Advanced Materials Characterization Core

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Reserve Equipment: https://www.uab.edu/cores/ircp/amcc

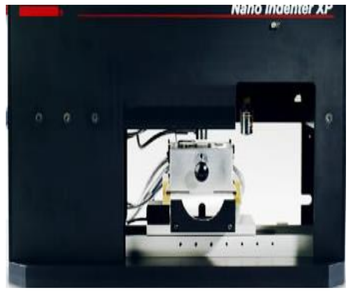
Scanning Electron Microscope (SEM)

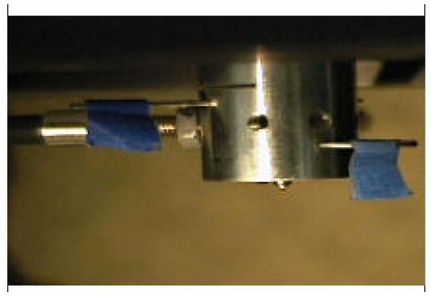
- Image surface features of metals, biomaterials, thin films, particles, polymers, grain boundaries, composites etc.
- Energy dispersive X-ray spectroscopy (EDX) to identify elemental composition of materials
- Can perform analysis on biological samples using environmental mode (ESEM).

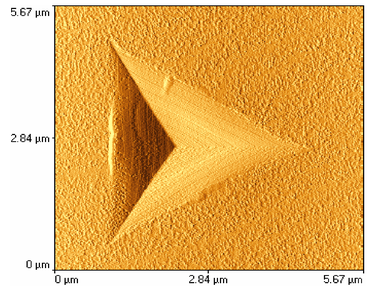
Multi-Purpose X-ray diffraction (XRD)

- Multi-purpose X-ray Diffractometer is non-destructive method to characterize materials' composition, crystal structure, phase change, grain-size and stress analyses of thin films, polymers and ceramics
- Can also perform particle size analysis using small angle X-ray scattering (SAXS)
- Epitaxial film analysis can be performed using Ultra Fast Reciprocal Space Mapping (URSM)

Nano-indenter

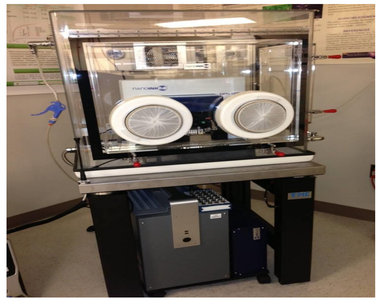


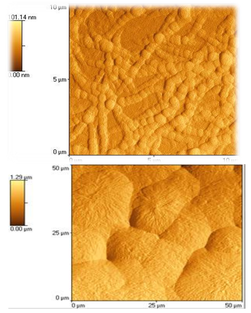




- Measurement of nanomechanical properties such as hardness and Young's modulus of nanostructured materials and thin films by a nano-tip indentation

Atomic Force Microscopy (AFM)

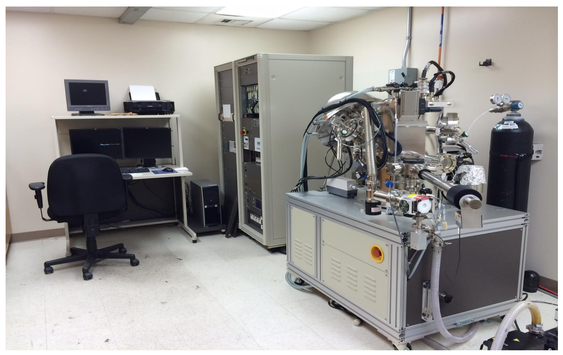




- Image nanoscale surface features and morphologies of metals, biomaterials, thin films, particles, polymers, proteins and other biometrics, grain boundaries, composites etc.
- Two AFM instruments with tapping and contact modes are available for topographic and phase imaging and roughness measurements

AFM instrument and images of collagen nanomatrix and polymer spherulites

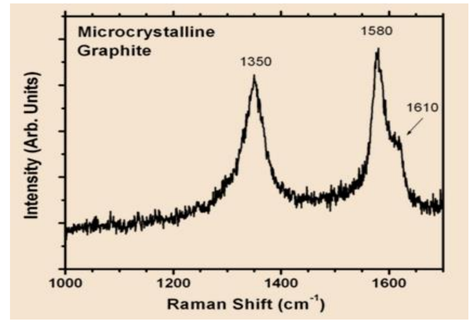
X-Ray Photoelectron Spectroscopy (XPS)



Thermoresponsive Polymers:

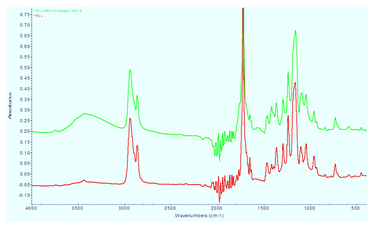
- **Mechanism of Action:** The copolymer's LCST allows for temperature-sensitive self-assembly, crucial for controlled drug encapsulation and release.
- **Implications for Targeting:** Enables selective drug delivery by minimizing systemic exposure and enhancing localization at target sites.

Raman Spectroscopy



- Micro-Raman/Photoluminescence Spectrometer for non-destructive characterization of materials.
- Very effective in characterizing carbon materials (CNTs and Diamonds)
- Complimentary to FT-IR.

Infrared Spectroscopy



- The instrumentation includes the Bruker Optics Hyperion 3000 infrared microscope and Vertex 70 FTIR spectrometer with numerous options for infrared imaging and composition mapping with down to 2-micrometer resolution , in addition to organic functional group analyses.
- Both transmission and reflection modes available.