Fabrication of Janus Colloidal Cluster through Evaporation-driven Self Assembly

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The small aggregates of colloidal particles have been studied as building blocks for advanced periodic structure. Low configurational symmetry of the colloidal clusters can compose uneven lattices of colloidal crystals, which can't be achieved by self-assembly of spherical colloids. For the preparation of colloidal clusters, emulsion droplets have been employed as confining geometry of monodisperse colloidal particles. In this paper, we introduced the bidisperse colloidal particles of different surface properties onto the droplet interface to create the colloidal clusters with enhanced complexity. To adjust the surface property of particles, we treated silica particles with silane coupling agents such as DCDMS and OTMOS. In addition, we applied dye molecule on the surface of silica spheres in order to distinguish silica spheres which have different surface properties. As the volatile oil droplets containg bidisperse colloids were evaporated, the colloids formed aggregates on the aqueous medium, which showed enhanced variety in configurations in comparison with conventional colloidal clusters.