APPLICATION OF RAFT OR NITROXIDE-MEDIATED AQUEOUS DISPERSION POLYMERIZATION TO THE DESIGN OF THERMOSENSITIVE NANO-HYDROGELS.

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Self-stabilized nanoparticles with a temperature-responsive poly(*N*,*N*-diethyl acrylamide-*co*-*N*,*N'*-methylenebisacrylamide) microgel core and a covalently attached, hairy shell were synthesized via a simple nitroxide-mediated controlled free-radical aqueous dispersion polymerization, using a poly(sodium acrylate) alkoxyamine macroinitiator. High solids content, surfactant-free particle suspensions were prepared, with diameter below 100 nm at high temperature, and able to reversibly swell with water at low temperature (Figure 1). The so-formed particles are analogous to core-crosslinked diblock copolymer micelles but the preparation technique is far simpler than the usual multistep method consisting in self-assembly of preformed amphiphilic block copolymers followed by post-crosslinking. Such an achievement might be of high academic and industrial interest for multiple applications and large scale production. A similar methodology based on the RAFT mechanism (reversible addition-fragmentation chain transfer) using poly(ethylene oxide) functionalized with a trithiocarbonate end-group allowed us to synthesize microgels with controlled surface property.

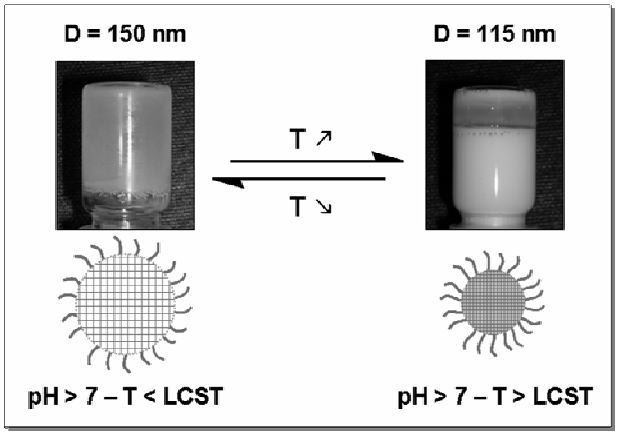

Figure 1. Reversible swelling of the poly(sodium acrylate)-*b*-poly(*N*,*N*-diethyl acrylamide-*co*-*N*,*N'*-methylenebisacrylamide) nano-hydrogels with temperature.

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