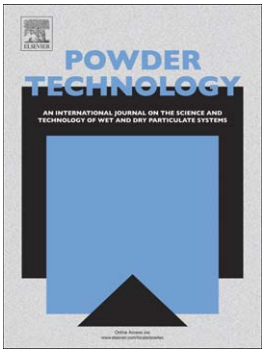

Luminescence properties and charge transfer mechanism of host sensitized $Ba_2CaWO_6:Eu^{3+}$ phosphor

E. Sreeja, Subash Gopi, Viji Vidyadharan, P. Remya Mohan, Cyriac Joseph, N.V. Unnikrishnan, P.R. Biju

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Luminescence properties and charge transfer mechanism of host sensitized $Ba_2CaWO_6:Eu^{3+}$ phosphor

Sreeja E, Subash Gopi, Viji Vidyadharan, Remya Mohan P, Cyriac Joseph, N.V. Unnikrishnan, P.R. Biju*

School of Pure and Applied Physics, Mahatma Gandhi University, Kottayam, 686560, India

**E-mail address: prb.mgu@gmail.com, Tel.: +919446316179*

Abstract

Eu^{3+} ions activated Ba_2CaWO_6 phosphors were synthesized by the conventional high temperature solid-state reaction method. The crystalline nature of the prepared phosphor was identified through XRD analysis and Williamson-Hall plot method. The compositional analysis was carried out by means of EDS. The morphology of the obtained samples were characterized by SEM and TEM analyses. Vibrational modes were studied using FTIR and Raman spectroscopy. It was noticed from the photoluminescence spectra that charge transfer band excitation in the host at 314 nm is much more prominent than the rare earth excitation wavelength at 393 nm to give the dominant 595 nm emission in the host matrix by the energy transfer mechanism. The change in emission intensity corresponding to varying concentration of Eu^{3+} was studied. The fluorescence lifetime of the samples were calculated. Optical transition intensity parameters and various radiative properties were calculated using the Judd-Ofelt theory. Photoluminescence spectra were used to estimate the CIE chromaticity co-ordinates and were observed to be in the orange-red region.

1. Introduction

White light emitting diodes are considered as the new generation solid-state lighting sources which would replace the conventional incandescent and fluorescent lamps, due to their high luminous efficiency, long lifetime, fast response, energy saving and environmental friendliness [1-3]. Most of the commercially available white LEDs are based on phosphor-converted emission method. The present strategy to produce white light is to make use of blue InGaN LED chip in combination with Cerium(III) doped Yttrium Aluminium Garnet ($YAG:Ce^{3+}$) yellow phosphor. The blue light emitting InGaN chip excites the yellow emitting