EXPAND CAPABILITIES FOR RESEARCH, DEVELOPMENT AND MATERIALS QUALITY CONTROL.

The Nanomaterials Core Characterization Facility (NCC) is an open access, nationally ranked collaborative materials analysis multiuser facility where researchers from universities and industry have access to the capabilities of our state-of-the-art instrumentation and expert advice.

The NCC offers technologies that benefit multi-disciplinary industrial and scholarly research in a broad range of sciences from: regenerative medicine, biotechnology, biology, forensic science, chemistry, pharmaceuticals, materials science, aerospace and microelectronics.

The NCC also provides a conduit to scientists and industry in a collaborative effort between the College of Humanities and Sciences and the School of Engineering.

WHAT THE NCC CAN DO FOR YOU:

- Imaging of samples using electron, optical, or x-ray methods
- Elemental mapping of structural features
  - *Complete surface analysis*
  - *Chemical mapping*
  - *Depth profiling*
  - *Elemental Speciation*
  - *Surface Roughness*
  - *Magnetic properties measurement*
- Variety of sample preparation tools

About VCU School of Engineering

Founded in 1996, the School of Engineering at Virginia Commonwealth University teaches 1,652 undergraduate and 265 graduate students. Driven to be the national model for innovation in engineering and research, the school offers B.S., M.S. and Ph.D. degrees in mechanical, nuclear, biomedical, electrical, computer and chemical and life science engineering, computer science and the country's only hybrid mechanical and nuclear engineering doctoral program. Cross-Disciplinary focus areas include: Sustainability and Energy Engineering, Micro and Nano Electronic Systems, Pharmaceutical Engineering, Mechanobiology and Regenerative Medicine, Security and Mining of Big Data, and Device Design and Development.

Interdisciplinary research opportunities are offered through the school's Nanomaterials Core Characterization Facility, the Institute for Engineering and Medicine, the C. Kenneth and Dianne Harris Wright Virginia Microelectronics Center, the Translational Research Innovation Projects Facility, the Dean's Undergraduate Research Initiative, and the da Vinci Center. To learn more, go to www.egr.vcu.edu.

About the University

Virginia Commonwealth University is a major, urban public research university with national and international rankings in sponsored research. Located in downtown Richmond, VCU enrolls more than 31,000 students in 222 degree and certificate programs in the arts, sciences and humanities. Sixty-six of the programs are unique in Virginia, many of them crossing the disciplines of VCU's 13 schools and one college. MCV Hospitals and the health sciences schools of Virginia Commonwealth University compose the VCU Medical Center, one of the nation's leading academic medical centers. For more, see www.vcu.edu.

VCU Innovation Gateway website:
research.vcu.edu/ott/

NANO

NANOMATERIALS CORE CHARACTERIZATION FACILITY

Nanomaterials Core Characterization Facility
620 West Cary Street, Richmond, Virginia 23284
804 828-3925 (Dean's office), 804 727-7020 (direct lab line)
nano@vcu.edu

VCU School of Engineering
VIRGINIA COMMONWEALTH UNIVERSITY

"We have a user center designed to be a one-stop shop for researchers working in materials science."

Everett Carpenter, Ph.D., Director
804-828-7508
ecarpenter2@vcu.edu

ABOUT THE NCC

The NCC is a research core facility of the VCU Office of Research and located in the Institute for Engineering and Medicine. The NCC is also a partnership between the VCU School of Engineering and the VCU College of Humanities and Sciences. As a research facility, resources and contract services are available to both university faculties and industry.

The NCC offers technologies that benefit multi-disciplinary industrial and scholarly research in a broad range of sciences to modify, manipulate or tailor the surface, size, or shape of a particular material.

With the NCC you gain access to over $11 million in sophisticated materials characterization equipment and analytical services unique to the mid-Atlantic region.

To learn more about NCC and what we can do for you, please visit us online at www.nano.vcu.edu.

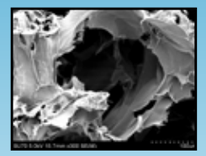
CHARACTERIZE NEW MATERIALS OR IMPROVE OLDER ONES IN ONE OF THE LARGEST UNIVERSITY-BASED RESEARCH FACILITIES IN THE U.S.

In 2009, through assistance from federal and state grants and private donations, VCU began building a state-of-the-art instrumentation facility to support characterization and development in materials science, especially nano-related materials and research.

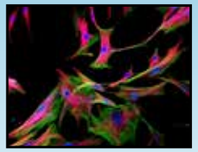
Today we are continuing to expand our suite of instruments, which are unique to the Mid-Atlantic region. The staff at the NCC has extensive experience in developing protocols for analysis of your materials characterization requirements and interpretation of findings. We are here to assist you!

To learn more, visit www.nano.vcu.edu.

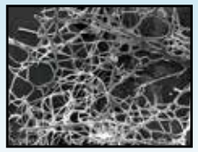
OUR INSTRUMENTS CAN BE USED ALONE OR TOGETHER TO PROVIDE COMPLIMENTARY ANALYSIS.



SEM image of sugars secreted by bacteria, then freeze-dried.



Stem cells grown on titanium surfaces and differentiating into osteoblasts (bone forming cells).



A film made by silk fibroin electrospun fibers, extracted from the cocoons of silk worms and electrospun in a lab.

THE NANOMATERIALS CORE CHARACTERIZATION FACILITY IS EQUIPPED WITH STATE-OF-THE-ART INSTRUMENTATION.

Hitachi SU-70 FE-SEM

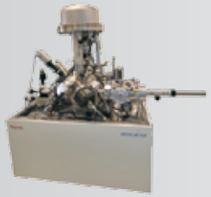
- Spatial resolution of 1 nm
- Elemental analysis using EDS
- E-beam lithography
- STEM mode

Zeiss Libra 120 Transmission Electron Microscope

- Lower acceleration voltage results in less sample damage while maintaining spatial resolution of ~0.4 nm
- An array of analytical tools to provide elemental identification and mapping

PANalytical MPD X'Pert Pro

- Versatile powder diffraction system
- Phase identification
- Crystal change with temperature
- Very small sample volumes



ThermoFisher ESCAlab 250

- Multi-mode surface characterization system
- Single monolayer sensitivity
- 10 µm spatial resolution
- Surface changes with temperature

Zeiss Auriga FIB-SEM

- High resolution SEM (1.0 nm at 15 kV) and FIB (2.5 nm resolution at 30 kV)
- Precision milling and nanofabrication abilities
- Fibics Nanopatterning and Visualization Engine
- EDS, EBSD
- Correlative imaging (with LSM 710)

Zeiss LSM 710 Laser Scanning Microscope

- Wide range of QUASAR detector configuration options
- 34-channel parallel imaging
- Laser lines: 405, Argon (458, 488, 514), 561, 633 nm
- Full incubation control
- Shuttle and Find holders to transition to the Zeiss Auriga FIB-SEM

Bruker SkyScan 1173 High Energy Micro-CT

- 130 kV microfocus X-ray source
- Distortion-free flat panel detector
- Better than 7 µm 3D spatial resolution (small samples)
- Continuous scanning for long objects
- 2D/3D image analysis and realistic visualization

Other instruments include:

- Veeco ICON Atomic Force Microscope
- HORIBA LabRAM HR Evolution Confocal Raman Microscope
- Quantum Design Versalab Platform
- Viscotek GPCMax
- Rame-Hart Contact Angle
- PANalytical X-ray Fluorescence Spectrometer

For our complete list of instrumentation capabilities, schedules and fees, please contact Everett Carpenter, Ph.D. (804-828-7508).