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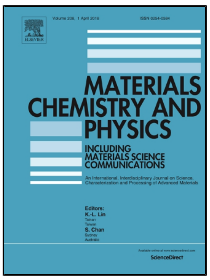

Near UV excited $SrAl_2O_4:Dy^{3+}$ phosphors for white LED applications

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Near UV excited $SrAl_2O_4:Dy^{3+}$ phosphors for white LED applications

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Abstract

Strontium aluminate phosphors containing different concentrations of Dy^{3+} ions ($SrAl_2O_4:Dy^{3+}$) were prepared by solid state reaction method by sintering at 1100°C for 3 hours. These phosphors were crystallized into monoclinic structure and well consistent with the JCPDS No. 34–0379. All these phosphors exhibit the characteristic emission transitions such as $^4F_{9/2} \rightarrow {}^6H_{15/2}$, $^4F_{9/2} \rightarrow {}^6H_{13/2}$ and $^4F_{9/2} \rightarrow {}^6H_{11/2}$ corresponding to blue (~480 nm), yellow (~572 nm) and red (~663 nm) regions when excited at 350 nm near UV wavelength. Beyond 1.0 mol% concentration of Dy^{3+} ions, a luminescence quenching was noticed and it has been assigned to the energy transfer through dipole-dipole interactions at higher concentrations. Due to crystallization into nanophase, the $SrAl_2O_4:Dy^{3+}$ phosphors exhibit novel and excellent luminescence properties at 350 nm excitation. The 1.0 mol% of Dy^{3+} - doped $SrAl_2O_4$ phosphor show a quantum yield of ~9.52%. The experimental results suggest that the $SrAl_2O_4$:1.0 mol% Dy^{3+} phosphor could be the best choice to design white LEDs with bright and intense luminescence.

Keywords: Aluminate phosphor; Dysprosium; Photoluminescence; Quantum Yield; White LEDs

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