

**BIOLOGICAL SCIENCES
ARTS AND SCIENCES****SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students****FOR APPLICATION YEAR: 2024****PROJECT TITLE: Developing genetic techniques for marine sediment microbes**

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Project Description

The discovery of microbial extracellular electron transfer (EET)—the process in which electrons are transferred across cell membrane(s) to/from the external environment interfacing with biological molecules—has greatly expanded not only our understanding of the types of substrates that microbes can utilize to acquire energy, but also the habitats and environmental niches where microbial life can be sustained. It has also stimulated research into microbe-electrode technologies, such as microbial electrosynthesis, which is the conversion of electricity to fixed carbon substrates (such as biofuels). However, there are currently very few described microbial mechanisms that allow organisms to take electrons from solid surfaces (i.e., electrodes) and use them for metabolism. Research in the Rowe lab focuses on cultivation and characterization of microbes that have the ability to take electrons from electrodes and fix CO₂ with the energy gained. This research project will build on recent high throughput genetic and transcriptomic studies in these novel microbes, to develop genetic mutants in hypothetical genes thought to be involved in the organisms' EET pathway. Students will be trained in basic microbial cultivation techniques, and genetic manipulations in *E. coli* and other microbes, including the potential use of CRISPR genetics tools.