Supporting Information

One-pot synthesis of Fe_2O_3/Y_2O_3@TNS for the enhanced photocatalytic and adsorption properties

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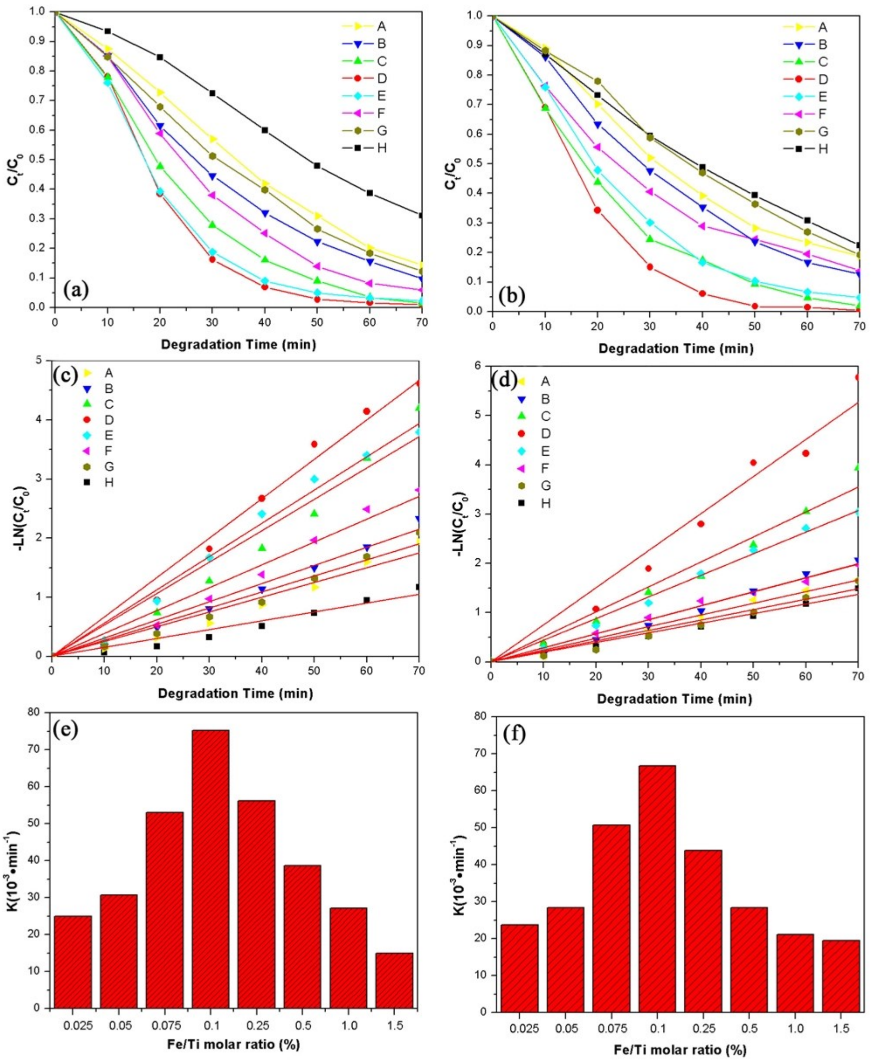

Fig. S 1 Photocatalytic degradation of RhB under UV-Vis light (a) and visible light (b); reaction kinetics (-ln $(C/C_0) = K_{app}t$) of UV-Vis (c) and visible (d) photoreaction; the reaction rate constant (K) values under UV-Vis light (e) and visible light (f) for the photocatalysts x%Fe_2O_3/0.75%Y_2O_3

@TNS: x=0.025 (A), 0.05 (B), 0.075 (C), 0.1 (D), 0.25 (E), 0.5 (F), 1.0 (G), 1.5 (H).

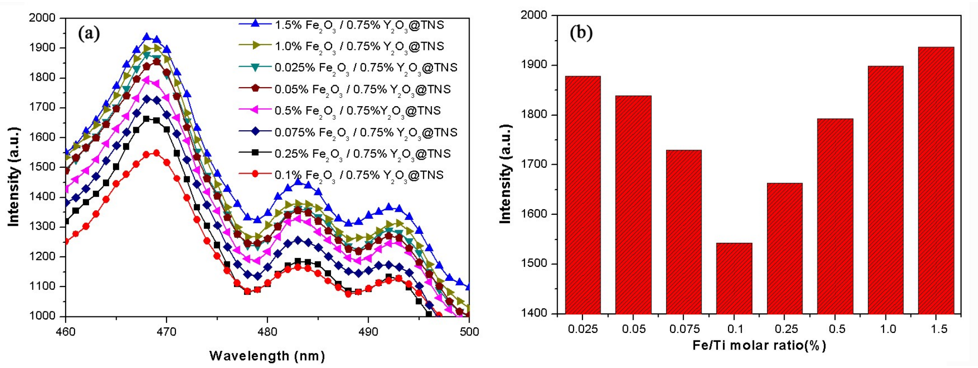

Fig. S 2 Fluorescence spectra of samples using excitation of 205 nm(a) ; the FL intensity of samples at 467 nm（b）

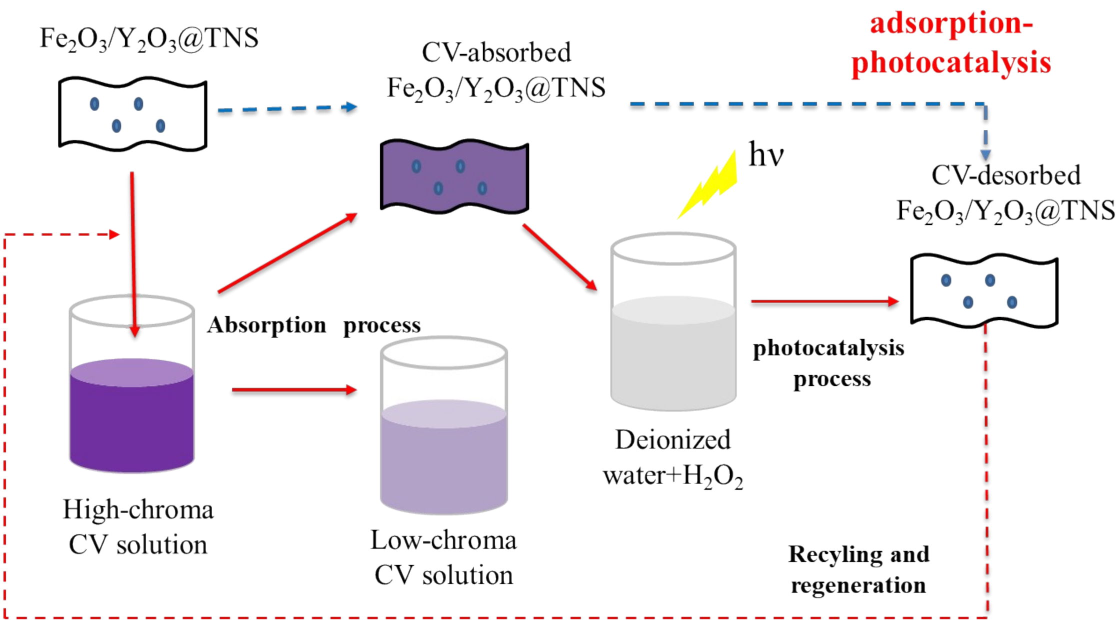

Fig. S 3 Schematic diagram of degradation of high-chroma CV by adsorption-photocatalysis method.

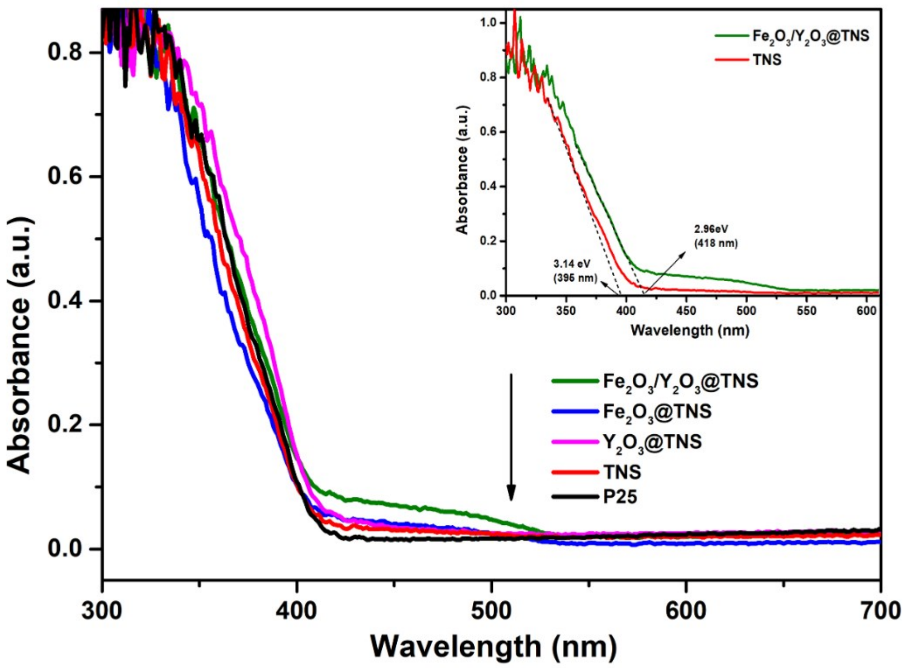

Fig. S 4 UV-vis diffuses reflectance spectra of prepared samples and P25.

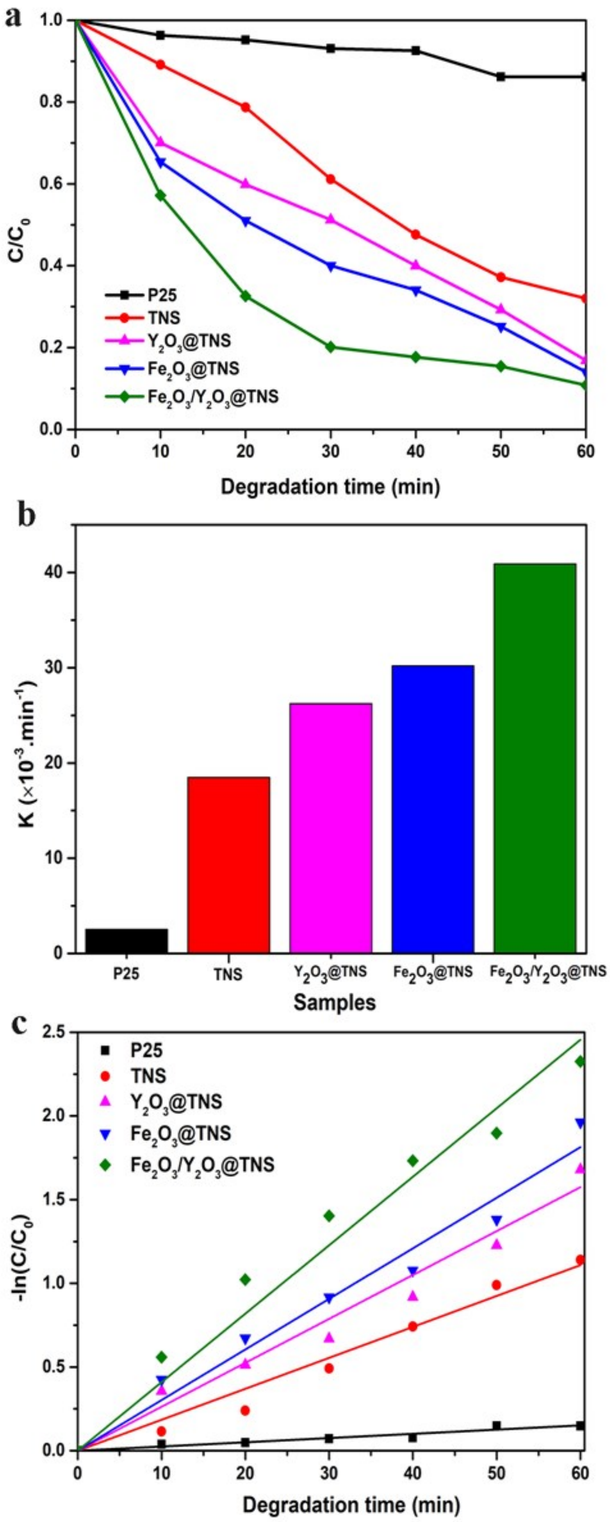

Fig. S 5 (a) The photocatalytic activity, (b) reaction rate constant (k) and kinetics fitting curves (c) of different samples on MO degradation under visible light irradiation.

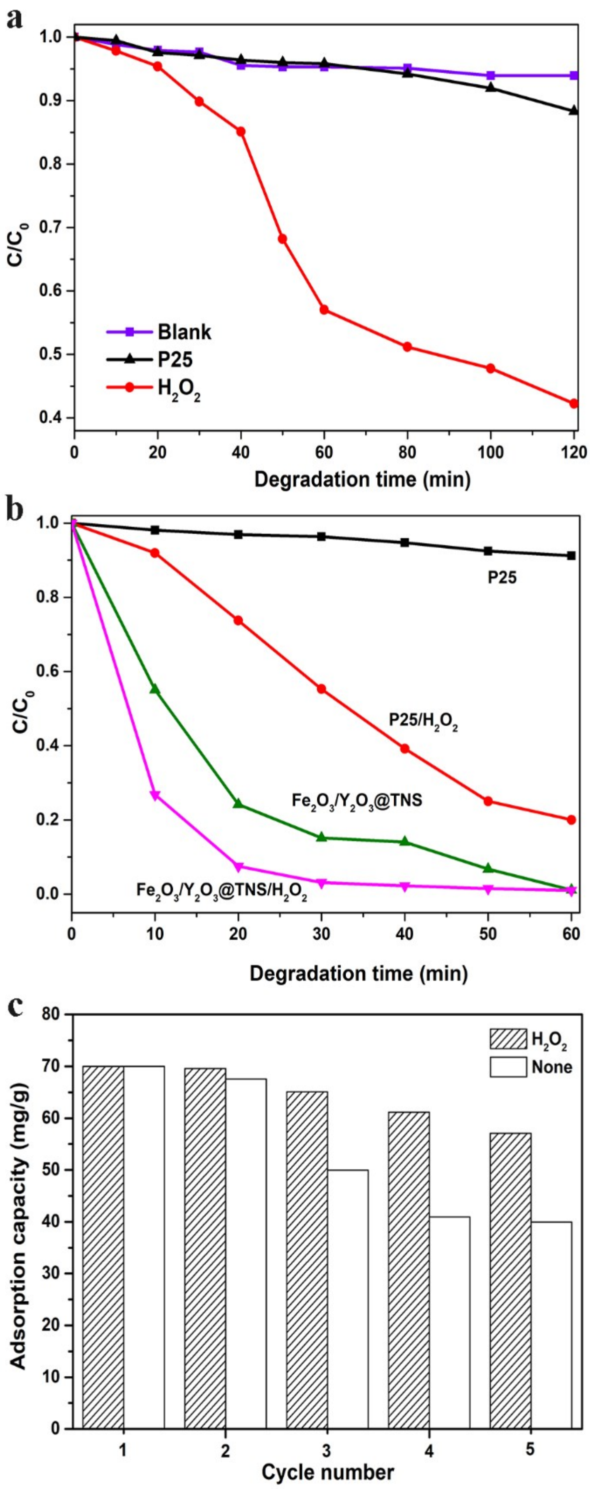

Fig. S 6 The photocatalytic activity of P25 and H_2O_2 on CV degradation under UV-visible irradiation (a); The photocatalytic efficiency of P25 and Fe_2O_3/Y_2O_3@TNS on CV degradation in the presence or absence of H_2O_2 under UV-visible irradiation (b); Comparison of regeneration for Fe_2O_3/Y_2O_3@TNS by adsorption-degradation in the presense or adsense of H_2O_2 conditions (c).

Table S 1 Comparison of photocatalytic efficiency with other photocatalysts.

Catalyst	Synthesis method	Light source[a]	Type of dyes	Degradation efficiency(%)	Ref.
Fe_2O_3/Y_2O_3@TNS	hydrothermal method	λ≥400 nm, 300 W Xe	RhB	92	This study
			Cr (VI) solution	80	
			Cr (VI) and phenol	90	
Fe^{3+}–TiO_2	sol-gel method	160 W high-pressure mercury lamp	RhB	60	[S1]
Fe_2O_3/H_2O_3@TNS	hydrothermal method	λ≥420 nm, 350 W Xe	RhB	90.7	[S2]
Y_2O_3/TiO_2	hydrothermal and deposition-precipitation	λ≥365 nm 8 W Xe	RhB	10	[S3]
			XO	80	
Fe/TiO_2	sol-gel method	UV-Visible	RhB	36	[S4]
Fe-doped TiO_2 NPs	sol-gel method	UV-Visible	RhB	70	[S5]
Fe_2O_3/TiO_2	Calcination method	UV light	RhB	80.8	[S6]
Fe_2O_3-TiO_2	Sol-gel method	250 W metal halide lamp	Rh-6G	88.9	[S7]
Fe_2O_3/TiO_2	co-precipitation method	300 W Xe	RhB	67.73	[S8]
α-Fe_2O_3@TiO_2	hydrothermal method	300W Hg and 350 W Xe	RhB	60	[S9]

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