1960 to 1962, he was employed as a Radar Systems Engineer with the Sperry Gyroscope Co, Great Neck, NY.

Dr. Leheny received his BS from the University of Connecticut in 1960 and a Doctor of Engineering Science Degree from Columbia University in 1966. In 1983, he was named a Bell Labs Distinguished Member of Technical Staff and in 1992 he was named a Distinguished Graduate of the University of Connecticut School of Engineering. He has published over 70 papers, co-edited a book and authored four book chapters. He is a Fellow of the IEEE and a member of the American Physical Society, American Association for the Advancement of Science, and the New York Academy of Sciences.