Schematic of a chemical AFM of lithographically carved thin film for an electronic nanochip.

Samarth Group
Penn State
Credit R. Malek

“In today’s budget-conscious, competitive environment, the demands and expectations are high, but the resources lean. By using the technical resources of the Penn State Materials Characterization Laboratory, we hope to gain insight into microstructural information that up to now has been beyond our reach.”

David M. Stumpf
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The Materials Characterization Laboratory (MCL) offers state-of-the-art analytical instrumentation and more than 20 highly trained technical staff to help researchers identify and understand the properties of novel materials. Users learn through analyzing their own samples under the guidance of the technical staff members and/or by participating in short courses and seminars offered throughout the year.

Offsite users are welcome to travel to the facility to perform their own analyses or work remotely in close concert with the technical staff members to achieve their analytical objectives.

**MCL provides:**
- World-class equipment
- Dedicated lab space for materials characterization and materials processing
- Opportunities to become educated in materials characterization
- Full-time professional staff

**Capabilities include:**

**Microscopy** – scanning electron microscopy, transmission electron microscopy, focused ion beam microscopy and lithography, atomic force microscopy, near-field scanning optical microscopy, orientation imaging microscopy, optical profilometry

**Surface Analysis** – Auger electron spectroscopy, X-ray photoelectron spectroscopy

**Optical Spectroscopy** – FT-IR microscopy, ultraviolet-visible spectroscopy, confocal Raman spectroscopy

**Physical Property Determination** – electrical characterization, particle analysis, thermal analysis, mechanical testing, nanoindentation

**Structural Analysis** – X-ray diffraction, small angle X-ray scattering

**Chemical Analysis** – electron probe microanalysis, energy dispersive X-ray spectroscopy, inductively-coupled plasma atomic emission spectrometry, and inductively-coupled plasma mass spectrometry

**Materials Processing** – sputter coater, sintering furnaces, hot press, hot isostatic press, cold isostatic press, machine shop, sample preparation and polishing