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Tuneable luminescence and energy transfer of Tb³⁺/Eu³⁺ co-doped cubic CaCO₃ nanoparticles

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Abstract

A series of Tb³⁺, Eu³⁺ singly or doubly doped CaCO₃ phosphors have been synthesized by carbonation method. The samples were characterized by X-ray diffraction (XRD), field-emission scanning electron microscopy (FE-SEM) and photoluminescence (PL) spectroscopy. The results show that the synthesized samples are all pure calcite CaCO₃. The obtained samples have a cubic morphology with about 20 nm length. Under UV excitation, CaCO₃:Tb³⁺, CaCO₃:Eu³⁺ nanoparticles exhibit strong green and red emission, respectively. By adjusting the relative doping concentration of Tb³⁺ and Eu³⁺ ions in the CaCO₃ host, the different color hues of green, red, and white light can be obtained. It has been verified through the luminescence spectra and decay curves that there exists an

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