

# Emily J. Gardel

**Graduate Institution:** Harvard University

**Graduate Discipline:** Applied Physics, Biophysics

**Hometown:** Acton, MA

**Relevant SC Research:** Biological and Environmental Research



## Research Interest:

Broadly, I am interested in how microorganisms interact with their surroundings and subsequently play a major role in our Earth's biogeochemistry. Metabolic pathways in microorganisms utilize pairs of reduction-oxidation reactions to gain energy and the variety of electron donors and terminal electron acceptors is as broad as the diversity of microorganisms. A majority of microorganisms are anaerobes and use a variety of oxidants, including solid-phase oxidants. Bioelectrical systems (BES) which separate the locations of oxidation and reduction reactions allow the anaerobes to use an electrode either as a donor or an acceptor.

My research examines both environmental and pure culture systems to identify limitations of BESs and discover how microbes are capable of using an electrode during metabolism. One project investigated the degree of diffusion limitation through duty cycling and how it influences overall current production. Another project explores how methane-producing microbes can use a supplied electrode as an electron donor.

## About Me:

I am fascinated by both the physics and chemistry that governs the diversity of life we see on this planet. Studying microorganisms allows me to research at the intersection of all these different scientific fields. I have always seen the interconnected nature of science that

goes beyond specific disciplines and enjoy applying my education in physics, chemistry, and engineering towards this research to think about biological questions in a new way. My interest in microbe-material interactions is further motivated by my desire to contribute to learning more about our environment and finding solutions to energy issues. I am very excited about the prospects of this research as it pertains to understanding microbial physiology as well as technological advances.

At Harvard University, I am involved in Harvard Graduate Women in Science and Engineering (HGWISE) as a co-chair as well as a departmental representative and have organized many professional development programs for graduate students. I have participated in Harvard's Energy Journal Club, an interdisciplinary group of graduate students that meet weekly to discuss energy related topics. In the lab, I have mentored several undergraduates on their research projects. Science outreach and education is important to me and I volunteer in a variety of different programs including the annual Cambridge Science Festival.

I am passionate about teaching science and learning about new ways to improve scientific curriculum in our country. I have had the fortunate experience of being a teaching assistant for in a general education class on science and cooking and awarded a teaching award from this experience. I have discovered that I thoroughly enjoy the combination of both

research and teaching and plan to pursue an academic career that allows me to combine both of these interests.

In addition to research and teaching, I am an avid bicyclist, outdoor enthusiast, gardener, and experimenter in the kitchen.



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