Glass-ceramics luminescent materials contained the doped yttrium-aluminum garnet particles prepared by the thermo-chemical method

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Objective of the research is the development of optical glass-ceramics composites using yttrium-aluminum garnet luminescent powders activated with rear-earth element ions prepared by the combustion method.

The method of yttrium oxide and yttrium-aluminum garnet luminescent powders activated by rear-earth element ions preparation, based on the combustion of nitrate salts in the presence of organic fuel, was developed. The variants of synthesis were optimized, and structural and luminescent characteristics of the powders $Y_3Al_5O_{12}:Ce^{3+}$ were studied. The doping of yttrium-aluminum garnet by cerium at excitation of 455 nm causes broadband luminescence in the range of 500–700 nm. The combustion in complex fuel (urea and hexamethylenetetramine) at the temperature of calcination 650 °C provides growth in intensity of luminescence by 1.5–2 times for phosphor $Y_3Al_5O_{12}:Ce^{3+}$.

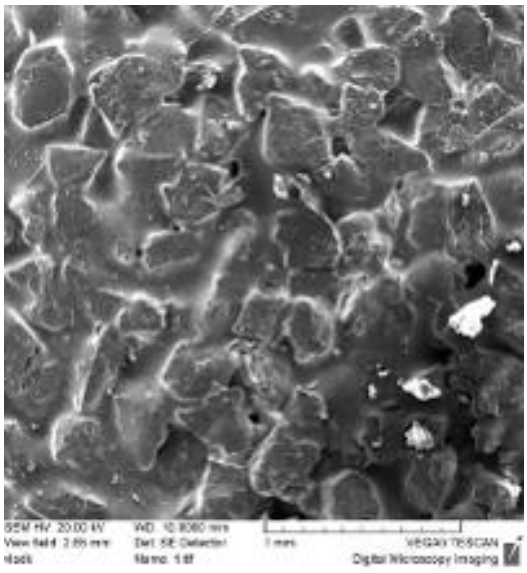

Fig. Thick-film composite covering deposed on glass substrate diode devices

Models of remote converters in the form of a thick-film covering deposed on glass smooth and grooved substrates, also disk glass-crystal samples with concentration of the phosphor powder up to 30 wt.% were fabricated (Fig.). Dependences of spectral-luminescent characteristics of coverings with respect to concentration of $Y_3Al_5O_{12}$ and powder dimensions of fillers were revealed. The glass-ceramics samples with silica glass particles and $Y_3Al_5O_{12}:Ce^{3+}$ phosphor at excitation of blue LED 455 nm causes broadband luminescence in the range of white light. Luminescent glass-crystal disks are destined for optical converters of light-emitting devices.