Department of Chemical Engineering
Distinguished Seminar Speaker

Daniel K. Schwartz
Professor and Chair, Chemical & Biological Engineering
University of Colorado Boulder

Host: Tom Webster
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"Single Molecule Tracking at Wet Interfaces"

Wednesday, April 2
320 Shillman
11:45a – 1:00p

Refreshments will be served

ABSTRACT Interactions between molecules and surfaces lead to complex and highly-varied interfacial behavior, where heterogeneity may arise from spatial variation of the surface/interface itself or from molecular configurations (i.e. conformation, orientation, aggregation state, etc.). These phenomena greatly impact technologies and applications including biomaterials, separations (chromatography and membrane filtration), heterogeneous catalysis, and biosensing, among others. The direct observation of adsorption, interfacial diffusion, and desorption of individual fluorescent molecules permits the characterization of heterogeneous interfacial behavior in ways that are inaccessible to traditional ensemble-averaged methods. Moreover, spectral information can be used to simultaneously track molecular configuration (aggregation or folding state). Single-molecule tracking experiments have traditionally been limited by small sample sizes (e.g. a few hundred molecules), leading to poor statistical significance and a lack of sensitivity to rare populations. However, new advances in high-throughput tracking methods now enable hundreds of thousands of molecules to be followed in a given experiment. This approach has recently been used to characterize heterogeneous molecule-surface interactions including: multiple modes of diffusion and desorption associated with both internal and external molecular configuration, intermittent interfacial transport, spatially dependent interactions, and others.

BIOGRAPHY Dr. Schwartz is Chair of the Department of Chemical and Biological Engineering and the Alfred and Betty Look Professor of Engineering at the University of Colorado Boulder. He has been a professor at CU-Boulder since 2001. He was previously an Assistant and Associate Professor of Chemistry at Tulane University from 1994-2000. Dan received his Bachelor's Degree (in Chemistry and Physics) and his PhD (in Physics) from Harvard University in 1984 and 1991 respectively, and subsequently performed postdoctoral fellowships in Chemical Engineering at UC Santa Barbara and Physical Chemistry at UCLA. Dan's research interests focus on interfacial phenomena with specialties in surface modification, surfactant phenomena, biotechnology, liquid crystals, single-molecule microscopy, and biomimetic catalysis. He has published roughly 160 peer-reviewed manuscripts that have been cited approximately 5000 times. His recognitions include the NSF CAREER award, the Dreyfus Foundation Teacher-Scholar award, the CU-Boulder Faculty Assembly Award for Excellence in Research, and election as a Fellow of the American Physical Society. Dan has been a Senior Editor of the journal *Langmuir*, the American Chemical Society's journal of surfaces and colloids since 2004 and is currently the Vice-Chair of the ACS Colloid and Surface Chemistry Division (COLL). He was the founding Director of the Tulane Science Scholars program (an enrichment program for High School students) and of the Summer Research Experience for Undergraduates Program in Functional Materials at CU-Boulder. He also developed a general education course at CU-Boulder, *Creative Technology*, that has communicated state-of-the-art technology concepts to more than 6,000 non-science undergraduates to date.

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