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Spectroscopic properties of Pr^{3+}-doped $20Al(PO_3)_3$-80LiF glasses as potential scintillators for neutron detection.

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Kolekcja

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Streszczenie

We investigate the spectroscopic properties of praseodymium (Pr3+)-doped APLF glasses[−+x20Al (PO)80LiFPrF333,=x0.5 to 3.0mol%] to realize their potential application as scintillators for neutrondetection. From the ultraviolet (UV) to the near infrared (NIR) region, the Pr3+-doped glasses exhibit absorptionand emission peaks which correspond to the different interconfigurational 4f5d and intraconfigurational 4ftransitions of Pr3+ions usually located within different environments of the glass matrix. The spectroscopyresults also indicate that Pr3+ions in APLF have a 4f5d excited state configuration which overlaps with the1S0level of the 4f ground state configuration. Under217nmexcitation, the267nmemissions of the Pr3+-doped APLFglasses which correspond to the 4f5d→3H6transition have fast lifetimes ranging from16. 0to19. 7ns.Incontrast with emission intensities, the emission lifetimes are found to depend only on the doping concentrationand not on the sample temperature. Our results suggest that Pr3+-doped APLF glasses can be used as neutronscintillators with robustness in a wide temperature range and with fast and intense emissions at low operatingtemperatures.

Słowa kluczowe

Fluoro-oxide glass, Pr 3+ doping, Spectroscopic properties, Scintillators

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