BIOMINING

Microbes can be used for mining and recycling due to their sensitivity and affinity for metal ions. We want to bring these advantages up to space. We're creating a chimeric flagellum system with metal binding sites that allows the easy extraction and utilization of minerals.

ACCOMPLISHMENTS: OPEN SOURCED FLAGELLA WITH OUR MCS; MOUNTED METAL BINDING SITES INTO FLAGELLA, WHICH SUCCESSFULLY ROUND COPPER (I) AND COPPER (II).

VENUS LIFE

We're studying bioaerosols by coupling cell cycle parameters and fluorescent proteins to monitor cell division.

This will provide insight into possible life in Venusian clouds, as they are more periodic than the nrd-promoted fluorescence.

ACCOMPLISHMENTS: BUILT AND CHARACTERIZED CELL-CYCLE REPORTERS TO VISUALLY QUANTIFY CELL REPRODUCTION IN AEROSOL.

HELL CELL

Space is filled with extremes, and we're here to prepare prospective microbial astronauts for their hellish commuting.

To custom engineer extremophiles for space exploration, we took cues from natural adaptations against the elements.

This not only broadens the scope of applications of synthetic biology, but also tests the limits of life, terrestrial and extraterrestrial.

ACCOMPLISHMENTS: WE BUILT A GENETIC TOOLKIT ADAPTED FOR RADIATION, DESICCATION, COLD, AND BASE.

RADIATION

Deinococcus radiodurans

Saccharomyces cerevisiae

Psychromonas ingrahami

Escherichia coli

Manganese transport, superoxide dismutases, DNA repair mechanisms

Glycolysis, betaine pathway

Amino acid catabolism

Manganese transporter, betaine biosynthesis, and threonate biosynthesis increased survivability under desiccation.