

National Nanotechnology Infrastructure Network Vol.3 # 4

A Periodic Newsletter of NNIN News and Announcements

July, 2007

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.

New Equipment Highlights

New Spectroscopic Ellipsometer at the University of Minnesota

Ellipsometry measures the change in polarization of light that occurs upon reflection from or transmission through interfaces of different materials. Analysis of ellipsometric data can be used to determine layer thickness, surface and interfacial roughness, sample anisotropy and optical constants (refractive index and extinction). The VASE ellipsometer features the Woollam patented AutoRetarder technology which allows the measurements of polarization change over the full phase range (0 -360), and advanced measurement capabilities such as depolarization and anisotropic sample scans. It has a wavelength range of 250-1100 nm, and a translational stage for 2-D mapping. The instrument is equipped with the WVASE32 software package that provides easy calibration, data acquisition, and analysis for all different applications. Pending sufficient user interest, grants may be pursued to buy various add-ons to expand research functionality such as wider wavelength range (193-2200nm), variable temperature (4.2-700K), and high resolution mapping (~100 m spot size with focusing optics), etc.

The PSNF has purchased an Etch-Develop-Clean (EDC) Unit and Two Spin Processing Units

The EDC unit will be used for automated developing and will improve throughput and repeatability and reduce developer usage. The new spin processing units will improve the cleanliness and repeatability of our spin casting processes. The three Laurel units will be placed in new Reynolds Tech processing stations with laminar air flow and will replace the existing two lithography benches. These units will be available for use in August 2007.

CNS at Harvard has acquired NSOM for Materials Characterization

The WiTek Alpha300 combines the advantages of NSOM (Near Field Scanning Optical Microscopy), Confocal Raman Microscopy, and Atomic Force Microscopy in a single instrument, selectable by simply rotating the objective turret. This system allows NNIN users to acquire chemical information non-destructively with a resolution down to the optical diffraction limit (~ 200 nm). In the confocal mode it is possible to collect information from the sample surface, and to look deep inside transparent samples to obtain 3D information. Using the AFM mode users may measure surface properties such as local adhesion or stiffness on the nanometer scale. This system is located in the new Laboratory for Integrated Science and Engineering (LISE). For more information regarding the WiTek Alpha300, or to request training as a user, please contact Jiangdong Deng at jdeng@cns.fas.harvard.edu.

Lithography Processing at TNLC involving BARC Layer

In the 193 nm lithography processes used in the TNLC, a BARC layer is used both as an adhesion promoter for 193 nm resist and as an antireflective coating. However, removal of the BARC layer requires a dry etching step, which can sometimes damage or oxidize underlying layers, and a number of different users would like to spin resist directly on underlying resist. Fortunately, some non-aminic adhesion promoters have recently been introduced, and we are currently in the process of obtaining and evaluating these materials, in particular their impact on resolution, in hopes that we will soon be able to offer a processing option that does not require BARC.

Workshops and Conferences

Nanotechnology and Microfabrication for Small Businesses at Michigan Nanofabrication Facility

This 2-day workshop on August 1-2 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>

Surface Modification by Ion Beams

The Michigan Ion Beam Analysis Laboratory at the University of Michigan is organizing a 1-day workshop on Surface Modification by Ion Beams on September 13th, 2007. Please visit <http://ssel-front.eecs.umich.edu/Events.aspx?id=88> for more information.

NAMBE Conference and Workshop

The Workshop on Nanoscale Epitaxial Semiconductor Structures (in conjunction with North America Molecular Beam Epitaxy Conference) will start at noon, Sept. 26th and end at noon, Sept. 27th, 2007, Albuquerque, NM.

Nanoscale epitaxial semiconductor structures with two or three of their dimensions at the nanometer scale promise revolutionary new device concepts and significant performance improvements for current devices. This workshop will spotlight the latest results of this disruptive technology and will focus on the epitaxial growth, characterization and device results of nanoscale epitaxial structures.

This workshop is co-sponsored by the NSF National Nanotechnology Infrastructure Network (NNIN) and the DOE Center for Integrated Nanotechnologies (CINT)
<http://nsg.chtm.unm.edu/>

Education and Outreach

NNIN sites offering Summer Camps in Nanotechnology During June & July

These camps for middle and high school students provide an introduction to the world of nanotechnology by means of lectures, demonstrations, and hands-on activities. Camps run from three to five days, depending of the NNIN location.

The NNIN Research Experience for Undergraduates program began in June and the interns are now well into their research projects. A total of 70 undergraduate students are participating in the summer 2007 program at 12 of the NNIN sites. In addition, the NNIN Research Experience for Teachers program also began in June. Teachers are spending six weeks undertaking nanotechnology research projects. Participants are at five sites: Georgia Institute of Technology, Harvard University, Howard University, Pennsylvania State University, and University of California Santa Barbara.

NNIN REU Convocation

The 70 students participating the the NNIN Research Experience for Undergraduates will gather at the University of Santa Barbara Aug. 9-11 for the annual end of program convocation. Each student will present his results to the group of his peers and also participate in a poster session. Video of the convocation will be streamed live on the web from a link that will be available on the NNIN web site on the day of the event. More information on the Convocation and the NNIN REU program is available at http://www.nnin.org/nnin_reu.html

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>.