

Dispersion polymerization of monodisperse carboxyl-functionalized polystyrene

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It is demonstrated that the fluorinated alcohol is a suitable medium for the preparation of monodisperse carboxyl-functionalized microspheres by dispersion polymerization. In the presence of polyvinylpyrrolidone as a stabilizer, coagulum-free and stable dispersion of monodisperse micrometer-sized copolymers containing acrylic acid up to 30 wt% could be produced via one-stage batch dispersion polymerization utilizing 2,2,2-trifluoroethanol as a medium. The coefficient of variation for the particle size distribution decreased as increasing acrylic acid content in monomers and flattened at around 3% when the acrylic acid content was 15 wt% or higher. The resulting microspheres exhibited pH-sensitive behavior. Dissolution of copolymer chains in alkaline solution could be reduced by incorporating cross-linkable comonomer. Monodispersity and colloidal stability of carboxyl-functionalized microspheres were preserved until the amount of divinylbenzene reached 2 wt% based on the monomer.