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Structure and optical properties of ZnO/Zn₂SiO₄ composite thin films containing Eu³⁺ ions

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Abstract

ZnO and ZnO/Zn₂SiO₄ thin films doped with 3% Eu³⁺ ions were prepared through sol-gel dip-coating and subsequently thermal annealing in the range of 600-900 °C. Effects of zinc and silica concentration on the structure and optical properties of these thin film specimens were investigated using thermogravimetric differential scanning calorimetry, X-ray diffraction, scanning electron microscopy, Fourier transform infrared spectroscopy and emission spectroscopy. Transparent thin films containing ZnO nanocrystals and Zn₂SiO₄ nanocrystals were fabricated. It was found that Eu³⁺ ions were mainly resided in the amorphous matrix or the surface of the nanocrystals, instead of being incorporated into the nanocrystals. As a result, these composites showed intense

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