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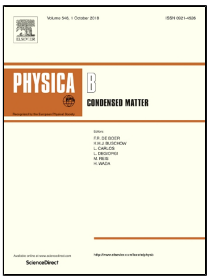

Dependence of Manganese phosphorescence on crystal lattice sites of spinel aluminate hosts

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Dependence of Manganese phosphorescence on crystal lattice sites of spinel aluminate hosts

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Abstract

This work investigates the structural and optical properties of $SrAl_2O_4$: 2%Mn^{2+} and $BaAl_2O_4$: 2%Mn^{2+} nano-phosphors. These nano-phosphors were synthesized by a conventional combustion method at 600 ^oC, using urea as a fuel. The effects of crystal lattice sites, hence the crystals field on the electronic transitions of Mn^{2+} have been investigated. The crystal structures, morphology, and photoluminescence properties of $SrAl_2O_4$: 2%Mn^{2+} and $BaAl_2O_4$: 2%Mn^{2+} nano-phosphors have been studied. The crystal structures, morphology, and photoluminescence studies were carried out using X-ray diffraction (XRD) spectrometer, field emission scanning electron microscope (HRSEM), and photoluminescence (PL) spectrofluorometer respectively. XRD patterns confirmed the hexagonal and monoclinic structures of $BaAl_2O_4$ and $SrAl_2O_4$ respectively. The crystallites sizes were also averaged from XRD peaks in all samples using scherrer equation, and they were found to be at nano scale. SEM micrographs revealed irregular shaped particles both in $SrAl_2O_4$: 2%Mn^{2+} and $BaAl_2O_4$: 2%Mn^{2+} nano-phosphors. Energy dispersive x-ray spectroscopy (EDS) analysis confirmed the presence of Mn in $BaAl_2O_4$: 2%Mn^{2+} and $SrAl_2O_4$: 2%Mn^{2+} samples. Under 426 nm excitation, PL emission spectrum of $SrAl_2O_4$: 2%Mn^{2+}