Seeing things at the nanoscale and determining how they behave is essential for nanoscience and nanotechnology to progress. Nanoscale imaging, spectroscopy, and properties identified in the AIMLab tell that story with amazing clarity.

The AIMLab is part of the Maryland NanoCenter, a partnership of the A. James Clark School of Engineering and the College of Computer, Mathematical and Natural Sciences at the University of Maryland. It is part of a full range of state-of-the-art research facilities at the University of Maryland including X-ray diffraction, NMR spectroscopy, and X-ray and ultraviolet photoelectron spectroscopy.

The AIMLab supports the University of Maryland’s mission of performing cutting-edge research and providing technologies and services for engineering and science researchers in academia, industry and government; developing future professionals who have hands-on experience in advanced microscopy and composition analysis; and promoting a vibrant technological economy in the state of Maryland through interactions with established and emerging companies.

The AIMLab is supported by the Maryland NanoCenter and the University of Maryland NSF Materials Research Science and Engineering Center (MRSEC).

A textile made of Si–CNT composite yarn with a Li-storage capacity five times higher than graphite electrodes, viewed with a SU-70 SEM.

FOR INFORMATION, PLEASE CONTACT:

DR. WEN-AN CHIOU
DIRECTOR, AIMLAB
(301) 405-0541
wachiou@umd.edu

PROF. GARY RUBLOFF
DIRECTOR, NANOCENTER
(301) 405-3011
rubloff@umd.edu
CAPABILITIES

TRANSMISSION ELECTRON MICROSCOPY (TEM)
- Field emission TEM with EDS and EELS chemical analysis
- Energy-filtered TEM (GIF) and holography
- LaB₆ TEM with EDS
  - Heating and cryo capability
  - Tilt and rotation capability
- Tomography
- Lorentz microscopy

SCANNING ELECTRON MICROSCOPY (SEM)
- Electron microprobe with WDS and EDS analysis
- Field emission SEM with EDS analysis
- FEG SEM with ultrafast stages
- Scanning probe microscopy

FOCUSED ION BEAM (Dual beam)
- Micromanipulator system

ATOMIC FORCE MICROSCOPY

SAMPLE PREPARATION
- Cutting, polishing, thinning, electro-polishing
- Cryo-ultramicrotomy, ion beam thinning
- Plasma cleaning

OTHER
- FTIR and optical microscopy

APPLICATONS

CHARACTERIZING MATERIALS AND STRUCTURES
- Nanowires and nanotubes
- Particles and composites
- Ultrathin and multilayer films
- Biological systems (cells, viruses, tissues)
- Nanoscale devices

IMAGING AT ATOMIC AND NANO SCALES
- Atomic resolution
- Lattice and defect imaging
- Tomography, 3-D reconstruction

ANALYTICAL COMPOSITION AND IMAGING
- Compositional analysis
- Local chemical bonding
- Elemental mapping

IN-SITU ELECTRON MICROSCOPY EXPERIMENTATION AND TESTING
- Ultra-fast heating
- Thermal response from cryogenic to high temperature
- Mechanical, magnetic, and other properties of nano and micro structures
- Lorentz microscopy

IMAGE CAPTURE AND ANALYSIS
- High resolution digital images and video
- 3-D imaging, tomography

SCANNING NANOPROBES
- Structure, composition
- Materials properties for applications

SURFACE ANALYSIS
- High resolution surface topography
- Chemical and compositional analysis

www.aimlab.umd.edu

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