

Luminescence properties of ZnGa_2O_4 and ZnAl_2O_4 spinels doped with Eu^{3+} and Tb^{3+} ions

**Rusu E., Ursaki V., Novitschi G., Vasile M.,
 Petrenco P., Kulyuk L.**

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Abstract

Spinel-type ZnGa_2O_4 and ZnAl_2O_4 powders doped with Eu^{3+} and Tb^{3+} ions, including dual doping, have been prepared by solid phase reactions and by deposition from chemical solutions. XRD analysis demonstrates the high quality of spinel grains constituting the powder. The luminescence shows that the rare earth ions are incorporated in the defect regions at the grain boundaries. The emission spectra of the samples with europium are characterized by an intense emission in red region due to the $^5\text{D}_0 \rightarrow ^7\text{F}_{1,2}$ transitions of Eu^{3+} ions, whereas in the case of terbium the highest intensity corresponds to the green emission due to the $^5\text{D}_4 \rightarrow ^7\text{F}_5$ transitions of Tb^{3+} ions. The possibility to change the color of the emission from green to red by the variation of Tb and Eu doping concentration is demonstrated.