

Luminescence and lifetime properties of rare-earth doped phosphate glass

A.L.F. Novais^{1,*}, L.F. Souza², C.M. Abreu¹, G. R. Barrera^{1,3} and D.N. Souza¹

¹ Universidade Federal de Sergipe, Departamento de Física, Av. Marechal Rondon, s/n, 49100-00 São Cristóvão, SE, Brazil

² Instituto de Pesquisas Energéticas e Nucleares, Comissão Nacional de Energia Nuclear, IPEN/CNEN-SP, Av. Prof. Lineu Prestes 2242, CEP 05508-000 São Paulo, Brazil

^{1,3} Corporación Universitaria del Huila, Calle 21 No. 6 – 01, Huila, Colombia

* Corresponding author: deafisica@yahoo.com.br

This work aims to investigate the characteristics related to the luminescence spectra of phosphate glass PbO-In₂O₃-P₂O₅ and PbO-P₂O₅, doped respectively with 1.0 wt% of Nd³⁺ and Eu³⁺. These glasses were produced by melt and rapid cooling method. The compounds are from Sigma Aldrich with a 99.99% degree of purity. The spectral characteristics of Nd³⁺, Eu³⁺, ions in phosphates are important to optical applications. Such glasses can be useful as optical fibers doped and in solid-state lasers. The emission and excitation spectra were obtained using a spectrofluorometer (Nanolog - Horiba) with a photomultiplier tube R928P equipped with a Xenon lamp (CW 450 W) as the excitation source, and a filter of 399 nm. Lifetime was also obtained with the NanoLog, using the same lamp and detector. The figure 1.(a) show luminescence spectra of Nd³⁺ (excitation 524 nm) where they were observed three bands at 898 nm, 1056 nm and 1325 nm that are characteristic of Nd³⁺ ions in glasses. The figure 1.(b) show luminescence spectra of Eu³⁺ (excitation 381 nm) where they were observed five bands at 579 nm, 592 nm, 612 nm, 652 nm and 700 nm that are characteristic of Eu³⁺ ions in glasses.

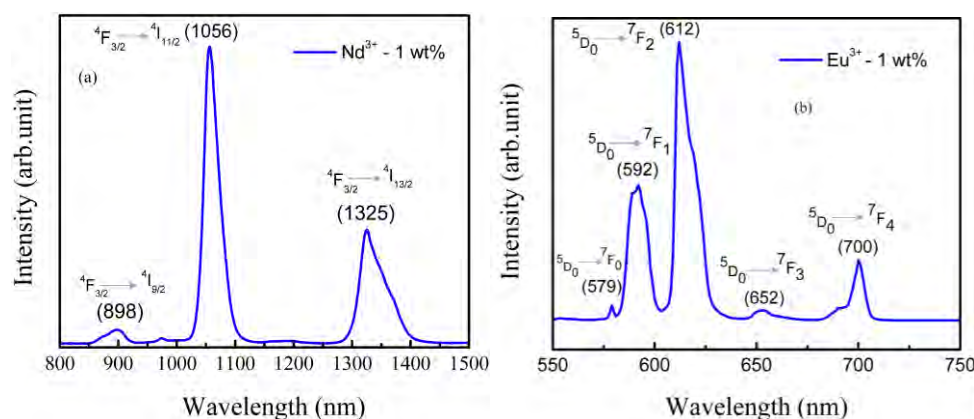


Fig.1. Luminescence spectra of the glass samples: (a) PbO-In₂O₃-P₂O₅:Nd₂O₃, and (b) PbO-P₂O₅:Eu₂O₃.

Keywords: Luminescence, lifetime, glass, spectroscopic, rare-earth.

Acknowledgements

This work was supported by CNPq, IPEN/CNEN, UFS, and CORHUILA.