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Synthesis, Characterization and Electrical Conductivity of Nano-Crystalline Erbium Sesquioxide by the Precipitation Method and Subsequent Calcination

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Abstract

Due to its superior properties, erbium sesquioxide, Er₂O₃, is considered as an important material for applications in various fields such as corrosion-resistant coating, electrical insulating coating, in sensing membranes, semiconductor devices, as catalyst, and for applications in nuclear engineering. In the open literature there is a lack of information about the preparation of Er₂O₃ nanoparticles using the homogenous precipitation and subsequent calcination route. In this paper a facile method for the synthesis of Er₂O₃ nanoparticles is suggested. The fabrication was carried out by using the homogeneous precipitation of an erbium ions using sodium hydroxide followed by the calcination process. The influence of: (i) the pH value (9-12) during precipitation process, and (ii) the calcination temperature 300-700 degrees C on the structural and textural properties of the solids obtained will be addressed. The thermal events accompanying the heat treatment of the dried parent was monitored using thermogravimetric analysis (TGA). Various physicochemical techniques were used for investigating the structure and morphology of Er₂O₃ nanoparticles. These include X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectra, field emission scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM), and X-ray photoelectron spectroscopy (XPS). Moreover, the electrical conductivity of the calcined samples with temperature was measured.

Keywords

Author Keywords: [nanocrystalline erbium oxide](#); [Er₂O₃](#); [erbium sesquioxide](#); [electrical conductivity](#); [precipitation method](#); [Er₂O₃ nanoparticles](#)

KeyWords Plus: [RARE-EARTH-OXIDES](#); [N₂O DECOMPOSITION ACTIVITY](#); [CUO CATALYST](#); [THIN-FILMS](#); [SOL-GEL](#); [ER₂O₃](#); [CARBONATES](#); [TEMPERATURE](#); [SIZE](#); [DEHYDRATION](#)

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