THE SURFACTANT CTAB AT INTERFACES STUDIED BY BROADBAND VIBRATIONAL SUM FREQUENCY GENERATION

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Surfactants are important to a variety of industrial technologies, and they are critical components of detergents, lubricants and oil recovery fluids. It is now well known that surfactants can assume complex structures and morphologies when adsorbed to heterogeneous interfaces, which in turn can control surfactant function. The surface-specific nonlinear optical technique broadband vibrational sum frequency generation (SFG) is a powerful tool for characterizing and understanding these systems. Here, we present polarization-resolved SFG spectra of silica surfaces containing cetyltrimethylammonium bromide (CTAB), a common cationic surfactant that is known to form ”worm-like” aggregates when adsorbed to the silica/water interface under proper conditions. Further insight into the structure, dynamics and aggregation of surfactants at interfaces can be obtained by combining SFG with the nonlinear technique Second Harmonic Generation (SHG). Using SFG and SHG we investigate the influence of surfactant concentration, pH and background electrolyte on the behavior of CTAB at silica interfaces.