

Peroxymonosulfate Activation by Bi-Fe Oxide Co-doped Graphitic Carbon Nitride for Degradation of Sulfamethoxazole: Performance and Mechanism

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Supporting Information: 3 pages, 2 figures, 6 tables.

1. Liquid Chromatograph-Mass Spectroscopy (LC-MS) Analysis

The degradation intermediates of SMX were further identified using a HPLC-MS equipped with an ultimate XB C18 column (1.8 μ m, 2.1*100 mm), which was coupled to a high-resolution time-of-flight mass spectrometer (Thermos TSQ Quantum Ultra) with an electrospray ionization (ESI) source in a negative ion model. The mass parameters were a ion spray voltage of 3200 V, a capillary temperature of 300°C, and a max spray current of 100 A. The mobile phases consisted of water with 0.1% formic acid (A) and acetonitrile with 0.1% formic acid (B). The gradient elution method for the two mobile phases was as follows: 85% A for 0–2 min; 85% A decreased to 5% A lineally for 2–9 min and kept for 9–11 min; 5% A increased to 85% A lineally for 11–11.01 min and kept for 11.01–15 min. The flow rate was kept at 0.3 mL/min.

2. The spectrum of JCPDS #46-0416 (Bi₂₅FeO₄₀) and Bi@Fe/CN

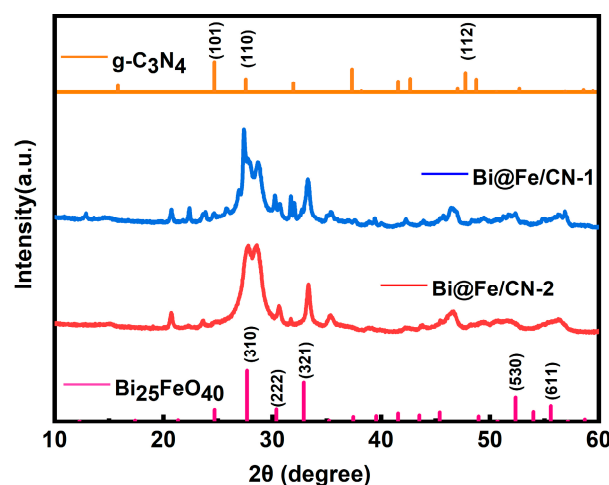


Figure S1. The spectrum of JCPDS #46-0416 (Bi₂₅FeO₄₀) and Bi@Fe/CN.

3. Stability and recyclability of Bi@Fe/CN-3

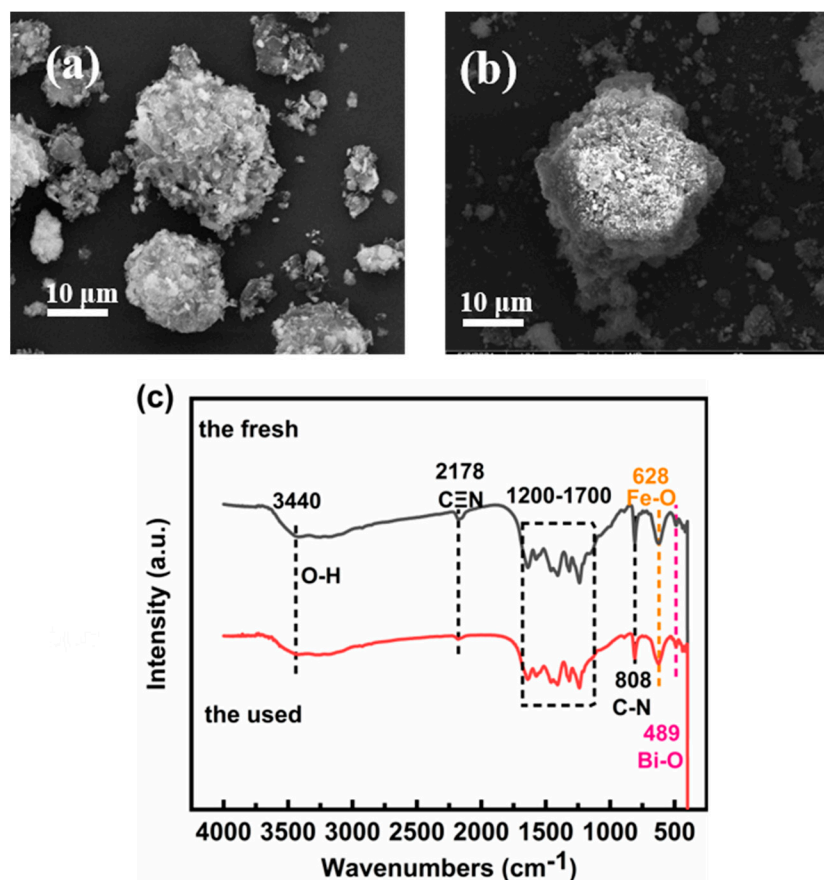


Figure S2. SEM of (a) fresh Bi@Fe/CN-3 and (b) used Bi@Fe/CN-3, (c) FTIR of fresh and used Bi@Fe/CN-3 (Vertical lines: Different peaks of Bi@Fe/CN).

Table S1. Different atom contents of fresh and used Bi@Fe/CN-3 catalysts.

Samples	Fresh Bi@Fe/CN-3	Used Bi@Fe/CN-3
Bi content, at. %	6.42	6.32
O content, at. %	26	25.68
N content, at. %	28.61	29.07
Fe content, at. %	9.45	9.11
C content, at. % ^a	29.52	29.82

4. The rate constants and SMX removal rate of each experiment

The rate constants and SMX removal rate of each experiment were listed in Table S2–7. The reaction conditions were as follows: [catalyst] = 0.10 g/L, [PMS] = 0.60 mM, [SMX]₀ = 15.0 mg/L, initial pH = 5.18

Table S2. Effect of catalyst dosage on SMX degradation in Bi@Fe/CN-3/PMS system.

Catalyst dosage (g/L)	SMX removal rate (%)	<i>k</i> (min ⁻¹)
0.025	26.1	0.0047
0.050	76.2	0.0217
0.100	99.7	0.0911
0.200	100	0.0194

Table S3. Effect of PMS concentration on SMX degradation in Bi@Fe/CN-3/PMS system.

PMS (mM)	SMX removal rate (%)	<i>k</i> (min ⁻¹)
0.2	70.1	0.0179
0.4	93.1	0.0419
0.6	99.7	0.0911
0.8	99.5	0.0921

Table S4. Effect of initial pH on SMX degradation in Bi@Fe/CN-3/PMS system.

Initial pH	SMX removal rate (%)	<i>k</i> (min ⁻¹)
3.01	55.9	0.0116
5.18	99.7	0.0911
7.02	72.3	0.0202
9.00	71.1	0.0192

Table S5. Effect of different anions on SMX degradation in Bi@Fe/CN-3/PMS system.

Anions	Concentration (mM)	SMX removal rate (%)	<i>k</i> (min ⁻¹)
H ₂ PO ₄ ⁻	10	36.2	0.0068
H ₂ PO ₄ ⁻	100	44.8	0.0083
HCO ₃ ⁻	10	10.2	0.0012
HCO ₃ ⁻	100	48.4	0.0073
Cl ⁻	10	83.7	0.0289
Cl ⁻	100	99.9	0.1173
NO ₃ ⁻	10	79.1	0.0250
NO ₃ ⁻	100	88.2	0.0328

Table S6. Degradation of SMX with different scavengers in Bi@Fe/CN-3/PMS system.

Scavengers	SMX removal rate (%)	<i>k</i> (min ⁻¹)
Control	99.8	0.0911
MeOH	39.2	0.0074
TBA	45.3	0.0095
L-histidine	0.18	0.0001