

Materials Science and Engineering at U.Va.

Materials science and engineering — or the development of new materials, new manufacturing processes for materials and new strategies for their safe use in severe environments — is an **integrative discipline with far-reaching impact**. Responding to important challenges such as safety, durability and system performance, materials scientists invent the metals, polymers, ceramics and semi-conductors used in transportation infrastructure and vehicles, computers and communications devices, energy conversion systems and countless other necessities upon which we rely each day.

The U.Va. Department of Materials Science and Engineering (MSE), established in 1962, is addressing these contemporary societal needs by **providing cutting-edge research solutions** and **educating the leaders of tomorrow** — in the classroom, in the lab and beyond. Highly collaborative in nature, the department offers a Bachelor of Science degree in engineering science, a novel emerging degree opportunity; Master of Science and Ph.D. degrees in materials science and engineering as well as a Master of Materials Science and Engineering; and Master of Engineering, Master of Science and Ph.D. degrees in engineering physics. The department also offers a minor in materials science, available to all University undergraduate students.

Snapshot

The U.Va. Department of Materials Science and Engineering ...

- Consistently ranks among the top 25 percent of all MSE departments nationally
- Enables undergraduates from across the University to earn a minor in MSE, participate in sponsored research or earn a customized degree in engineering science
- Supports 100 graduate students each year who are deeply involved in research, journal publication and international technical conferences
- Is led by 23 nationally renowned faculty, including three members of the National Academy of Engineering, 10 endowed chair-holders and 30 recipients of Fellow-of-technical-society awards
- Receives \$10 million in research funding per year



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ENGINEERING

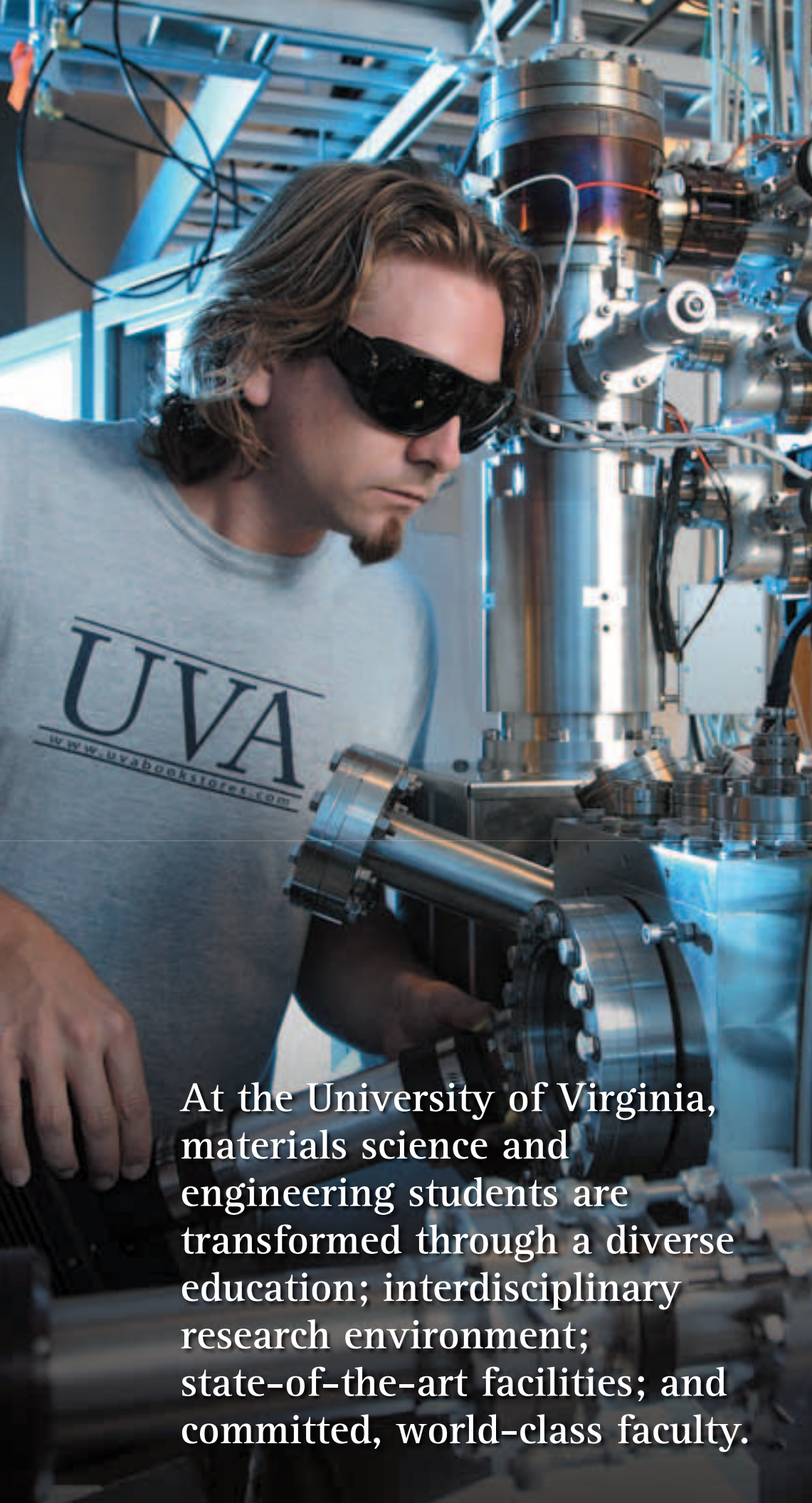
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Department of
Materials Science and Engineering
at the U.Va. School of Engineering and Applied Science



Educating
Leaders



At the University of Virginia, materials science and engineering students are transformed through a diverse education; interdisciplinary research environment; state-of-the-art facilities; and committed, world-class faculty.

Our Students

The mission of the MSE Department is to provide undergraduate and graduate students with the highest-quality instruction and a research environment that continually produces new knowledge. Our students learn to solve critical materials problems by integrating traditional MSE knowledge and skills with a strong foundation in mathematics, chemistry and physics, as well as cross-disciplinary pursuits in major engineering disciplines.



Our undergraduates choose to **tackle compelling issues** in materials science and engineering or engineering science, which

entails a customized curriculum with the option of emphasizing either emerging areas of engineering, fundamental sciences, pre-professional preparation (law, medicine, business) or an intense materials focus. Through the engineering thesis and additional **hands-on projects**, students engage in sponsored research that brings class studies to life and provides a view of myriad career paths.

Our graduate students — whose backgrounds range from metallurgy, polymer science, chemistry, physics, ceramics and mathematics to all branches of engineering — have equally varied interests, allowing students and faculty alike to solve research problems with the aid of many **unique and innovative perspectives**. Our graduates currently work for some of the best industrial science laboratories (e.g., Alcoa,

Boeing, IBM, GE and Lucent Technologies), government laboratories (e.g., Bettis, Los Alamos, NASA, the National Institute of Standards and Technologies, the Nuclear Regulatory Commission, Oak Ridge, Sandia, the U.S. Army, the U.S. Navy) and universities (Michigan Tech, The Ohio State University, the U.S. Naval Academy, the University of South Carolina and the University of Southern California).

Graduate students in the engineering physics degree program experience either strong integration of materials science with physics of solids or customized curricula for studies at the intersections of science and engineering fields; for example surface science and biological systems or astrophysics, laser/plasma processing of materials and biomedical function, or materials performance and risk analysis.

Our Research

At the U.Va. MSE Department, our students and faculty collaborate with experts in industry and government as well as those across the University's Grounds. Our **innovative research** — enabled by faculty expertise in mathematics, chemistry and physics of solids — focuses on materials for structural, electronic, optical and magnetic functions. Our internationally recognized areas of research include:

Amorphous, nanocrystalline and multi-functional high-performance metals; astrophysics and space sciences; computational materials science; fatigue and fracture; electrochemistry and corrosion; magnetism; microscopy and spectroscopy with electrons, ions and X-rays; phase transformations, thermodynamics and kinetics; and surface and interface science

The department houses six **interdisciplinary centers for excellence** — the Center for Electrochemical Science and Engineering, the Intelligent Processing of Materials Laboratory, the Light Metals Center, the Nanoscale Materials Characterization Facility, the Laboratory for Atomic and Surface Physics and the Center for Computational Materials. Sponsors of our research include Alcoa, DARPA, GE, GM, IBM, Lockheed Martin, Micron Technology, NASA, the NSF, the U.S. Air Force, the U.S. Department of Energy, the U.S. Office of Naval Research, VDOT and others.

Opened in 2006, Wilsdorf Hall enables advanced research in nanoscale materials research and more. The highly collaborative facility features a controlled environment for next-generation instruments to probe material structure and composition at the atomic level, a computational center for computer-based modeling and simulation, and upgraded office and laboratory space for faculty and graduate students.

