**EMSL RESOURCES NEEDED**

At a high level, please check the types of resources that you are considering for your research approach. This list allows management and instrument staff to get an idea of the information that would be needed for a full proposal.

EMSL resources are organized below in alphabetical order by groupings of instrument types (not by research platforms). Details about these instruments and resources can be found on [EMSL’s website](https://www.emsl.pnnl.gov/science/instruments-resources).

**AEROSOL CHARACTERIZATION**

Computer-controlled Scanning Electron Microscopy/Energy Dispersed X-ray/Ice Nucleation Stage (CCSEM/EDX)

Ice Nucleation Chamber

Nanospray Desorption Electrospray Ionization Mass Spectrometry (NanoDESI)

Photoacoustic Spectrometer

Single Particle Mass Spectrometry (SPLAT)

**ANALYTICAL**

C, H, N, S Analyzer

Confocal Raman Spectrometry

Fluorescence Spectroscopy

Fourier Transform Infrared (FTIR) Microscopy

Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

Ion Chromatography

Isotope Ratio Mass Spectrometry

Mossbauer Spectrometry

Pyrolysis Gas Chromatography/Mass Spectrometry (Pyrolysis GC/MS)

Real Time Mass Spectrometry

Sum Frequency/Second Harmonic Generation (SFG/SHG)

X-ray Diffraction (XRD)

X-ray Photoelectron Spectroscopy (XPS)

**BIOLOGICAL SAMPLE PREPARATIONS & CELL SEPARATIONS**

Cell-Free Expression Pipeline

Cryogenic Focused Ion Beam-Scanning Electron Microscopy (Cryo-FIB/SEM)

Fluorescence-Activated Cell Sorting (FACS)

Focused Ion Beam-Scanning Electron Microscopy (FIB-SEM)

Laser Capture Dissection Microscope

Mass Cytometer

Microfluidics and Microfabrication (Clean Room)

Nanoscale Biological Sample Processing (NanoPOTS)

Stereo Zoom Microscope

**CHEMICAL IMAGING**

Atom Probe Tomography (APT)

Coherent Anti-Stokes Raman Scattering (CARS)/Stimulated Raman

Confocal Raman Spectrometry

Electron Microprobe

Fourier Transform Infrared (FTIR) Microscopy

Imaging Mass Spectrometry

Nanoscale Fourier Transform Infrared (Nano FTIR)

Nanoscale Secondary Ion Mass Spectrometry (NanoSIMS)

Nanospray Desorption Electrospray Ionization Mass Spectrometry (NanoDESI)

Raman Atomic Force Microscopy (Raman AFM)

Scanning Electron Microscopy-Energy Dispersed X-ray (SEM-EDX)

Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS)

Transmission Electron Microscopy-Energy Dispersed X-ray/Electron Energy-Loss Spectroscopy (TEM-EDX/EELS)

X-ray Photoelectron Spectroscopy (XPS)

**FLOW & TRANSPORT**

Intermediate Scale Flow Cells

Microfluidics and Microfabrication (Clean Room)

Pore Scale Micromodels

Soil Hydraulic Property Measurement

**HIGH PERFORMANCE COMPUTING & VISUALIZATION**

Data Visualization

Linux Clusters

**NMR & EPR**

Electron Paramagnetic Resonance (EPR)

Liquid NMR - Organic Matter/Complex Mixtures (DOM/NOM and lignin)

Liquid NMR - Structural Biology (proteins, protein complexes, etc.)

Liquid NMR for Metabolomics and Natural Products

NMR for Solids

**OMICS/MASS SPECTROMETRY**

Imaging Mass Spectrometry

Nanoscale Biological Sample Processing (NanoPOTS)

Omics/Mass Spectrometry for Bottom-Up Proteomics

Omics/Mass Spectrometry for Intact Proteins/Top-down Proteomics

Omics/Mass Spectrometry for Lipidomics

Omics/Mass Spectrometry for Metabolomics

Organic Matter Analysis (SOM/DOM)

**OPTICAL MICROSCOPES**

Confocal, FLIM & Multi-Photon Fluorescence Microscope

Holographic 3D Live Cell Imaging

Lattice Light Sheet

Pore Scale Micromodels

Single-Molecule Fluorescence Microscopy

Stereo Zoom Microscope

Structured Illumination Microscope & Confocal Airyscan

Super Resolution Fluorescence STORM/PALM

**PLANT GROWTH & SOIL INCUBATION**

Portable Photosynthesis System (LI-COR)

Reach-in Plant Growth Chambers

Soil Incubation

Walk-In Plant Growth Chambers

**SEQUENCERS**

Ion Proton B Sequencer

Ion S5 Sequencer

NextSeq550 Sequencer

**STRUCTURAL TOMOGRAPHY & TOPOGRAPHY**

Atom Probe Tomography (APT)

Atomic Force Microscopy (AFM)

Cryogenic Transmission Electron Microscopy for Environmental Microbiology

Cryogenic Transmission Electron Microscopy for Structural Biology

Environmental Transmission Electron Microscopy (TEM)

Helium Ion Microscopy (HIM)

Optical Coherence Tomography

X-ray Computed Tomography (XCT)

**SYNTHETIC SURFACES**

Microfluidics and Microfabrication (Clean Room)

Molecular Beam Epitaxy (MBE)