Electronic supplementary information

A magnetically separable photocatalyst based on nest-like γ-Fe_2O_3/ZnO double-shelled hollow structures with enhanced photocatalytic activity

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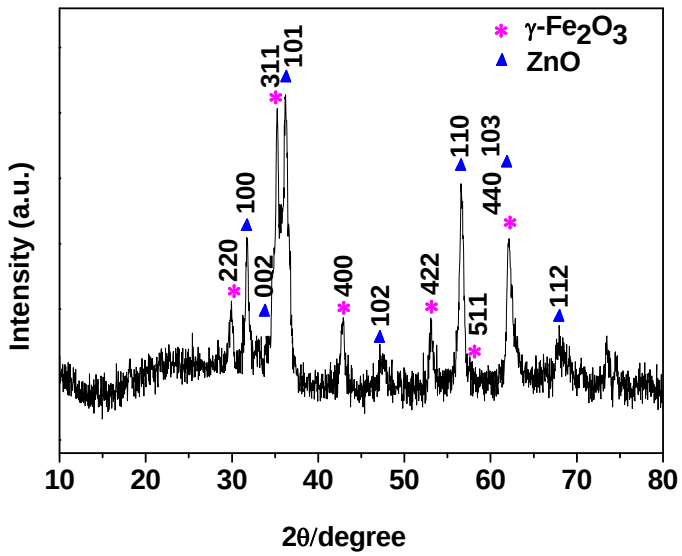


Figure S1. XRD pattern of the magnetic photocatalyst after the photocatalytic test.

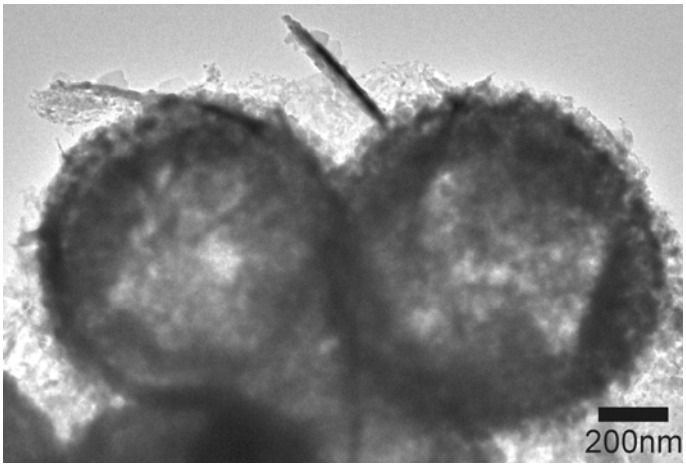
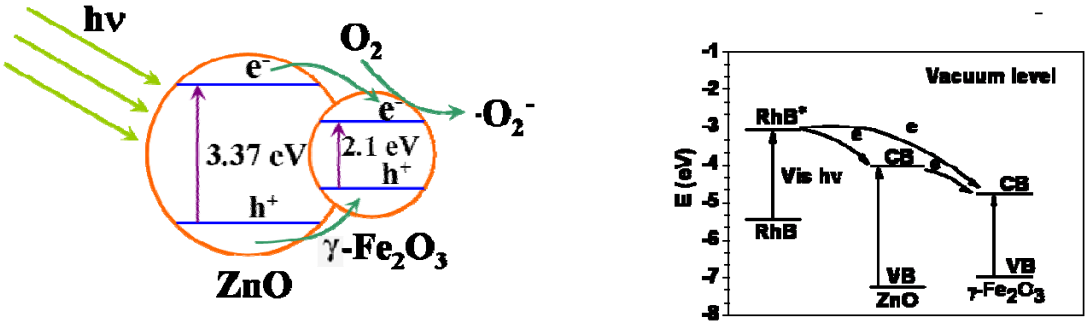


Figure S2. TEM image of the magnetic photocatalyst after the photocatalytic test. From the image, there is no significant structural alteration after the photocatalytic test, indicating good chemical stability of the photocatalyst.



Scheme S1. Schematic diagram representing the charge-transfer process in γ-Fe_2O_3/ZnO heterostructure under direct excitation of electrons from the valence band (left) or excitation of dye molecules (e.g., RhB) by visible light. The conduction band energy of ZnO is higher than that of the γ-Fe_2O_3, γ-Fe_2O_3 act as a sink for the photogenerated electrons. It is reported that the Fe(III) in Fe_2O_3 can be easily reduced to Fe(II). Hence, it is deduced that the electrons in the conduction band of ZnO in the presence of Fe_2O_3 can be easily accepted by Fe_2O_3, which results in the formation of Fe(II). These accumulated electrons in the conduction band of Fe_2O_3 will then be transferred to the molecular oxygen adsorbed on the surface of mixed semiconductor systems. [see Ref. 30. S. Sakthivel, S. U. Geissen, D. W. Bahnemann, V. Murugesan and A. Vogelpohl, *J. Photochem. Photobiol. A: Chem.*, 2002, **148**, 283.]