**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)