

Synthesis of hollow nanostructured silica particle and their application for optically transparent and thermally insulating polymer

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Hollow nanostructured particles have been extensively studied as important nanomaterials. Hollow silica particles has attracted great attention due to its unique structural properties and possible applications as efficient catalysts, in optical devices, drug delivery carriers, thermal and electrical insulators. In this study, we present an improved route to hollow silica particles starting from tetramethyl-orthosilicate (TMOS) instead of the traditionally used ethyl ester. The silica was first deposited onto polystyrene (PS) particles that were later removed. The here introduced, apparently minor modification in synthesis, however, allowed for a very high purity material. The improved, low density hollow silica particles were successfully implemented into polymer films and permitted maintaining optical transparency while significantly improving the heat barrier properties of the composite. The results showed that the prepared hollow silica has a high potential to be used as flexible optical transparent composite film and thermal insulator applications.