

## Plenary & Session Speakers

### Gregory J. Downing, D.O., Ph.D.

Director, Office of Technology and Industrial Relations  
Office of the Director, National Cancer Institute



Dr. Downing is Director of the Office of Technology and Industrial Relations (OTIR) in the Office of the Director at the National Cancer Institute (NCI), National Institutes of Health. In this role, he facilitates the collaboration among federal, academic, and private biomedical research sectors to support technology development that will yield innovative diagnostic, detection, and targeted treatment strategies for cancer. Through the OTIR, he supervises the administration of grants and contracts for programs in nanotechnology, biosensors, therapeutic delivery systems, and new technology platforms and imaging systems. He currently serves on several committees, including the NCI-FDA Interagency Oncology Task Force and the Biomedical Information Science and Technology Consortium.

### Robert Chau, Ph.D.

Intel Senior Fellow  
Director of Transistor Research and Nanotechnology



Dr. Robert Chau is an Intel Senior Fellow and Director of Transistor Research and Nanotechnology at Intel Corporation. He is responsible for directing research and development in advanced transistors, process modules, and technologies, and silicon integrated processes for microprocessor applications. He is also leading research efforts in emerging non-silicon nanotechnologies (e.g. III-V quantum-well devices and carbon nanotubes) for future nanoelectronics applications. Dr. Chau holds more than 75 U.S. patents, has received six Intel Achievement Awards and 13 Intel Logic Technology Development Division Recognition Awards, was recognized by *IndustryWeek* in 2003 as one of the 16 "R&D Stars" in the United States, and is an IEEE Fellow.

### Richard S. Fisher, Ph.D.

Nanomedicine Initiative, Project Team Leader,  
Program Director, Corneal Diseases, NEI, NIH



Richard S. Fisher received a Ph.D from the Department of Physiology and Biophysics at the University of Illinois at Urbana-Champaign. As a staff fellow in the Laboratory of Kidney and Electrolyte Metabolism, National Heart, Lung, and Blood Institute of the NIH, he continued studies of membrane transport properties and cell volume regulation. While a staff physiologist in the Department of Nephrology, Division of Medicine at the Walter Reed Army Institute of Research, he was also a visiting scientist at the Catholic University of Leuven, Belgium. Dr. Fisher returned to the NIH as a scientific review administrator in the National Institute of Deafness and Other Communication Disorders and then joined the National Eye Institute as a health science administrator where he is the Director of the Corneal Diseases program. He has served on the Institutional Review Board of Frederick Memorial Hospital, Frederick, MD, and has served on various trans-NIH committees. He also currently serves as the project team leader for the Nanomedicine Initiative.

## 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, Roy J. Carver 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, Center for the Design of Biomimetic Nanoconductors, National Center for Supercomputing Applications, and the School of Chemical Sciences. The CNST is working toward seamless integration of interdisciplinary research from atoms and materials to devices and systems. It 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. [www.cnst.uiuc.edu](http://www.cnst.uiuc.edu)

## Micro and Nanotechnology Laboratory

The Micro and Nanotechnology Laboratory (MNTL) at the College of Engineering, University of Illinois at Urbana-Champaign 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 to university and industrial researchers from across the nation. It contains over 8,000 square feet of class 100 and class 1000 clean room laboratory 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 MNTL research activities. Currently, an \$18 million expansion of the facility is underway, which includes bionanotechnology and additional space for researchers. The expansion is scheduled to complete by Fall 2006. [www.micro.uiuc.edu](http://www.micro.uiuc.edu)

## Workshop Organizing Committee

**Ilesanmi Adesida**, Interim Dean, College of Engineering, and Director CNST

**Irfan Ahmad**, Associate Director, CNST (co-Chair)

**Carolyn Anderson**, Mallinckrodt Institute of Radiology, Washington University in Saint Louis

**Kent Choquette**, Acting Director, Micro and Nanotechnology Laboratory (Chair)

**Dominique Griffon**, Associate Professor, Veterinary Clinical Medicine

**Eric Jakobsson**, Professor, Molecular and Integrative Physiology

**Jean-Pierre Leburton**, Professor, Electrical and Computer Engineering

**Graciela Padua**, Associate Professor, Food Science and Human Nutrition

**Taher Saif**, Associate Professor, Mechanical and Industrial Engineering

## Center for Nanoscale Science and Technology

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# CNST

## Nanotechnology Workshop

### May 4-5, 2006

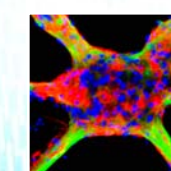
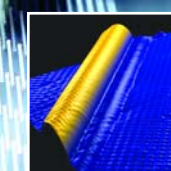
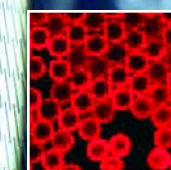
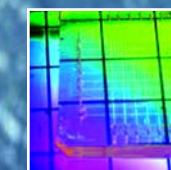
University of Illinois at Urbana-Champaign  
Beckman Institute for Advanced Science and Technology  
405 North Mathews Avenue  
Urbana, Illinois

### Sponsored by

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

### Co-sponsors

- Beckman Institute for Advanced Science and Technology
- Institute for Genomic Biology (IGB)
- Micro and Nanotechnology Laboratory
- Nanoscale Chemical, Electrical, Mechanical, Manufacturing Systems (Nano-CEMMS)
- National Center for Supercomputing Applications
- Siteman Center for Cancer Nanotechnology, Washington University in Saint Louis, and University of Illinois at Urbana-Champaign



## Workshop Premise

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

The general framework of the nanotechnology workshop will be similar to those held on campus in May 2003-05, 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 undergraduates, administration) from UIUC and Washington University, and industry engaged in cutting-edge research. A workshop panel will discuss the roadmap to future direction of research and development in nanomedicine.

The two-day workshop is being held on May 4 & 5, 2006 at the prestigious Beckman Institute for Advanced Science and Technology at the University of Illinois at Urbana-Champaign. The workshop program includes plenary session speeches, technical sessions, panel discussion, poster sessions, and laboratory tours, in addition to lunch and dinner receptions.

**Registration, Poster Signup, and Hotel Information**  
Pre-registration required. Register online at:  
[www.cnst.uiuc.edu/NanoWorkshop2006.htm](http://www.cnst.uiuc.edu/NanoWorkshop2006.htm)

### Parking

For parking directions to the Beckman Institute at the University of Illinois at Urbana-Champaign visit:  
[www.cnst.uiuc.edu/NanoWorkshop2006.htm](http://www.cnst.uiuc.edu/NanoWorkshop2006.htm)

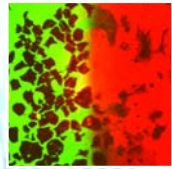
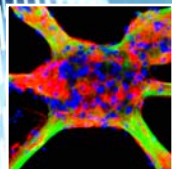
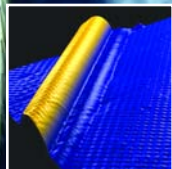
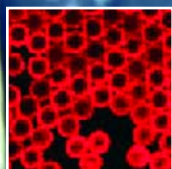
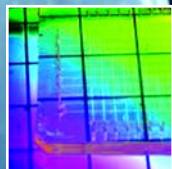
### For Workshop Information Contact

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### For Technical Collaboration Contact

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Dr. Irfan Ahmad, [isahmad@uiuc.edu](mailto:isahmad@uiuc.edu), 217.333.2015



## AGENDA

### Thursday, May 4, 2006

**7:30 – 8:15 a.m.**  
**Registration and Breakfast**  
Beckman, Room 1005

**8:30 – 10:00 a.m.**  
**Plenary Session**  
Auditorium  
Chair – Kent Choquette, Micro & Nanotechnology Laboratory

**8:30 a.m.**  
**Welcome Remarks**  
Richard Herman, Chancellor, University of Illinois at Urbana-Champaign

Charles Zukoski, Vice Chancellor for Research, University of Illinois at Urbana-Champaign

Ilesanmi Adesida, Interim-Dean, College of Engineering; Director, Center for Nanoscale Science and Technology

Tanya Gallagher, Dean, Applied Life Studies, University of Illinois at Urbana-Champaign

**9:00 a.m.**  
**Recent Advances and Future Directions in Cancer Nanotechnology**  
Gregory Downing, Director, Office of Technology & Industrial Relations, National Cancer Institute

**9:35 a.m.**  
**Silicon Innovations and Emerging Nanotechnologies for High-Speed and Low-Power Logic Applications**  
Robert Chau, Senior Fellow and Director of Transistor Research and Nanotechnology, Intel

**10:10 a.m.**  
**Coffee Break**

### NANOMEDICINE I

**10:30 a.m. – 12:30 p.m.**  
**Session I**  
Chair – Gregory Freund, College of Medicine

**10:30 a.m.**  
**The NIH Roadmap Nanomedicine Initiative**  
Richard Fisher, Nanomedicine Initiative, Project Team Leader, Program Director, Corneal Diseases, NEI, NIH

**10:50 AM**  
**Targeted Nanoparticles for Molecular Imaging and Therapy of Cancer and Cardiovascular Disease**  
Samuel Wickline, SCCNE/Washington University in Saint Louis

**11:10 a.m.**  
**Multifunctional Contrast and Therapeutic Agents for Optical Biomedical Imaging**  
Stephen Boppart, Bioengineering, Medicine, Electrical and Computer Engineering

**11:30 a.m.**  
**Imaging Breast and Prostate Tumors for Receptor Content and Receptor Function Using Positron Emission Tomography: A Guide to Targeted Therapy and a Route to Individualized Medicine**  
John Katzenellenbogen, Chemistry

**11:50 a.m.**  
**Single Walled Carbon Nanotubes as Near Infrared Fluorescent Biomolecular Probes**  
Michael Strano, Chemical and Biomolecular Engineering

**12:10 p.m.**  
**Nanowrinkles and Nanofolds in an On-demand Drug Delivery**  
Sahraoui Chaieb, Mechanical and Industrial Engineering

**12:30 – 1:45 p.m.**  
**Buffet Lunch**  
Beckman, Room 1005  
**Poster Session**  
Beckman, Atrium

### NANOMEDICINE II

**1:45 – 3:45 p.m.**  
**Session II**  
Chair – Bruce Wheeler, Bioengineering

**1:45 p.m.**  
**Actin Agglomeration in Single Cells Due to Mechanical Stimuli**  
Taher Saif, Mechanical and Industrial Engineering

**2:05 p.m.**  
**Visualizing the Molecular Signals in Live Cells by FRET**  
Yingxiao Wang, Bioengineering

**2:25 p.m.**  
**Roles of Nanomolecules and Nanomaterials in Optical Imaging of Tumors In Vivo**  
Samuel Achilefu, Radiology, Washington University in Saint Louis

**2:45 p.m.**  
**Atomic Resolution Imaging of Nanodevices with Large Scale Molecular Dynamics**  
Aleksi Aksimentiev, Physics

**3:05 p.m.**  
**Program of Excellence in Nanotechnology at Washington University**  
Carolyn Anderson, Radiology, Washington University in Saint Louis

**3:25 p.m.**  
**Ultrasound Mediated Delivery of RNAi for the Treatment of Metastatic Cancer using Targeted Nanoparticles**  
Kenneth Watkin, Speech and Hearing Sciences

**3:45 p.m.**  
**Coffee Break**

### PANEL ON RESEARCH AND DEVELOPMENT, AND SOCIETAL ISSUES IN NANOMEDICINE

**4:00 – 5:30 p.m.**  
**Session III**  
Moderator – Eric Jakobsson, Molecular and Integrative Physiology, Center for the Design of Biomimetic Nanoconductors

**Panelists:** Brian Cunningham (ECE, UIUC and SRU Biosystems); Wayland Eppard, Patient Advocacy Committee, NCCTG; Gregory Downing, NCI; and Samuel Wickline, SCCNE, Washington University Medical School

**5:30 – 7:00 p.m.**  
**Poster Session and Reception**  
Beckman, Atrium

### Friday, May 5, 2006

**7:30 – 9:00 a.m.**  
**Continental Breakfast**  
Beckman, Room 1005

**8:00 – 9:30 a.m.**  
**NIH Grant Writing Workshop**  
Richard Fisher, Program Leader, Nanomedicine, NIH  
Room 5602 Beckman Institute (seating limited: **pre-registration required**; send email to [nano@cnst.uiuc.edu](mailto:nano@cnst.uiuc.edu))

**Objective:** This CNST-organized session is primarily intended for UIUC engineering faculty and others who have had little or no NIH grant-writing experience, and have continued interest in working with/through CNST on Nanotechnology-based research and development.

### NANOELECTRONICS/ NANOPHOTONICS

**9:15 – 11:15 a.m.**  
**Session IV**  
Chair – James Coleman, Electrical and Computer Engineering

**9:15 a.m.**  
**Microcavity Plasma Devices and Rare Earth-Doped Nanoparticles**  
Gary Eden, Electrical and Computer Engineering

**9:35 a.m.**  
**Carbon Nanotubes – From Individual Devices to Integrated Circuits**  
Zhihong Chen, T.J. Watson Research Center, IBM

**9:55 a.m.**  
**EXX Phenomena in Semiconductor-metal Hybrid Structures**  
Stuart Solin, Physics, Washington University in Saint Louis

**10:15 a.m.**  
**Silicon Photonics: Recent Progress in Silicon Laser and Amplifier based on Stimulated Raman Scattering**  
Haisheng Rong, Intel

**10:35 a.m.**  
**Controlling Carbon Nanotube Quantum Devices**  
Nadya Mason, Physics

**10:55 a.m.**  
**Nanoelectronic and Nanophotonic Applications for Compound Semiconductors**  
David Ahmari, Epiworks, Inc.

**11:15 a.m.**  
**Coffee Break**

### NANOMATERIALS/ NANOMANUFACTURING

**11:30 a.m. – 1:00 p.m.**  
**Session V**  
Chair: Placid Ferreira, Nano-CEMMS

**11:30 a.m.**  
**Tubes, Ribbons and Wires for Printed Electronics**  
John Rogers, Materials Science and Engineering/Nano-CEMMS

**11:50 a.m.**  
**Quest for Rapid Manufacturing at Nanoscale: An Optical Approach**  
Nicholas Fang, Mechanical and Industrial Engineering/Nano-CEMMS

**12:10 p.m.**  
**Integrated Microfluidic Networks for Nanoliter Combinatorial Chemistry**  
Paul Kenis, Chemical and Biomolecular Engineering/Nano-CEMMS

**12:30 p.m.**  
**Nanofabrication using HSQ**  
Niu Jin, Mechanical and Industrial Engineering; Mark Shannon, Mechanical and Industrial Engineering; and Ilesanmi Adesida, Electrical and Computer Engineering

**12:50 p.m.**  
**Closing Remarks**  
Irfan Ahmad, CNST

**1:00 – 1:45 p.m.**  
**Box Lunch**

**2:00 – 4:00 p.m.**

**Tours**  
• FS Materials Research Laboratory  
• Bioengineering Department  
• National Center for Supercomputing Applications  
(signup online at [www.cnst.uiuc.edu/NanoWorkshop2006.htm](http://www.cnst.uiuc.edu/NanoWorkshop2006.htm). Tour duration: 20 minutes; tours start at 20-minute intervals beginning at 2:00 p.m.)