Measurement Facilities: *Nanocharacterization*

The Polymers Division has established several capabilities for structural measurements of polymer and organic thin films and nanoparticles. These include the ability to map out surface features at the nano-scale and associated kinetic and thermodynamic changes of nanostructure with temperature and magnetic field.

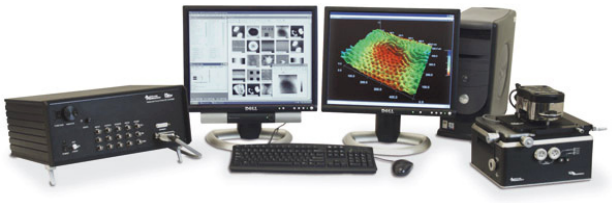
Atomic Force Microscopy (AFM)

A set of three AFM's that range from "workhorse" to multi-modal high throughput instruments are available in this facility. Specifically:

- Small sample, AFM for quick measurements of sample surface morphology

- Large sample AFM with a high precision closed loop scanner and a large travel stage for automated measurements over large areas such as a combinatorial gradient.

- Small sample AFM with high precision closed loop scanner and a variety of sample environments including fluid operation, variable humidity and temperature. Functionalities include a heated tip for measuring local thermomechanical properties of polymers, electrical measurements for measuring potential across organic electronic devices, and magnetic field measurements for examining magnetic nanoparticles.



Multifunctional high-precision AFM.

Low Voltage Electron Microscopy (LVEM)

The LVEM5 is a very simple desktop design and has practically no installations demands:

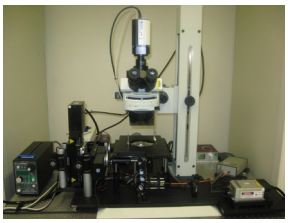
- Due to the low accelerating voltage, no staining is required. The result is high contrast imaging of polymer samples in their native states

The LVEM5 applies 5 kV to 4 integrated imaging modes: TEM, STEM, SEM and Electron Diffraction.

LVEM for low resolution electron microscopy needs

Surface Plasmon Resonance (SPR) with Fluorescence Imaging Microscopy

This state-of-art temperature controlled SPR-Fluorescence imaging instrument is developed to map multiple nanoparticle-biomolecule (proteins, lipids, enzyme) interactions by the use of immobilized nanoparticles that are pre-patterned on gold and silver coated substrates. Interactions with different biomolecules can be simultaneously measured by changes in the SPR and TIR-fluorescence signal. Changes associated to biomolecule binding can be related directly to the underlying nanoparticle pat-terning characteristics. The results can be analyzed by Langmuir adsorption isotherms for determination of the binding energies of nanoparticle-biomolecule associations.



Surface plasmon resonance with fluorescence microscopy for mapping nanoparticle interactions with biomolecules.

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FACILITIES