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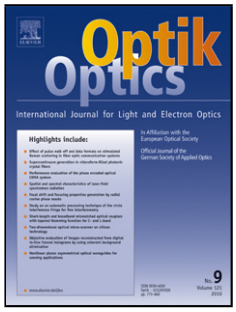

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Tuning of Emission Color in the Germanate Luminescent Materials for Cement Application

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Abstract

Nowadays, tunable luminescence that can be only pumped upon excitation at an invisible single ultraviolet (UV) wavelength has attracted great attentions in the lighting fields. Unlike most of previous works which focus mainly on the application of luminescent phosphor materials for phosphor converted white light-emitting diodes (pc-wLEDs), a new type of germanate phosphor luminescent material, which can emit a broadly tunable spectral range and show the promising for cement application, has been reported in this work. As for the structure purity of the as-obtained germanate phosphor materials, we, based on the XRD results, reveal that they belong to a trigonal structure with the space group of R_3(No.146). The luminescent centers, *i.e.*, the +3 europium and +3 bismuth ions, which tend to substitute the Lu sites in the germinate crystal host, can emit the blue emission and the red emission upon excitation at 297 nm and 393 nm, respectively. Due the great spectral overlapping between the excitation wavelength of +3 europium and the emission wavelength of +3 bismuth, the energy transfer from +3 bismuth to +3 europium is demonstrated. More remarkable, fixing the doping content of +3 bismuth yet changing the doping content of +3 europium can induce the emission color tuning from blue, white and to red. In order to explain the PL results we achieved, here we also construct a mechanistic pattern based on the energy transfer from +3 bismuth to +3 europium. Our results show that such germanate materials can suggested for cement application

Keywords: germinate; bismuth; europium; tunable emission; energy transfer; cement

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