Scintillation performance of the Ce^{3+} -activated lithium phosphate glass

Sudipta Saha, AV Ntarisa, Nguyen Duy Quang, NT Luan, PQ Vuong, HJ Kim, N Intachai, S Kothan, J Kaewkhao

Abstract

Ce^{3+} -doped phosphate glasses with intense luminescence were reported extensively for radiation detection in recent decades. With the same intension, we fabricated glasses of composition $45P_2O_5$:$35Li_2O$:(10-x)GdI_3:$5Al_2O_3$:$5Ca_2CO_3$:x$CeBr_3$ (x = 1, 2, 3, 5) in molar ratio using conventional technique followed by thermal annealing. The luminescence studies confirmed the energy transfer process from Gd^{3+} to Ce^{3+} -ions. The scintillation measurements of the optimized sample were performed under the excitation of α -particles and γ-rays. A photopeak was detected under γ-ray excitation at 662 keV energy from ^{137}Cs source. The estimated absolute light yield was 1600 ± 200 Photons/MeV. The shortest component of the decay time under α -particles and γ -ray excitations was found 32.5 ± 0.3 ns and 39.9 ± 0.4 ns, respectively. In the future, the glass configuration can be engineered to improve radiation detection performance.

The full text can be found at the following link:

https://doi.org/10.1016/j.radphyschem.2022.110285