

## National Nanotechnology Infrastructure Network Vol.3 # 3

### A Periodic Newsletter of NNIN News and Announcements

June, 2007

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## NNIN

The National Nanotechnology Infrastructure Network consists of 13 nanotechnology user facilities at 13 major academic institutions. Funded by the National Science Foundation, our facilities are available to the national user community on an open basis. We provide accessible resources across the entire breadth of nanotechnology. To this end, each site has specialized areas of expertise within the network, ranging from biology and chemistry to materials characterization and traditional microfabrication. Complete information on NNIN sites, resources and access is available via the web site at [nnin.org](http://nnin.org).

## New Equipment and Processes

### **ALD System to be installed at Penn State Nanofabrication Facility**

The Penn State Nanofabrication Facility is in the process of purchasing an Atomic and Molecular Layer Deposition system to support its existing infrastructure and unique set of molecular scale analysis and fabrication instrumentation. The Savannah 200 Standard 8 ALD reactor is configured with 4 automated precursor lines and an additional manual precursor line. The 8 inch diameter internal chamber will allow the processing of small pieces through 8 inch substrates which meets the current and future needs of users. The system will be installed and on-line by August 2007.

### **New FEI Tecnai 300-kV Cryo TEM at University of Minnesota**

A recent major acquisition at the University of Minnesota's Characterization Facility ([www.charfac.umn.edu](http://www.charfac.umn.edu)) is a new FEI Tecnai 300-kV transmission electron microscope for cryogenic applications, energy-filtered imaging, and loss spectroscopy as well as 3D reconstruction (tomography). This next-generation system is primarily intended for bio as well as soft synthetic systems such as block copolymers and nanostructured composite formulations. A fully configured system is expected by the end of June.

### **New Trias SPA plasma processing system at Stanford University**

Tokyo Electron Limited (TEL) has donated a Trias SPA plasma processing system to the Stanford Nanofabrication Facility. This single wafer system will be used to produce high-quality dielectric films on a variety of structures. The Slot Plane Antenna (SPA) design produces a high density of free radicals at a low electron temperature resulting in lowered process temperatures while maintaining high film quality. Because the process temperature is below 400 degrees Celsius, it will be attractive to a broad range of users.

Installation of this tool is complete and it is currently undergoing testing and characterization.

## Equipment Highlights

### **ASML Step and Scan System at North Carolina State University**

The ASML PAS 5500/950B model Step and Scan system at the Triangle National Lithography Center (TNLC) offers a number of options for very precise alignment or overlay of one lithography layer over another. The tool specification calls for overlay accuracy of plus or minus 30 nanometers and extensive data have been collected recently to document the actual overlay achieved. It is important, however, that the process be planned to ensure that the alignment fiducials that are printed with the first layer are preserved so the system can read them. The TNLC staff should be consulted to formulate an overlay process plan to make the best use of the available options.

## Facilities

### **New Laboratory for Integrated Science and Engineering at Harvard University**

The Center for Nanoscale Systems (CNS) at Harvard University is moving! The new Laboratory for Integrated Science and Engineering (LISE) is in the final stages of completion and CNS will begin to move its personnel into the building in late June and early July with the facilities to follow. This new 137,000 square foot building will consolidate CNS equipment and staff into one building and provide CNS/NNIN users with ultra-modern, world-class facilities to conduct nanoscale science. Along with the new building, CNS is ordering a lot of new equipment for LISE that will be arriving throughout the summer and autumn. Please note that CNS will move the current facilities in stages to insure no loss in capability during the move-in period. Please stay tuned to the CNS web page, [www.cns.fas.harvard.edu](http://www.cns.fas.harvard.edu) for information regarding the move and new equipment.

## Workshops and Conferences

### **2007 ASEE Workshops on K-12 Engineering Education**

Nancy Healy and Diana Palma of the NNIN Education Office at Georgia Tech presented two workshops at the 2007 ASEE Workshop on K-12 Engineering Education in Honolulu, Hawaii, Saturday, June 23, 2007. These Nanotechnology in the classroom workshops were intended for middle and high school teachers and provided hands-on lessons that can be used in the classroom. The website for the event is:

<http://www.engineeringk12.org/k12workshop2007/program.htm>

### **Workshops at the University of Michigan**

The Michigan Nanofabrication Facility at the University of Michigan is organizing a 2 day workshop for Small Businesses held on August 1, 2007 - August 2, 2007. It will provide an introduction to micro and nanofabrication technologies for industrial engineers and researchers. No previous microfabrication experience is required. For more information and online registration, please visit

<http://www.mnf.umich.edu/Events.aspx?id=86>

### **NNIN Participates in NanoInformatics Workshop at NSF**

On June 12 and 13 at the Westin Gateway Hotel in Arlington, a workshop was held under the auspices of the National Nanomanufacturing Network and the NSF Center for Hierarchical Manufacturing to discuss the emerging field of NanoInformatics.

*Nanoinformatics* involves the development of effective mechanisms for collecting, sharing, visualizing and analyzing information relevant to the nanoscale science and engineering community. It also involves the utilization of information and communication technologies that help to launch and support efficient communities of practice. Nanoinformatics is necessary for comparative characterization of nanomaterials, for design and use of nanodevices and nanosystems, for instrumentation development and manufacturing processes. The purpose of this workshop is to identify and prioritize nanoinformatics needs, discuss ongoing activities and draw up strategies for the future.

NNIN was represented by coordinator Michael Stopa who presented a synopsis of NNIN and the computation project and focused on the creation and usage of databases, areas where such databases were currently impractical, and high performance and petaflop computing.

Representatives to the Workshop included Mihail Roco from NSF and Nancy Miller from NIH as well as participants from the National Cancer Institute's caBIG database program, from the National Institute for Occupational Safety and Health and the NanoInformatics program at the Department of Energy. Altogether approximately 25 participants attended. The workshop was organized by Dr. Mark Tuominen of the University of Massachusetts at Amherst. A report, to be handed to the National Science Foundation, will be written on the workshop's conclusions within the coming months.

### **Penn State Materials Characterization Lab Summer Open Houses**

Penn State Materials Characterization Lab will be hosting free open houses on Thursday mornings throughout the summer for researchers interested in learning more about materials characterization and sample analysis. Each Thursday from June 7 through August 23, a different characterization technique will be highlighted, first by a technique overview and discussion of MCL capabilities, followed by a lab tour and introduction to the instrumentation. External users are encouraged to attend the open houses, which will run from 10:00am to 12:00pm each week. For more information, please see our webpage at: [www.mri.psu.edu/ematerials/v07i03/MCLOpenHouse.asp](http://www.mri.psu.edu/ematerials/v07i03/MCLOpenHouse.asp)

### **Cornell University to host Short Course**

J.A. Woolam Co., leaders in the field of Spectroscopic Ellipsometry, will offer its 4 day short course on Data Analysis for Spectroscopic Ellipsometry at Cornell University July 30-Aug. 2. The registration deadline is June 29. Please visit:

[http://www.cnf.cornell.edu/cnf\\_woollamcourse.html](http://www.cnf.cornell.edu/cnf_woollamcourse.html)

## **Outreach**

### **"Day in Nanotechnology" workshop at East Georgia State College**

NNIN RET 2006 participant Joyce Palmer presented a workshop at East Georgia State

College on June 13. The "Day in Nanotechnology" was presented to 30 middle and high school teachers who were participating in a two-week science enrichment program. The teachers were from four counties in east Georgia. Joyce used several units developed by NNIN to show how nanotechnology instructional units can be incorporated into the classroom and be used to teach science concepts currently taught by teachers. Teachers learned about current nanoproducts, size and scale, shape memory alloys, self assembly, and hydrophobic/hydrophylic properties.

### **2007 NNIN Research Experience Program**

The 2007 NNIN Research Experience for Undergraduates Program has begun at 12 NNIN sites. 72 students were selected from across the country to participate in this 10 week research program. Projects cover the breadth of nanotechnology using the extensive resources available within NNIN. At the end of the program, all the participants will gather at UCSB Aug. 8-11 for the NNIN REU Convocation to share their results with their peers.

### **Middle + High School Workshop**

Come to the Michigan Nanofabrication Facility to learn about microelectronics, nanotechnology and more! The MNF is organizing a one-day Nanocamp for middle and high school students on July 24th, 2007. Please visit <http://www.mnf.umich.edu/Events.aspx?id=87> for more details and application information.

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NNIN is a network of open user facilities. All resources at member facilities are available equally to users from Academia, industry, and government. Contact information and facility details are available via the NNIN web site at <http://www.nnin.org>.