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Investigation the Photocatalytic Properties of Fe3O4-ZnO Nanocomposites Prepared by Sonochemical Method

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Abstract : Fe3O4 is one of the important magnetic oxides with spinel structure; it has exhibited unique electric and magnetic properties based on the electron transfer between Fe2+ and Fe3+ in the octahedral sites. Fe3O4 have received considerable attention in various areas such as cancer therapy, drug targeting, enzyme immobilization catalysis, magnetic cell separation, magnetic refrigeration systems and super-paramagnetic materials. Fe3O4–ZnO nanostructures were synthesized via a surfactant-free ultrasonic reaction at room temperatures. The effect of various parameters such as temperature, time, and power on the size and morphology of the product was investigated. Alternating gradient force magnetometer shows that Fe3O4 nanoparticles exhibit super-paramagnetic behaviour at room temperature. For preparation of nanocomposite 1 g of Fe3O4 nanostructures were dispersed in 100 mL of distilled water. 0.25 g of Zn (NO3)2 and 20 mL of NH3 solution 1 M were then slowly added to the solution under ultrasonic irradiation. The product was centrifuged, washed with distilled water and dried in the air. The photocatalytic behaviour of Fe3O4–ZnO nanoparticles was evaluated using the degradation of a methyl orange aqueous solution under ultraviolet light irradiation. As time increased, more and more methyl orange was adsorbed on the nanoparticles catalyst, until the absorption peak vanish. The methyl orange concentration decreased rapidly with increasing UV-irradiation time.

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