Supporting Information

In situ generation of hydrogen peroxide using a schwertmannite/nickel foam catalyst for enhanced heterogenous Fenton degradation of dye wastewater

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Table S1 The catalytic systems for in-situ production H_2O_2 and organic pollutant degradation.

| Materials	Reaction conditions	Contaminants	H_2O_2 generation	Removal efficiency (%)	Refs
Sch/NF	Heterogenous Fenton, [RhB] = 20 mg/L, [Catalysts] = 3*3 cm^2, pH = 2, 180 rpm	RhB	559.8 μM/h	99 (15 min)	--
ACNN	Photocatalytic, [Catalysts] = 0.5 g/L, 300 W Xenon lamp (λ > 420 nm)	--	10.2 mM/h (1 g)	--	[1,2]
Cv-g-C$_3$N$_4$	Photocatalytic, [Catalysts] = 1 g/L, 300 W Xenon lamp (λ > 420 nm)	--	96 μM/h (100 mg)	--	[3]
KLCN (lignin-derived carbon ring-embedded and nitrogen defect co-doped g-C$_3$N$_4$)	Photocatalytic, [Catalysts] = 1 g/L, 300 W xenon lamp (λ > 420 nm)	--	1856.8 μM/h (50 mg)	--	[4]
α-Fe$_2$O$_3$/ZnFe$_2$O$_4$@Ti$_3$C$_2$	Photo Fenton, [RhB] = 8 mg/L, [Catalysts] = 0.5 g/L, 500 W Xe lamp (λ > 420 nm)	RhB	--	88.3 (50 min)	[5,6]
α-Fe$_2$O$_3$/g-C$_3$N$_4$	Photo Fenton, [Catalysts] = 1 g/L, [RhB] = 10 mg/L, 300 W Xenon lamp	RhB	--	96 (90 min)	[7]
Fe-CHI/Ni|ACF|Fe-CHI/Ni sandwich film cathode	Electro-Fenton, [RhB] = 5 mg/L, pH = 6.2, I = 10 mA, Na$_2$SO$_4$ = 0.05 M, air flow rate = 0.1 m^3/h	RhB	--	92 (120 min)	[8,9]
FeS	Fenton-like, [Phenol] = 5 mg/L, [FeS] = 1 g/L, pH = 7	Phenol	--	35 (120 min)	[10]
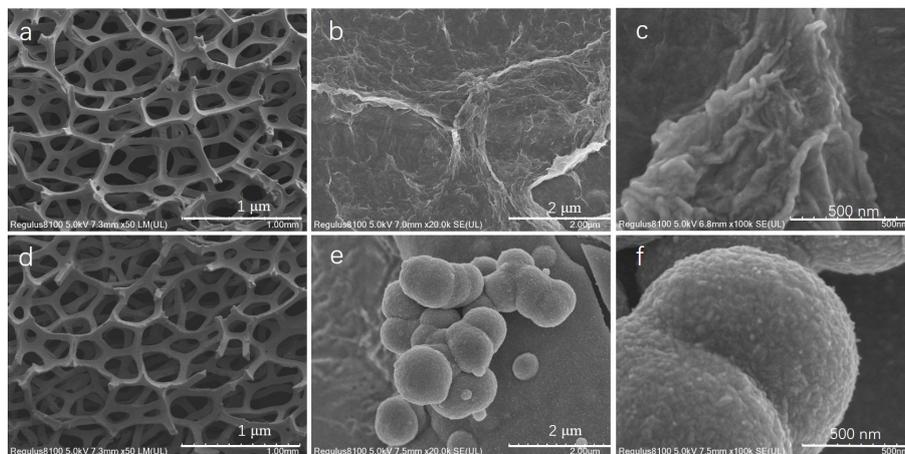
Fig. S1 SEM diagrams of NF (a, b, c,) and Sch/NF composite catalyst (d, e, f).
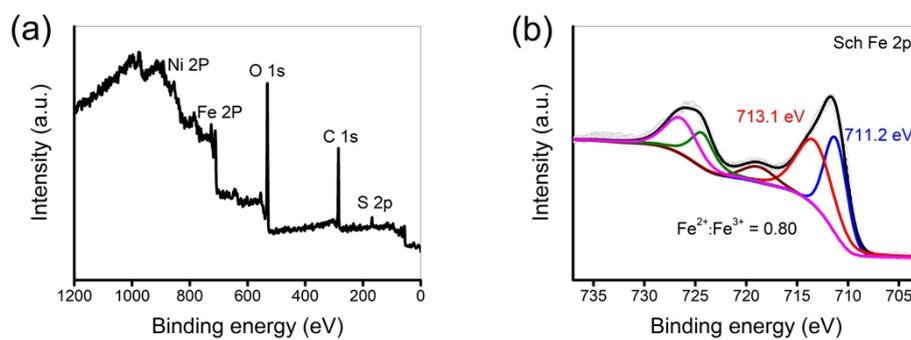

Fig. S2 XPS spectra of Sch/NF and Sch. XPS broad scan survey spectra of Sch/NF (a). High
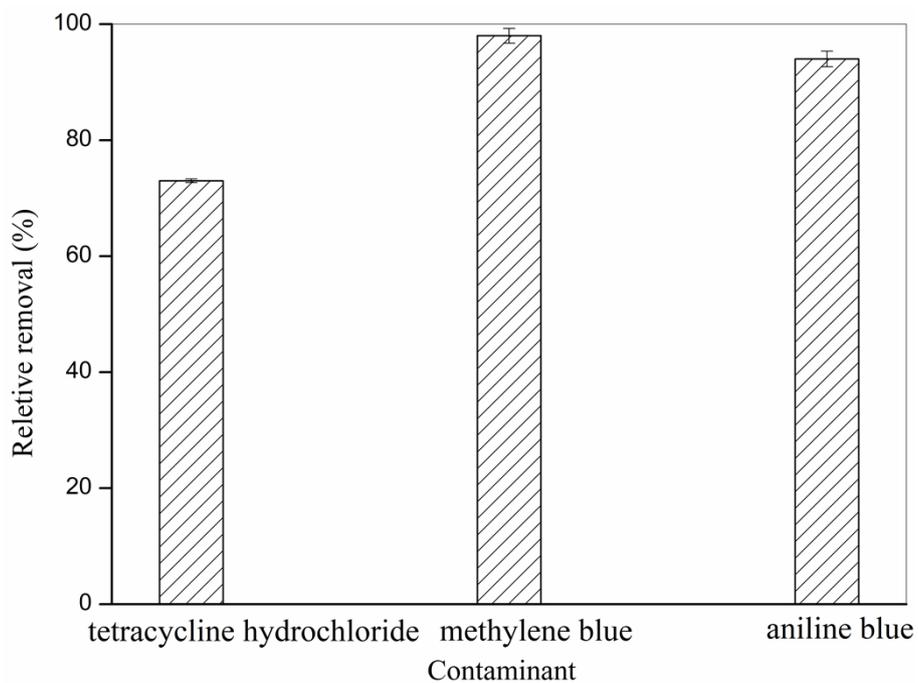
resolution of Fe2p of Sch (b).

Fig. S3 The degradation efficiency of tetracycline hydrochloride, methylene blue and aniline bule using Sch/NF. (Tetracycline hydrochloride: 20 mg/L, methylene blue: 20 mg/L and aniline bule: 20 mg/L, a piece of Sch/NF (3 cm*3 cm), pH = 2, rotation rate: 180 rpm).
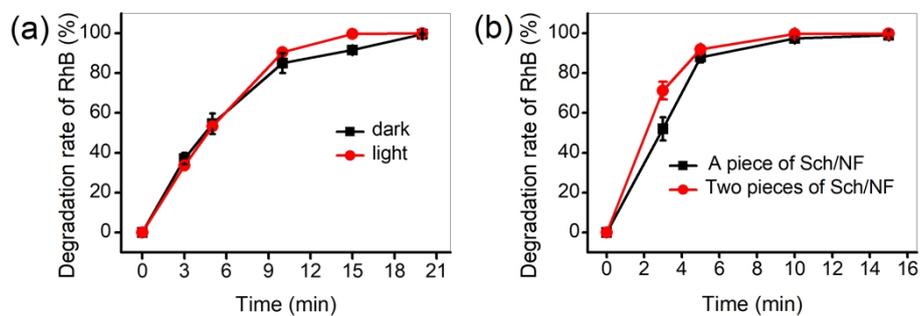

Fig. S4 Effect of light irradiation (a) and different dosage (b) of Sch/NF composite catalyst on

degradation rate of RhB. Experimental conditions: Rhodamine B: 20 mg/L, pH: 2.0, rotation rate:
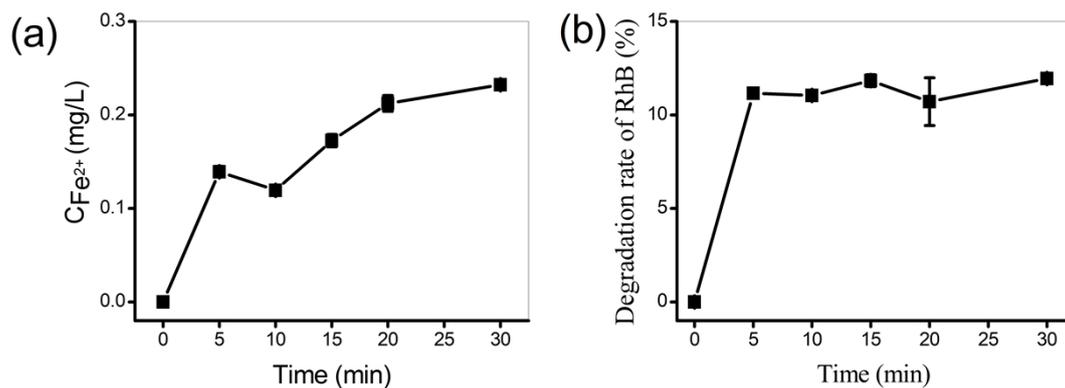
180 rpm.

Fig. S5 Content change of Fe^{2+} in the degradation of RhB by Sch/NF catalyst (a). Reaction condition: RhB: 20 mg/L, a piece of Sch/NF (3 cm*3 cm), pH = 2, rotation rate: 180 rpm. Degradation of MB in the homogeneous Fenton system of Fe^{2+}-H_2O_2 system (b). Experimental conditions: RhB = 20 mg/L, H_2O_2 = 10 mg/L, Fe^{2+} = 0.2 mg/L, pH =2.
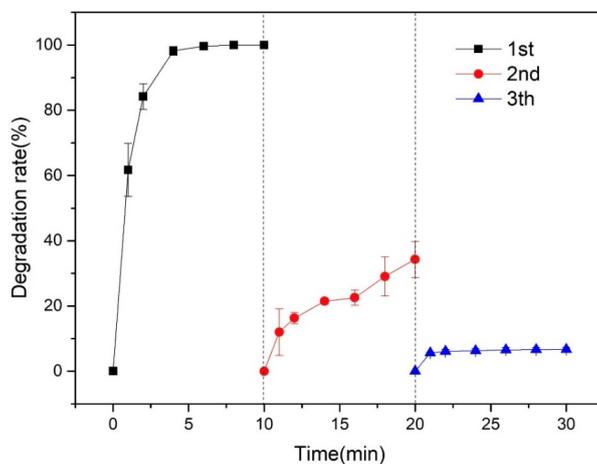

Fig. S6 Stability and reusability of Sch/NF catalyst. RhB degradation efficiency during three successive batches of degradation experiments by Sch/NF catalyst. Experimental conditions: RhB: 20 mg/L, a piece of Sch/NF (3 cm*3 cm), pH: 2.0.

(a) Before reaction

Ni

O

S

Fe

Element	W%
O K	12.67
S K	1.90
Fe K	14.06
Ni K	71.38

Energy/KeV

(b) After the 3th reaction

Ni

O

S

Fe

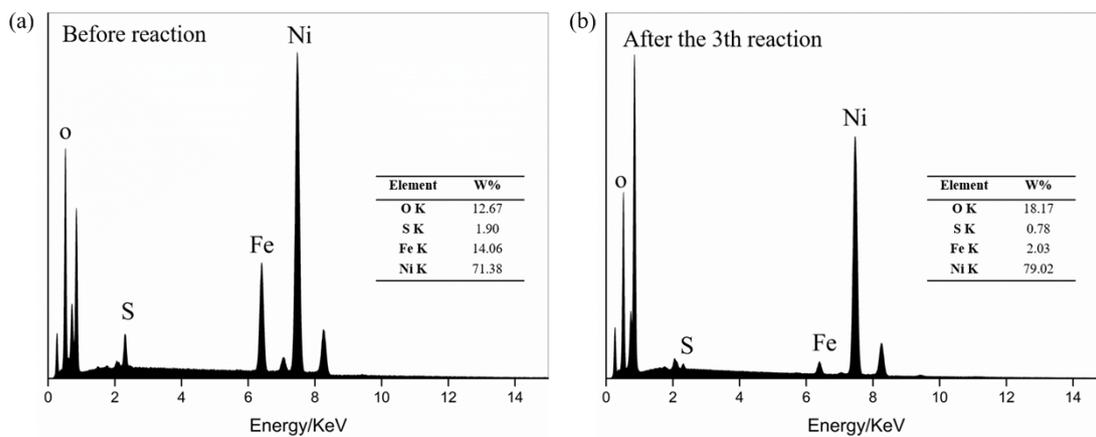| Element	W%
O K	18.17
S K	0.78
Fe K	2.03
Ni K	79.02

Energy/KeV

Fig.S7 EDS spectra of Sch/NF before (a) and after reaction (b).
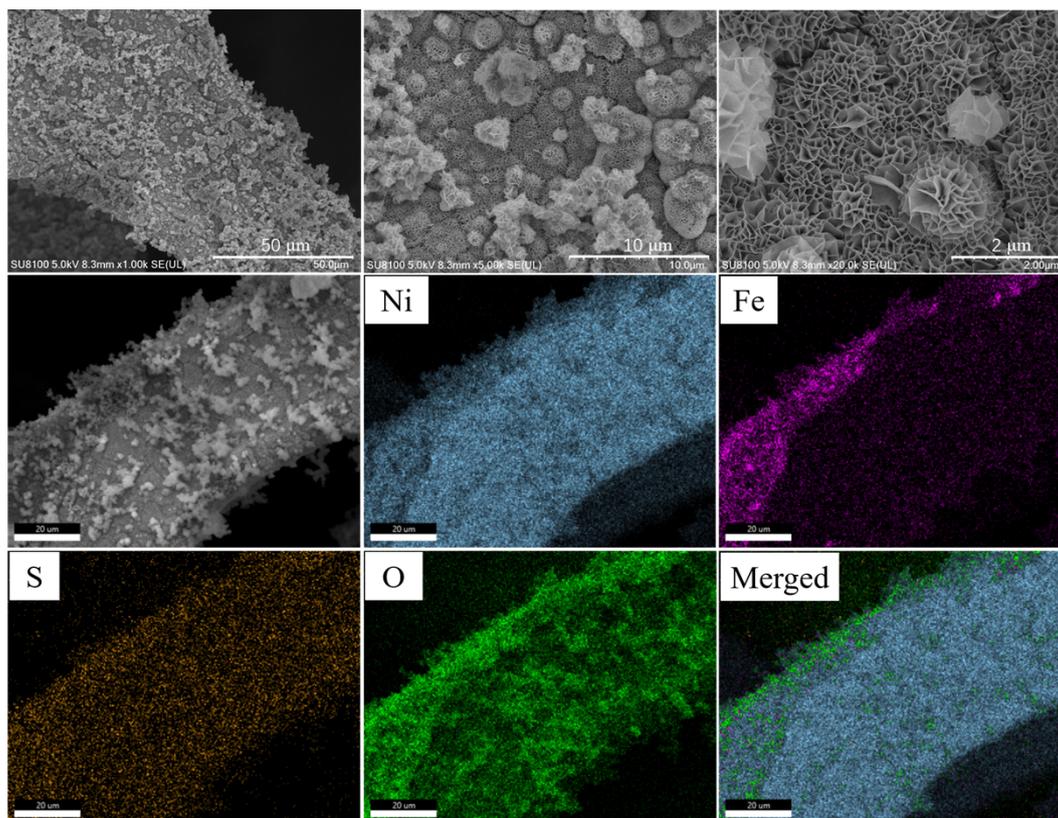

Fig. S8 SEM images and EDS elemental mapping of Ni, Fe, S, and O elements for Sch/NF catalyst after 3th reaction.

References

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