

Silica aerogel encapsulated by polystyrene via in situ emulsion polymerization

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Over the past few decades, nanostructured materials have shown great promise in a variety of application areas like catalysis, insulation, sensors, or drug delivery. Among them, nanoporous aerogels were found to be promising materials for the encapsulation and adsorption of a variety of molecules due to their large inner surface areas, high surface to volume ratios, large pore volumes, and uniform pore sizes. Among all the hybrid materials, nanocapsules are especially interesting, due to their capability in making a diverse range of new materials for different applications. The encapsulation of inorganic particles with polymers is desirable in many applications to improve the stability of the encapsulated product, to improve the dispersibility in organic media to reduce toxicity, and to facilitate storage or transport. Furthermore, the incorporation of inorganic materials on the nanoscale can enhance the fire retardancy and mechanical strength of organic polymers and coatings. In this study, silica aerogel was encapsulated with core-shell structure by styrene (St) through the in-situ emulsion polymerization.