Supporting Information

Ferromagnetic photocatalysts of $FeTiO_3$-Fe_2O_3 nanocomposites

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The crystallite size of xFTO-(1-x)FO nanocomposites

Table S1. The crystallite sizes of xFTO-(1-x)FO nanocomposites from (110) peak using Scherrer's relation.

Samples	x=0.00	x=0.20	x=0.40	x=0.60	x=0.80	x=1.00
Crystallite sizes	60.0 nm	40.7 nm	41.8 nm	66.6 nm	43.0 nm	53.8 nm

The fitting results for Fe and Ti using XPS.

Table S2. The fitted results of XPS, in comparison with the EDX data. The calculated x is determined by the relative concentrations of Fe^{2+} and Fe^{3+} from FTO and FO.

Samples (xFTO-(1-x)FO)	x=1.00		x=0.80		x=0.60		x=0.00		Annealed at 300 ℃		Annealed at 700 ℃	
Fitted peak area of Fe (%)	Fe^{2+}	Fe^{3+}	Fe^{2+}	Fe^{3+}	Fe^{2+}	Fe^{3+}	Fe^{2+}	Fe^{3+}	Fe^{2+}	Fe^{3+}	Fe^{2+}	Fe^{3+}
	68.3	31.7	58.0	42.0	34.5	65.5	11.4	88.6	34.0	66.0	3.9	96.1
Fe^{2+}/ Fe^{3+}	2.15		1.38		0.53		0.13		0.52		0.04	
Fitted peak area of Ti (%)	Ti^{3+}	Ti^{4+}	Ti^{3+}	Ti^{4+}	Ti^{3+}	Ti^{4+}	Ti^{3+}	Ti^{4+}	Ti^{3+}	Ti^{4+}	Ti^{3+}	Ti^{4+}
	31.6	68.4	33.3	66.7	30.9	69.1	/	/	31.3	68.7	95.4	5.6
Ti^{4+}/ Ti^{3+}	2.16		2.00		2.23		/		2.20		0.06	
Calculated x (XPS)	1.00		0.89		0.58		0.00		0.57		/	
Measured x (EDX)	/		0.90		0.55		0.00		0.55		0.55	

The BET surface area of x=0.60 and 1.00 nanocomposites.

BET summary		
Slope =		232.481
Intercept =		2.186e-01
Correlation coefficient, r =		0.999575
C constant=		1064.693
Surface Area =	x=0.60	14.966 m?g

BET summary		
Slope =		130.500
Intercept =		1.133e+01
Correlation coefficient, r =		0.962023
C constant=		12.520
Surface Area =	x=1.00	24.554 m?g

Figure S1. The BET surface area of x=0.60 and 1.00 samples. The surface area is 14.966 m^2/g for x=0.60 and 24.554 m^2/g for x=1.00.

The photocatalytic performance of physically mixed xFTO-(1-x)FO (x=0.60)

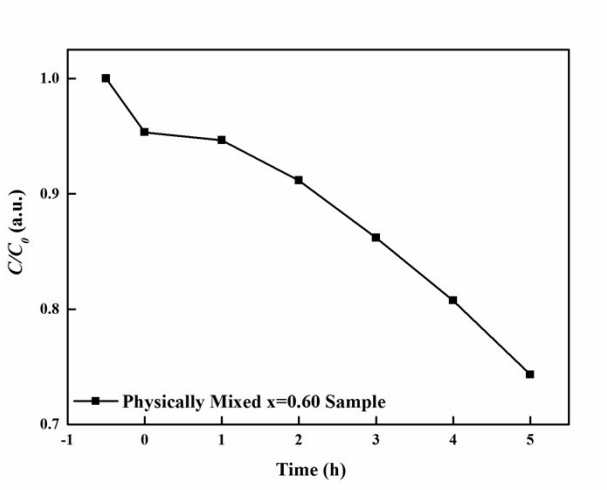

Figure S2. The photocatalytic performance of physically mixed xFTO-(1-x)FO (x=0.60).

XRD patterns of annealed xFTO-(1-x)FO (x=0.60)

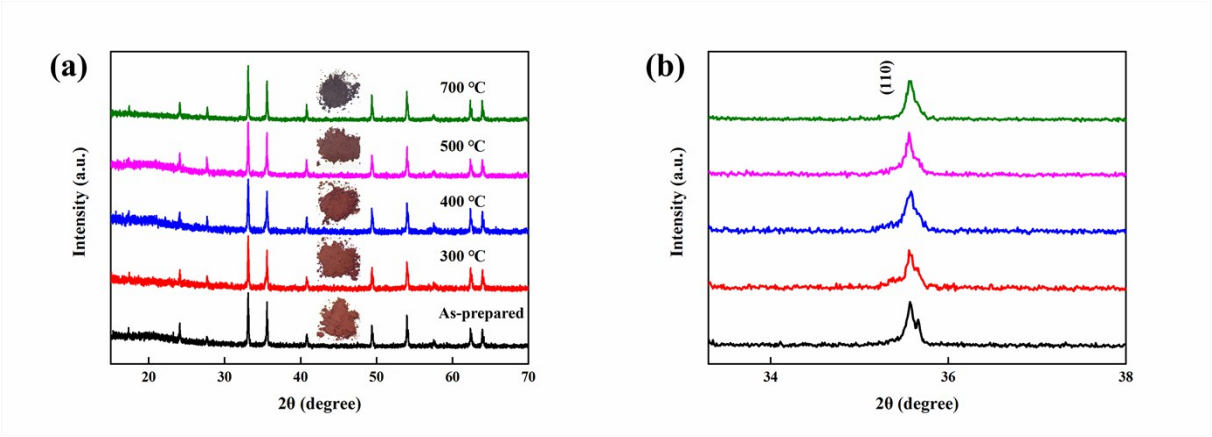

Figure S3. (a) The XRD patterns of xFTO-(1-x)FO (x=0.60) annealed at various temperatures, insets shows the corresponding images of the samples. (b) The magnified view of (110) peaks of the annealed samples.

SEM images of annealed xFTO-(1-x)FO (x=0.60)

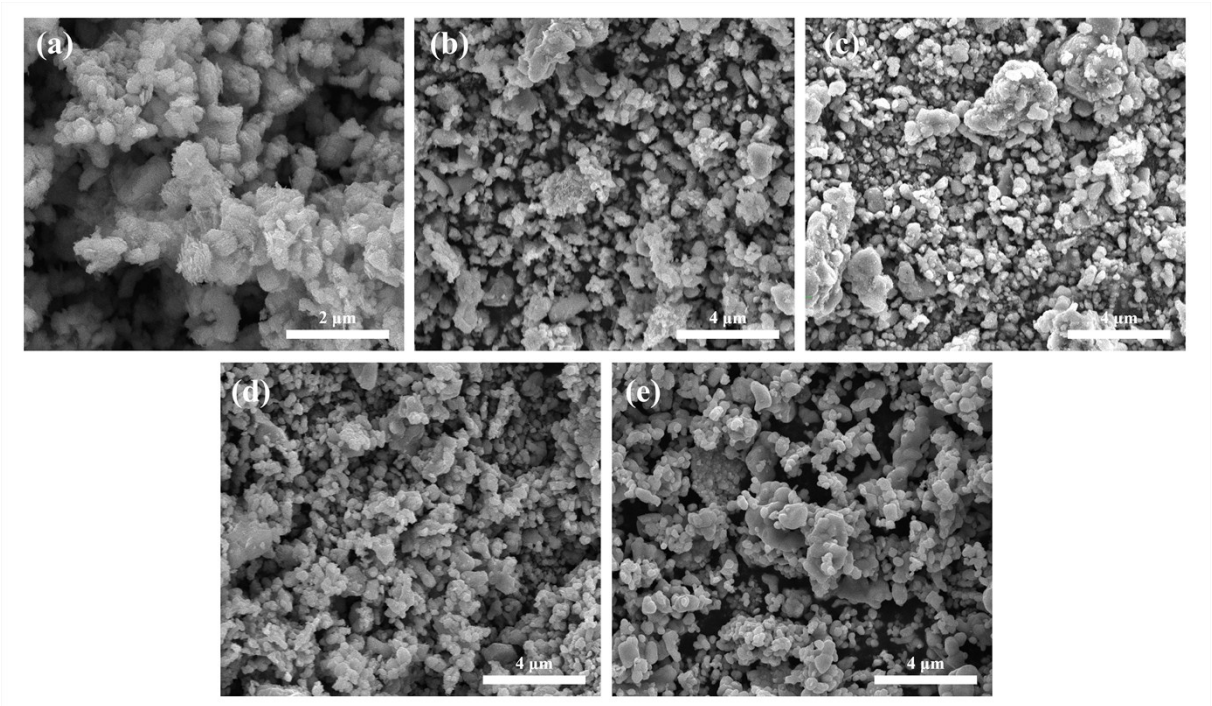

Figure S4. SEM images of xFTO-(1-x)FO (x=0.60) (a) as-prepared, and annealed at (b) 300 °C, (c) 400 °C, (d) 500 °C and (e) 700 °C, respectively.

Raman spectra of annealed xFTO-(1-x)FO (x=0.60)

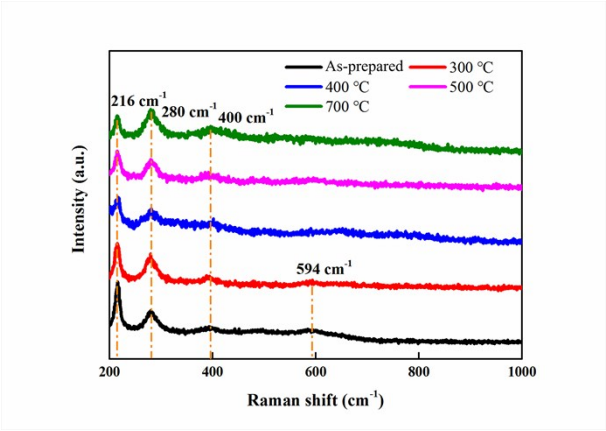

Figure S5. Raman spectra of xFTO-(1-x)FO (x=0.60) annealed at different temperatures.

XPS of annealed xFTO-(1-x)FO (x=0.60)

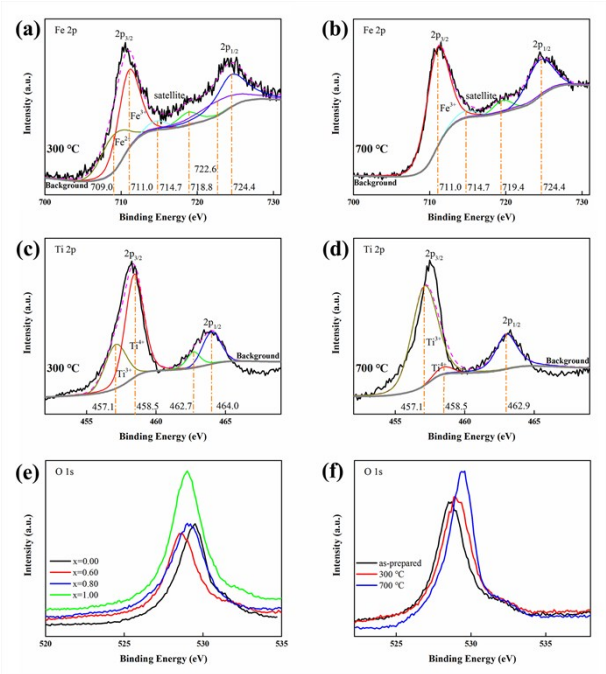

Figure S6. The XPS of annealed xFTO-(1-x)FO (x=0.60) at 300 °C and 700 °C.

Photocatalysis of annealed xFTO-(1-x)FO (x=0.60)

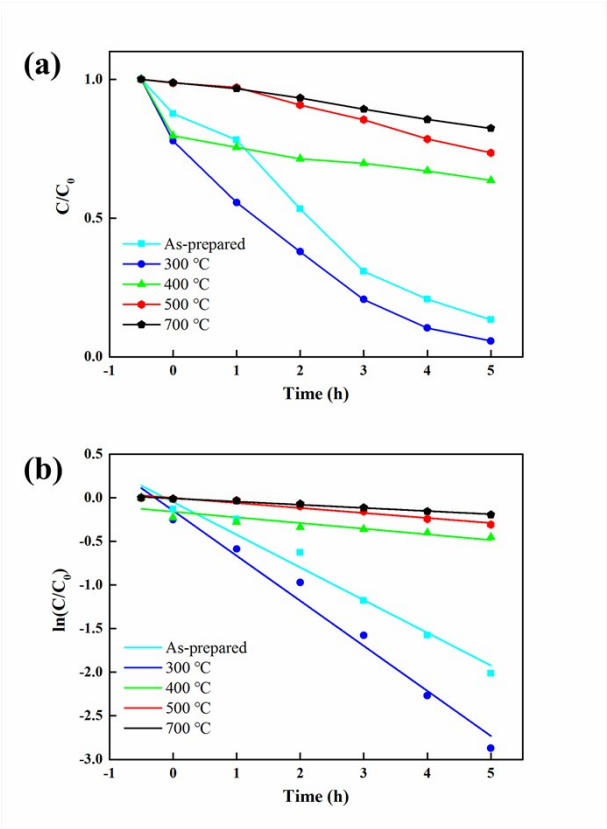

Figure S7. (a) Photo-decolonization ratios of RhB under visible light irradiation, using annealed xFTO-(1-x)FO (x=0.60). (b) Fitting using Pseudo-first-order model.

Magnetic hysteresis loops of annealed xFTO-(1-x)FO (x=0.60)

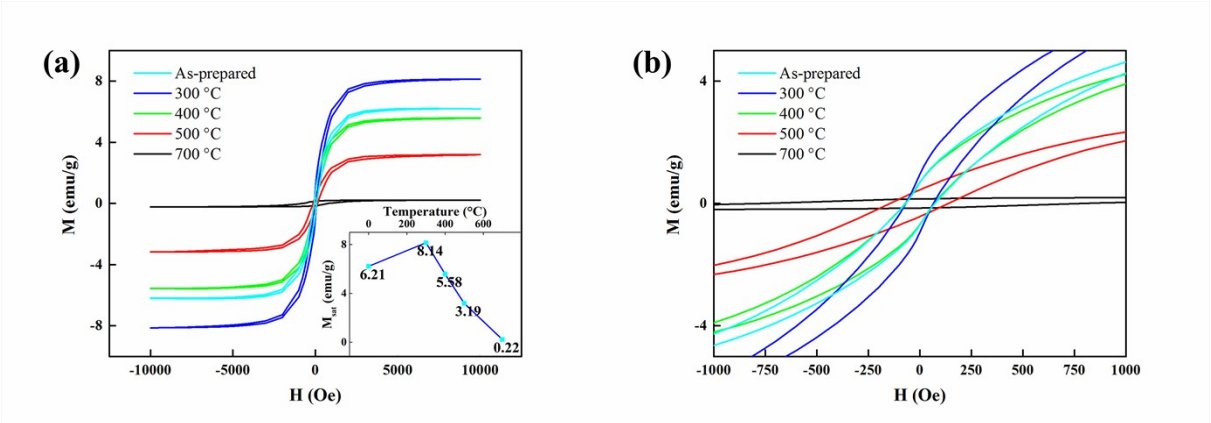

Figure S8. (a) Magnetic hysteresis loops of annealed xFTO-(1-x)FO (x=0.60), inset shows the dependence of M_{sat} on annealed temperatures. (b) Magnified view of M-H curves at low field region.