

Synthesis and spectroscopic investigations of $\text{Sr}_2\text{Y}_8(\text{SiO}_4)_6\text{O}_2:\text{Eu}^{2+}$, Eu^{3+} phosphor for white LEDs.

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Streszczenie

Europium doped silicate $\text{Sr}_2\text{Y}_8(\text{SiO}_4)_6\text{O}_2:\text{Eu}$ was successfully obtained by the reaction of nanocrystalline $\text{SrO}/\text{Y}_2\text{O}_3:\text{Eu}^{3+}$ and colloidal SiO_2 at 1000 °C in the reducing atmosphere (25% H_2 /75% N_2). It has typical apatite crystal structure with the P63/m space group. The distributions of Eu^{3+} and Eu^{2+} between the two crystallographic sites 4f and 6h in the apatite structure were investigated by means of photoluminescence techniques. Results show that both ions are present in 4f and 6h sites at initial Eu^{3+} concentration of 0.1 mol%. With increasing concentration the occupancy of 4f sites by both ions increase faster. Due to significantly shifted luminescence of Eu^{2+} ions from both sites a tunable broad band emission in the spectral range of 450–650 nm can be produced varying the excitation energy. With the excitation in the wavelength range of 380–400 nm, the resultant yellow emission has spectral distribution beneficial for high color rendering index (CRI). These phosphors are efficiently excited in the wavelength range of 300–500 nm, which can be executed by a near UV- or blue-emitting InGaN chip. While the emission intensity is quite stable up to 100 °C, the emission quantum efficiency (QE) of 45% is still below the value of commercial phosphors.

Słowa kluczowe

oxyapatite, Eu^{2+} , white light, LED, phosphor

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