

Spectroscopic investigation of praseodymium and cerium co-doped $20\text{Al}(\text{PO}_3)_3\text{-}80\text{LiF}$ glass for potential scintillator applications.

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Streszczenie

The optical properties of $20\text{Al}(\text{PO}_3)_3\text{-}80\text{LiF}$ (APLF80) glass co-doped with praseodymium (Pr^{3+}) and cerium (Ce^{3+}) ions are explored. By co-doping the host APLF80 glass matrix with praseodymium (Pr^{3+}) and cerium (Ce^{3+}) ions (APLF80+PrCe), improvement in the luminescence decay time of the $5d \rightarrow 4f$ allowed electric dipole transition of singly-doped APLF80+Pr under optical excitation is achieved. Both radiative and non-radiative energy transfers from Pr^{3+} to Ce^{3+} are observed. Non-radiative energy transfer leads to Pr^{3+} luminescence quenching resulting to faster decay times of Pr^{3+} , especially at high Ce^{3+} -doping concentrations. Our results present exciting prospects for APLF80 as a response time improved scintillator.

Słowa kluczowe

Optical properties, Fluorophosphate glass, Rare earth ion co-doping, Ultraviolet luminescence, Optical spectroscopy

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