Interfacial properties of fluid-fluid interfaces with adsorbed colloid-surfactant complexes

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Complexation of colloidal species (particles, proteins, macromolecules) and surfactant in bulk solution has long been used to generate complexes of different geometry, size, and surface chemistry. These complexes will have different interfacial properties than the individual components allowing for the formation of irreversibly adsorbed and elastic interfaces. The detailed control of these interfaces for optimization of interfacial properties is necessary. We are developing the knowledge and tools to have this control and also generating a characterized library of interfaces for study of phenomena like coalescence, deformation and break up of fluid-fluid interfaces. The properties (interfacial tension and interfacial rheology) of fluid-fluid interfaces with either polymer-surfactant complexes and particle-surfactant complexes adsorbed will be discussed. Of specific interest is the ramifications of complex properties on these interfacial properties. Most characterization of interfaces is performed to extract isotherms, or equilibrium and steady-state behavior. For processing, the more relevant information is the transient state; knowledge of transport time scales will have a significant impact on the design of processes. Sequential adsorption to interfaces rather than adsorption of existing complexes from bulk solution provides a method to characterize transport to interfaces and expand the range of composition of multicomponent interfaces. In co-adsorption of hydrophobins and small molecule surfactants, we have been able to generate adsorbed layers with different properties than seen when complexes are adsorbed from the bulk. This ability to control and generate different interfacial properties through the sequence of exposure is important for processing of multicomponent layers.