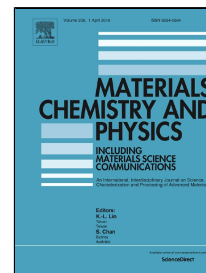


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Bungala Chinna Jamalaiah, Yagateela Ramesh Babu



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Near UV excited $\text{SrAl}_2\text{O}_4:\text{Dy}^{3+}$ phosphors for white LED applications

Bungala Chinna Jamalaiah^{1*}, Yagateela Ramesh Babu²

¹Department of Physics, Rajeev Gandhi Memorial College of Engineering & Technology,
Nandyal 518501, India

²Department of Humanities & Basic Sciences, G. Pulla Reddy Engineering College, Kurnool
518007, India

Abstract

Strontium aluminate phosphors containing different concentrations of Dy^{3+} ions ($\text{SrAl}_2\text{O}_4:\text{Dy}^{3+}$) 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 $^4\text{F}_{9/2} \rightarrow ^6\text{H}_{15/2}$, $^4\text{F}_{9/2} \rightarrow ^6\text{H}_{13/2}$ and $^4\text{F}_{9/2} \rightarrow ^6\text{H}_{11/2}$ 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 $\text{SrAl}_2\text{O}_4:\text{Dy}^{3+}$ 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 $\text{SrAl}_2\text{O}_4:1.0 \text{ mol\% Dy}^{3+}$ phosphor could be the best choice to design white LEDs with bright and intense luminescence.

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

*Corresponding author's e-mail: bcjphysics@gmail.com (B.C. Jamalaiah)

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