

Sol-gel synthesis and antioxidant properties of yttrium oxide nanocrystallites incorporating P-123 (Article)

[Mellado-Vázquez, R.^a](#) , [García-Hernández, M.^a](#) , [López-Marure, A.^b](#) , [López-Camacho, P.Y.^a](#)
 , [Morales-Ramírez, A.J.^c](#) , [Beltrán-Conde, H.I.^a](#) _

^a Departamento de Ciencias Naturales, Universidad Autónoma Metropolitana-Unidad Cuajimalpa, Colonia Santa Fé Cuajimalpa, Delegación Cuajimalpa de Morelos, 4871 Avenida Vasco de Quiroga, Mexico, D.F., Mexico

^b Instituto Politécnico Nacional-Centro de Investigación en Ciencia Aplicada, Tecnología Avanzada (CICATA) Unidad **Altamira**, Carretera Tampico Puerto Industrial **Altamira**, Km 14.5 **Altamira**, Tamaulipas, Mexico

^c Instituto Politecnico Nacional-Centro de Investigacion e Innovación Tecnologica (CIITEC), Cerrada de Cecati s/n Col. Santa Catarina Del Azcapotzalco, Mexico, D.F., Mexico

Abstract

Yttrium oxide (Y_2O_3) nanocrystallites were synthesized by mean of a sol-gel method using two different precursors. Raw materials used were yttrium nitrate and yttrium chloride, in methanol. In order to promote oxygen vacancies, P-123 poloxamer was incorporated. Synthesized systems were heat-treated at temperatures from 700 °C to 900 °C. Systems at 900 °C were prepared in the presence and absence of P-123 using different molar ratios (P-123:Y = 1:1 and 2:1). Fourier transform infrared spectroscopy (FTIR) results revealed a characteristic absorption band of Y-O vibrations typical of Y_2O_3 matrix. The structural phase was analyzed by X-ray diffraction (XRD), showing the characteristic cubic phase in all systems. The diffraction peak that presented the major intensity corresponded to the sample prepared from yttrium chloride incorporating P-123 in a molar ratio of P-123:Y = 2:1 at 900 °C. Crystallites sizes were determined by Scherrer equation as between 21 nm and 32 nm. Antioxidant properties were estimated by 2,2-diphenyl-1-picrylhydrazyl (DPPH•) assays; the results are discussed. © 2014 by the authors.

Author keywords

Antioxidant properties; Nanocrystallites; Sol-gel; Yttrium oxide (Y_2O_3)