

School of Energy, Environmental, Biological, and Medical Engineering
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 1, 2012

The School of Energy, Environmental, Biological, and Medical Engineering is pleased to offer the following research project for the summer of 2012. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.

PROJECT TITLE: ADVANCED MATERIALS FOR BIOSEPARATIONS

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Project Description

Bioseparations play a key role in a wide range of chemical processes, from pharmaceutical manufacturing to biochemically produced commodity chemicals. The common element of these processes is the need to recover a specific target molecule (typically a protein) from a complex mixture containing many similar compounds. For example, many pharmaceuticals manufactured through a bioprocess and must be recovered from such a mixture. In this situation, a protein must also be recovered in a highly purified form using processes that avoid heat and harsh chemicals that could damage the protein and its effectiveness.

One key separation technology that is often applied in bioseparations is **preparative chromatography**, in which a highly selective solid (the “stationary phase”) is used to selectively capture one or more target components from a liquid phase (the “mobile phase”) by adsorption. Stationary phases are often categorized based on the separation mechanism: size exclusion, hydrophobic interactions, ion exchange, antigen-antibody affinity, or the use of a bonded phase to form a “reverse phase” that is chemically bonded to the stationary phase. The goal of this project is to synthesize and test a number of **dual-mode** adsorbents, in which two of the separation mechanisms above are active. Project participants will

- Synthesize and characterize a set of adsorbents with targeted physical and chemical properties
- Study the adsorption and desorption behavior (isotherms and thermodynamics) of the functionalized adsorbents
- Test the most promising adsorbent into a column to separate a protein-protein mixture using parameters determined from the adsorption/desorption studies.

Students participating in this project will also be expected to participate in weekly group meetings of the Adsorption and Ion Exchange Laboratory. In these meetings, one member of the team presents his or her results to the rest of the team, after which those results are discussed. REU students will make a presentation to the team at the end of their project.