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Broadening emission band of Ba₂B₂O₅: Dy³⁺ by codoping Ce³⁺ as sensitizer and its application to white LEDs

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Abstract: In order to achieve broad-band white emitting phosphor, Ce³⁺/Dy³⁺ codoped Ba₂B₂O₅ were synthesized by a solid-state method, and the luminescence property and energy transfer were discussed in detail. Dy³⁺ doped Ba₂B₂O₅ shows white emission, and the two narrow peaks which are assigned to the ⁴F_{9/2}→⁶H_{15/2} and ⁴F_{9/2}→⁶H_{13/2} transitions of Dy³⁺ ions, respectively. When codoped Ce³⁺ as sensitizer, the broad-band white emission can be obtained by the energy transfer from Ce³⁺ to Dy³⁺ ions in Ba₂B₂O₅, and the mechanism is the dipole-dipole interaction. And the CIE coordinates can be tuned from (0.2501, 0.2323) to (0.3422, 0.3799) by increase Dy³⁺ content. The emission peak blue-shift of Ce³⁺ ions in Ba₂B₂O₅:Ce³⁺, Dy³⁺ was observed from the thermal spectra, and the mechanism was analyzed. A white light emitting diodes (LEDs) can be fabricated Ba₂B₂O₅:Ce³⁺, Dy³⁺ with 380 nm chip, and the results show that the phosphor may be a potential application in this field.

Keywords: Luminescence; Phosphors

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