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FIB-SEM and Serial Sectioning Characterization of 3D Microstructures in FEBEX-DP Samples

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U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

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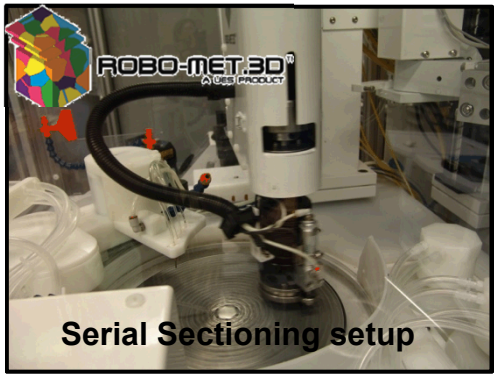
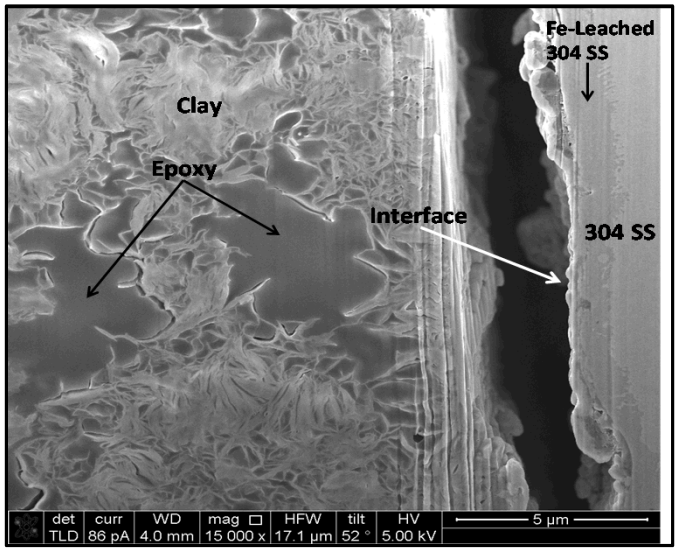
FIB-SEM and Serial Sectioning to Resolve 3D Microstructures

- **Focus on engineered barrier system (EBS) material interfaces** (concrete-bentonite, heater metal-bentonite, rock-bentonite)
- Sampling sections: 34, 41, and 49.
- Sample dimensions: 5×5×3 (cm)
- Methodologies: **Focused Ion Beam (FIB)-SEM** and automated **Serial Sectioning** for 2D-3D microstructure reconstruction
- Textural and mineralogical characterization at various scales:
  - Serial Sectioning: Optical analysis of bulk micron-scale features including interfaces
  - FIB-SEM: Submicron- to nano-scale analysis of interfacial domains
- **Goal:** Resolve 2D-3D microstructural features of barrier material degradation at EBS interfaces



Serial Sectioning setup



FIB-SEM picture clay-metal (304 SS) interfacial domain from hydrothermal experiments