

New fluorinated surfactants for nanogels preparation in supercritical CO₂

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Summary (max 200 words):

A series of novel fluorinated amphiphilic stabilizers of different architectures (diblock, comb, or palm tree copolymers) were successfully prepared by reversible addition-fragmentation chain transfer and used as stabilizers for the dispersion polymerization of 2-hydroxyethyl methacrylate (HEMA) in fluorinated solvents, namely α,α,α -trifluorotoluene (TFT) and in supercritical CO₂. The effect of the amount and the architecture of the copolymer on the size and the stabilization of the particles was studied. In TFT, we found that whatever the experimental conditions, scanning electron microscopy showed the formation of submicronic (typically about 300 nm) spherical particles, with a narrow size distribution but at higher copolymer concentration, smaller and less aggregated particles were produced. Using supercritical CO₂ as solvent, we also obtained spherical nanoparticles with a diameter around 300 nm. Very good results were obtained using the diblock copolymer compared to the two other architectures giving more aggregated particles. Furthermore, the surfactant properties of the copolymers were investigated by measuring the interfacial tension at the H₂O/TFT and H₂O/Air interfaces, and correlated to their stabilizing efficiency for the dispersion polymerization of HEMA.