Supplementary information:

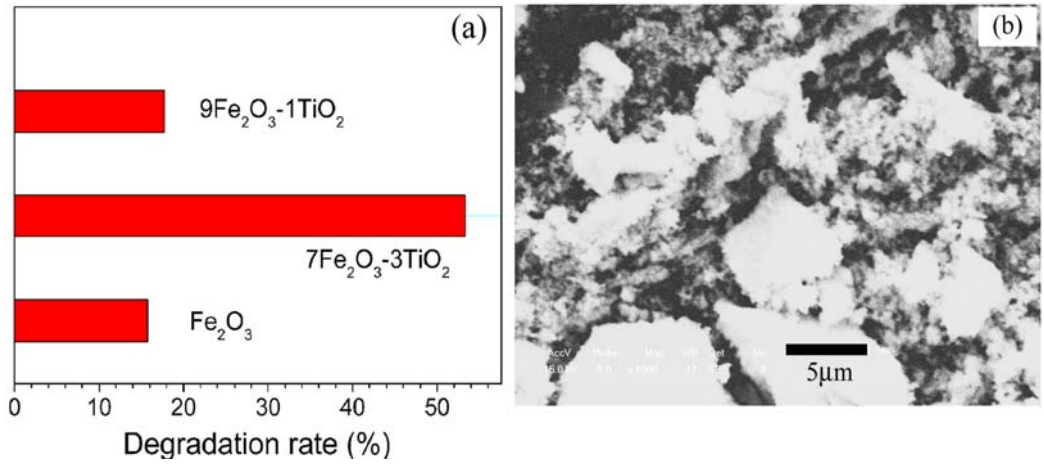

Fig. S1: (a) Effects of Fe_2O_3/TiO_2 composites (with mass ratio of 9:1 and 7:3) and pure Fe_2O_3 on the photodegradation of orange II aqueous solution (20 mg/L) under visible light irradiation within 3 hours. (b) SEM image of Fe_2O_3/TiO_2 composite with mass ratio of 9:1.

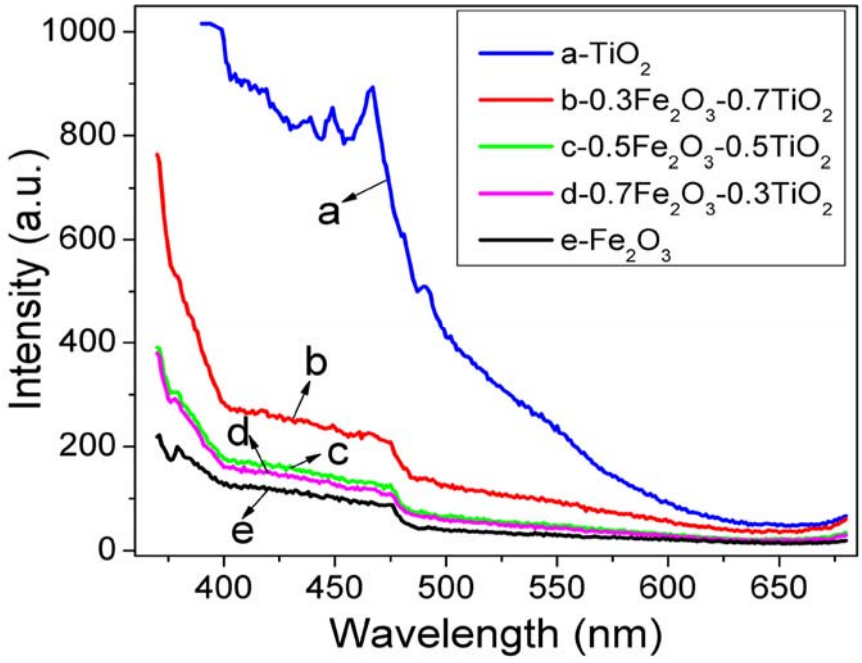

Fig. S2 Photoluminescence (PL) spectra of pure TiO_2 microrods (curve a), pure Fe_2O_3 (curve e) and hetero-structure composites with mass ratio of 3:7 (curve b), 5:5 (curve c) and 7:3 (curve d) excited at 355 nm.

The experimental section of the adsorption in dark:

The procedure is carried out under room temperature. 50 mg of the composites were mixed in the 20 mL of 20 mg/L orange Ⅱ. The mother solution was continuous stirred in dark and 1 mL of the turbid solution was removed from the above solution to measure their absorption. The solution spectrum was measured on a 723 PC vis spectrophotometer. The orange Ⅱ in solution was analyzed by measuring its maximal absorbance at 485 nm.

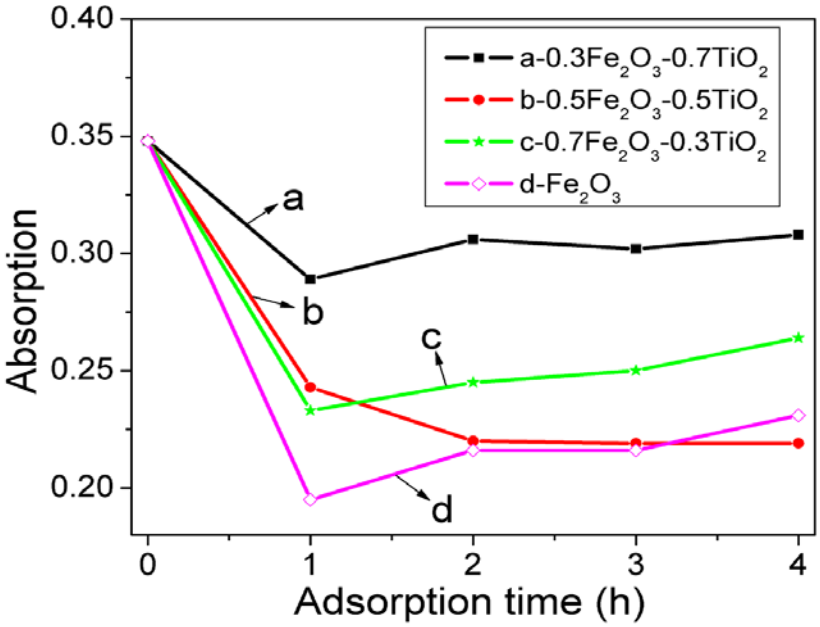

Fig. S3 Adsorption isotherms in dark of orange Ⅱ on pure Fe2O3 and Fe_2O_3/TiO_2 composites with different mass ratios of 3:7, 5:5 and 7:3.