



Ultrasonic rheology of the aqueous phase of SDS micellar systems

Thomas J. Lane¹, Connie Y. H. Cheng¹, Matthew C. Dixon², Anna Oom², Malkiat S. Johal^{1,*}

¹Department of Chemistry, Pomona College, 645 N. College Avenue, Claremont, CA 91711, USA

²Q-Sense Inc., 808 Landmark Drive, Suite 124, Glen Burnie, MD 21061

Abstract: We report the application of a quartz crystal microbalance with dissipation monitoring (QCM-D) to rheology of mixed-phase micellar systems. This novel application of QCM-D allows for the facile monitoring of complex systems under a variety of conditions. Viscosity measurements were obtained for sodium dodecyl sulfate (SDS) solutions, ranging from 1.0 mg/mL to 50.0 mg/mL, in the presence and absence of toluene. Toluene was shown to swell SDS micelles as observed through an increase in viscosity, and an inflection point designating the critical micelle concentration (CMC) was clearly visible. Aqueous SDS solutions were also stabilized with sodium chloride (NaCl), up to 1.2 M, and n-dodecanol in toluene solutions, up to 0.5 vol%. Rod-like micelle formation and swelling with toluene were observed in both cases, supporting previous studies. Finally a phase change was induced and monitored by heating the aqueous phase of a 10 mg/mL aqueous SDS/toluene system from 16°C to 50°C. These studies show ultrasonic rheology holds potential for the specific study of multi-phase systems, non-Newtonian fluids and low volumes of analyte, aspects highly useful for complex or expensive colloidal dispersions such as micellar or biomolecular solutions.



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