

Dr. Kathleen Stebe

Professor, Department of Chemical & Biomolecular Engineering

University of Pennsylvania

Dr. Stebe is the Deputy Dean for Research and Innovation and the Goodwin Professor in the School Engineering and Applied Sciences at the University of Pennsylvania. Educated at the City College of New York, she received a B.A. in Economics, Magna cum Laude, and a Ph.D. in Chemical Engineering at the Levich Institute under the guidance of Charles Maldarelli. Thereafter, she spent a post-doctoral year in Compiègne, France working with Dominique Barthes Biesel. She joined the Department of Chemical Engineering at Johns Hopkins University, where she rose through the ranks to become Professor and to serve as the department chair. In 2008, she joined the faculty at the University of Pennsylvania, where she was department chair from 2008-2012, before assuming her current position. Professor Stebe has been a Fellow at the Radcliffe Institute for Advanced Studies; she has received the Robert S. Pond Excellence in Teaching Award at JHU, the Frenkiel Award from the Division of Fluid Dynamics of the American Physical Society, and was named a Fellow of the APS and a Fellow of the Johns Hopkins Society of Scholars.



DATE:

April 28, 2016

TIME:

2:00 p.m.

LOCATION:

366 CLB

Professor Stebe's research focuses on materials at fluid interfaces and in complex fluids. She is an expert interfacial flows, with particular emphasis on how surfactants and complexes at interfaces alter interfacial stresses. Other aspects of her research address dynamic surface tension, rheology of protein laden interfaces, and the design of interfaces and bounding surfaces for biological and materials applications.

“Curvature Directed Assembly”

In materials science, the control over the spatial arrangement of colloids in soft matter hosts implies control over a wide variety of materials properties, ranging from the system's rheology, to its optics, to its catalytic activity. To direct particle assembly, colloids are often manipulated using external fields to steer them into well-defined structures at given locations. We have been developing alternative strategies based on fields that arise when a colloid is placed within soft matter to form an inclusion that generates a potential field in its host. Such potential fields allow particles to interact with each other. If the soft matter host is deformed in some way, the potential allows the particles to interact with the global system distortion. The concept is quite general, and applied within any medium in which distortions cost energy. We have explored these ideas in three media: curved fluid interfaces, where particles interact with the host interface via capillarity; confined nematic liquid crystals, where particles interact with the host director field via elastic interactions, and deformed lipid bilayers, where particles interact on tense membranes. These example systems have important analogies and pronounced differences which we seek to understand and exploit.