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Luminescent, Structural and Morphological studies of a green-emitting BaB8O13: Ce³⁺ phosphors

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Key words: Combustion method; William-Hall; Band-gap; Photoluminescence; CIE.

Abstract: BaB8O13: Ce³⁺ powder phosphors were synthesized by solution combustion method for general lighting applications. X-ray diffraction, Fourier transform spectroscopy, Scanning electron microscopy, UV-visible spectroscopy and photoluminescence studies were used to characterize the prepared powder phosphors. Powder X-ray spectra confirmed the formation of orthorhombic structure of BaB8O13 with cell parameters $a = 8.550 \text{ \AA}$, $b = 17.350 \text{ \AA}$ and $c = 13.211 \text{ \AA}$ according to JCPDS file no: 20-0097 [1]. The estimated crystallite sizes of the powder phosphors from Scherrer's equation and Hall-Williamson's plot were in the nanometre scale. Scanning electron microscopy micrographs showed that the particles with irregular shapes were agglomerated together. The bands in the Fourier transform infrared spectra in the range $650 - 1600 \text{ cm}^{-1}$ also confirms the formation of the desired powder phosphor. The estimated bandgap of the powder phosphors from Kubelka - Munk was reduced with the increase in concentration of Ce³⁺. The BaB8O13: Ce³⁺ powder phosphors showed emission at around 515 nm ascribed to $5d_1 - 4f_1$ transition of Ce³⁺ after UV excitation of 270 nm using a monochromatized xenon lamp. A standard CIE diagram derived from relative emissions from the powder phosphors suggested a unique emission concentrated in the green region, thus the phosphor serve as a potential source of green light emitting devices [1].

Reference: 1] E, Erdogmus, E. Orkmaz and V.E. Kafadar, J. Appl. Spectrosc, 80, 2014, 952-956

Summary

N/A

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

PhD

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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