

Stimuli-Responsive Micelles of Amphiphilic and Bis-hydrophilic Block and Graft Copolymers

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We have studied the micellisation of poly(n-butyl acrylate)-*block*-poly(acrylic acid) and poly(n-butyl acrylate)-*graft*-poly(acrylic acid) in aqueous solution. The size and structure of the formed micelles was elucidated by scattering and imaging techniques. The micelle structure depends on pH, composition, and topology: graft copolymers form much smaller micelles than block copolymers of similar composition.

We have also synthesized block copolymers of acrylic acid and N-isopropylacrylamide (NIPAAm) or N,N-diethylacrylamide (DEAAm). Due to the LCST of polyNIPAAm and polyDEAAm, these block copolymers spontaneously form micelles upon heating and they form inverse micelles upon decreasing pH below 4. If the LCST block is much longer than the PAA one, this presents a very convenient way to prepare crew-cut micelles. The polymers have been successfully used as stabilizers in emulsion polymerization. They also have been conjugated to streptavidin. The conjugates reversibly form mesoscopic particles on heating.