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SYNTHESIS OF POROUS SiO2 SPHERES AND ITS CHARACTERIZATION AFTER A LOW TEMPERATURE HEAT POST-TREATMENT

Silica spheres are widely used as catalysts, adsorbents, templates and substrates due to their large specific area and uniformity. In this work, we demonstrate that after low-temperature (≤400℃) heat treatments of the spheres, their optical response is modified without sintering effects or changes in their morphology. Initially, colloids of SiO_2 spheres were synthesized by the Stöber method [1]. Several samples with average diameters ranging from 200 to 450 nm were obtained. Each sample was characterized by X-ray diffraction, and an increase in the crystallite size was observed in some of them. The reflectance of the spheres was also affected by the heat treatment, with a consequent effect on the band gap. For example, the sample with 200 nm spheres had a band gap of 5.5 eV before the treatment and 6 eV after the treatment, presumably due to changes in the porosity composition. We conclude that the use of low-temperature heat treatment allows the optical band gap to be tuned without changing the morphology.

Keywords

SiO2, porosity, heat treatment, XRD, band gap

Reference

W. Stöber, A. Fink and E. Bohn, Controlled growth of monodisperse silica spheres in the micron size range, J. Colloid Interface Sci. 26 (1968) 62-69. https://doi.org/10.1016/0021-9797(68)90272-5

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