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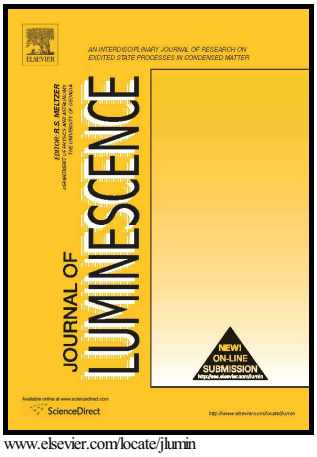

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Narrowband Ultraviolet B Emitting Gd Doped $CaAl_2O_4$ Phosphors - An ESR and Photoluminescence Study

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Abstract

Phosphors with the composition $Ca_{1-x}Gd_xAl_2O_4$ (x = 0.0025 to 0.09) were synthesized by a simple combustion route in a short time. The formation of the as-prepared combustion products was confirmed by the X-ray diffraction analysis, indicating the formation of a monoclinic phase. The PL spectroscopy assessment shows that with increasing Gd^{3+} concentration, the ultraviolet emission from Gd^{3+} at 314 nm ($^6P_{7/2} \rightarrow {}^8S_{7/2}$) progressively enhanced. The Gd^{3+}-doped $CaAl_2O_4$ displays electron spin resonance signals with the effective g values at $g \approx 1.95$, 2.9, and 3.7. Additional lines were also observed at the approximate g values of ~2.2 and 5.3. Gd^{3+} ion located in the distorted surroundings and experiencing relatively strong crystal field, give rise to low field lines. Distorted surroundings in the present system may result from the nearness of the charge compensator oxygen vacancies.

Keywords: Combustion; XRD; ESR; Gd^{3+} ions; $CaAl_2O_4$; Photoluminescence

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