

Incorporation of Au and Ag nanostructures inside SiO₂

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Incorporation of Au⁰ inside SiO₂ was achieved by a solid-state method from the pyrolysis of the composites (Chitosan)_n(AuCl₃)_n(SiO₂)_m and (PS-co-4-PVP)_n(AuCl₃)_n(SiO₂)_m. Similarly, the incorporation of Ag⁰ inside SiO₂ it was made from thermal treatment of the composites (Chitosan)_n(AgNO₃)_n(SiO₂)_m and (PS-co-4-PVP)_n(AgNO₃)_n(SiO₂)_m. The nature of the polymer controls the particle size for the Au/SiO₂ composite, while that for the Ag/SiO₂ both, polymer Chitosan and PS-co-4-PVP, produces similar particle size. In the case of the composite Ag/SiO₂ the particle size as small as 5 nm were obtained. The 1:1 or 1:5 metal/polymer ratios, as well as the nature of the polymer in the macromolecular precursors (Chitosan)_n(AuCl₃)_n(SiO₂)_m and (PS-co-4-PVP)_n(AuCl₃)_n(SiO₂)_m influences the dispersion of the Au⁰ nanostructures inside SiO₂ matrix. The results are compared with those previously obtained for bimetallic composites Au/Ag//SiO₂. A formation mechanism of the Au⁰/SiO₂ and Ag⁰/SiO₂ composites involving the combustion of the organic matter and the growth of the Au⁰ and Ag⁰ nanoparticles inside the holes, generated from the combustion process, is proposed. © 2019 Sociedad Chilena de Quimica. All rights reserved.

Composites

Gold nanoparticles

Silica

Silver nanoparticles