

**National Science  
Foundation  
Industry/University  
Cooperative Research  
Center for Advanced Studies  
on Novel Surfactants**

**DEAP26-06NT03837**

**Goal**

The goals of the University Cooperative Research center are to perform industrially relevant research to address the technology needs of surfactant-polymer systems. These environmentally benign surfactants are to be developed to be more efficient surface-active reagents with specific applications for the industry.

**Performer**

*Columbia University  
New York, NY*

**Results**

Since the inception of the center, numerous publications have been generated. Technology transfer is one of the most important products. There is a Web site for this project.

**Benefits**

The benefits are working with other industries and other petroleum companies to develop the new surfactants needed to economically recover oil.

**Background**

The center was established in 1998. Detailed structure-property assessment of several classes of surface-active molecules is a major activity of the center. The focus is on design, development and characterization of solution and interfacial behavior of specialty surfactants. The aim is to develop and characterize these novel surfactants for industrial applications.

**Summary**

The study requires simultaneous investigation of the interaction of individual components in bulk solution as well as the interface that is in contact with it and will use a multi-pronged approach involving:

(1) Conventional techniques for measuring adsorption/desorption isotherms, surface tension, zeta potential, wettability, and heat adsorption.

(2) Advanced spectroscopic (fluorescence, electron spin resonance and nuclear magnetic resonance) techniques for probing the micro- and nano-characteristics of the adsorbed layer. Certain novel surfactant and surfactant mixtures as well as their mode of mixing will be investigated for their ability to lower oil-water interfacial tension with minimal adsorption (or loss) on reservoir minerals.

**Current Status (February 2007)**

DOE is a member in good standing of the consortium. This cutting-edge research includes synthesizing nano-structures of aggregates of mixed surfactants in solutions and at solid/liquid interfaces.

**Funding**

The project was awarded via purchase order.

**Publications**

Lu, Shaohua, Ph. D. dissertation, Columbia University, February 2007.

Bergna, H.E. and Roberts, W.O., "Adsorption of surfactants and polymers on silica," (with Lei Zhang), Chapter in Colloidal Silica: Fundamentals and Applications, Eds. pp. 531-534 (2006).

Somasundaran, P., Krishnakumar, S. and Mehta, Somil C., "A New Model to Describe the Sorption of Surfactants on Solids in Non-Aqueous Media," Journal of Colloid and Interface Science, 292, pp. 373-380 (2005).

**Project Start:** July 31, 2006

**Project End:** July 31, 2007

**Anticipated DOE Contribution:** \$25,000

**Performer Contribution:** \$425,000 (94 percent of total)

**Contact Information**

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