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Development of flash nanoprecipitation as a scalable platform for production of hybrid polymer-inorganic Janus particles[1] VICTORIA E. LEE, ROBERT K. PRUD'HOMME, RODNEY D. PRIESTLEY, Princeton University — Polymer Janus particles, containing two or more distinct domains, can act as supports for inorganic nanoparticles, stabilizing them against aggregation and templating anisotropic functionalization of the microparticles. This anisotropy can be advantageous for applications such as biofuel upgrading, bionanosensors, and responsive materials. Here, we introduce flash nanoprecipitation (FNP) as a scalable, fast process to create hybrid polymer-inorganic Janus particles with control of particle size and anisotropy. During FNP, polymer Janus particles form by rapid intermixing of a polymer solution with a poor solvent, inducing polymer precipitation and phase separation. Inorganic nanoparticles are then adsorbed selectively onto one domain of the polymer support by exploiting electrostatic interactions between the charged particles. By tuning polymer concentration and ratio in the feed stream, the particle size and anisotropy can be controlled. We further demonstrate that these hybrid particles can simultaneously stabilize emulsions and selectively catalyze the degradation of dye in one phase.

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