

National Nanotechnology Infrastructure Network Vol.3 # 4

A Periodic Newsletter of NNIN News and Announcements

December, 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

Facilities Highlights

Michigan's New Cleanroom Facility

The Michigan Nanofabrication Facility has reached substantial completion of its expansion project. The new cleanroom space and all of the ancillary support systems will be operational at that point, and the MNF will begin testing and connecting them with existing laboratory facilities. The expansion will add 4500 sq. ft. of Class 100/ISO M3.5 cleanroom to the MNF's current cleanroom. Pictures and more information about the new cleanroom can be found at <http://ssel-front.eecs.umich.edu/News.aspx?id=89>.

UW Nanotech User facility expands

The NTUF is delighted to announce that it will expand its footprint by 1,500 square feet to accommodate steady growth in usage. The new facility will house a cell culture room, the soft lithography shop, and nanometrology and characterization tools including scanning probe microscopes, confocal microscope, and Raman confocal microscope.

New Equipment Highlights

Michigan Installs Chemical Mechanical Polisher

The Michigan Nanofabrication Facility has installed and characterized processes for a new IPEC 472 chemical mechanical polishing tool. The tool is configured for 4 wafers, can process from 1-25 wafers at a time, and handles up to three slurries. Slurries have been characterized for CMP of silicon, silicon dioxide, and silicon nitride. For further information about this tool, please contact Dr. Pilar Herrera-Fierro (pilarhf@eecs.umich.edu).

Intel Donates High Resolution Profilometer to Michigan

The Michigan Nanofabrication Facility is pleased to announce the generous donation of a KLA-Tencor HRP-200 High Resolution Profilometer by Intel. This surface profilometer, which is now operational, can measure surface topography, surface roughness, and step height with a resolution of ~1 nm, over scanning distances and areas ranging from a few microns to several millimeters. At different scan speeds, it can measure step heights of a few Angstroms up to hundreds of microns.

UW soft lithography shop opens for business

The University of Washington Nanotech User Facility (NTUF) has expanded its micro- and nanofabrication capabilities by adding a soft lithography shop to assist users in the exploration of non-conventional micro- and nanofabrication approaches in support of research projects related to nanobiology and nanomedicine. Capabilities include a project-based portfolio for fabrication methods, expert assistance in the design of custom experiments and a flat rate cost structure. For more information please visit: <https://depts.washington.edu/ntuf/facility/service.php>

Penn State Installs Surface Particle Inspection Analyzer

The Penn State Nanofabrication Facility is installing a Tencor Surfscan 4500 Surface Particle Inspection Analyzer. This laser-based system scans the entire substrate surface producing color coded graphic displays and hardcopy printouts of particles locations. Sub-micron particles, down to 0.2 μm are readily detected. The system has a measurement time of 30 seconds on 6 wafers, particles sensitivity is 0.2 μm diameter latex spheres, haze sensitivity is 0.4ppm, spatial resolution is 50 μm spacing minimum, measurement range: 0.004 μm and 102 μm in twelve ranges and 256 gradations. The Tencor Surfscan 4500 Surface Particle Inspection Analyzer will be available for use in November 2007.

The FIB-Center at GT Moves to MiRC

After extensive discussions on the future of the FIB-Center at Georgia Tech beyond the NSF funding period and its sustained maintenance and growth, we are honored to announce that the FIB-Center will become a visible component of the Microelectronics Research Center (MiRC), and will relocate to the Pettit Building, room 160. We are more than pleased with this development, as the diverse background of the MiRC users base will significantly expand and enhance the FIB users community on state-of-the-art nanofabrication and -characterization with FIB-SEM technology, which ideally complements the e-beam lithography system at MiRC. We anticipate that an even broader user base will now take advantage of FIB-SEM technology, while the already existing user community at the FIB-Center will benefit from the proximity to MiRC, and its rather outstanding selection of micro- and nanofabrication technologies.

New Zeiss NVision 40 Dual Beam Focused Ion Beam at Harvard University

A next generation CrossBeam workstation with EsB detection, Gemini electron beam column, and SIINT zeta focused ion beam column has been installed in the Center for Nanoscale Systems at Harvard University. The electron beam column has a resolution of 1.1 nm at 20 kV, while the ion beam column has a resolution of 4 nm at 30 kV. A Raith lithography package allows simple and complicated patterning and milling. Additional capabilities include tungsten, carbon, silicon dioxide, water and xenon difluoride gas injection systems; Omniprobe 3000; an EDAX Apollo 40 energy dispersive spectrometer; a liquid nitrogen temperature cooling stage; and a heating stage.

TNLC Integrates Spin Coater Track with Step and Scan System

The Triangle National Lithography Center has an SVG 90-SE spin coater track that is integrated with the ASML 193 nm wavelength PAS 5500/950B step and scan system. This production grade coater is configured for 6 inch wafers, and includes one spinner module along with three hotplates and three chill plates. It provides front and backside edge bead removal and includes two filtered pump systems primed with BARC (bottom anti-reflective coating) and photoresist. It has been configured, however, to allow for manual dispense of photoresist from a syringe or dropper. This feature is being utilized by researchers from both industry and the university community to test experimental resist formulations using small amounts of resist, yet utilizing the high quality contamination control, edge bead removal, baking, and handling provided by a track system.

Workshops and Conferences

Technology and Characterization at the Nanoscale - 3 day workshop

The Cornell Nanoscale Facility will conduct a three day lecture and laboratory short course, Jan 15-18, at Cornell University in Ithaca, New York. Attendance is open to the general scientific community, not limited to current or future CNF lab users. This session will use typical fabrication processes for microfluidics, MEMS cantilevers, and nanoelectrodes as demonstration vehicles for both the lab and lecture sessions. To maximize the learning experience, attendance is limited to 30 people. [Pre-registration required.](#)

Nanoscale Probing of Biomaterials and Biointerfaces

The University of Minnesota Characterization Facility will present a one day workshop on Nanoscale Probing of Biomaterials and Biointerfaces, Jan 16, 2007. The workshop will include laboratory demonstrations and attendee sample analysis using Scanned Probe microscopy, nanomechanical testing, confocal Raman microscopy, electron microscopy, XPS, and time of flight mass spectroscopy. For details, contact Greg Haugstad at Haug001@umn.edu

Nanoscale Epitaxial Semiconductor Structures (NESS) Workshop

NESS workshop (in conjunction with North America Molecular Beam Epitaxy Conference) was held Sept. 26th - Sept. 27th, 2007, in 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 University of New Mexico node of the NSF National Nanotechnology Infrastructure Network (NNIN) and the DOE Center for Integrated Nanotechnologies (CINT)

3rd Annual Minnesota Nanotechnology Conference

On November 13 - 14, 2007 the University of Minnesota hosted the [3rd Annual Minnesota Nanotechnology Conference](#), a two day workshop on nanotechnology at the Radisson University Hotel on Washington Avenue on the Twin Cities East Bank campus. The conference offered

presentations and discussions on Nano Energy, Devices, Sensors and Materials. This year's event was expanded to two full days with presentations by some of the country's leading nano researchers from top institutions. A reception and poster session were held after Tuesday's talks. The reception provided a wonderful opportunity to network, enjoy refreshments and view the poster exhibit while talking one-on-one with researchers about their work.

Education and Outreach

Nanotechnology Showcase

On Nov. 1, 2007, NNIN presented a Nanotechnology Showcase at the Annual Conference of the Society of Hispanic Professional Engineers (SHPE) in Philadelphia. The showcase, directed primarily at undergraduates, featured several talks in the morning covering nanotechnology concepts, careers, and education. For the afternoon, NNIN set up a series of experimental stations demonstrating various nanotechnology instruments and concepts, including scanning electron microscopy, scanning tunneling microscopy, quantum dots, MEMS, etc. Over 200 students participated in these sessions.

The purpose of this Showcase was to introduce a broader audience of undergraduates to the exciting opportunities afforded by nanotechnology. NNIN expects to offer this Showcase at other conference venues in the near future to continue to reach a diverse population of undergraduate students.

NNIN REU Program

The [NNIN Research Experience for Undergraduates Program](http://www.nnin.org/nnin_reu.html) is accepting applications for the summer 2008. Approximately 70 students will be selected to participate in a 10 week research experience at one of the 12 NNIN sites. Each student will work on an individual research project using the advanced facilities available within NNIN. Our program begins in June, and concludes in August with a network wide joint research convocation, where the students will all gather at Cornell to present their results to their peers. This highly regarded REU program is in its 12th year of operation. The on-line application and other information are available at http://www.nnin.org/nnin_reu.html . **Applications are due Feb. 19.**

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>.