310g Flow and Confinement Effects on the Evolution of Surfactant Mesophases

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A microfluidic platform is used to examine evolution of surfactant aggregate microstructures in highly constrained domains. Surface effects dominate because of the high area/volume ratio in these channels, and because of the proximity of boundaries, steric constraints and boundary chemistry impact both the range of available morphologies as well as the dynamics of aggregate formation. The small liquid volumes and precise metering, the ability to control domain dimensions that can vary from several orders of magnitude greater than the aggregate size to the order of the aggregate size, and in-line optical imaging and spectroscopy permits rapid evaluation of kinetics, morphology and phase behavior. The micelle-to-vesicle transition in aqueous solutions of sodium octyl sulfate (SOS) and cetyl trimethyl ammonium bromide (CTAB) are explored using a probe fluorophore to track microstructure changes and turbidity to monitor size changes. Our results will focus on the differences in aggregation and flow behavior between bulk and confined systems.