



[www.aimlab.umd.edu](http://www.aimlab.umd.edu)

Cutting-edge instrumentation for nanocharacterization and microscopy

Supporting research, education, and technology development

A regional facility open to and serving the University of Maryland, industry, government labs, and external academic and nonprofit organizations

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 and ultraviolet photoelectron spectroscopy, X-ray diffraction, and NMR 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).

*Cryo-SEM image of two textile fibers with different properties sliced with an ion beam at cryogenic temperatures*

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UNIVERSITY OF  
MARYLAND

# CAPABILITIES

## TRANSMISSION ELECTRON & SCANNING TRANSMISSION ELECTRON MICROSCOPY (TEM/STEM)

Field emission TEM/STEM with EDS and EELS chemical analysis

LaB<sub>6</sub> TEM with EDS

### Equipped with:

Heating and cryo capability

High-tilt and rotation capability

Tomography

Lorentz microscopy

## SCANNING ELECTRON MICROSCOPY (SEM)

### FEG SEM

SE, BSE, STEM and ion detectors

Electron backscatter diffraction

Cathodoluminescence

Energy dispersed x-ray spectroscopy

Ultrafast heating stages

Wet-cell capability

Electron microprobe with WDS, EDS and CL

## FOCUSED ION BEAM

Gallium FIB

Xenon plasma FIB

TOF-SIMS

5-gas injection system

Kleindiek micromanipulator system

Peltier heating/cooling stage

Omniprobe nanomanipulator system

## SAMPLE PREPARATION

Cutting saw, polisher, dimpler and coring devices

Electro-polishing equipment

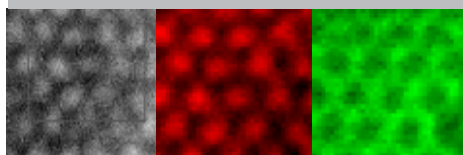
Ion beam thinner

Cryo-plunger

Cryo-ultramicrotome

Plasma cleaning system

Sputter & carbon coaters



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THE AIMLAB IS PART OF THE MARYLAND NANOCENTER, A PARTNERSHIP OF:



A. JAMES CLARK  
SCHOOL OF ENGINEERING



COLLEGE OF  
COMPUTER, MATHEMATICAL,  
& NATURAL SCIENCES



SUPPORTED IN PART BY:



# APPLICATIONS

## CHARACTERIZING MATERIALS AND STRUCTURES

Nanowires and nanotubes

Particles and composites

Ultrathin and multilayer films

Polymers

Defect study

Nanoscale devices

Geological materials

Biological materials (cells, viruses, tissues)

## IMAGING AT ATOMIC AND NANO SCALES

Atomic resolution defect imaging

Tomography, 3-D reconstruction

## ANALYTICAL COMPOSITION AND IMAGING

Compositional analysis

Local chemical bonding

Elemental mapping

## IN-SITU ELECTRON MICROSCOPY EXPERIMENTATION AND TESTING

Thermal response from cryogenic to high temperature

Mechanical, magnetic, and other properties of nano and micro structures

Wet-environmental SEM

Lorentz microscopy

## IMAGE CAPTURE AND ANALYSIS

High resolution digital images and video

3-D imaging, tomography

## SURFACE ANALYSIS

High resolution surface topography

Chemical and compositional analysis

## SMALL DEVICES

Micro-fabrication, repair and modification

