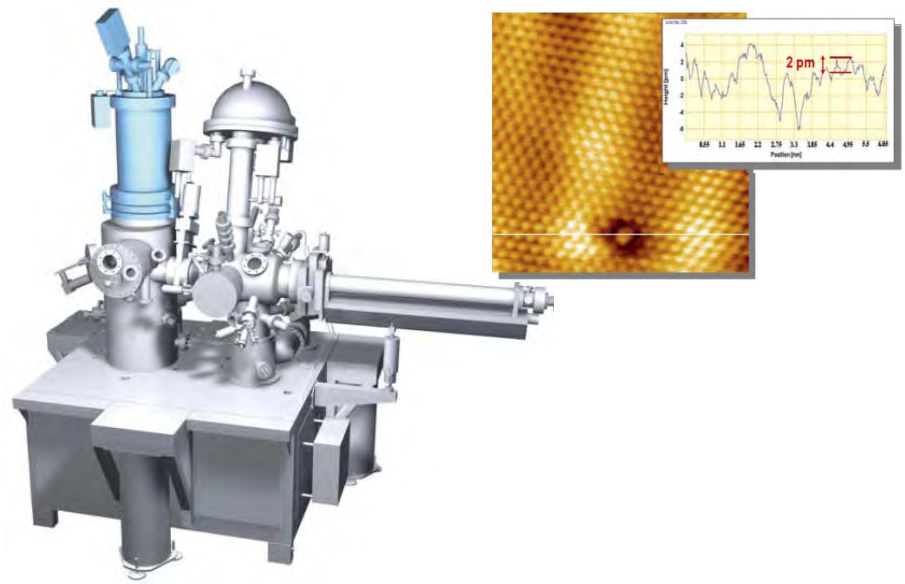
Low-Temperature Scanning Probe Microscopy Capability

EMSL

Capability/Need

- **Preeminent system** for probing single-site chemical reactivity
- **Significantly expand**s upon EMSL's existing capabilities in the chemical imaging with atomic resolution
- Features:
  - true cryo (5 K) scanning tunneling and non-contact atomic force microscope
  - combined *in-situ* with hyperthermal molecular beam (a true unique combination)
  - single molecule vibrational spectroscopy
  -combined with traditional, ensemble-averaging surface analytical tools (XPS, UPS, AES, LEED, ISS).



Science/Users

- Provides unique combination of tools to examine the molecular details of chemical reactions important for catalysis and photocatalysis
  - Enables measurements at specific catalytic reaction sites in realistic conditions
  - Allows spatially-resolved reaction kinetics and dynamics.
- Enhances the ability to measure and control the vibrational structure of reacting molecules . Extends to a new level the ability to determine the details of molecular interactions at surfaces.
- Enables detailed measurements of nucleation and growth processes important for materials synthesis and geochemical reactions

EMSL Strategy Alignment; Specifics

- Science themes: Science of Interfacial Phenomena
- Cross-cutting challenges: Static-Dynamics; Unprecedented Resolution; Design/Synthesis of Complex Materials; Linking Theory/Experiment; Bridging Scales
- EMSL capability area: Microscopy
- Anticipated availability: August 2010
- Technical POC: Igor Lyubinetsky

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