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Structural and luminescent features of cerium doped $CaZrO_3$ blue nanophosphors

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Abstract: Ce activated $CaZrO_3$ nanophosphors were prepared at different concentrations (0.2, 0.4, 0.6, 0.8 and 1.0 wt %) through sol–gel method utilizing polyvinyl alcohol as a chelating agent. The as-obtained samples were investigated using the characterization techniques such as X-ray diffraction (XRD), field emission scanning electron microscope (FESEM-EDAX), transmission electron microscope (TEM), photoluminescence (PL), Raman, Fourier transform infrared (FTIR) and UV–visible absorption spectroscopy respectively. The crystallite sizes were calculated by XRD patterns. Agglomeration nature of the samples were observed from FESEM images of samples. The energy dispersive spectroscopy (EDS) measurements affirm the existence of Ca, Zr, O and Ce elements in the samples. From TEM images, the average particle sizes of the samples were calculated and compared with obtained XRD values. The samples' energy gap was derived from UV-Vis spectra. When the samples were excited with 250nm, three emission peaks at 400 nm, 423 nm and 466 nm were obtained. From CIE diagram, the corresponding CIE co-ordinates were calculated and found to be located in blue region.

Keywords: Nanophosphors; XRD; TEM; luminescence.

1. Introduction

Luminescent materials (phosphors) have the capacity to transform different exciting energies into visible radiation making possible their utilization in lightening, displays and optical communication fields [1-4]. The special class of compounds perovskite oxides with ABO_3 formula found their application in every aspect of science and technology. Solar cell, energy harvesting device, multiferroic material, anode material in solid oxide fuel cell and photocatalysis are a few applications of ABO_3 oxides. In today's world, luminous

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