Polymeric nanocapsule enhances the peroxidase-like activity of Fe_3O_4 nanozyme for removing organic dyes

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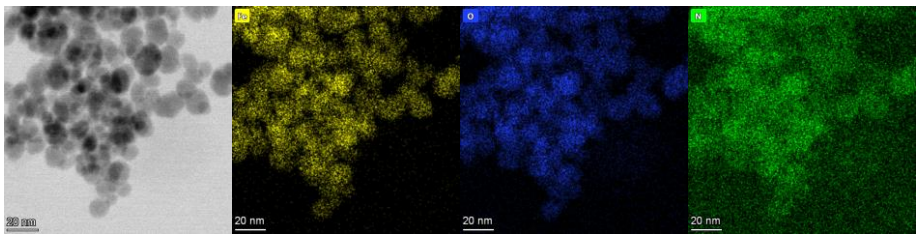

Figure S1. The corresponding elemental mapping pattern of the dried Fe_3O_4@Gel.

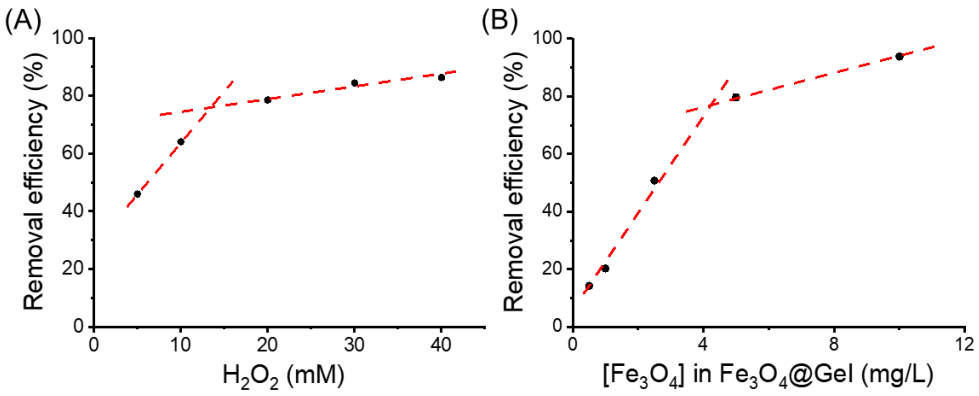

Figure S2. Influence of various initial parameters on the Fe_3O_4@Gel-mediated oxidation of dye pollutant: (A) H_2O_2 dosage and (B) Fe_3O_4 loading in the sample Fe_3O_4@Gel. The elapsed reaction times were set as 180 min. Reaction conditions: $[H_2O_2]_0$ = 20 mM, $[Fe_3O_4]$ = 5 mg/L, $[IC]_0$ = 200 mg/L, pH = 7, and T = 30 °C.

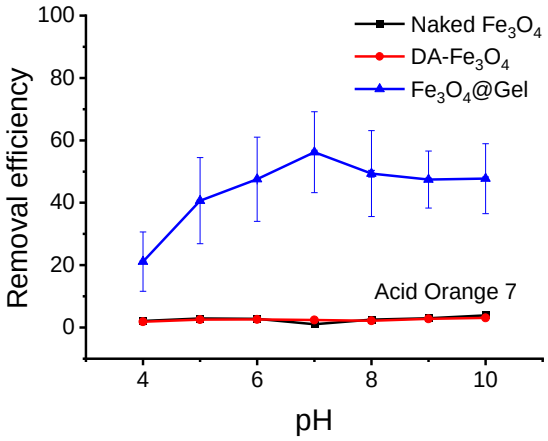

Figure S3. Influence of pH on the Fe_3O_4@Gel-mediated oxidation of dye pollutant. The reaction parameters were as following: $[Na_2S_2O_8]_0$ = 5 mM, $[Fe_3O_4]$ = 2.5 mg/L, $[AO7]_0$ = 100 mg/L, and *T* = 30 °C.

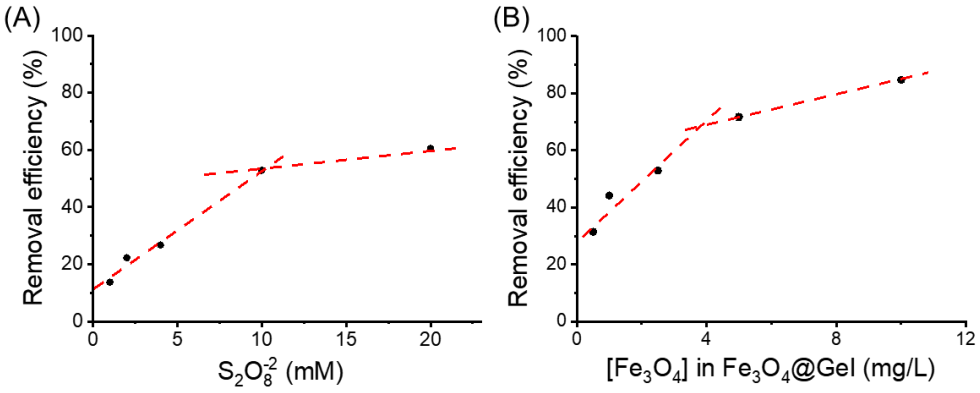

Figure S4. Influence of various initial parameters on the Fe_3O_4@Gel-mediated oxidation of dye pollutant: (A) $Na_2S_2O_8$ dosage, (B) Fe_3O_4 loading in the sample Fe_3O_4@Gel. Except for the investigated parameter, other parameters were fixed as following: $[Na_2S_2O_8]$ = 10 mM, $[Fe_3O_4]$ = 5.0 mg/L, $[AO7]_0$ = 100 mg/L, pH = 7.0, and *T* = 30 °C.

Table S1. A comparison of catalysis performance between this work and literature that used similar catalysis systems.

Catalysts	**Reaction conditions**	**Removal efficiency**	**References**
Fe_3O_4 @Gel	Catalysts =[Fe_3O_4@Gel] = 112 mg L^{-1}, [Fe_3O_4] = 5 mg L^{-1}, H_2O_2= 20mM, IC=200 mg L^{-1}, pH=7, T=30°C	99%	This work
FeS	Catalysts =350 mg L^{-1}, $Na_2S_2O_8$=4mM, PCA=0.2mM, pH = 3-11,	98%	[8]
$CuFe_2O_4$	Catalysts =200mg L^{-1}, PMS= 0.1mM, As(III)=1.415mg L^{-1}, pH=3.1-6.8, T=10-40°C	100%	[9]
AMnTi	Catalysts =200mg L^{-1}, PMS= 0.2mM, CBZ=5µmol L^{-1}, pH=5, T=25°C	100%	[11]
CuO-Fe_3O_4	Catalysts =300mg L^{-1}, $Na_2S_2O_8$= 5mM, Phenol=0.1mM, pH=5.6,	44%	[13]
Fe_3O_4@GSH	Catalysts =2000mg L^{-1}, H_2O_2= 5mM, 2,4-DCP=100mg L^{-1}, pH=6.5, T=30°C	99%	[14]
Fe_3O_4	Catalysts =400mg L^{-1}, Ultrasound+PMS=3mM, AO7=0.06 mM, T=25°C	90%	[15]
H_2A/Fe_3O_4	Catalysts =400mg L^{-1}, $Na_2S_2O_8$=30mM, 2,4-DCP=100mg L^{-1}, pH = 3, T=25°C	98.5%	[16]
FeO (I)	Catalysts = 300 mg L^{-1}, H_2O_2= 0.04%, Rhodamine-B = 25pm	93%	[40]
Fe_3O_4 MNPs	Catalysts = 800 mg L^{-1}, PMS= 0.2mM, APAP= 10 mg L^{-1}, pH = 4.3,	98.1%	[28]
Fe_3O_4@MnO_2	Catalysts = 300 mg L^{-1}, H_2O_2=1%, MB=40 mg/L , pH 4-9	99.0%	[41]
Fe_3O_4@MOF-5	Catalysts = 1000mg L^{-1}, H_2O_2 = 30 mM, MB=50 mg L^{-1}, pH= 4, T = 30 °C	100%	[42]
Fe_3O_4 /CeO_2	Catalysts = 1000mg L^{-1}, H_2O_2 = 163.7 mM, MB = 100 mg L^{-1}, pH= 4, T = 35 °C	100%	[43]
Fe_3O_4/Carbon	Catalysts = 800mg L^{-1}, H_2O_2 = 90 mM, MB = 10 mg L^{-1}, PH= 3, T = 30 °C	100%	[44]