Advanced Materials and Nanotechnology (CAMN) (Center for)

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The Center for Advanced Materials and Nanotechnology (CAMN) was formed in 2003 to demonstrate Lehigh University's commitment to the emerging field of nanotechnology and to expand and apply established strengths in advanced materials research. The center evolved from the Materials Research Center, first established in 1964. CAMN's mission is to promote and engage in strategic areas of research and education in advanced materials and nanotechnology that meet the needs of students and industry. Current research areas include nanoparticle synthesis, catalysis, biomaterials and biotechnology, interfacial kinetic engineering, polymer, ceramic, and metal nanocomposites, micro-electromechanical systems (MEMS), metals and alloys, microfabricated devices for clinical diagnostics, biosensors, materials for energy and electronics, and materials modeling.

**INNOVATIVE INTERDISCIPLINARY RESEARCH PROGRAMS WITH STATE AND FEDERAL GOVERNMENT**

The CAMN engages in a variety of government supported research activities. These enable innovative student projects, laboratory equipment upgrades, interactions with technology businesses, and translation of university research commercial applications. Since 2011, CAMN also leads five universities in a five-year Multidisciplinary University Research Initiative (MURI) under the Office of Naval Research on engineering better materials through the understanding of interphase behavior at the atomic scale. CAMN also seeks and participates in research projects and initiatives funded by a number of other state and federal agencies, utilizing Lehigh faculty and industry partnerships to create effective teams and increase the impact and return on funding obtained.

**PROJECTS AND RELATIONSHIPS WITH INDUSTRY**

The CAMN Industrial Liaison Program (ILP) facilitates interactions with industry to support R&D needs and create opportunities for innovation. The ILP connects with a wide range of technology based companies, and manages industry collaborations with faculty and students. It also helps companies access lab facilities, conduct research and development, solve problems, obtain funding and other business support, and learn about new developments. These connections expose Lehigh students to industry challenges and practices, and can lead to internships and employment opportunities.

The Lehigh Emerging Technologies Network (formerly the Lehigh Nanotech Network or LNN) was organized in 2004. The LETN is an organization of business, education, and government members that facilitates the understanding, advancement, and commercialization of materials and nanotechnology for a broad range of applications. The LETN conducts events for members to learn about novel technology research and applications, funding opportunities, and educational initiatives. It provides a way for companies to connect to government technology initiatives and to members that are active in teaching, developing, applying, and commercializing technology. The LETN currently includes over 125 organizations including regional partners like the PA Department of Community and Economic Development, Ben Franklin Technology Partners of Northeast PA, the Lehigh Valley Economic Development Corporation, and the Manufacturers Resource Center.

**STATE-OF-THE-ART FACILITIES**

Laboratory facilities are available for use by students and faculty, and through the ILP to industry and government researchers. The CAMN Nanocharacterization Laboratory is a leading center for electron microscopy, with a diverse array of high level equipment. The laboratory houses one of the largest collections of electron microscopes of any university in the United States, and is managed and utilized by highly skilled scientists and engineers for cutting edge research. The facility includes transmission (TEM), scanning (SEM), and scanning transmission (STEM) electron microscopes, a focused ion beam instrument, an electron microscope, e-beam lithography, and scanning probe microscopes. An aberration corrected STEM can resolve images on a sub-nanometer scale (atomic level). Since 1970 Lehigh has trained nearly 6000 professionals in electron microscopy through a world renowned summer Microscopy School. In addition, CAMN facilities include a wide range of instruments for development and analysis of ceramics, polymers, metals, and composite materials.

**INNOVATIVE EDUCATIONAL COURSES AND PROGRAMS**

The CAMN facilitates programs of study and research that cross the departmental lines of science and engineering curricula to help provide a fundamental, broad approach to studies in materials science and nanotechnology. Graduate students participating in research supported by CAMN usually receive a Master of Science or PhD in the science or engineering discipline of their choice, or in an interdisciplinary program such as polymer science. A Graduate Certificate Program in Nanomaterials enables students to gain a working knowledge of a broad range of materials, instrumentation, and techniques. Credits earned towards this certificate may be accepted as part of a Masters or PhD in Materials Science and Engineering, or a Masters in Nanomaterials. A Minor in Nanotechnology can also be attained in connection with most engineering and science bachelor degrees. Courses in nanotechnology include Materials for Nanotechnology, Strategies for Nanocharacterization, Materials Structure at the Nanoscale, Electron Microscopy and Microanalysis, Advanced Transmission Electron Microscopy, Advanced Scanning Electron Microscopy, and Crystallography and Diffraction.

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