

Colloidal Clusters of Microspheres from Water-in-Oil Emulsions

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We report a general method for small aggregates (or clusters) of water-borne colloids inside water-in-oil (W/O) emulsions. First, aqueous suspension of monodisperse polystyrene or silica (SiO₂) microspheres was emulsified into polydisperse water droplets of micrometer scales in oil phase and colloidal aggregates were produced spontaneously during slow evaporation of water. Then, the colloidal clusters consolidated by complete removal of water were separated from the oil phase and re-dispersed in water for the subsequent fractionation according to the number (n) of the constituent spheres by a density gradient ultracentrifugation. Each cluster of n particles possessed a unique configuration except for a few particular cases of $n = 7, 8$ and 11 , in which we observed some isomeric structures depending on their surface properties of colloidal microspheres. These isomers have not been reported in the preceding studies for colloidal clusters fabricated from the phase inverted oil-in-water emulsions.