



## Center for Nanotechnology Education and Utilization

### 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:** Nov. 13-15, 2007

**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 is **NOT** covered.

**How does it work?**

- Complete and return the workshop registration form to the Penn State Center for Nanotechnology Education and Utilization  
Attn: Lisa Daub, 101 Innovation Blvd., Suite 112, University Park PA 16802-7003.  
**Registration closes Nov 1, 2007. Please register as soon as possible; spaces fill up quickly.**
- A block of rooms is being held at the Penn Stater Conference Center Hotel until October 12<sup>th</sup>. The room rates are \$99/night single and \$109/night double.
- Please contact the Penn State Hospitality Services Reservation Department directly prior to October 12<sup>th</sup> to reserve your room. The number to call is: 1-800-233-7505. Attendees should reference the reservation identification # CNE1112.
- 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 Lisa Daub at (814) 865-9635, or ldaub@engr.psu.edu
- If you have any workshop questions, contact Amy Brunner at (814) 865-8977 or abrunner@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 November 1, 2007)*

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: Lisa Daub  
101 Innovation Blvd., Suite 112  
University Park, PA 16802-7003**

**Phone: 814-865-9635  
Fax: 814-865-9400  
Email: [ldaub@engr.psu.edu](mailto:ldaub@engr.psu.edu)**

***This agenda is a sample only and subject to change.***

## **AGENDA**

### **Day One**

8:00 a.m. – 8:30 a.m.	Continental Breakfast/Registration
8:30 a.m. – 9:30 a.m.	Welcome and Overview of the Workshop and the CNEU
9:30 a.m. – 10:15 a.m.	Keynote: The World of Nanotechnology
10:15 a.m. – 10:30 a.m.	Break
10:30 a.m. – 11:30 a.m.	Historical Perspective of Nanotechnology
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
1:30 p.m. – 4:30 p.m.	Rotating Activity Sessions: See Lab Agenda for Details <ul style="list-style-type: none"><li>• Nanotechnology Products, Applications, Careers, and Education</li><li>• Tour of Clean Room / Lab</li></ul>

# AGENDA

## Day Two

8:00 a.m. – 8:30 a.m.	Continental Breakfast
8:30 a.m. – 9:30 a.m.	Lithography and Deposition Techniques
9:30 a.m. – 9:45 a.m.	Break
9:45 a.m. – 10:45 a.m.	Etch Techniques
10:45 a.m. – 11:00 a.m.	Break
11:00 a.m. – 12:00 p.m.	Nanoparticle Synthesis
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 <ul style="list-style-type: none"><li>• Atomic Force Microscopy (AFM)</li><li>• Lithography and Etching</li><li>• Deposition and Characterization</li><li>• Optical Metrology and Scanning Electron Microscopy.</li></ul>
3:15 p.m. – 4:15 p.m.	General Discussion / Q & A Session

# **AGENDA**

## **Day Three**

8:00 a.m. – 8:30 a.m.	Continental Breakfast
8:30 a.m. – 9:30 a.m.	Micro-Electrical-Mechanical-Systems (MEMS) and NEMS
9:30 a.m. – 9:45 a.m.	Break
9:45 a.m. – 10:45 a.m.	Bottom-Up Nanofabrication/Nano-Bio
10:45 a.m. – 11:00 a.m.	Break
11:00 a.m. – 12:00 p.m.	Nanoelectronics
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 <ul style="list-style-type: none"><li>• Atomic Force Microscopy (AFM)</li><li>• Lithography and Etching</li><li>• Deposition and Characterization</li><li>• Optical Metrology and Scanning Electron Microscopy</li></ul>
3:15 p.m. – 4:00 p.m.	Final Workshop Q & A / Workshop Evaluations / Wrap-up