

Exploring the Structure and Luminescence Properties of Dy³⁺ Ions Doped Oxy Antimony Lead Boro Barium Glasses for Photonic Devices

K. Swapna

Department of Physics, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, India

M. Mahivardhan

Department of Physics, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, India

Ch. Pravallika

Department of Physics, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, India

Sk. Mahamuda

Department of Physics, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, India

M. Venkateswarlu

Department of Physics, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, India

A.S. Rao

Department of Physics, Vikrama Simhapuri University, Nellore, A.P, India

Abstract:

A series of Dy³⁺ doped B₂O₃-Sb₂O₃-BaO-PbO-LiF (PbSbBa) glasses were developed using the conventional melt-quenching method to investigate their luminescent properties for possible wLED applications. To evaluate the structural and luminous properties of each sample, the following techniques were employed: Raman spectroscopy, X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), along with excitation, emission, and decay lifetime measurements. The non-crystalline nature of the titled glasses confirmed through XRD analysis. The existence of borate units was established using Raman and FTIR investigations. The Judd-Ofelt parameters were determined by the analysis of absorption spectra to enhance understanding of the optical behaviour of the prepared glasses. Emission bands of strong blue (482 nm), yellow (575 nm), and red (664 nm) have been seen in PbSbBa glasses under various excitation conditions. Three emission spectral lines exhibit transitions of Dy³⁺ ions from ⁴F_{9/2} to ⁶H_{15/2}, ⁶H_{13/2} and ⁶H_{11/2}. Using the CIE 1931 colour chromaticity