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AC-Electrokinetic Characterization and Induced Encapsulation Release of Micelles in Aqueous Suspensions VICTORIA FROUDE, YINGXI ELAINE ZHU, University of Notre Dame — Micelles and polymers vesicles have been of increasing interest as drug delivery systems for controlled release, specific cell targeting, and medical diagnostics. In addition, AC-electrokinetic techniques have emerged as a viable option for colloidal and biocolloidal manipulation. In this work, we examine the dielectrophoresis (DEP) characteristics of complex micellar nanoparticles under non-uniform AC-electric field of varied ac-field frequencies (5 kHz-20 MHz) and amplitudes (0.1-10 Vpp) by fluorescence correlation spectroscopy (FCS) at a single-molecule resolution. We focus on the AC-field induced transport of sodium tetradecyl sulfate (STS) and sodium dodecyl sulfate (SDS) micelles tagged with various fluorescent and drug encapsulates in aqueous media. We observe a strong AC-frequency dependence of micelle concentration between two microelectrodes, from which the DEP crossover frequency is determined. Surprisingly, we also observe an AC-field induced dissociation of the micelle structure and a resulting release of fluorescent encapsulates at a characteristic low AC-field frequency of approximately 1-10 kHz, where the dissociation has been found to be dependent on the surface charge of the interior encapsulate.

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