

Stability and Induction of Curvature in Mixed Colloid Particles (Invited)

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Mixed colloid solutions, containing two surfactants, show a number of liquid crystal and isotropic phases. Small-angle neutron scattering (SANS) has become the essential tool for characterization of the morphology, molecular organization, polydispersity, interactions and curvature of the phases and for determining the composition, temperature and pressure-dependent stability. This information is essential for understanding the self-assembly in these complex fluids. We review our work on the globular and rodlike micelles and spherical vesicles in isotropic phases of asymmetric mixed colloids—the bile salt-fatty lipid systems—and the methods we devised to analyze particle structure. The particle structure and polydispersity depend on the solubility of the bile salt and the spontaneous curvature of the fatty lipid. The results show how the interplay of the spontaneous curvature of the fatty lipid and that induced by the bile salt determines interface curvature and, therefore, particle morphology. Particle interactions play a role in structural transitions. The rescaled mean spherical approximation accurately describes the electro-static particle interactions. However, variants of this approach that include attractive interactions could not explain the transitions observed in these systems.