Electronic Supplementary Material (ESI) for Environmental Science: Nano.

A porous graphitic biochar wrapped Co_9S_8 core-shell composite enables pH-universal activation of peroxymonosulfate for highly efficient and rapid antibiotics degradation

Text. S1. Electron spin resonance (EPR) spectroscopy experiments

20 μL of DMPO (20 mM) as spin-trapping agent $SO_4^{\bullet-}$ and $^{\bullet}OH$ was added into 5 mL of reaction solution immediately. Similarly, 20 μL of TEMP (20 mM) as spin-trapping agent $^1O_2$ was added into 5 mL of reaction solution immediately. To capture $O_2^{\bullet-}$, 20 μL of the mixture solution containing DMPO (20 mM) and EtOH (20 mM) was added into 5 mL of reaction solution. Then, the solution was detected by a A300-10/12 spectrometer after 5 min or 10 min reaction, respectively.

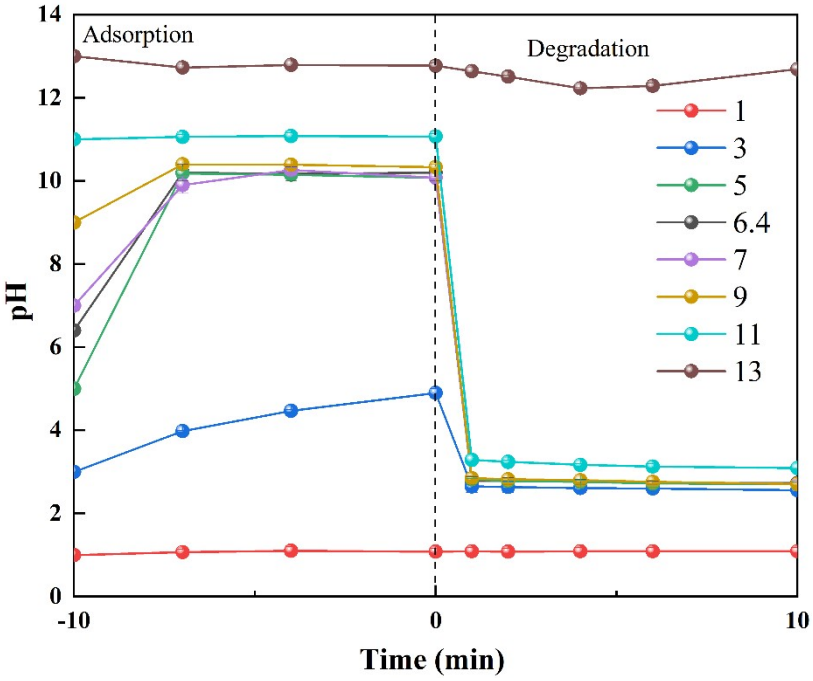

Fig. S1. Change of pH in solution under different pHi of solution. Reaction conditions: $[SMX]_0$ = 20 mg/L, pHi = 6.4, $[catalyst]_0$ = 0.1 g/L, $[PMS]_0$ = 7 mM.

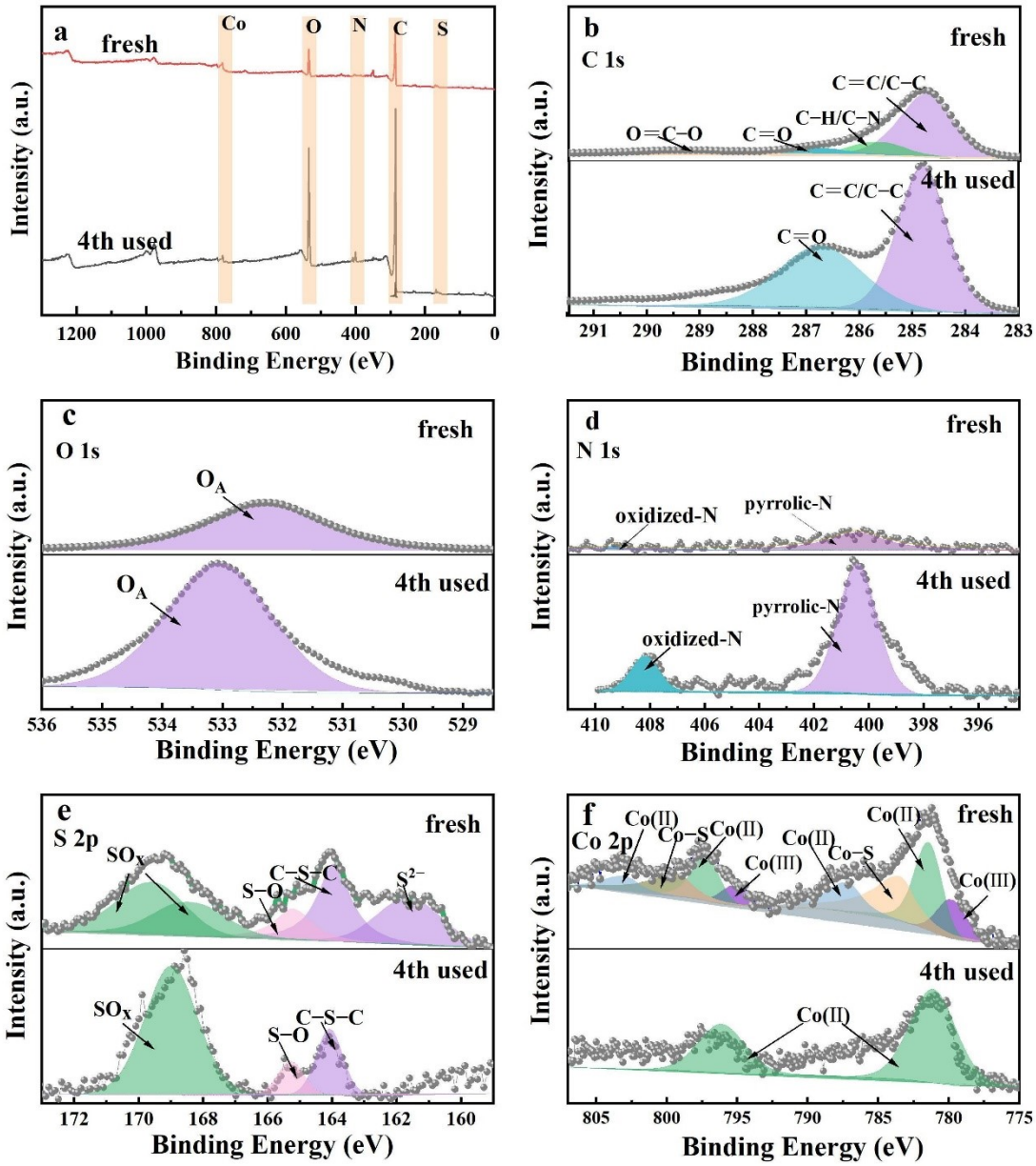

Fig. S2. (a) XPS survey spectrum, (b) C 1s spectrum, (c) O 1s spectrum, (d) N 1s spectrum, (e) S 2p spectrum and (f) Co 2p spectrum of fresh and 4th used catalyst.

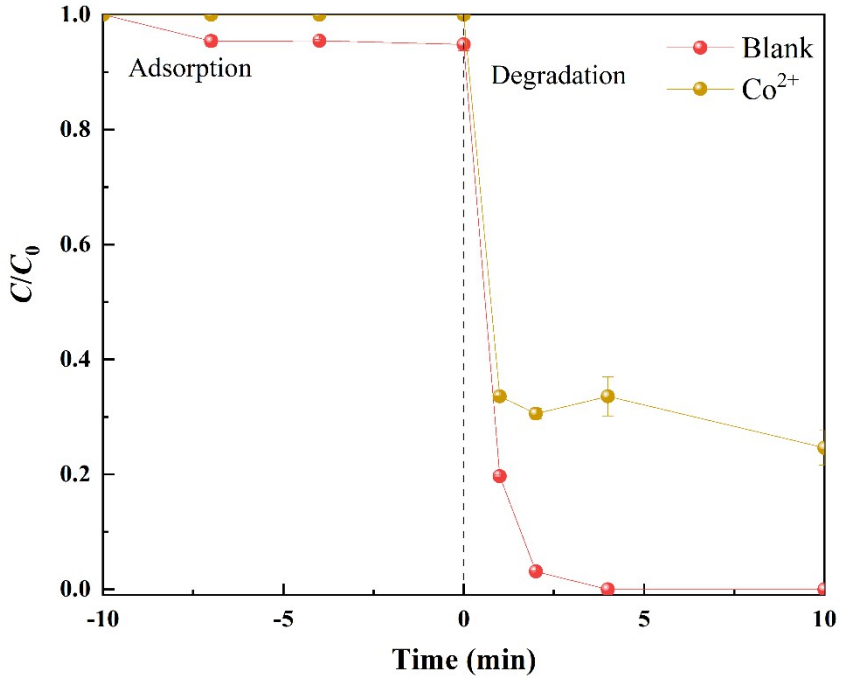

Fig. S3. Degradation of SMX by cobalt ion. Reaction conditions: $[SMX]_0$ = 20 mg/L, pHi = 6.4, $[catalyst]_0$ = 0.1 g/L, $[PMS]_0$ = 7 mM.

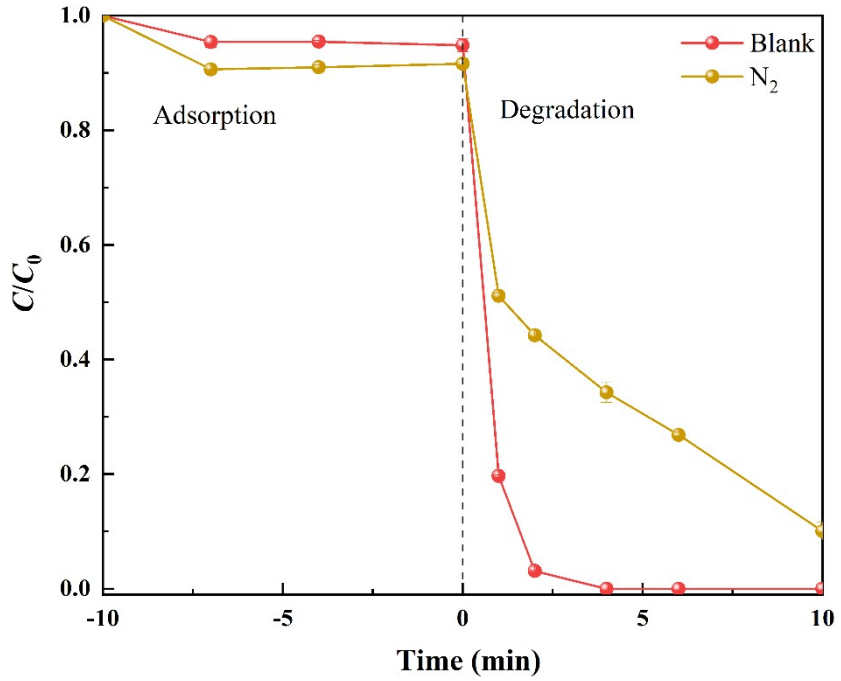

Fig. S4. SMX degradation effect in N_2 atmosphere. Reaction conditions: $[SMX]_0$ = 20 mg/L, pHi = 6.4, $[catalyst]_0$ = 0.1 g/L, $[PMS]_0$ = 7 mM.

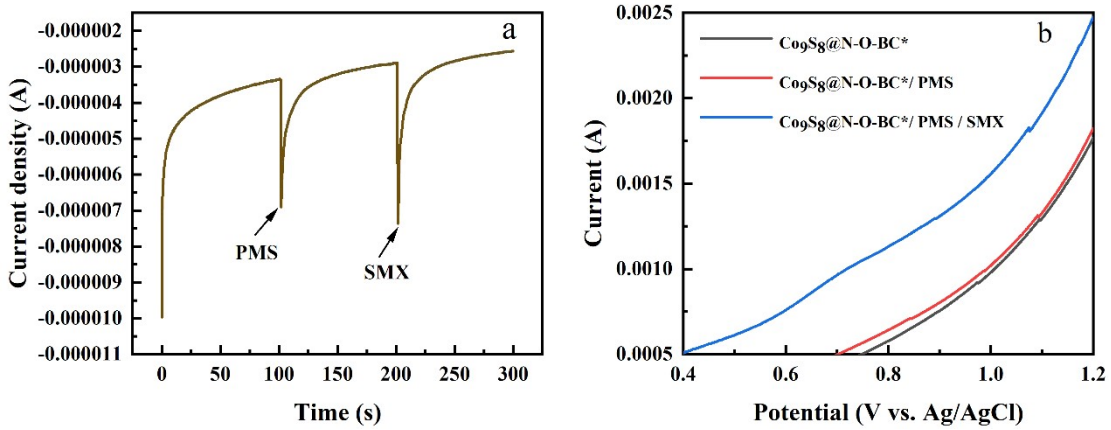

Fig. S5. (a) The *i-t* curves of Co_9S_8@N-O-BC*/PMS system. (b) Linear sweep voltammetry (LSV) curves obtained from different systems.