

**LUMINESCENCE AND LUMINESCENCE KINETICS OF $\text{Gd}_3\text{Ga}_5\text{O}_{12}$
POLYCRYSTALS DOPED WITH Cr^{3+} AND Pr^{3+}**

S. Mahlik¹, B. Kukliński¹, M. Grinberg¹, L. Kostyk², O. Tsvetkova²

¹ Institute of Experimental Physics, University of Gdańsk, Gdansk , Poland

² Ivan Franko Lviv National University, Ukraine

E-mail: doksma@univ.gda.pl

In this paper spectroscopic investigations of GGG polycrystals, containing Cr^{3+} and intentionally doped with Pr^{3+} of concentration 0.1, 0.5, 1 and 1.5 mol % are presented. We have measured the steady state luminescence and luminescence excitation spectra, as well as the time resolved spectra and luminescence kinetics. The main goal was to investigate the excitation energy transfer from lattice to impurity and between impurities.

We found that relative intensity of Cr^{3+} and GGG lattice luminescence decreased when material was doped with Pr^{3+} . On the other hand time resolved spectroscopy and luminescence decay measurements showed the Cr^{3+} and GGG lattice luminescence decays were independent of Pr^{3+} content. The lifetime of Pr^{3+} luminescence related to $^1\text{D}_2 \rightarrow ^3\text{H}_4$ and $^3\text{P}_0 \rightarrow ^3\text{H}_4$ transitions decreased with concentration of Pr^{3+} , what was attributed to the concentration luminescence quenching. No energy transfer between GGG lattice defects and Cr^{3+} , and Pr^{3+} ions was observed. We proposed the model of radiative recombination of electron and hole, which took place through three independent pathways: by GGG host emission that peaked at 12750 cm^{-1} , by Cr^{3+} luminescence that peaked at 15400 cm^{-1} and by Pr^{3+} luminescence.