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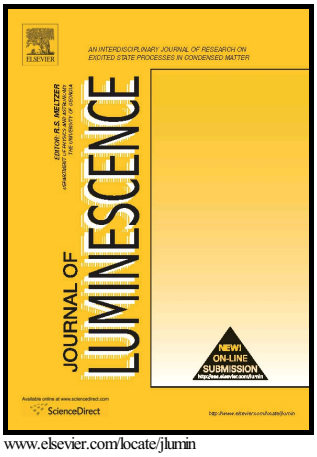

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Crystallization and Photoluminescent properties of Eu, Gd, Sm, Nd co-doped $SrAl_2B_2O_7$ nanocrystals phosphors prepared by glass-ceramic technique

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Abstract

Ternary strontium aluminum borate glasses co-doped with Europium and Gadolinium or Samarium or Neodymium were prepared via melting-quenching technique. Differential thermal analysis (DTA) was applied, as a reference technique, to obtain the optimum heat treatment schedule for crystallization process. Pure $SrAl_2B_2O_7$ was the main crystallized phase which identified by x-ray diffraction (XRD). Scanning electron microscope (SEM) confirmed precipitation of nano size rounded crystals. Extended structural study by FTIR was performed to identify the building units in both glasses and their corresponding glass–ceramics. Optical absorption spectrum in the UV-Visible NIR range was recorded and it was found to be depending on the type of implanted rare earth ions. Photoluminescence properties were studied in relation to the type of rare earth doped in glass and heat treatment. The photoluminescence indicated different colored emission peaks under excitation wavelengths 254 and 365 nm. The life time values were observed to be depending on both the applied excitation wavelength and the type of rare earth. Phosphorescence measurements indicated that the formed $SrAl_2B_2O_7$ phase is a promising host phosphor for rare earth ions to give different emission colors used in different applications.

Keywords: $SrAl_2B_2O_7$, Glass-ceramic; Rare earth; Phosphorescence; **Phosphor**; **CIE 1931 color space.**