

The Effect of calcination temperature on the structure properties of ZrO₂ nanoparticles synthesized by modified sol gel ingelatin media

M. S. Nouri¹, A. Kompany^{*1}, Gh. H. Khorrami², A. Khorsand Zak³

1- Electroceramics and Materials Laboratory, Department of Physics, Ferdowsi University of Mashhad

2- Department of Physics, Faculty of basic science, University of Bojnord

3- Nanotechnology Laboratory, Department of Physics, Esfarayen University of Technology

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Abstract: In this research, ZrO₂ nanoparticles were synthesized by modified sol-gel method at different calcination temperatures (600, 800, 1000, 1200 °C). Zirconium (IV) oxynitrate hydrate as zirconium source, gelatin as polymerization and stabilizer agent and distilled water was used as the solvent. The crystal structures of the synthesized samples were characterized by X-ray diffraction (XRD) and the average crystallite size was estimated by Scherrer formula and Williamson-Hall method. Transmission electron microscopy (TEM) images showed that the average particle size of zirconia calcined at 600 and 1200°C are 10 and 32 nm, respectively. FTIR analysis in the range of 400-4000 cm⁻¹ was carried out, the results of FTIR showed that the samples are calcined at 600 and 1200 °C have tetragonal and monoclinic structure, respectively. FT-IR spectroscopy analyses of the synthesized samples confirmed the XRD results.

Keywords: ZrO₂ nanoparticle; Gelatin; Sol-gel; Williamson-Hall.

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*Corresponding author, Tel: 09153131366, Fax: 05138807152, Email: kompany@um.ac.ir