

Particle-Stabilised Emulsions as a Tool in the Fabrication of Janus Particles

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Colloidal particles with inhomogeneous surface composition (Janus particles) show potential for use in many applications. Fine tuning of their properties enables control of the particle behaviour at either liquid interfaces or in bulk phases. For example, it has been shown that charged particles with opposite charge on each hemisphere can self assemble in a bulk liquid phase to form interesting structures¹. Janus particles can be prepared by masking part of the surface of isotropic particles followed by a chemical modification of the unmasked surface. Our approach involves the use of particle-stabilised emulsions as a masking tool in the fabrication of Janus particles. Initially, we make oil-in-water emulsions by dispersing polymerisable oil (2-ethylhexyl methacrylate) in water using 1 μm diameter silica particles as a stabiliser. Then the dispersed oil phase is polymerised by the means of a thermoinitiator (azobisisobutyronitrile, AIBN) at elevated temperature for several hours. As a result polymer beads (several hundred micrometers in diameter) are produced. Optical and electron microscopy images show that the polymer beads are coated with a layer of silica particles partially embedded in the polymer. The chemical modification of the silica particle surface outside the polymer bead can lead to the formation of Janus particles. The latter can be released and isolated after the dissolution of the polymer in chloroform. One of the main advantages of this approach is that it can be used for the fabrication of significant amounts (grams) of Janus particles due to the large interfacial area of the particle-stabilised emulsions.

Reference:

[1] L. Hong, A. Cacciuto, E. Luijten, S. Granick, *Nano Letters*, **2006**, *6*, 2510.