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Enhanced photocatalytic degradation of C.I. Reactive Orange 86 in aqueous environment using nanostructure $Zn_{1-x}Co_xO$ composite thin film coated on glass

Mohammad Hossein Habibi*, Iman Asadi Farsani

Catalysis Division, Department of Chemistry, University of Isfahan, Isfahan, 81746-73441, Iran
Tel. +98 (311) 7932707; email: habibi@chem.ui.ac.ir

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ABSTRACT

Nanostructure composite zinc and cobalt oxide thin fi lm coated on flat glass with different Co contents were prepared and characterized by X-ray power diffraction (XRD), UV–vis, atomic force microscope (AFM) and scanning electron microscope (SEM). The results revealed that the particle size of 32 nm and 40 nm for $Zn_{1-x}Co_xO$ and pure ZnO respectively, which is critical for enhancing the photocatalytic activity. The photocatalytic activity of $Zn_{1-x}Co_xO$ was enhanced compared with pure nanostructure zinc oxide thin film. The effects of the cobalt content of $Zn_{1-x}Co_xO$ thin film and dye concentration in the photocatalytic degradation of C.I. Reactive Orange 86 were studied. Among the catalysts studied, the $Zn_{0.9}Co_{0.1}O$ thin fi lm was the most active, and the degradation rate of C.I. Reactive Orange 86 (RO) reached maximum when the concentration of the catalyst was 10 mg/l. Final products were, in all cases, CO_2, NH_4^+ and NO_3^- ions and SO_4^{2-} ions.

Keywords: Photocatalytic degradation; $Zn_{1-x}Co_xO$ thin film; Composite thin film; Nanoparticle; Reactive Orange 86

* Corresponding author.