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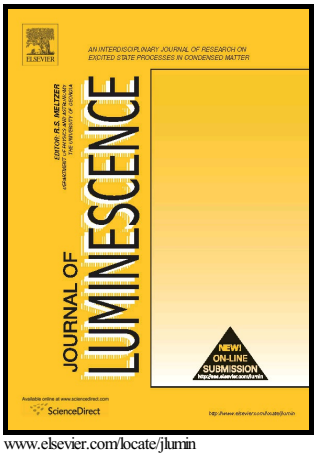

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Luminescence Properties of Y^{3+} Stabilized $Gd_3Al_5O_{12}:Tb^{3+}/Ce^{3+}$ Phosphors with Yellow Light-Emitting for Warm White LEDs

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Abstract

The new system of $[(Gd_{0.9}Y_{0.1})_{0.9-x}Tb_{0.1}Ce_x]AG$ phosphors have been successfully obtained by using a modified co-precipitation method which include the precursor synthesis and post treatment at 1300 ^oC. The crystal structure stabilization, morphology, PL/PLE spectra, fluorescence decay analysis and thermal property have been studied in detail. The metastable $GdAG:Tb^{3+}/Ce^{3+}$ samples could be effectively stabilized via smaller 10 at.% Y^{3+} doping, which can develop a new phosphor of $[(Gd_{0.9}Y_{0.1})_{0.9-x}Tb_{0.1}Ce_x]AG$ for exploring the field of the opto-functionality. The presence of Gd^{3+} and Tb^{3+} excitation bands in the PLE spectra monitoring the Ce^{3+} yellow emission directly provides an evidence of $Gd^{3+}\rightarrow Ce^{3+}$ and $Tb^{3+}\rightarrow Ce^{3+}$ energy transfer. The $[(Gd_{0.9}Y_{0.1})_{0.9-x}Tb_{0.1}Ce_x]AG$ phosphors with good dispersion show various luminescence properties monitoring at 275 nm, 331 nm and 452 nm excitation, respectively. The optimized $(Gd_{0.9}Y_{0.1})_{0.89}Tb_{0.1}Ce_{0.01}]AG$ phosphor has a red-shifted emission and the applicable emission intensity because of the energy transfer of $Gd^{3+}\rightarrow Ce^{3+}$ and $Tb^{3+}\rightarrow Ce^{3+}$, thus being more suitable for the application of warm-white lighting than $YAG:Tb^{3+}/Ce^{3+}$ and $LuAG:Tb^{3+}/Ce^{3+}$. The Stokes shift

[1] The two authors contributed equally to this paper.