

National Nanotechnology Infrastructure Network Vol. 5 # 1

A Periodic Newsletter of NNIN News and Announcements

January 2009

NNIN

The [National Nanotechnology Infrastructure Network](http://nnin.org) consists of 14 nanotechnology user facilities at 14 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 (*note to recipients: All links clicked in this newsletter are redirected through a proxy server and are thus tracked. You may access the links directly without tracking by opening them manually in your browser*)

NNIN Renewal and Expansion

At its December meeting, the National Science Board approved funding for the renewal of the **National Nanotechnology Infrastructure Network** for the period March 1, 2009-February 28, 2014. As part of the renewal, new sites will be added at **Arizona State University**, the **University of Colorado**, and **Washington University at St. Louis**. The **University of New Mexico** will no longer be part of NNIN.

The 14 laboratories of the newly expanded NNIN look forward to continuing to serve the nanotechnology user community. In the upcoming months we will introduce the capabilities of the new sites through this newsletter.

NNIN Events and Activities

Technology and Characterization at the Nanoscale Short Course at Cornell (Next Week !).

Tuesday Afternoon-Friday, January 13-16, 2009, Ithaca, NY

This intensive four day short course, the CNF TCN, offered by the **Cornell NanoScale Science & Technology Facility**, combines lectures and laboratory demonstrations designed to impart a broad understanding of the science and technology required to undertake research in nanoscience. Attendance is open to the general scientific community and is not limited to CNF users or Cornell students. . It is suitable for both new and experienced researchers interested in nanoscale science. An emphasis will be placed on CNF laboratory resources, however, the concepts and techniques discussed are generally applicable to research in this field and do not require use of CNF.

Information and registration is available at http://www.cnf.cornell.edu/cnf_2009tcn.html

NNIN Research Experience for Undergraduates Program

NNIN is accepting applications for its 2009 summer **Research Experience for Undergraduates** program, to be held at all 14 NNIN sites. Approximately 80 students will be selected to participate in this 10 week summer research program. Our program features independent research projects using the advanced facilities of NNIN, with a high level of mentorship and support. Our program is in its 13th year and has been received high ratings from both participants and sponsoring faculty. Our program ends with a 4 day network-wide REU convocation held at one of the sites where the participants share their results and experiences with their peers.

As part of our program, we also offer a 2nd summer experience for the best students from the prior year s NNIN REU program. Up to ten participants will be offered an opportunity to work at a national laboratory in Germany or Japan during the next summer. This exciting opportunity is only available to NNIN REU participants.

This is a highly selective program, but we have many positions available across the spectrum of nanotechnology. Participation is limited to US Citizens and Permanent Residents who have not received a Bachelor s degree prior to the end of the program. We ask that you bring this opportunity to the attention of appropriate students. Exceptional students from all scientific disciplines are invited to apply, on-line, via the NNIN web site. Applications are due by Feb.11 , 2008. http://www.nnin.org/nnin_reu.html

NNIN iWSG

Students and faculty have just returned from the **NNIN International Winter School for Graduate Students (iWSG)** held Dec. 4-19, 2008. It was by all reports a very successful experience. This was the first IWSG, held at IIT-Kanpur on the subject of Organic Electronics and Optoelectronics. Student participants were selected from a national application pool and included Bradley MacLeod (U.Washington), Matthew Gregoire (Cornell), Darren Lipomi (Harvard), Vladimire Pozdin (Cornell), Christopher Scilla (U.Mass), Martin Schubert (RPI), Chris Lombardo (U.Texas), Sharon Gerbode (Cornell), Jennifer Smythe (Harvard), Joy Johnson (MIT), Tricia Bull (U. Washington), and Kaylie Young (Northwestern). Participating technical faculty included George Malliaras (Cornell), Will Dichtel (Cornell), Richard Hennig (Cornell), John Kymissis (Columbia), Christine Luscombe (U.Washington). Profs. Robert McGinn (Stanford) and Jamison Wetmore (ASU) represented the society and ethics areas as applied to nanotechnology, with Sandip Tiwari, NNIN Director, (Cornell) as overall host and guide.

Over 50 faculty and students from IIT joined the 6 days of lecture and laboratory technical sections. For the second week, the participants (12 US students, 2 US faculty, and a dozen IIT students and faculty) traveled by train across India (more than 24 hours) to Paralakhemundi, in the south of Orissa province, to a camp in a rural/trial area, operated by the Association for India s Development. There they interacted with villagers and with faculty and students from a local technical school, and, in general, tried to understand how nanotechnology and science in general might relate to a totally unfamiliar social and economic environment. In the end they began to acquire an understanding of the complexities, impacts, and issues related to technology in the 3d

world.

The next NNIN iWSG will be held in Dec 2009 on the subject of the science and technology of nanofabrication, in conjunction with IISc-Bangalore. Again after the technical part of the course, the participants will venture to a rural area for an immersion and technology implementation experience. Applications and information will be available in the late summer 2009 via the NNIN web site.

University of Washington Releases Report on Nanotechnology as an Enabler for Ocean Sciences

A report describing the outcomes and recommendations of a NNIN-sponsored workshop aimed at energizing research in underwater sensing technologies has been released by the University of Washington. The report highlights the needs and challenges of ocean observation, and details the research activities and milestones that will be needed to put micro- and nanotechnology at the service of aquatic sciences. The report can be downloaded at <https://depts.washington.edu/ntuf/outreach/workshop4-08.php>

NNIN Facilities and Equipment

Linux Cluster at Stanford Nanofabrication Facility

As part of the NNIN computing initiative, the **Stanford Nanofabrication Facility** has installed a Linux cluster, thanks in part due to a generous donation from Intel of 64 dual processor nodes with quad-core E5440 Xeon cpus. A Stanford School of Engineering grant made possible the purchase of blades and racks from Penguin Computing, who provided DRAM at deep discount, free integration of the cluster and free management software. The cluster has 512 cpus, 704 GByte of DRAM, and 11 TByte of disk storage.

A comprehensive suite of software packages are being installed including NWChem, GAMESS, COLUMBUS, CHAMP (Quantum Monte Carlo calculations), ABINIT, and Quantum ESPRESSO (atomistic simulations in chemical, biological and material science applications). Licensed software including VASP and other atomistic simulations for nanoelectronics will be available to licensed users.

The cluster will be available at beginning of 2009 for general access. Contact Dr. Zhiyong Zhang (zyzhang@stanford.edu) for more details and information on how to access the cluster.

The new facilities at Stanford join the existing NNIN computational nanotechnology resources at Cornell and Harvard, supported by Dr. Derek Stewart and Dr. Michael Stopa, respectively. Additional information on NNIN computational resources is available via the NNIN web site.

Proximity Correction Software for Ebeam Lithography

Georgia Tech has recently acquired powerful new software to greatly enhance its JEOL JBX-9300FS 100kV direct write electron beam lithography system needed for demanding nanometer scale applications. Two software packages have been obtained. The first is Skeleton, an electron solid interaction Monte Carlo simulator, provided by Dr. B. E.

Maile of Ulm, Germany. The second software package is Layout BEAMER provided by GenISys GmbH, based in Munich, Germany. These two packages combined will provide users with more accurate, robust, and uniform nanoscale patterning with a fast, flexible and easy to use interface. To read the full article, go to: <http://grover.mirc.gatech.edu/news.php?id=72>

Similar software is available at the Cornell site to support its ebeam systems.

NNIN Education and Diversity

Nanotechnology Showcase for Students

The NNIN Nanotechnology Showcase for Students was presented at the annual meeting of the Society of Hispanic Professional Engineers on November 13, 2008. The Showcase is a one day workshop designed to inform undergraduates about nanotechnology and education and career opportunities in the field. The morning consists of two hours of lectures followed by two hours in the afternoon of demonstrations and hands-on activities. NNIN sites support this program by providing staff and activities for the afternoon session. Students get to experience AFM, SEM, TEM, microfluidics, current nanoproducts, early diabetes detection through nanobumps, carbon nanotubes, among other activities.

NNIN also participated in SHPE's Career Exhibition which occurred on Saturday November 15, 2008. We had an exhibit booth which provided attendees with information on our Research Experience for Undergraduates Program. We spoke with many enthusiastic students and hope they will apply to the 2009 NNIN REU program. In addition, we encouraged students to apply for REU programs in general as an excellent means to learning about research and graduate school.

The next NNIN Nanotechnology showcase will be held at the annual conference of the National Society of Black Engineers, in Las Vegas, March 27, 2009.

Other NNIN News

New Bio-Imaging Scientist joins Harvard Team

Evangelos Gatzogiannis has joined the **Harvard CNS** node as their new bio-imaging scientist, and brings with him significant laboratory experience. He has a degree in Chemistry from the University of Pennsylvania, and a Masters degree in Physical Chemistry from Princeton. He will also be the lead for biological imaging on the CNS CARS system, TIRF, cell culture microscope, and Bio-Materials facility.

Open Positions at the Washington University at St. Louis site

In conjunction with its entrance into NNIN, the **Nanotechnology Research Facility at Washington University in St. Louis** has posted several scientific positions. These include Program Manager and Lab Manager/Principal Scientist. Information is available via the WUSTL human resources web site, <https://www.wustlcareers.com>, where they are listed as positions 090981 and 090800, respectively.. Additional positions at the

research engineer level may also be posted (look under the Dept of Energy, Environmental, & Chemical Engineering).

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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>.