

IEH Undergraduate Intern Mentoring Opportunity

Deadline: March 17, 2015

Selections Announced:

Name/Title/Institution(s) of senior mentor(s): Paul G. Tratnyek, Professor, OHSU

Name/Title/Institution(s) of frontline mentor(s): Miranda Bradley, Ph.D. Student, OHSU

Project Title: Characterization of Magnetite from Columbia River Sediments

Context for Project:

The most biogeochemically important fraction of sediments—such as those from the Columbia River (CR)—consist of manganese and iron oxides and sulfides. Of these, magnetite is of particular interest because of its unique magnetic and redox properties. Recent work has shown that magnetite redox properties vary greatly with mineral composition and condition, but the scope and implications of this variability are not yet known. We are working on this as part of an on-going NSF funded project.

Brief Description:

Last summer, with participation by an ASE intern, we developed a uniquely powerful electrochemical method for studying the redox properties of naturally-sourced magnetite from CR sediments. This summer we will continue this research, with less time spent on method development and more emphasis on analysis of samples from diverse locations and use of more advanced electrochemical methods. The intern will participate in some field sampling, sample preparation and analysis in the laboratory, as well as fitting electrochemical data (to equivalent circuit models). We will coordinate with other CMOP investigator activities on common materials and methods.

Proposed Outcomes/Broader Impact:

This work will contribute to a better understanding of biogeochemical redox processes in CR sediments, which are coupled in many ways to surface water quality. The front-line mentor (Bradley) has an NSF Graduate Fellowship application pending that elaborates on a range of somewhat novel outreach activities that she is interested in pursuing, some of which could be initiated during the summer.

Proposed timeline (within a 10 week span):

<i>Week</i>	<i>Activities</i>	<i>Deliverables</i>
1	Basic training on safety, lab protocols, analytical methods.	
2	Sampling CR sediments. Extract magnetite from CR sediment samples.	
3	Preliminary electrochemical analysis of CR magnetite samples.	
4	Resample CR sediments. Refine methods based on preliminary results.	
5	Synthesize and present interim results.	Presentation
6-9	Resample CR sediments. Analyze. Compare results.	
10	Synthesize and present final results.	Report

Intern academic experience and skill-set should include:

Applicants should be majoring in chemistry, chemical engineering, environmental engineering, or a closely related field. Strong math and computer skills are also required. Ability to do (shore-based) field work and aptitude to do lab work with electronic instrumentation.