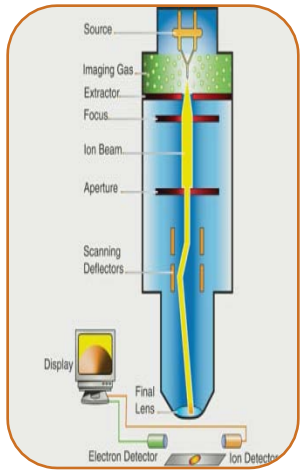
Helium Ion Microscope (HIM)

Capability/Need

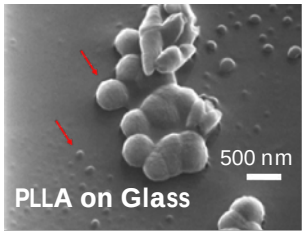
One of four to five instruments in the world for cutting-edge imaging and chemical analysis:

- Extremely high spatial resolution (0.35 nm)
- Imaging capability for insulating specimens at high resolution without conductive coatings
- Capability of imaging low Z elements
- Large focus depth and high surface sensitivity
- Sharp Z contrast via backscattered ion imaging
- Rutherford backscattering analysis with a sub-nanometer He^+ probe
- **Uniqueness and complement to** scanning electron microscopy and transmission electron microscopy

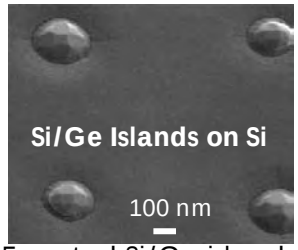


Science/Users

- Observe dynamics, nucleation and growth of biomolecules
- Examine microbe/protein interactions with minerals and nanomaterials
- Obtain unique, high-resolution characterization of surface and interface microstructure



Nucleation and growth of Poly-L-Lactide acid on hydroxyl-apatite



Faceted Si/Ge islands on Si. Details cannot be seen by SEM or AFM.

EMSL Strategy Alignment; Specifics

- Science themes: Biological Interactions/Dynamics; Geochemistry/Biogeochemistry and Subsurface Science; Science of Interfacial Phenomena
- Cross-cutting challenges: Unprecedented Resolution; Design/Syn Complex Materials; Bridging Scales
- EMSL capability area: Microscopy
- Anticipated availability: April 2010
- Technical POCs: Weilin Jiang and Shuttha Shutthanandan

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