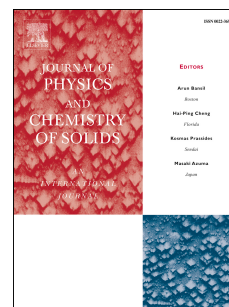


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E. Gharibshahian, M. Jafar Tafershi, M. Fazli



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Effects of solution concentration and capping agents on the properties of potassium titanyl phosphate nanoparticles synthesized using a co-precipitation method

E. Gharibshahian^a, M. Jafar Tafershi^{a*}, M. Fazli^b

^a*Faculty of Physics, Semnan University, Semnan, Iran*

^b*Faculty of Chemistry, Semnan University, Semnan, Iran*

Abstract

In this study, KTiOPO_4 (KTP) nanoparticles were synthesized using a co-precipitation method. The effects of the solution concentration (M) and capping agents, such as PVA, oxalic acid, glycine, triethanolamine, and L-alanine, on the structural, microstructural, and optical properties of the products were investigated using X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, ultraviolet-visible spectroscopy, field emission scanning electron microscopy, and transmission electron microscopy. Decreasing the solution concentration decreased the crystallite size from 53.07 nm (for M = 2) to 39.42 nm (for M = 0.5). After applying different capping agents to the sample at the optimum concentration (M = 0.5), the crystallite size decreased again and grains as small as 10.61 nm were obtained. XRD and FTIR analyses indicated the formation of KTP nanoparticles with an orthorhombic structure in all of the samples. The optical band gap increased as the crystallite size decreased. Different morphological patterns such as spherical, needle shaped, polyhedron, and tablet forms were observed in the nanoparticles, which were correlated with the effects of the capping agents employed.

Keywords: *Capping agent, Co-precipitation method, KTiOPO_4 Nanoparticle, Nanoparticle size control*

* Corresponding author:

E-mail: mtafreshi@semnan.ac.ir

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