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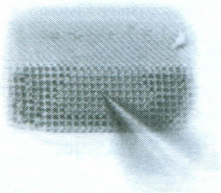

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Effects of temperature on luminescent properties of Gd_2O_3:Er,Yb nanophosphor

D. Šević[1], M.S. Rabasović[1], J. Križan[2], S. Savić-Šević[1], M.D. Rabasović[1], B. P. Marinkovic[1], and M. G. Nikolic[1]

(1) *Institute of Physics, University of Belgrade, Belgrade, Serbia*

(2) *AMI d.o.o., Ptuj, Slovenia*

Contact: Dragutin Sevic (sevic@ipb.ac.rs)

Abstract. Recently, we have started investigations of upconverting nanophosphors and effects of temperature on their luminescent properties. In this study we analyze nanocrystalline Gd_2O_3 doped with Er^{3+} and Yb^{3+} cations. Material was synthesized by combustion method, as described in [1]. Fluorescence intensity ratios (FIR) were determined in a range from 50 °C up to 300 °C in [1]. Here, we have obtained time resolved luminescence spectra of nano powder samples of Gd_2O_3:Er,Yb. Streak image of Gd_2O_3:Er,Yb phosphor emission is shown in Fig. 1 (a). Our experimental setup is presented in detail in [2,3]. However, in this study we have used pulsed laser diode excitation at 980 nm. The structure of material was observed by high resolution scanning electron microscope (SEM). The experimental setup for luminescence measurement as a function of temperature is described in [4]. Effects of temperature on luminescent properties of Gd_2O_3:Er,Yb phosphor are shown in Fig. 1 (b), where varying FIR between different transitions could be observed.

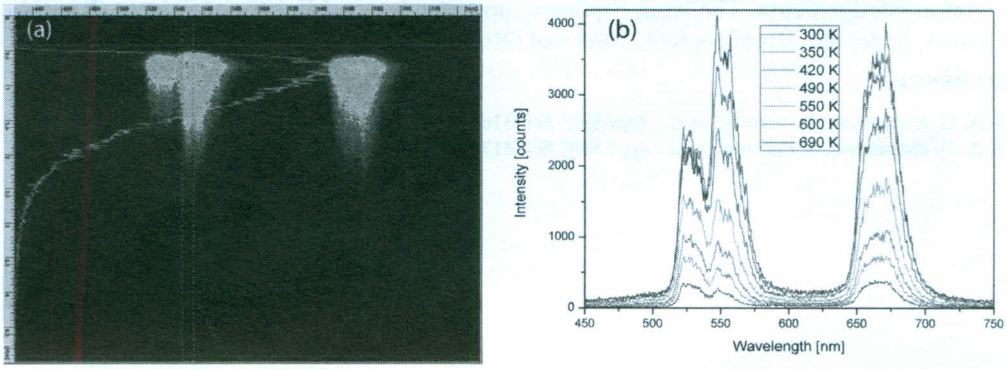

Figure 1. (a) Streak image of Er and Yb doped Gd_2O_3 nanopowder. (b) Emission spectra of Gd_2O_3:Er,Yb at different temperatures. Laser excitation is at 980 nm.

The luminescence lifetime of this phosphor was determined by streak camera (HPD-TA) software. Our preliminary results show that the lifetime of transition from the level $^4S_{3/2}$ is about 0.77 ms at room temperature, decreasing to about 0.07 ms at 623 K. Our analysis proves that synthesized Gd_2O_3:Er,Yb phosphor is appropriate for remote temperature sensing.

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