

NIST's MEL conducts theoretical and experimental research in length, mass, force, vibration, acoustics, and ultrasonics, as well as intelligent machines, precision control of machine tools, and information technology for the integration of all elements of a product's life cycle. Much of this applied research is devoted to overcoming barriers to the next technological revolution, in which manufacturing facilities are spread across the globe. MEL's research and development leads to standards, test methods and data that are crucial to industry's success in exploiting advanced manufacturing technology. Critical components of manufacturing at any level are measurement and measurement-related standards, not just of products, but increasingly of information about products and processes. Thus, MEL programs enhance both physical and information-based measurements and standards. Research projects can be theoretical or experimental, and will range in focus from intelligent machine control, characterizing a manufacturing process or improving product data exchange in manufacturing and related industries such as healthcare, to the accurate measurement of an artifact's dimensions.

NIST's CSTL strives to be a world-class research laboratory that is recognized by the nation as the primary source for the chemical, biochemical, and chemical engineering measurements, data, models, and reference standards that are required to enhance U.S. industrial competitiveness in the world market. CSTL is the primary reference laboratory for chemical measurements, entrusted with developing, maintaining, advancing, and enabling the chemical measurement system for the United States of America, thereby enhancing industry's productivity and competitiveness, establishing comparability of measurements to facilitate equity of global trade, and improving public health, safety, and environmental quality. CSTL's activities include: Transportation, Biomaterials, Biotechnology, Chemical and Allied Products, Energy Systems, Environmental Technology and Systems, Health and Medical Products and Services, Industrial and Analytical Instruments and Services, Forensics, Microelectronics, Food and Nutritional Products, International Measurement Standards, Data and Informatics, and emerging Technologies (Nanotechnology, Molecular

Electronics, Microfluidics, Combinatorial Chemistry).

Attending to the long-term needs of many U.S. high-technology industries, NIST's PL conducts basic research in the areas of quantum, electron, optical, atomic, molecular, and radiation physics. To achieve these goals, PL staff develop and utilize highly specialized equipment, such as polarized electron microscopes, scanning tunneling microscopes, lasers, and x-ray and synchrotron radiation sources. Research projects can be theoretical or experimental and will range in focus from computer modeling of fundamental processes through trapping atoms and choreographing molecular collisions, to standards for radiation therapy.

NIST's MSEL conducts basic research in the electronic, magnetic, optical, superconducting, mechanical, thermal, chemical, and structural properties of metals, ceramics, polymers, and composites. Much of this applied research is devoted to overcoming barriers to the next technological revolution, in which individual atoms and molecules will serve as the fundamental building blocks of devices. Preparation of unique materials by atomic level tailoring of multi-layers, perfect single crystals, and nanocomposites are just some of the future technologies being developed and explored in NIST's MSEL. To achieve these goals, staff develop and utilize highly specialized equipment, such as high resolution electron microscopes, atomic force microscopes, neutron scattering instruments, x-ray diffraction sources, lasers, magnetometers, plasma furnaces, melt spinners, molecular beam epitaxy systems, and thermal spray systems. Research projects can be theoretical or experimental and will range in focus from the structural, chemical, and morphological characterization of advanced materials made in the NIST laboratories to the accurate measurement of the unique properties possessed by these special materials.

NIST's BFRL provides technical leadership and participates in developing the measurement and standards infrastructure related to materials critical to U.S. industry, academia, government, and the public. Building and Fire Research programs at NIST cover a full range of materials issues from design to processing to performance. Separate research initiatives address concrete, coating, earthquake resistance of structures, fire science and engineering, the theory and modeling of materials, and materials reliability. Through laboratory-

organized consortia and one-on-one collaborations, BFRL's scientists and engineers work closely with industrial researchers, manufacturers of high-technology products, and the major users of advanced materials.

NIST's ITL responds to industry and user needs for objective, neutral tests for information technology. These are enabling tools that help companies produce the next generation of products and services, and that help industries and individuals use these complex products and services. ITL works with industry, research and government organizations to develop and demonstrate tests, test methods, reference data, proof of concept implementations and other infrastructural technologies. Program activities include: high performance computing and communications systems; emerging network technologies; access to, exchange, and retrieval of complex information; computational and statistical methods; information security; and testing tools and methods to improve the quality of software.

SURF students will have the opportunity to work one-on-one with our nation's top scientists and engineers. It is anticipated that successful SURF students will move from a position of reliance on guidance from their research advisors to one of research independence during the twelve-week period. One goal of this partnership is to provide opportunities for our nation's next generation of scientists and engineers to engage in world-class scientific research at NIST, especially in ground-breaking areas of emerging technologies. This carries with it the hope of motivating individuals to pursue a Ph.D. in physics, chemistry, materials science, engineering, mathematics, or computer science, and to consider research careers. The SURF Programs will help to forge partnerships with NSF and with post-secondary institutions that demonstrate strong, hands-on undergraduate science curricula, especially those with a demonstrated commitment to the education of women, minorities, and students with disabilities.

Eligibility: The EEEL, MEL, CSTL, PL, MSEL, BFRL, and ITL, SURF Programs are open to colleges and universities in the United States and its territories with degree granting programs in materials science, chemistry, engineering, computer science, mathematics, or physics. Participating students must be U.S. citizens or permanent U.S. residents.

Funding Availability: Funds budgeted for payment to students under these