HANDS-ON NANOFABRICATION WORKSHOP FOR EDUCATORS

This workshop will be an exploration of the world of nanotechnology. Participants will learn about the growing applications of nanotechnology in many industries including the biotechnology, MEMS, optoelectronics, chemical, and nanoelectronics industries. The basics of nanofabrication processes and tools will be covered and emphasized through processing labs held in the class 10 cleanrooms of the Penn State Nanofabrication Facility. This three-day workshop is broken down into daily morning lectures by nationally recognized Penn State researchers and engineering staff and into afternoon lab sessions in nanofabrication. The agenda is attached.

Target Audience: College and University Faculty, Secondary Science and Technology Teachers, Vocational-Technical Teachers, Guidance Counselors, school administrators and others

Where: Penn State Center for Nanotechnology Education and Utilization
101 Innovation Blvd., Suite 114
University Park - State College, PA 16802

When: May 9-11, 2006

Workshop Fee: $200.00 for PA educators *; $500.00 for non PA educators

* Participation by PA educators is partially supported by the Commonwealth of PA

Workshop Fee Includes:
- Workshop registration
- Workshop materials/lab manuals (distributed at the workshop)
- Lunch as a group function

Hotel as well as travel from your institution to the workshop and the return are NOT covered.

How does it work?
- Complete and return the workshop registration form to the Penn State Center for Nanotechnology Education and Utilization
  Attn: Tina Crosson, 101 Innovation Blvd., Suite 112, University Park PA 16802-7003.
  Registration closes April 28, 2006. Please register as soon as possible; spaces fill up quickly.
- A block of rooms is being held at the Penn Stater Conference Center until April 3. Please contact the Penn State Hospitality Services Reservation Department directly prior to April 3 to reserve your room. The number to call is: 1-800-233-7505. Attendees should reference reservation ID# CNE0508_001.
- You will be responsible for your transportation to and from the workshop each day.
- Additional details will be mailed/faxed to you as a confirmation.
- If you have any registration questions, contact Tina Crosson at (814) 863-2955, or tcrosson@engr.psu.edu
- If you have any workshop questions, contact Bill Mahoney at (814) 865-9081 or bmahoney@engr.psu.edu

This workshop is co-sponsored by the State of Pennsylvania and by the National Science Foundation under the auspices of the National Nanotechnology Infrastructure Network.
HANDS-ON NANOFABRICATION WORKSHOP FOR EDUCATORS
(Must be received by April 28, 2006)

Name: ____________________________________________________________

Title: ____________________________________________________________

Organization: ______________________________________________________

Address: ___________________________________________________________________

Work Phone: ______________________           Home Phone: ______________________

FAX: ______________________________________________________________________

E-mail: ____________________________________________________________________

Check 1 box-    ☐ Secondary School    ☐ Vocational Technical School
☐ 2-Year College    ☐ 4-Year College/University

Workshop Fee:    ☐ $200 PA Educators
☐ $500 Non PA Educators

Special Needs: ____________________________________________________________

Sorry, we do not accept credit cards.

Make checks payable to Penn State and send to the address below:

Return To:  Penn State Center for Nanotechnology
            Education and Utilization
            Attn: Tina Crosson
            101 Innovation Blvd., Suite 112
            University Park, PA 16802-7003

            Phone: 814-863-2955
            Fax: 814-865-3018
            Email: tcrosson@engr.psu.edu
AGENDA
Day One

8:00 a.m. – 8:30 a.m.  Continental Breakfast/Registration  (114 Lubert Building)

8:30 a.m. – 9:30 a.m.  Welcome and Overview of the Workshop and the CNEU
Bob Ehrmann
Director of Education & Outreach Services
CNEU

9:30 a.m. – 10:15 a.m.  Keynote: The World of Nanotechnology
Dr. Stephen J. Fonash
Director
CNEU

10:15 a.m. – 10:30 a.m.  Break

10:30 a.m. – 11:30 a.m.  Historical Perspective of Nanotechnology
Bill Mahoney
Project Engineer/Outreach Associate
CNEU

11:30 a.m. – 12:00 p.m.  Video Presentation

12:00 p.m. - 12:30 p.m.  Lunch

12:30 p.m. – 1:30 p.m.  Nanoscale Characterization and Metrology
Amy Brunner
Project Engineer/Outreach Associate
CNEU

1:30 p.m. – 4:30 p.m.  Rotating Activity Sessions: See Lab Agenda for Details (MRI Building)
  - Nanotechnology Products, Applications, Careers, and Education
    - 114 MRI
  - Tour of Clean Room / Lab
    - 127 MRI
AGENDA

Day Two

8:00 a.m. – 8:30 a.m. Contintental Breakfast *(114 Lubert Building)*

8:30 a.m. – 9:30 a.m. Lithography and Deposition Techniques
Bill Mahoney
Project Engineer/Outreach Associate
CNEU

9:30 a.m. – 9:45 a.m. Break

9:45 a.m. – 10:45 a.m. Etch Techniques
Terry Kuzma
NMT Program Instructor
CNEU

10:45 a.m. – 11:00 a.m. Break

11:00 a.m. – 12:00 p.m. Nanoparticle Synthesis
Dr. Ali Kaan Kalkan
Research Assistant
CNEU

12:00 p.m. – 12:30 p.m. Lunch

12:30 p.m. – 12:45 p.m. Lab Orientation / Safety Reminders

12:45 p.m. – 3:15 p.m. Rotating Lab Activity Experiments:  See Lab Agenda for Details *(MRI Building)*
• Atomic Force Microscopy (AFM)
• Lithography and Etching
• Deposition and Characterization
• Optical Metrology and Scanning Electron Microscopy.

3:15 p.m. – 4:15 p.m. General Discussion / Q & A Session *(114 Lubert Building)*
AGENDA
Day Three

8:00 a.m. – 8:30 a.m. Continental Breakfast (114 Lubert Building)

8:30 a.m. – 9:30 a.m. Micro-Electrical-Mechanical-Systems (MEMS) and NEMS
Amy Brunner
Project Engineer/Outreach Associate
CNEU

9:30 a.m. – 9:45 a.m. Break

9:45 a.m. – 10:45 a.m. Bottom-Up Nanofabrication/Nano-Bio
Dr. Wook-Jun Nam
Post Doctoral Scholar
CNEU

10:45 a.m. – 11:00 a.m. Break

11:00 a.m. – 12:00 p.m. Nanoelectronics
Shawn Keebaugh
Graduate Student

12:00 p.m. – 12:45 p.m. Lunch/Workshop Evaluation/Wrap-Up

12:45 p.m. – 3:15 p.m. Rotating Lab Activity Experiments: See Lab Agenda for Details (MRI Building)
- Atomic Force Microscopy (AFM)
- Lithography and Etching
- Deposition and Characterization
- Optical Metrology and Scanning Electron Microscopy

3:15 p.m. – 4:00 p.m. Final Workshop Q & A / Workshop Evaluations / Wrap-up (114 Lubert Building)