Prioritized Technology:
Instruments to Identify Microscopic Organisms in Ocean Worlds

### Technical Goal

- Identify and characterize morphological, textural, or other indicators of life.
- Identify cells and other microstructures that are 0.2 μm or larger in their longest dimension*.
- Detect putative cells Limit of Detection (LOD): 100 cells per cc of ice*.
- Detect key molecular signatures that represent dormant stage of cells (DPA) and energy supplier of cells (ATP)
- Detect native auto fluorescence


### Mission Applications

- Identification of structures with dimensions similar to terrestrial microorganisms with observed mobility would be a very strong indicator of life.
- Identification of terrestrial organisms in the sample would be strong indicator of terrestrial contamination.

### Technical Status/SOA

**Optical Microscopes:**
- **Visible Bright/Dark Field:** Phoenix and Rosetta however resolution insufficient;
- **Holographic Microscopy & Bright Field Microscopy**
- **Deep-UV (DUV) Microscopy** detection of native fluorescence (e.g., aromatic amino acids);
- **Epifluorescence Microscopy** with fluorescent stains that target biomolecules, allows identification of cells <0.2 μm in size;

**Atomic Force Microscopes:**
- Rosetta, Phoenix AFM

**Electron & Atomic Force Microscopes:**
- COLDTech/ICEE-2/PICASSO/MATISSE