PHOTOCATALYTIC ACTIVITY OF ZnO/Mn NANOCOMPOSITE IN THE DEGRADATION OF ANTHRACENE

Blanca L. Martínez-Vargas, Jesús A. Díaz-Real, J. J. Pérez-Bueno, Raúl Ortega-Borges, J. L. Rodríguez-López, Luis Ortiz-Frade


The photocatalytic activity of ZnO/Mn nanocomposite through degradation of anthracene was studied. ZnO/Mn nanocomposite powders with different percentages of manganese (0.5 %, 1.1 % and 2.25 %) were synthesized with a one pot alkaline hydrolysis using acetate salts (Zn and Mn) as precursors. The optical properties were determined by UV-Vis and fluorescence spectroscopy. Morphology, crystalline phase, particle size and specific surface area of as prepared photocatalyst powders were determined by SEM coupled with energy-dispersive spectroscopy (EDS), XRD, X-ray fluorescence, FT-IR, HR-TEM and nitrogen adsorption isotherms. The semiconducting properties of the composites were obtained in the dark by cyclic voltammetry (CV), linear voltammetry (LV) and Mott-Schottky analysis (capacitance measurements). The band edge energy levels of all samples were estimated through measurements of flat band potentials and forbidden band gaps. The photodegradation of anthracene was performed in a solution of ethanol: water (pH 12) in a ratio of 1:1, using the nanocomposite powders showed the highest photocatalytic activity for ZnO/Mn 2.25 % nanocomposite. Correlation between the energetic positions of band edges, density of donors and the extent anthracene oxidation allowed explaining this high photocatalytic activity. The presence of manganese ions and oxygen vacancy on the surface of ZnO nanoparticles promotes the separation of photogenerated electron-hole pairs and thus enhances the photocatalytic activity.

Keywords: ZnO/Mn nanocomposite, photocatalytic activity, anthracene

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Presenting author’s email: bmartinez@cideteq.mx