Luminescence and scintillation properties of Ce^{3+}-doped P_2O_5-Li_2CO_3-$GdBr_3$-Al_2O_3 glasses

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Abstract

A series of glass samples were fabricated with the composition of (65-x)P_2O_5:20Li_2CO_3:10$GdBr_3$:5Al_2O_3:x$CeBr_3$ (where, x = 0.5,1,2,3,4). The powder X-ray diffraction measurements were performed to verify the amorphous structure of the prepared glass samples. Energy-dispersive X-ray spectroscopy showed an interesting phenomenon of oxygen bridging eliminating Br (Bromine) from the initial compounds. The luminescence characteristics of the samples were studied using X-rays and UV–Vis excitations. Characteristics Ce^{3+} emission was observed at 350 nm including energy transfer from 4f energy state of Gd^{3+} to 5d energy band of Ce^{3+}. The fast decay component was observed as 37 ns, 42 ns, and 44 ns for the UV, α-particles, and γ-ray excitations, respectively. The intermediate and slow components were observed for α-particles, and γ-rays excitations indicating Gd^{3+} to Ce^{3+} energy transfer and 4f-4f transitions of Gd^{3+} -ions accordingly. The scintillation property was studied with α-particles using a ^{241}Am source.

The full text can be found at the following link:

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