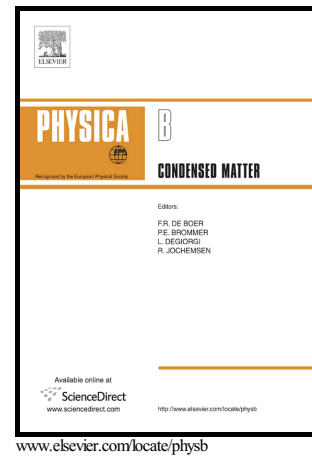


# Author's Accepted Manuscript

Red light Emission from Europium doped Zinc Sodium Bismuth Borate Glasses

Vinod Hegde, C.S. Dwaraka Viswanath, Vyasa Upadhyaya, K.K Mahato, Sudha D. Kamath



PII: S0921-4526(17)30709-3  
DOI: <https://doi.org/10.1016/j.physb.2017.09.113>  
Reference: PHYSB310339

To appear in: *Physica B: Physics of Condensed Matter*

Received date: 9 May 2017  
Revised date: 26 September 2017  
Accepted date: 27 September 2017

Cite this article as: Vinod Hegde, C.S. Dwaraka Viswanath, Vyasa Upadhyaya, K.K Mahato and Sudha D. Kamath, Red light Emission from Europium doped Zinc Sodium Bismuth Borate Glasses, *Physica B: Physics of Condensed Matter*, <https://doi.org/10.1016/j.physb.2017.09.113>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Red light Emission from Europium doped Zinc Sodium Bismuth Borate Glasses

Vinod Hegde<sup>1</sup>, C.S. Dwaraka Viswanath<sup>2</sup>, Vyasa Upadhyaya<sup>1</sup>, K.K Mahato<sup>3</sup>, Sudha D. Kamath<sup>1\*</sup>

<sup>1</sup>Department of Physics, Manipal Institute of Technology, Manipal University, Manipal – 576 104, India.

<sup>2</sup>Department of Physics, Sri Venkateswara University, Tirupati - 517502, India.

<sup>3</sup>Department of Biophysics, School of Life Sciences, Manipal University, Manipal – 452 013, India.

\*Email: sudhakamath6@gmail.com

### Abstract

Zinc sodium bismuth borate (ZNBB) glasses doped with different concentrations of europium were prepared by conventional melt quenching method and characterized through the measurements of density, refractive index, X-ray diffraction (XRD), Fourier Transform Infrared (FTIR) spectra, optical absorption, luminescence and radiative lifetimes. FTIR spectra showed seven characteristic peaks of bismuth and borate functional groups in the range of 400-1600 $\text{cm}^{-1}$ . The optical band gap and bonding parameters have been calculated from absorption spectra. Photoluminescence spectra recorded in the visible region with 394 nm excitation are used to calculate the Judd-Ofelt (JO) intensity parameters ( $\Omega_2$  and  $\Omega_4$ ). The JO intensity parameters have been used to calculate the radiative parameters such as branching ratio ( $\beta$ ), stimulated emission cross-section ( $\sigma_{se}$ ), transition probability (A) for the fluorescent level of  $^5D_0 \rightarrow ^7F_2$ . Decay rates through single exponential are used to calculate the lifetime ( $\tau_m$ ) of the meta-stable state  $^5D_0$  of (Eu<sup>3+</sup> ion) these glasses. The radiative parameters measured for all these glasses show 0.7 mol % europium doped zinc sodium bismuth borate glass  $^5D_0 \rightarrow ^7F_2$  transition has the potential for red laser applications. The quality of the color emitted by the present glasses are estimated quantitatively by CIE chromaticity coordinates, which confirms the suitability of these glasses as a red emitting material for field emission technologies and LEDs.

**Key Words:** Doped glass, FTIR, optical band gap, photoluminescence, lifetime, CIE chromaticity.

### Address for Correspondence:

Dr. Sudha D. Kamath

Associate Professor-Senior scale

Department of Physics

Manipal Institute of Technology, Manipal University, Manipal – 576 104

India. Tel: +91-: 0820-2573597

E-mail: sudhakamath6@gmail.com

Download English Version:

<https://daneshyari.com/en/article/8161679>

Download Persian Version:

<https://daneshyari.com/article/8161679>

[Daneshyari.com](https://daneshyari.com)