

Silica Nanoparticles with Proton Donor and Proton Acceptor Groups: Synthesis and Aggregation

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Abstract

The effects of precursor structure and polycondensation conditions on the properties of hybrid nanoparticles synthesized from organo-trimethoxysilanes were studied. Hybrid nanoparticles containing groups capable of forming hydrogen bonds were synthesized from functional derivatives of 3-aminopropyltrimethoxysilane. For the synthesis of phenylurea-functionalized organosilica nanoparticles different approaches to nanoparticle preparation were used. It was shown that the nature of the functional groups (proton-donor or proton-acceptor) affects the aggregation of silica nanoparticles. Also, the difference in behavior of nanoparticles prepared using surface modification and polycondensation was demonstrated for different pH, ionic strength and solvent polarity. As a result, by changing the pH of the solutions, it is possible to shift the aggregation pattern of these nanoparticles, such as the size of the initially formed aggregates. © 2011 Springer Science+Business Media B.V.

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Keywords

Aggregation, Colloid, Nanoparticle, Silica