

Characterization of Nanomaterials from atoms to structures, systems, and devices

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Characterizing nanostructure properties is critical for detailed understanding, predictability, and control.

Electronic properties

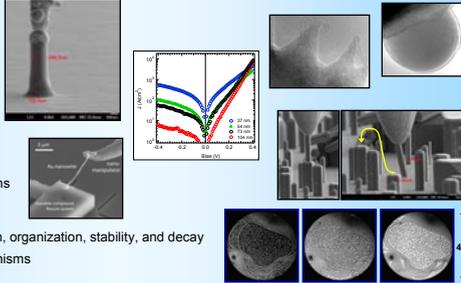
- Bulk and interface transport
- Electronic structure
- Surface effects

Mechanical properties

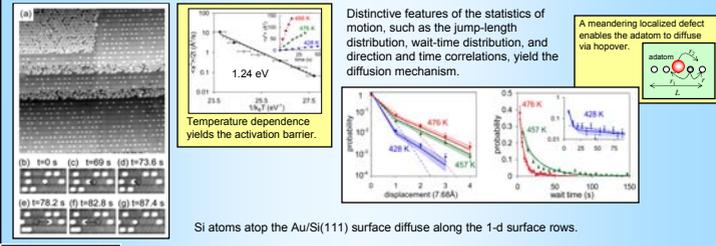
- Elastic and plastic deformation
- Fracture and failure mechanisms

Kinetic properties

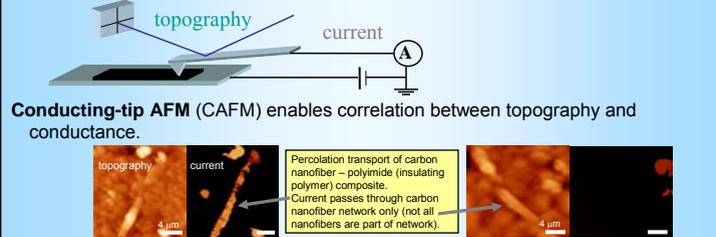
- Processes underlying formation, organization, stability, and decay
- Diffusivity and diffusion mechanisms



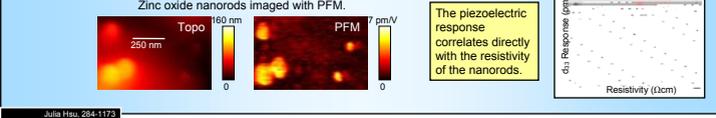
Scanning tunneling microscope (STM) probes atomic-scale motion directly.



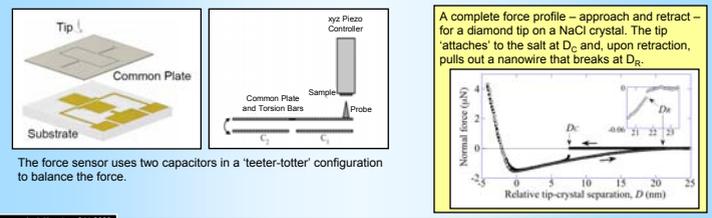
AFM provides rapid characterization of surface nanostructures.



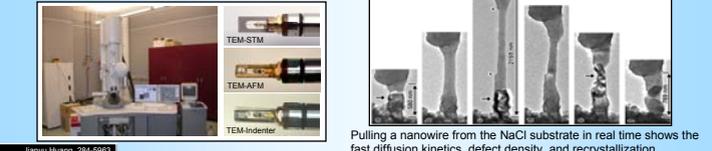
Piezoelectric force microscopy (PFM) relates mechanical and electrical state of materials



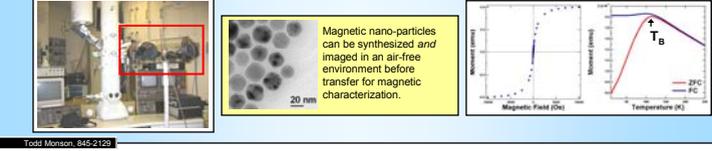
Interfacial force microscope (IFM) has a non-compliant force sensor that allows complete measurement of attractive and repulsive force profiles.



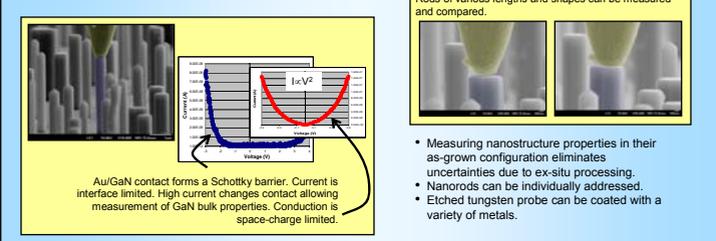
The Tecnai F30 TEM at the Center for Integrated Nanotechnologies contains specialized piezo-controlled probes.



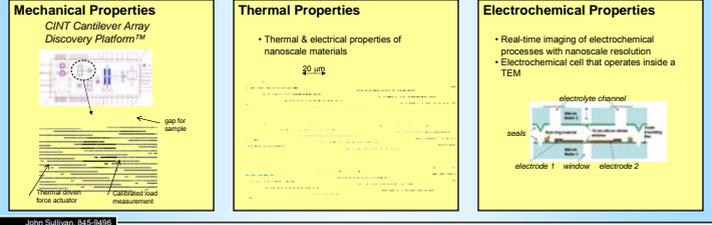
The 'air-free' TEM allows transfer through a glove-box without contamination.



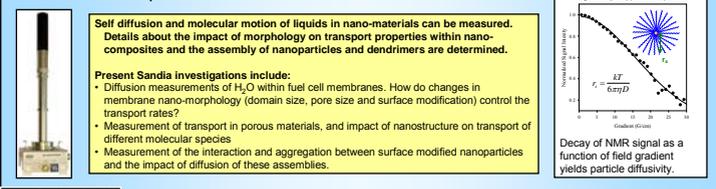
Nanomanipulator in an SEM allows electrical characterization and direct manipulation of nanostructures.



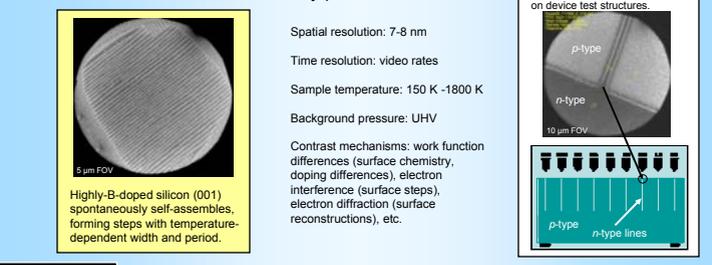
Designing micro-scale platforms for testing mechanical and thermal properties.



Pulsed field gradient nuclear magnetic resonance (PFG-NMR) measures the diffusion of nanoparticles in solution.



Low-energy electron microscope (LEEM) can image real-time surface nanostructure formation and self-assembly processes.



Microsystems reliability and failure analysis is pushing to the nanoscale.

