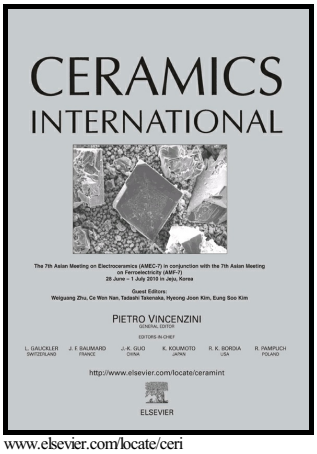


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# Photocatalysis and Luminescence properties of Zinc Stannate Oxides

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## Abstract

In the present study, $ZnO/SnO_2$ nanocomposites and $Zn_2SnO_4$ powder phosphors were synthesized via a sol–gel method through the control of annealing process. The coupled oxides $ZnO/SnO_2$ nanopowders formed after annealing at 400–600$^oC$, and the spinel zinc stannate phase appeared at 700$^oC$. On annealing in the temperature range of 1000–1200$^oC$, $Zn_2SnO_4$ is the dominant phase with small traces of ZnO and $SnO_2$. The photocatalysis evaluation indicated that the photocatalytic activity of $ZnO/SnO_2$ nanocomposites for the degradation of azo dye Acid Orange 7 (AO7) was much higher than those of pure ZnO and $SnO_2$ 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 $Zn_2SnO_4$ 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 $Zn_2SnO_4$ powders having the characteristics of near white light emission. The results show that $ZnO/SnO_2$ nanocomposites and $Zn_2SnO_4$ powders have potential applications for the nanophotocatalysts, display, and solid-state lighting devices, respectively.