

Nanofabrication Laboratory at Penn State

Offering companies another avenue of research

—By Sue Marquette Poremba

Penn State's Nanofabrication Laboratory is one of thirteen university partners of the NSF-funded National Nanotechnology Infrastructure Network (NNIN). The NNIN sites allow businesses and industry access to technology, instrumentation, and expertise not otherwise readily available outside academia.



Each of the partners has a particular area of expertise. At Penn State, that expertise centers on materials and chemical technologies at the molecular scale with unique strengths that include chemical and molecular patterning, self-assembly, and complex ferroelectric oxide materials and devices. The Nanofabrication Laboratory is made up

of three clean room facilities located in the Materials Research Institute (MRI), Materials Research Laboratory, and Electrical Engineering West Buildings.

“We work with a diverse set of materials,” says Theresa Mayer, associate director of MRI and site director of the Penn State NNIN site. “Our facilities are well equipped to work with materials that are not permitted in most semiconductor manufacturing facilities or are otherwise difficult to process.” General capabilities include optical photolithography, electron-beam lithography, nanoimprinting, thin film deposition of metals, dielectrics, and polymers, wet and dry chemical etching, and characterization.

The focal point of the NNIN, Mayer adds, is outreach to outside companies. Several Ph.D.-level technical liaisons are on staff to provide a contact point between the company and the campus facilities.

“Any intellectual property that is developed by a company employee using the Nanofabrication Laboratory belongs to the



company, and not the University,” Mayer comments. Companies are not required to set up a formal research program with a faculty member to use the Nanofabrication Laboratory, although, Mayer adds, the NNIN staff often direct companies to faculty members who are able to assist with their longer term research and development needs.

To use the Nanofabrication Laboratory, the businesses should have research and development problems that couldn't be solved at a foundry. “Part of the agreement is that we don't compete with foundries,” says Mayer.

Companies wanting to use the clean room and equipment have several options available. Their own researchers can become trained users of the facility, allowing them to conduct their own research. If they aren't able to send someone to the site, companies can work remotely with process engineers. The process engineers come from different departments and disciplines around campus, including experts in the lab's specialty. Many companies tend to combine those options by working on site but also working remotely through the technical liaisons and process engineers.

The nanofabrication facilities are available to any company or business that has a need. “We have companies that use the clean room for a single process step and are here for a couple of hours,” says Mayer, “and we have companies that are involved in complex device fabrication that takes a long period of time.”

Currently, the Nanofabrication Laboratory works with approximately 80 national or international external users annually, but Mayer says there is no limit to how many companies can use the facilities. In fact, she would like to see that number rise because she believes the NNIN labs give companies another avenue of research.

“If you have the funding to cover the instrument usage fees,” says Mayer, “you can be off and running within three weeks after submitting your application to us.” ■

www.mri.psu.edu/facilities/nnin