

Preparation of Nanoparticles from the Amphiphilies

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The self-assembly of amphiphiles in varying sizes and shapes such as micelles and vesicles are of great importance to material and biomedical sciences due to their spontaneous generation of well-defined structures under thermodynamic equilibrium conditions. Initially, we have reported the block copolymers with hydrophilic and hydrophobic moieties that form amphiphilic assemblies such as microphase-separated nanostructures, hollow micelles, and vesicles in selective solvents. We have also shown that even homopolymer based-on amphiphilies form micelles/vesicles like that of block copolymers.

A rare self-assembly was observed in various monomers containing amphiphiles when polymerized in water with a hydrophilic initiator resulting in monodisperse polymeric nanoparticles in a single step which we termed as self-emulsion polymerization (SEP). This facile and robust procedure enabled the production of highly monodisperse polymeric nanoparticles with a tunable size without using any cross-linker, stabilizing agent, surfactant or polymeric emulsifier, mimicking the more commonly reported amphiphiles. These synthesized polymers were used as templates for the application.