
The Penn State Center for Nanotechnology Education and Utilization (CNEU) is the home of the Pennsylvania Nanofabrication Manufacturing Technology (NMT) Partnership, and the NSF Advanced Technology Education (ATE) Center for Nanofabrication Manufacturing Education. The CNEU also coordinates the educational outreach activities for the Penn State site of the NSF National Nanotechnology Infrastructure Network (NNIN), the national NSF nanotechnology resource for enabling academic and industry R&D.

The CNEU Mission:
The CNEU is dedicated to research, development, and education across all aspects of micro- and nanotechnology. The Center resources are focused on addressing the incorporation of nanotechnology into secondary education, into post-secondary education, and into industry applications.

CNEU – Highlights of Upcoming Activities:

Capstone Semester Update: The spring 2008 capstone semester is now complete. Congratulations to the sixteen students from all across Pennsylvania students who successfully completed the rigorous semester and are now on to the next step in their educational journey or have graduated their degree programs and are entering the working world to contribute to our economy. The summer 2008 capstone semester began on May 19, 2008, and twenty seven students are presently immersed in the eighteen-credit twelve week spring session. Registrations are still being accepted for the fall 2008 capstone which will begin on August 25, 2008. Registration for the spring, summer, and fall 2009 capstone semesters are also being accepted. Please contact Lisa Daub at 814-865-9635 (lndaub@engr.psu.edu) to register, or for further information.

2008 NNIN REU Program: The summer 2008 NSF National Nanotechnology Infrastructure Network (NNIN) Research Experience for Undergraduates (REU) program began on June 2nd and will run through August 14th. Five undergraduate students from schools across the United States have arrived and are well into their ten week summer program. This is the fifth year of a joint program of the National Nanotechnology Infrastructure Network (NNIN), which consists of 13 universities from across the country (for a detailed list of the network members, please see www.nnin.org). The experience will culminate with an NNIN-wide convocation which will be held at Cornell University. For more detailed information about the REU program, eligibility requirements, and other important facts please see http://www.reu.nnin.org/nnin11_login.php.

2008 NNIN RET Program: Two Pennsylvania in-service science teachers along two Pennsylvania pre-service science teachers began their summer of 2008 Research Experience for Teachers on June 23, 2008. This activity is sponsored by the Penn State NSF National Nanotechnology Infrastructure Network (NNIN) site in conjunction with the Penn State Center for Science and the Schools (CSATS). It is an opportunity for these educators to experience the excitement of nanotechnology research and to share this experience in their classrooms and with their peers. This program is also offered to teachers (in-service and pre-service) at four other NNIN sites: Georgia Institute of Technology, Harvard University, Howard University, and the University of California Santa Barbara. Some of the objectives of this program are to assist a diverse group of science teachers in understanding and communicating the importance of using inquiry-based methods to solve problems by doing research in nanotechnology and to establish a long-term mentorship support group of teachers who will become advocates for nanotechnology education and careers. The summer portion of the program will be completed on August 1, 2008.

Summer Nanotech Academies: The 2008 three-day Nanotechnology Introduction Academies began in June and will continue into July. Once again they are proving to be a big hit with the student attendees along with their chaperones. These Nanotech Introduction Academies, for students in 9th grade and above, are a great opportunity to learn about nanotechnology and nanofabrication. Careers are explored and educational pathways to nanofabrication careers are discussed. The agenda is designed to be interactive and fun, while still maintaining a high level of introductory level knowledge.

Hands-On Nanofabrication Workshop for Educators: Attention educators! Registrations are now being accepted for the next Hands-on Nanofabrication Workshop for Educators to be held November 5-7, 2008 at the Center for Nanotechnology Education and Utilization (CNEU) at Penn State University. This three-day workshop utilizes the facilities at Penn State to teach nanotechnology at an introductory level and also enables the participant to understand how nanotechnology is and will continue to be integral to STEM curriculum and careers. Participants will learn about the growing applications of nanotechnology in many industries including the biotechnology, MEMs, optoelectronics, chemical and electronics industries. The basics of nanofabrication processes and tools will be covered and practiced through a combination of classroom lectures and hands-on processing, utilizing the Penn State NNIN Nanofabrication Facility along with the CNEU educational cleanroom. Please contact Lisa Daub at 814-865-9635 (lndaub@engr.psu.edu) to register, or for further information.

NMT Partnership Career Day: The Pennsylvania NMT Partnership will again be holding a Career Day this fall at University Park. This event will bring together Pennsylvania employers, students enrolled in the capstone semester, and alumni of the NMT capstone semester. The annual NMT Career Day is a great way for students to update their skills, refresh knowledge, reconnect with former classmates, and network with Pennsylvania nanotechnology companies. The exact date for this event has not yet been finalized. We are
presently targeting late the October and early November time frame. More details on the date and registration information will follow soon. For further information please contact Phi Oanh Pham at 814-865-6962 ppham@engr.psu.edu.

NMT Partnership Industry Outreach Initiative: In collaboration with area NMT Partners, a series of Industry Outreach Workshops entitled “Competing in the 21st Century: The Nanotechnology Edge” are presently scheduled or are in the planning stages at various locations across the Commonwealth in the upcoming months. The desired outcome for this initiative is to reach as many companies as possible to share: a beginning understanding of what nanotechnology is and the immense opportunities that nanotechnology offers, the current and forecasted impact of nanotechnology upon the marketplace, and to make them aware of the nanotechnologist worker pool available to them through the NMT Partnership. Please contact Bob Ehrmann at 814-865-7558 (rehrmann@engr.psu.edu) or Darlene Fink at 814-863-2955 (dfink@engr.psu.edu) for additional information.

NMT Partnership Educational Outreach Initiative: Again, in collaboration with area NMT Partners, a series of Educational Outreach Meetings continue during the first few months of 2008 at NMT Partner facilities across the commonwealth of Pennsylvania. These outreach opportunities will continue during the summer and fall of 2008. The objective of this initiative is to introduce nanotechnology and the nanotechnology education program available through NMT Partnership to as many students as possible at NMT Partner institutions. Please contact Jamie Houseknecht at 814-865-5285 (juhl147@psu.edu) or Darlene Fink at 814-863-2955 (dfink@engr.psu.edu) for additional information.

CNEU Program Highlights for May- June 2008

Student Recruitment Brochure and Recruitment Video is Released: The Center published a new recruitment brochure and produced a new 9 minute recruitment video to attract students into nanotechnology degree programs at Pennsylvania Partner schools. The new tag line developed during this process is “Take Matter Into Your Own Hands: The Capstone Semester: Your Pathways to a Career in Nanotechnology”. The video can be viewed on the Center website at http://www.cneu.psu.edu/nePublications.html#capstoneVideo. The brochures and DVD copies of the video can be attained by contacting Darlene Fink at 814-863-2955 (dfink@engr.psu.edu).

Hands-On Nanofabrication Workshop for Educators held in May and June: Two of the three Hands-on Nanotechnology Workshop for Educators workshops planned for the 2008 calendar year have been held. The first workshop was held on May 13-15, 2008 and was offered primarily for faculty and staff from post-secondary institutions across the nation who are interested in learning about this technology or in creating similar workshops of their own at their institutions. As planned, a large National audience was served at this May 2008 workshop. Attendees at this workshop were from 11 different states (California, Washington, Oklahoma, Florida, Wisconsin, Pennsylvania, Illinois, Michigan, Oregon, Texas, New Jersey) with a total of 22 of the 28 attendees being non-Pennsylvanians. The second educator workshop for 2008 was held June 23 -25. This workshop was focused on the Philadelphia School District and surrounding districts. Thirteen of the twenty four workshop participants were from institutions in the Philadelphia area whose have large under-served minority student populations. This workshop was held in partnership with the University of Pennsylvania Nano Bio Center and NSF ITEST project. A combination of state Department of Community and Economic Development (DCED) and NSF Participant support money was utilized to encourage teacher/faculty participation in both of the above workshops. These teacher workshops entail lectures on the fundamentals of nanotechnology and nanofabrication, combined with laboratory experiments in the teaching clean room in which these fundamentals are practiced. Examples of lab demonstrations include material modification on the nanoscale, characterization methods, and new products enabled by nano-manufacturing methods. Hands on activities in the CNEU Teaching Cleanroom and the PSU NSF NNIN Cleanroom utilize techniques such as self-assembly, plasma based processing equipment, a range of current patterning equipment, and characterization equipment including the SEM, AFM and other methods. In addition, workshop participants learn about the role of nanotechnology in the modern workforce and the growing applications of nanotechnology in many areas including the biotechnology, medicine, sensors and detection, optoelectronics, clean energy, electronics, and water treatment.

NMT Industry Advisory Board Regional Meetings: The PA NMT Partnership Advisory Board’s most recent meetings took place as a series of regional meetings during May 2008. These meetings were held in strategic locations across Pennsylvania to best facilitate the participation of key industry and Center NMT partner representatives. Three partner institutions hosted these regional advisory board meetings; Montgomery County Community College, May 6, 2008; Northampton Community College, May 7, 2008 and Community College of Allegheny County May 9, 2008. Industry representation came from a variety of large, mid-size, and small “start-up” nanotechnology companies, as follows: May 6th – Merck, AE Polysilicon, and Rohm & Haas; May 7th – LSI, Tyco Electronics, Velox Semiconductor, Fairchild Semiconductor, and Airgas Specialty Products; May 8th – Plextronics, Kurt J. Lesker Company, Seagate, RJ Lee Group, Crystalplex, and PPG. The goal of these meetings was to solicit industry input regarding the Center goals, courses, programs, and plans for the future.

Testimony to U.S. House of Representatives Committee on Science and Technology: On June 19, 2007 Professor Stephen Fonash gave invited testimony on Nanotechnology Technician Education before the House Subcommittee on Research and Science Education. This testimony was part the subcommittee’s examination of role that community colleges play in recruiting and training skilled technicians and industry workers in the advanced manufacturing industry. Complete transcripts and videos of this event are available at http://www.cneu.psu.edu/newsevents_061907subCommitteeTestimony.html.
Penn College Nanotechnology Video Available on CNEU Website: In mid November 2007, the Pennsylvania College of Technology and WVIA public television released a broadcast production entitled “Degrees that Work - Nanotechnology”. The video introduces 21st century career and education opportunities to viewers. This 30-minute presentation explores nanotechnology and the related career opportunities with experts in the field. The production follows a former Penn College student, Mark A. Atwater, as he completes the capstone semester at The Pennsylvania State University’s Center for Nanotechnology Education and Utilization. The video can be accessed at http://www.cneu.psu.edu/edCapstoneVideo.html.

Teaching Cleanroom Webcast: We continue to have requests from associates across the nation to access the teaching cleanroom webcast entitled "Design and Implementation of an Educational Laboratory for Nanofabrication Manufacturing Technology". The webcast was held on Friday November 10, 2006 to introduce the new educational cleanroom at the Penn State Center for Nanotechnology Education and Utilization to a national audience. The webcast included a video tour of CNEU's new Educational Laboratory, a presentation discussing facets of the design process (including laboratory layout, equipment purchase criteria, safety, support and maintenance) and concluded with a live question and answer session. The webcast was recorded and is available for viewing at http://www.cneu.psu.edu/labwebcast.htm.

CNEU Website: The CNEU website (www.cneu.psu.edu) continues to be available as an aide to prospective students, parents, educators, counselors, and industry personnel. Highlighted website features include Nanotechnology Education Modules, Student and Industry Video testimonials, NMT Associate to Baccalaureate Pathways, overviews of the NMT Partnership Capstone Semester as well as other CNEU programs and offerings. Recent additions to the website include Dr. Fonash's June 2007 testimony to Congress, the 30 minute video entitled “Degrees that Work – Nanotechnology” which was produced by the Penn College of Technology, and the new 9 minute student recruitment video.

CNEU Outreach: During the months of May and June 2008 Center received 153 visitors representing 10 organizations in addition to the earlier mentioned NMT Partners Meeting. Offsite and remote access presentations impacted an additional 251 individuals at 8 sites.

For Further Information on these Highlights or on the NMT Partnership in general, please contact:

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