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The Role of Colloidal Interactions on the Formation of Particle Stabilized Capsules[1] SHELLEY ANNA, CHARLES SHARKEY, ANTHONY KOTULA, Carnegie Mellon University — Nanoparticles can adsorb to fluid-fluid interfaces to make stable foams and emulsions. Surfactants adsorbed to the nanoparticle surface modulate both particle wettability and interparticle interactions, altering the nanoparticle adsorption. We have shown that bubbles generated in a nanoparticle-surfactant mixture collect particles as they travel through a long microchannel. The particle stabilized region of the bubble grows in a manner consistent with convection and diffusion of particles in the fluid surrounding the bubble. If the bubble residence time is long enough compared with the adsorption timescales, a stable, non-spherical, gas-filled capsule emerges from the microchannel and retains its shape for tens of hours. We find that the nanoparticle-surfactant mixture composition can be used to tune the degree of capsule stabilization. Greater stabilization occurs with larger surfactant concentrations for a fixed nanoparticle volume fraction. These observations can be rationalized in terms of the particle wettability and electrostatic interactions as well as interfacial elasticity and bulk nanoparticle transport and adsorption.

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