

SMS Fall 2021 Seminar Series

Friday Nov 12 | 2:30pm | Biodesign Auditorium*

Surfactant Aggregate Size Distributions Above and Below the Critical Micelle Concentration

Aggregate size distributions in an aqueous solution containing either charged or neutral surfactants are investigated using Raman multivariate curve resolution (Raman-MCR) spectroscopy, analyzed with the aid of a multi-aggregation chemical potential surface (MCPS) modeling strategy. Total least squares decompositions of the concentration-dependent Raman-MCR spectra are used to quantify the free and micelle surfactant populations, and the surfactant's CH stretch frequency is used as a measure of its average aggregation state. MCPS predictions are used to relate the experimental measurements to the underlying surfactant aggregate size distribution, by fitting either the component concentrations or the average CH frequency to MCPS predictions. Our results indicate that a low-order aggregate population gradually emerges as the critical micelle concentration is approached and then remains nearly concentration-independent after the appearance of micelles. The MCPS modeling strategy can also be used to describe the self-assembly of other sorts of microheterogeneous liquid mixtures and aggregation processes.

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Dor Ben-Amotz received a BA from Bennington College, a PhD from U.C. Berkeley with Charles Harris, and was a postdoc with Dudley Herschbach at Exxon Research and Engineering. He has been a faculty member in the Department of Chemistry at Purdue University since 1989, where he is currently a Distinguished Professor (and will be retiring at the end of 2021).

His recent experimental and theoretical interests include water-mediated interactions, hyperspectral compressive chemical imaging and teaching physical chemistry

