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Effect of flux on the composition and luminescent properties of $\text{Ca}_{0.68}\text{Mg}_{0.2}\text{SiO}_3:0.12\text{Eu}^{3+}$ red phosphor

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Abstract: $\text{Ca}_{0.68}\text{Mg}_{0.2}\text{SiO}_3:0.12\text{Eu}^{3+}$ red-emitting phosphor was synthesized via one-step calcination process of the precursor prepared by chemical coprecipitation with different fluxes. Then X-ray diffraction and fluorescence spectrophotometry were adopted to investigate the structure and luminescent properties of $\text{Ca}_{0.68}\text{Mg}_{0.2}\text{SiO}_3:0.12\text{Eu}^{3+}$. The results indicated that adding fluxes increased the crystalline significantly while the phase composition of samples was not changed. Furthermore, the fluxes improved the intensity of emission peak and the quantum efficiency greatly. With the concentration of flux (Li_2CO_3 or K_2CO_3) increasing, the emission intensity of $\text{Ca}_{0.68}\text{Mg}_{0.2}\text{SiO}_3:0.12\text{Eu}^{3+}$ firstly increased and then decreased. Meanwhile, red-shift phenomenon was observed in the emission spectra. The optimal adding fraction of Li_2CO_3 and K_2CO_3 was 6% and 5% respectively, and the luminous intensity of samples calcined with the optimum adding amount of Li_2CO_3 , K_2CO_3 is 42 and 48 times that of the samples without flux. K_2CO_3 showed a better effect on improving the emission intensity of the phosphors than Li_2CO_3 .

Keywords: $\text{Ca}_{0.68}\text{Mg}_{0.2}\text{SiO}_3:0.12\text{Eu}^{3+}$; Flux; Emission intensity; Red phosphor

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