

Materials Research Laboratory
X-Ray Diffraction Shared Experimental Facility

REGISTRATION FOR X-RAY ACCESS AND TRAINING

Please complete this form and e-mail it to settens@mit.edu
Be sure to register in the MRL user management system, MUMMS,
at <https://cmse-coral.mit.edu/mumms/home.html>

Date: Click here to enter text.

Name: Click here to enter text.

MIT ID# Click here to enter text.

E-mail Address: Click here to enter text.

Have you previously operated X-ray diffraction equipment? Yes No

What type of X-ray scattering technique do you want to use?

- XRPD (X-Ray Powder Diffraction)- used to study polycrystalline samples, including polycrystalline thin films and solid samples
- HRXRD (High Resolution X-Ray Diffraction)- used to study epitaxial thin films and, to a lesser extent, single crystals
- XRR (X-Ray Reflectivity)- used to study polycrystalline, epitaxial, or amorphous thin films
- SAXS (small angle X-ray scattering) used to study mesostructure such as particle or pore size
- SCD (single crystal diffraction)- used to analyze single crystal samples
- XRF (X-Ray Fluorescence)- used to determine chemical composition of inorganic samples

What instrument(s) are you interested in using?

- PANalytical X'Pert Multipurpose Diffractometer—a flexible Cu-source instrument used for high-speed XRPD analysis of polycrystalline samples
- Rigaku SmartLab Multipurpose Diffractometer- a flexible high-power instrument optimized for thin film analysis (XRPD, HRXRD, XRR, GI-SAXS)
- Rigaku Rotating Anode Diffractometers—high-power Cr source instrument for XRPD analysis of polycrystalline samples with very good signal-to-noise ratio
- Bruker D8 HRXRD—high resolution diffractometer for HRXRD analysis epitaxial thin films and XRR analysis of thicker thin films (>60 nm)
- Bruker D8 GADDS—2-dimensional detector and small X-ray beam for XRPD texture analysis and microdiffraction; also used for small angle X-ray scattering (SAXS)
- Bruker Handheld XRF—elemental composition analysis of Mg through U
- Multiwire MWL120 Back-Reflection Laue instrument—used to determine orientation and quality of single crystals
- SAXSLAB instrument—small/wide angle X-ray scattering for studying nm-scale structure

What type of information do you want to learn about your sample?

- | | |
|--|---|
| <input type="checkbox"/> Phase Composition | <input type="checkbox"/> Relaxation/Strain of Epitaxial Film (in-plane and out-of-plane lattice parameters) |
| <input type="checkbox"/> Crystallite Size and Microstrain | <input type="checkbox"/> Defect Concentration in Epitaxial Film |
| <input type="checkbox"/> Lattice Parameter | <input type="checkbox"/> Curvature of Substrate |
| <input type="checkbox"/> Texture | <input type="checkbox"/> Thickness and Roughness of Film |
| <input type="checkbox"/> Crystal Structure | <input type="checkbox"/> Elemental Composition |
| <input type="checkbox"/> % Crystallinity | <input type="checkbox"/> Other: Click here to enter text. |
| <input type="checkbox"/> Residual Stress of Polycrystalline Sample | |

What type of samples are you studying?

- | | |
|--|--|
| <input type="checkbox"/> Powder or Bulk Polycrystalline (pellets, coatings, machined parts, etc) | <input type="checkbox"/> Large Molecules (zeolites, MOFs, etc) |
| <input type="checkbox"/> Polycrystalline Thin Film | <input type="checkbox"/> Mesostructured Samples (mesoporous silica, quantum dots, etc) |
| <input type="checkbox"/> Nanocrystalline Powder or Films | <input type="checkbox"/> Polymers |
| <input type="checkbox"/> Epitaxial Thin Films | <input type="checkbox"/> Other: Click here to enter text. |

What is the general composition of your samples? [Click here to enter text.](#)

What chemical hygiene hazards are associated with your samples?

- Known Toxin (agents that over time damage specific organs, poisons, etc)
- High Degree of Acute Toxicity (a single exposure may be fatal or cause severe damage)
- Potentially Hazardous (must wear gloves when handling but does not require additional PPE)
- Contains Heavy Elements (Sb, As, Ba, Bi, Cd, Ce, Ga, In, Pb, Hg, Se, Te, Th, V, actinides)
- Respirable
- Nanopowder or free nanoparticles
- Corrosive
- Irritant
- Flammable or Highly Reactive
- Carcinogen
- Reproductive Toxin

***if you begin working with different materials, notify the SEF staff of the material and any associated hazards.*

Training costs \$200, which will be charged to the research account number that you provide on this form. Training includes classes on safety, diffraction theory, data collection and data analysis. This fee allows you to attend all training classes and workshops for an unlimited number of instruments in the X-ray SEF without incurring additional costs. Individually scheduled training will still be charged at the assisted-use hourly rate.