

*Irradiated materials are prepared for examination right to left: the Shielded Sample Preparation Area (SSPA), the Shielded Transfer Cell (STC), the glovebox, and the fume hood.*



## Irradiated Materials Characterization Laboratory

The Irradiated Materials Characterization Laboratory (IMCL) is the newest nuclear energy research facility at Idaho National Laboratory's Materials and Fuels Complex. This unique, 12,000-square-foot facility incorporates many features designed to allow researchers to safely and efficiently prepare and conduct microstructural-level investigations on irradiated fuel.

IMCL focuses on microstructural and thermal characterization of irradiated nuclear fuels and materials. IMCL's unique design combines advanced characterization instruments in an environment

with tight controls on vibration, temperature, and electromagnetic interference with customizable radiological shielding and

confinement systems. The shielded instruments allow characterization of highly

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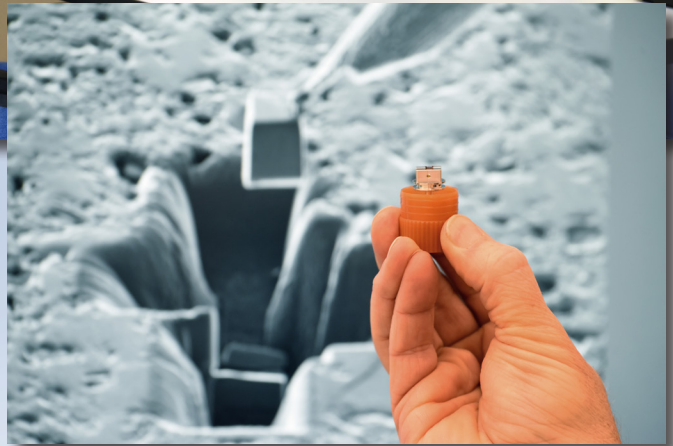
**IMCL is capable of providing shielded characterization and advanced post-irradiation examination of fuels and materials.**



*The Energy of Innovation*



The focused ion beam is used to remove a micron-sized cube of irradiated fuel for micro-analysis. The cube is prepared as a transmission electron microscope sample mount ready to be sent for analysis.



**For more information**

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radioactive fuels and materials at the micro- and nanoscale at which irradiation damage processes occur. Enabled by its modular design, IMCL will continue to evolve and improve capability to meet the national and international user demand for high-end characterization instruments for the study on nuclear fuel and materials.

Combined with INL's advanced computer modeling techniques, this understanding will enable advanced fuel designs, and reduce the time needed for fuel development and licensing. IMCL includes a shipping bay, high-efficiency ventilation, and a monitored exhaust stack.

**Current capabilities**

- Unshielded focused ion beam (FIB) for preparing minute samples for further testing
- Unshielded Electron Probe Micro-Analyzer (EPMA)

- Titan transmission electron microscope
- Shielded dual Beam FIB for TEM lamella preparation
- Scanning Electron Microscopes for microstructural characterization

**Key capabilities available in Fiscal Year 2017**

- Shielded hot cell for sample preparation
- Glovebox and hood for sample preparation and facility support
- Shielded Electron Probe Micro-Analyzer
- Shielded plasma FIB for preparing block samples for 3-D reconstruction, micromechanical testing, and microscale thermal property testing

**Key capabilities available in Fiscal Year 2018**

- Shielded thermal property measurement cell
  - Laser Flash Thermal Diffusivity
  - Differential Scanning Calorimetry
  - Thermal Conductivity Microscope
- Space for future user-defined capability