**Resource Needs**

Identify the types of capabilities at CSMB, EMSL, JGI, APS and NEON that you are considering for your research approach. At minimum, your proposal should request resources from two facilities, and be inclusive of EMSL and/or JGI. Note that competitive proposals will typically require use of both EMSL and JGI.

**CSMB Resources**

**BIO-SANS**

[ ] Biological Small-Angle Neutron Scattering Instrument (BIO-SANS)

**EMSL Resources**

Additional information about these resources can be found on the [EMSL 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

[ ]  Mössbauer 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

[ ]  Super Resolution Fluorescence STORM/PALM

**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**

[ ]  Airyscan

[ ]  Confocal, FLIM & Multi-Photon Fluorescence Microscope

[ ]  Holographic 3D Live Cell Imaging

[ ]  Lattice Light Sheet

[ ]  Pore Scale Micromodels

[ ]  Single-Molecule Fluorescence Microscopy

[ ]  Structured Illumination Microscope & Confocal

**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)

**JGI Resources**

For each capability selected, please indicate the approximate number of samples being requested for each type. More information on the products listed can be found here: <https://jgi.doe.gov/our-science/product-offerings/>.

|  |
| --- |
| **Cell Sorting and SIP Capabilities** |
| ***Capabilities Available*** | ***Approx. # of Samples*** |
| [ ]  FACS sorting of bacterial/archaeal cells (limit 4 samples) |  |
| [ ]  Stable Isotope Probing (SIP) fractionation (limit 36 samples) |  |

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| --- |
| **DNA Synthesis (limit 500 kb)** |
| ***Capabilities Available*** | ***Approx. # of Constructs*** |
| [ ]  Constructs <5kb |  |
| [ ]  Constructs 5-10kb |  |
| [ ]  Constructs >10kb |  |
| [ ]  Combinatorial libraries |  |
| [ ]  sgRNA library |  |
| [ ]  Data mining |  |
| [ ]  Strain engineering/CRAGE |  |

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| --- |
| **Ecosystem Fabrication (EcoFAB)** |
| ***Capabilities Available*** | ***Approx. # of Devices*** |
| [ ] Plant EcoFAB (limit 50 devices) |  |

*More information available at https://eco-fab.org/*

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| **Metabolomics** |
| ***Capabilities Available*** | ***Approx. # of Samples*** |
| [ ] Non-polar metabolite analysis (LC/MS) (limit 500 samples) |  |
| [ ] Polar metabolite analysis (LC/MS) (limit 200 samples) |  |

*More information available at* [*https://jgi.doe.gov/our-science/science-programs/metabolomics-technology/metabolite-analyses/*](https://jgi.doe.gov/our-science/science-programs/metabolomics-technology/metabolite-analyses/)

|  |
| --- |
| **Sequencing** |
| ***Capabilities Available*** | ***Approx. # of Samples*** |
| [ ] Algal *de novo* genomes |  |
| [ ] Algal resequencing |  |
| [ ] Algal RNA-seq |  |
| [ ] Bacterial/archaeal *de novo* genomes |  |
| [ ] Bacterial/archaeal resequencing |  |
| [ ] Bacterial/archaeal RNA-seq |  |
| [ ] Bacterial/archaeal single cells |  |
| [ ] Fungal *de novo* genomes |  |
| [ ] Fungal resequencing |  |
| [ ] Fungal RNA-seq |  |
| [ ] Metagenomes (no iTags) |  |
| [ ] Metatranscriptomes |  |
| [ ] Plant *de novo* genomes |  |
| [ ] Plant resequencing |  |
| [ ] Plant RNA-seq |  |
| [ ] Stable Isotope Probing (SIP) metagenomes |  |
| [ ] Other sequencing request |  |

*NOTE: JGI has recently discontinued support for the following products: these should not be included in your request: smRNA, bisulfite sequencing, ChIP-seq, ATAC-seq. More details here:* [*https://jgi.doe.gov/user-programs/phased-out-products/*](https://jgi.doe.gov/user-programs/phased-out-products/)

**NEON Resources**

If you are proposing to use soils from the NEON Biorepository, you must also include a [letter of support from NEON](https://www.neonscience.org/resources/research-support/letters-support) for the specific samples in your Letter of Intent. The letter must be included as an appendix in your Project Description file.

For more information about the available samples, visit: https://www.neonscience.org/samples/find-samples

**NEON Biorepository**

[ ] Samples from the NEON Biorepository

**APS Resources**

**X-ray Fluorescence Imaging**

[ ]  2ID-E nano XRF tomography

[ ]  2ID-D nano XRF and Ptychography under cryo temp

[ ]  8BM micro XRF 2D

**X-ray Computed Tomography**

[ ]  2BM micro tomography

[ ]  7BM pinkbeam tomography

[ ]  32ID nano tomography

**Macromolecular Crystallography (MX)**

[ ]  21ID-D fully tunable (6.5 - 20keV)

[ ]  21ID-F fixed energy @12.7keV

[ ]  21ID-G fixed energy @12.7keV

**Protein production and MX structure determination by the APS staff**

[ ]  Gene cloning\*

[ ]  Protein production\*

[ ]  Protein crystallization\*

[ ]  Structure determination\*

*\*These capabilities are also available to users who wish to come onsite and do the work themselves. Hands-on training provided.*

**Plant Growth**

[ ]  Reach-in Plant Growth Chamber