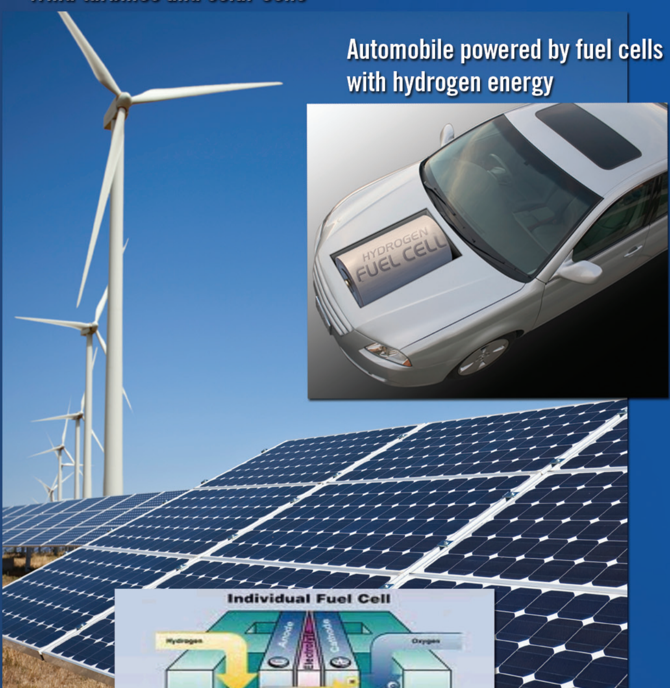
Energy Materials

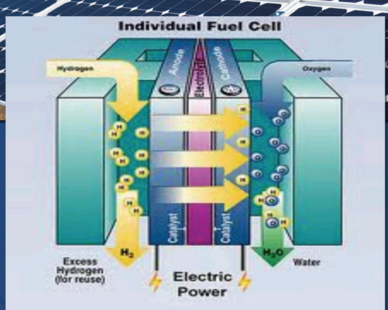
Energy materials are critical to the progress of emerging technologies in the fields of fossil and renewable energy systems, ranging from coal gasification to combustion, fuel cells, batteries, supercapacitors, sustainable fuels, and energy production. The Energy Materials concentration within the MSE program provides students with in-depth knowledge of the materials requirements and challenges for various energy production, storage, and conversion devices and systems. Students will also gain an understanding of the fundamentals of materials degradation, mechanisms, and mitigation.

Wind turbines and solar cells



Automobile powered by fuel cells with hydrogen energy

Fuel cell

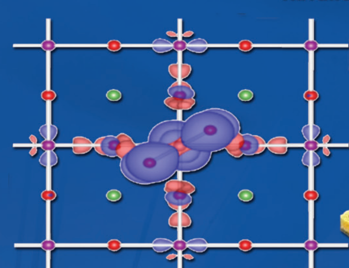


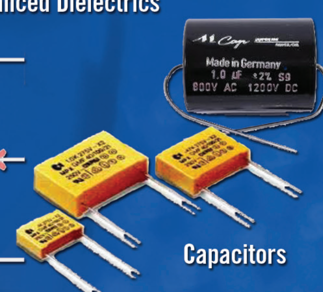
Electronic Materials

Electronic materials used in devices and systems exploit the properties of electrical conductors, semiconductors, insulators, superconductors, hard and soft magnets, ferroelectrics, piezoelectrics, and optical and display materials. The Electronic Materials concentration in the MSE program will allow students to gain an understanding of the principles of electronic materials, their applications to various devices, and their instrumentation in science and engineering. The students will also attain an in-depth knowledge of characterization of electronic materials.

Components for
Consumer Electronics/Telecommunication Devices

Advanced Dielectrics





Capacitors

University of Connecticut
School of Engineering

Materials Science & Engineering Program

...Offers 5 Concentrations

UConn MSE is the #1 MSE program in the Northeast. With an undergraduate student-to-faculty ratio of 6 to 1, internships, departmental scholarships, industry co-ops, undergraduate research opportunities, and industry-sponsored senior design projects, we are committed to providing students a comprehensive education to become leaders in the international marketplace.

For more information, please contact
MSE Program Director
Professor Pamir Alpay
Phone: (860) 486-4621
Email: pamir.alpay@uconn.edu

Biomaterials

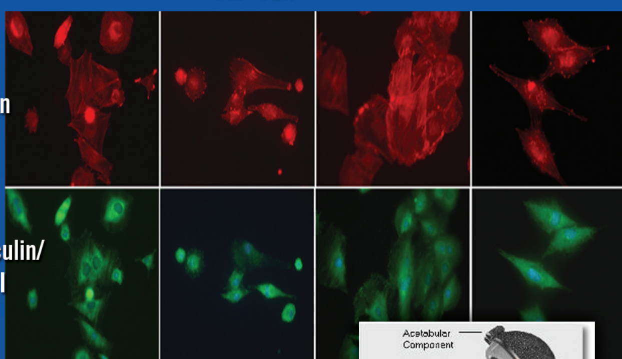
Biomaterials are synthetic materials used in making devices that will either replace part of a living system or function in intimate contact with living tissue. Biomaterial research is at the interface of materials science and biology and plays a crucial role in designing new devices and implants, especially in the emerging fields of tissue engineering and stem cell studies. The new Biomaterials concentration within the MSE program provides students with the excellent opportunity to be exposed to this exciting world of biomaterials and to appreciate the multidisciplinary nature of biomaterial studies. This concentration focuses on biomaterial selection and application to various contemporary issues.

Osteoblasts

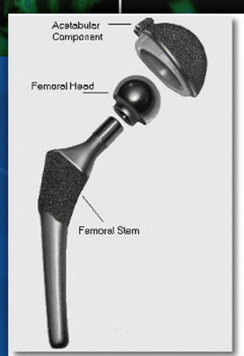
ATT-12h CaP-12h ATT-24h CaP-24h

Actin

Vinculin/ DAPI



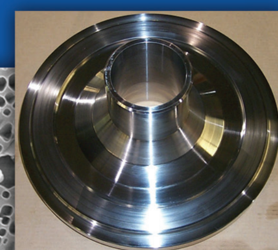
Total hip replacement

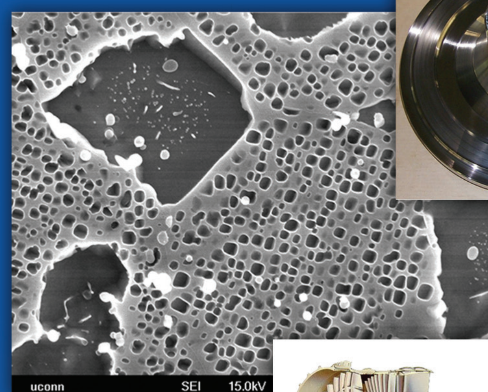


Dental posts

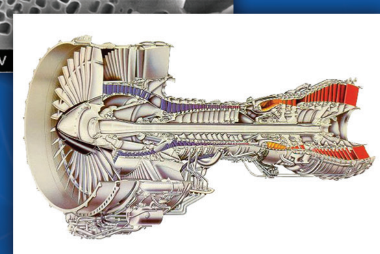
Metallurgy

Metallurgy is the study of the physical and chemical behavior of metallic materials and their design, processing, and production. Metallurgy has played a critical role in the modernization of our lives in the 21st century and will continue to be indispensible in the future. The metallurgy concentration within the MSE program provides students with unparalleled opportunities to become leaders in the design, development, and processing of novel metallic materials. The concentration, combined with the core materials courses, covers the necessary foundation for the processing of materials, such as their behavior at both ambient and high temperatures and in corrosive environments, for use in aerospace, transportation, electronic, energy conservation, and biomedical systems.





Electron microscopy image from the alloy used for rotors in the hot zone of gas turbine engines as shown above



Microstructures in nickel-based superalloys for aerospace applications

Nanomaterials

Nanomaterials are playing an increasingly important role in modern technology, with applications in the semiconductor, aerospace, biotechnology, environmental, petrochemical, and energy industries. As the nanotechnology industry is predicted to become a trillion dollar discipline within the decade, the new Nanomaterials concentration offered by the UConn Materials Science and Engineering program provides students an exciting entry into a rapidly growing field. The program builds upon the strong core of materials courses with the incorporation of focused electives emphasizing nanomaterials phenomena, fabrication, characterization, modeling, and applications.

Scanning Electron Microscope (SEM) images of polar surface-dominated ZnO nanopropeller arrays, including side and top views of a bunch of aligned ZnO nanopropeller blades with perpendicularly ordered ZnO nanowires