



PREPARATION OF NANOSTRUCTURED Y_2O_2S POWDERS, DOPED WITH TERBIUM

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Abstract

The new method of ultra-dispersed powders preparation of yttrium oxide doped with terbium and sulfur ions (green phosphor) obtained by thermochemical synthesis (combustion) have been studied. It is well known, that sulfur introduction into $Y_2O_3:Tb$ phosphor improve significantly the light yield, but processes of the preparation and energy transfer at excitations need further investigation. Nanostructured $Y_2O_2S:Tb$ powders were synthesized under the conditions of oxidation–reduction of nitrate salts of yttrium and terbium in the presence of thiourea (TU) and hexamethylenetetramine (HMTA) as a fuel. The method comprises the following steps: preparing the mixture $Y(NO_3)_3 \cdot 9 H_2O$, $Tb(NO_3)_3 \cdot 9 H_2O$, HMTA and TU to form a precursor; heat stirring and drying the mixture to form a gel-type precursor; heat treating the precursor at 650 °C in the muffle furnace to form a nanostructured powders. The average size of such prepared agglomerated powders was in the region of 5–50 mkm. After grinding and calcination on air at 700 – 1100 °C (1 hour) the size of powder particles was in the region of 50–100 nm. The precursors and powders were characterized by DTA, TG, IR-spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM) and spectral-luminescent analysis. It was shown that the obtained materials have bright luminescence with a maximum at a wavelength of 537 to 563,4 nm (green radiation) when excited at a wavelength of 250 nm, and the size of agglomerates and intensity of the radiation depends on the degree of dispersion and temperature of calcination.

Keywords: Y_2O_2S , Terbium, Nanostructure, SEM.