32d Mobility and in-Situ Aggregation of Charged Microparticles at Oil-Water Interfaces

Jeremy P. Vernetti, Sowmitri Tarimala, Srinivas R. Ranabothu, and Lenore L. Dai

Particle mobility, aggregate structure, and the mechanism of aggregate growth at the two-dimensional level have been of long-standing interest. Here we use solid-stabilized emulsions as a model system to investigate the mobility of charged microparticles at polydimethylsiloxane (oil)-water interfaces using confocal laser scanning microscopy. Remarkably, the rate of diffusion of the charged colloidal-sized polystyrene particles at the oil-water interface is only moderately slower than in the bulk water phase. The ambient diffusion constant of solid particles is significantly reduced from 1.1„e10-9 cm2/s to 2.1„e10-11 cm2/s when the viscosity of the oil phase increases from 5 cSt to 350 cSt. In addition, we successfully observe the in-situ structural formation of solid particles at the oil-water interface.