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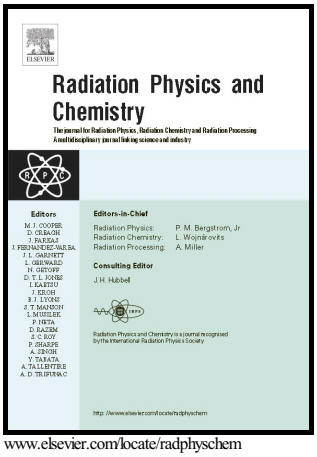

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Gamma Rays Shielding and Sensing Application of Some Rare Earth Doped Lead-Alumino-Phosphate Glasses

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Abstract:

Seven rare earth (Sm^{3+}, Eu^{3+} and Nd^{3+}) doped lead alumino phosphate glasses were prepared. The protective and sensing measures from gamma rays were analysed in terms of parameters viz. density (ρ), refractive index, energy band gap (E_g), mean free path (mfp), effective atomic number (Z_{eff}) and buildup factors (energy absorption EABF as well as exposure buildup factor EBF). The energy dependent parameters (mfp, Z_{eff}, EABF and EBF) were investigated in the energy region from 15 keV to 15 MeV. EABF and EBF values were observed to be maximum in the intermediate energy region. Besides, the EABF and EBF values for the prepared samples are shown to have strong dependence on chemical composition of the glass at lower energy, whereas, it is almost independent of chemical composition in higher energy region. The prepared glass samples are found to have potential applications in radiation shielding as well as radiation sensing, which further find numerous applications in the field of medicine and industry.

Keywords: Rare earth doped glasses, gamma rays, sensing and shielding.

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