WILSDORF HALL Research

Nanotechnology

Nanotechnology — or the ability to engineer systems with components on the scale of one to 100 nanometers — enables researchers to examine how properties react on this very small scale. This work has implications in a variety of fields, among them the nine "grand challenges" detailed in a national nanotechnology initiative issued by the president of the United States: nanomaterials by design; nanoelectronics, -optics and -magnetics; healthcare; the environment; energy; microspacecraft; bio-threat detection; transportation; and national security.

Wilsdorf Hall laboratories, designed to inhibit vibration and sound interference and to accommodate the next several generations of nanoscale materials characterization and fabrication instrumentation, will enable research far beyond what is currently possible.

At the University of Virginia, faculty and students are leading research initiatives in each of these areas. The U.Va. Institute for Nanoscale and Quantum Science or NanoQuest (est. 2002) represents the research interests of about 70 faculty members who are working to set the stage for quantum computing, new chemical and biological sensors, cleaner energy sources, advanced tissue engineering and more. In addition, the U.Va. Engineering School has joined the newly formed Virginia Partnership for Nanotechnology Education and Workforce Development, which, through a $600,000 grant from the National Science Foundation, will soon offer distance-learning and short courses as well as certificates across the breadth and depth of nanotechnology. Wilsdorf Hall laboratories, designed to inhibit vibration and sound interference and to accommodate the next several generations of nanoscale materials characterization and fabrication instrumentation, will enable research far beyond what is currently possible.

Materials Science and Engineering

Materials science — or the development of new materials, new manufacturing processes for materials and new strategies for their use — is an integrative discipline with far-reaching effects. Materials scientists invent the metals, plastics and ceramics used in our bridges, computers and energy conversion systems, among countless other necessities upon which we rely every day.

At the University of Virginia, faculty and students in the Department of Materials Science and Engineering (est. 1962) make strides in the areas of structural metals, electrochemistry, electronic materials, intelligent processing, engineering physics of solids and nanotechnology. State-of-the-art research space for the department and its five interdisciplinary centers for excellence — the Center for Electrochemical Science and Engineering, the Intelligent Processing of Materials Laboratory, the Light Metals Center, the NSF MRSEC on Nanoscopic Materials Design and the Engineering Physics Program — will triple with the opening of Wilsdorf Hall. Moreover, Wilsdorf Hall laboratories have been designed to accommodate the next several generations of nanoscale materials characterization and fabrication instrumentation — features that will enable materials science research excellence at U.Va. Plus, for the first time, faculty from a variety of disciplines will be housed in a central location — Wilsdorf Hall — allowing like never before for the intense collaborations necessary to tackle society-critical problems in sustainable materials, energy, nano- and quantum electronics and defense.

Chemical Engineering

Chemical engineering involves the application of mathematics, chemistry and other natural sciences to find economic ways of using energy and materials — such as fuels, pharmaceuticals, foods, plastics, metals and basic chemicals — for the benefit of humankind. While many chemical engineers serve in the traditional chemical process industries of petroleum, natural gas, chemicals, paper and plastics, others are increasingly called upon to work in energy and alternative resources, healthcare and biotechnology, environmental engineering and more.

Wilsdorf Hall will provide demonstration labs that will greatly enhance the educational experience of both graduate and undergraduate students.

At the University of Virginia, faculty and students in the Department of Chemical Engineering (est. 1908) embrace both traditional and nontraditional areas of study within the field. The department's main research thrusts include: bioengineering and biotechnology; complex biological and chemical systems; computer and molecular simulation; electrochemical engineering; environmental engineering; heterogeneous catalysis and reaction engineering; materials, materials processing and interfacial phenomena; separations technology; and thermodynamic properties and phase equilibria. In addition, chemical engineering students and faculty are often involved in multidisciplinary research in areas such as biophysics and electrochemical sciences, among others. Wilsdorf Hall will provide demonstration labs that will greatly enhance the educational experience of both graduate and undergraduate students.