



Not in
UGC care
list



Peer reviewed and Refereed
UGC Approved Jr. No. 64011
RAMAN-2022
2nd International Conference on Recent Advances in Material Science and Nanotechnology
In Association with International Journal of Scientific Research in Science and Technology
Volume 9 | Issue 13 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X (www.ijsrst.com)

Synthesis and Photoluminescence Properties of $\text{ZnB}_4\text{O}_7:\text{Eu}^{3+}$ Phosphor

V. R. Kharabe

Department of Physics, Kamla Nehru Mahavidyalaya, Nagpur 440024, Maharashtra, India

ABSTRACT

The solid state diffusion technique was used to successfully prepare the $\text{ZnB}_4\text{O}_7:\text{Eu}^{3+}$ phosphor. The PL's excitation spectra exhibited a broad band between 240 and 330 nm with a peak around 257 nm and many lesser excitation peaks between 240nm and 340nm. In the broad band at 250-300 nm, the $\text{O}^{2-} \rightarrow \text{Eu}^{3+}$ charge transfer transition in the Eu^{3+} doped ZnB_4O_7 phosphor was seen. The phosphor may be efficiently activated with mercury as well as UV rays, based on excitation peaks at 257nm and 393nm. In the wavelength range of 580nm to 680nm, a number of emission peaks are detected, which correspond to the transitions of $5\text{D}_0 \rightarrow 7\text{F}_1$ (orange emission), 7F_2 (orange emission), and 7F_3 (orange emission) (red emission). The $\text{ZnB}_4\text{O}_7:\text{Eu}^{3+}$ phosphor is a new red-orange color emitting phosphor, according to the comprehensive investigation of the emission and excitation spectra. In the future, XRD and SEM could be employed to examine the material's structural properties and surface morphology.

Keywords: ZnB_4O_7 , PL, XRD, SEM.

I. INTRODUCTION

Luminescent materials have grown in popularity in recent years as their features have been related to a wide range of scientific applications. It involves the design and development of novel optical devices like white light emitting diodes (WLEDs), plasma display panels (PDPs), solid-state lasers, [1-4]. Researchers were interested in getting glasses for various optical devices like as activated phosphors, up converters, optical amplifiers and laser because of the glasses's unique visible emission. [5]. The type of bonding, chemical composition, and structure of RE ions in glasses affect both luminescence and absorption properties [6]. Because of their size, composition flexibility borate glasses are excellent hosts for RE ions [7]. The Eu^{3+} ion, a popular spectroscopic tool, is extensively employed to analyze structure in glasses, near RE ions because of its relative simplicity of energy level structure with non-degenerate ground (7F_0) and excited (5D_0) states [8-15]. In Eu^{3+} doped phosphors a $5\text{D}_0 \rightarrow 7\text{F}_2$ transition produces narrow, monochromatic radiation at 613nm (red) which is commonly used in technologies for field emission. Zinc borates are multifunctional compounds containing ZnO , B_2O_3 , and H_2O in various ratios. They are vital chemical raw materials required in a wide range of applications. They're prominent in flame-resistant polymer materials [16]. Zinc borate has garnered a lot of attention as a luminescence host material in recent decades. LaBO_3 and YBO_3 are rare earth orthoborates that