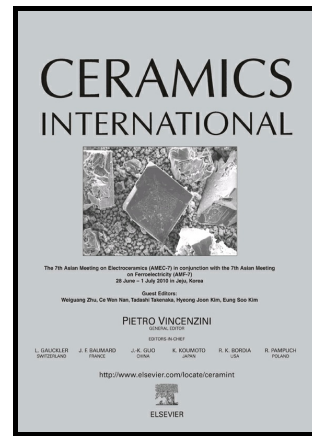


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Abstract

In the present study, ZnO/SnO₂ nanocomposites and Zn₂SnO₄ powder phosphors were synthesized via a sol-gel method through the control of annealing process. The coupled oxides ZnO/SnO₂ nanopowders formed after annealing at 400–600°C, and the spinel zinc stannate phase appeared at 700°C. On annealing in the temperature range of 1000–1200°C, Zn₂SnO₄ is the dominant phase with small traces of ZnO and SnO₂. The photocatalysis evaluation indicated that the photocatalytic activity of ZnO/SnO₂ nanocomposites for the degradation of azo dye Acid Orange 7 (AO7) was much higher than those of pure ZnO and SnO₂ under near UV light irradiation. The higher photocatalytic activity is related to the formation of nano-heterostructures, which provided an effective way to suppress the charge recombination and enhanced the degradation efficiency consequently. Under excitation at 327 nm, photoluminescence (PL) spectra revealed the Zn₂SnO₄ powder phosphors having a weak n-UV emission and a broad visible emission around 400–700 nm with peaking at 548 nm. Chromaticity diagram exhibited the Zn₂SnO₄ powders having the characteristics of near white light emission. The results show that ZnO/SnO₂ nanocomposites and Zn₂SnO₄ powders have potential applications for the nanophotocatalysts, display, and solid-state lighting devices, respectively.

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