The new method of nanocrystal Y_2O_3:Eu powders preparation

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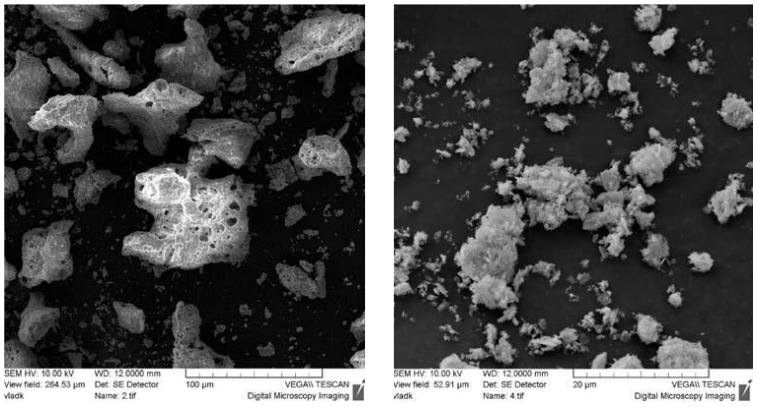
The new versions of ultra-dispersed powders of yttrium oxide doped with europium ions (red phosphor) obtained by thermochemical synthesis (combustion) have been studied. Y_2O_3:Eu^{3+} powders were synthesized by combustion method in and the influence of dispersant was investigated [1].



a *b*

Fig. SEM image of the Y_2O_3:Eu^{3+} samples: *a* – without dispersing agent; *b* – using PVA as dispersing agent

Nanostructured powders of yttrium oxide doped with europium Y_2O_3:Eu^{3+} (red phosphor) were synthesized by the thermochemical method under the conditions of oxidation–reduction of nitrate salts of yttrium and europium in the presence of citric acid as a fuel. The method comprises the following steps: preparing the starting material, $Y(NO_3)_3 \cdot 9H_2O$ and $Eu(NO_3)_3 \cdot 9H_2O$; dissolving in citric acid; adding a polyvinyl alcohol (PVA) solution to the mixture to form a precursor; heat stirring and drying the mixture to form a gel-type precursor; and heat treating the precursor to form a nanocrystal Y_2O_3:Eu^{3+} structure. The combustion at the temperature of ignition 350 °C and calcination 650 °C provides removing the PVA and the powders preparation with the average size of coherent scattering region 28–30 nm. The products of powder obtained using polyvinyl alcohol as dispersing agent were characterized by X-ray diffraction, scanning electron microscopy, and IR-spectroscopy.

It was shown that the obtained materials have bright luminescence with a maximum at a wavelength of 612 nm (red radiation) when excited at a wave length of λ = 393 nm, and the size of agglomerates and intensity of the radiation depends on the degree of dispersion (Fig.).

1. C. Wang, J. Zhao, Y. Li, *et al.*, J. Rare Earths. **27** (6) (2009) 879.