## Accepted Manuscript

Spectroscopic investigations of neodymium doped barium bismuth fluoroborate glasses

K. Mariselvam, R. Arun Kumar, P. Manasa

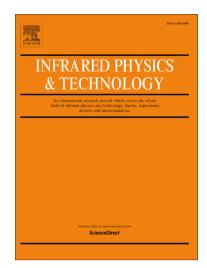
PII: S1350-4495(17)30761-2

DOI: https://doi.org/10.1016/j.infrared.2018.03.021

Reference: INFPHY 2524

To appear in: Infrared Physics & Technology

Received Date: 14 November 2017 Revised Date: 13 March 2018 Accepted Date: 23 March 2018



Please cite this article as: K. Mariselvam, R. Arun Kumar, P. Manasa, Spectroscopic investigations of neodymium doped barium bismuth fluoroborate glasses, *Infrared Physics & Technology* (2018), doi: https://doi.org/10.1016/j.infrared.2018.03.021

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 proof before it is published in its final 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.

### **ACCEPTED MANUSCRIPT**

# Spectroscopic investigations of neodymium doped barium bismuth fluoroborate glasses

K. Mariselvam<sup>a</sup>, R. Arun Kumar<sup>a,b,\*</sup>, P. Manasa<sup>c</sup>,

<sup>a</sup>GRD Centre for Materials Research, PSG College of Technology, Coimbatore-641 004, India.

<sup>b</sup>Department of Physics, PSG College of Technology, Coimbatore-641 004, India.

<sup>c</sup>Department of Physics, Sri Venkateswara University, Tirupati -517 502, India.

#### **Abstract**

A new series of neodymium doped barium bismuth fluoroborate glasses with the chemical composition of  $(70\text{-x})H_3BO_3+~5Bi_2O_3+~10BaCO_3+~7.5CaF_2+~7.5ZnO+~xNd_2O_3$  (where x= 0.05, 0.1, 0.25, 0.5, 1, 2 (in wt %) have been prepared by the conventional melt quenching method. The powder x-ray diffraction pattern confirms the amorphous nature of the prepared glasses. The Urbach energy reveals the minimum disorderness of the glass samples. Judd-Ofelt intensity parameters ( $\Omega_{\lambda}$ =2, 4 and 6) were derived from the absorption spectrum and were used to calculate the emission properties. The near infrared emission spectra recorded with 808 nm laser diode excitation for different concentrations of Nd<sup>3+</sup> ions and the emission for the  ${}^4F_{3/2} \rightarrow {}^4I_{11/2}$  transition at 1060 nm found to be high intense. The measured decay curves for  ${}^4F_{3/2}$  fluorescent level exhibit single exponential nature with shortening of lifetime with increase in concentration. The laser parameters such as stimulated emission cross-section, branching ratios, gain band width and optical gain values are found to be high for BBFB:Nd<sup>3+</sup> (0.5 wt %) glass. Hence, the results suggested that the present BBFB:Nd<sup>3+</sup> (0.5 wt %) glass could be used as an efficient infrared laser source around 1.06  $\mu$ m region.

**Keywords:** Amorphous material; Nd<sup>3+</sup>: glasses; Urbach energy; Photoluminescence; Judd-Ofelt parameter; Infrared laser.

\*Corresponding author

Dr. R. Arun Kumar,

Associate Professor (Physics) and Centre Head,

GRD Centre for Materials Research,

PSG College of Technology,

#### Download English Version:

# https://daneshyari.com/en/article/8145585

Download Persian Version:

https://daneshyari.com/article/8145585

Daneshyari.com