Text S1

Ferrous sulfate heptahydrate ($FeSO_4·7H_2O$), sodium chloride (NaCl), sodium sulfate (Na_2SO_4), urea and sodium bicarbonate ($NaHCO_3$) are purchased from Tianjin Damao Chemical Reagent Factory. Cobalt (II) acetate tetrahydrate ($(CH_3COO)_2Co·4H_2O$) and copper nitrate trihydrate ($Cu(NO_3)_2 \cdot 3H_2O$) was purchased from Shanghai Zhanyun Chemical Co, LTD. Tetracycline hydrochloride (TC, $C_{22}H_{24}N_2O_8$) was purchased from Aladdin's reagent platform. Potassium dihydrogen phosphate (KH_2PO_4) was purchased from Tianjin Tian-li Chemical Reagent Co, LTD. Tert-butanol (TBA, $C_4H_{10}O$) was purchased from Sinopharm Group Chemical Reagent Co, LTD. Furfuryl alcohol (FFA, $C_5H_6O_2$), 2-methyl imidazole (2-HMIM), and terephthalic acid (PTA, $C_8H_6O_4$) are purchased from Shanghai Maclin Biochemical Technology Co, LTD. P-benzoquinone (p-BQ, $C_6H_4O_2$) was purchased from Aladdin's reagent platform. N, N dimethylformamide (DMF, C_3H_7NO), anhydrous ethanol (EtOH, C_2H_5OH), 5, 5-dimethyl-1-pyrroline n-oxide (DMPO) and 2, 2, 6, 6-tetramethylpiperidine (TEMP) were purchased from Tianjin Fuyu Fine Chemical Co, LTD. Hydroxylamine hydrochloride, acetonitrile, and glacial acetic acid were purchased from Sinopharm Chemical Reagent Co.

Text S2 Characterization

The TMC materials were scanned by scanning electron microscope (SEM, Tescan, Xplore) to observe the morphological features. The catalyst elements and chemical states were characterized by X-ray diffraction spectroscopy (XRD, Bruker D8 Bruker，Germany) and X-ray photoelectron spectroscopy (XPS, AXIS SUPRA Kratos，Britain), and elemental analyses were performed by ICP-OES.

To assess the environmental impact of TMC we detected leached ions in the reaction system using an inductively coupled plasma mass spectrometer (ICP-MS, Thermo Fisher iCAP-RQ). A total organic carbon analyzer (TOC, Tekmar Fusion) was used to determine the residual content of organic carbon after the OFX degradation reaction. Acute toxicity analysis was performed by a rapid water toxicity analyzer (BX-LID-P, Hunan Biotechnology).

Electrochemical measurements of different catalysts were carried out on an electrochemical workstation (Shanghai Zhenhua CHI-660E) using Tafel scan, current-

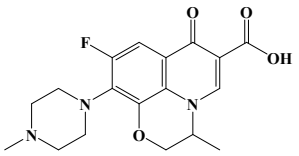
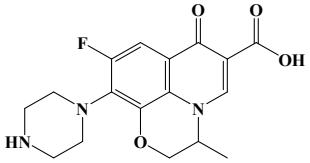
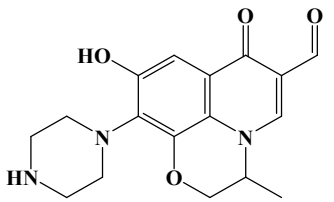
time curve (I-t) linear scanning voltammetry (LSV) and impedance spectroscopy (EIS). A three-electrode system was used, i.e., a counter electrode (platinum wire), a working electrode and a reference electrode (saturated calomel electrode).

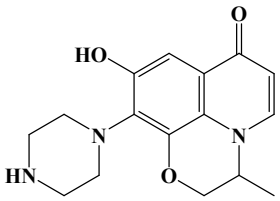
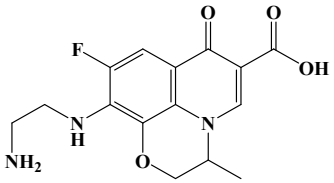
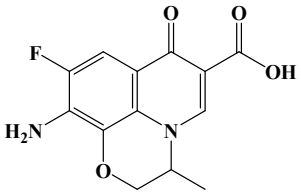
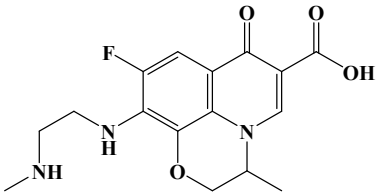
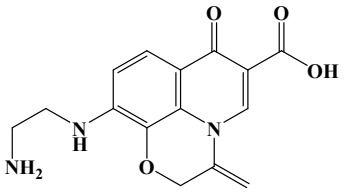
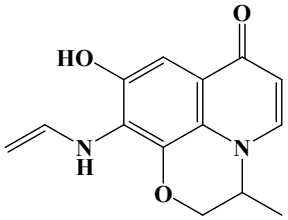
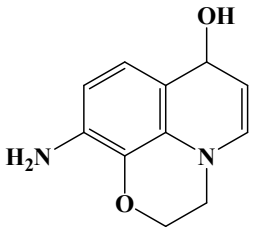
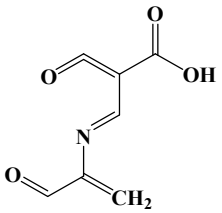
Text S3 Detection of OFX concentration

Liquid chromatography-mass spectrometry (LC-MS, Agilent 1200, America) was conducted to analysis the concentration of residual TC and identify the intermediates of OFX degradation. A reverse phase Hypersil C-18 column (4.6 mm×250 mm, 5 μm) was equipped and the maximum absorption wavelength was 288 nm. The flow rate of mobile phase (0.01 mol/L oxalic acid: acetonitrile: methanol = 70:20:10, v:v:v) was 1 mL/min and the injection volume was 20 μL at 25 ℃.

The flow rate of mobile phase (0.01 mol/L oxalic acid: acetonitrile: methanol = 70:20:10, v:v:v) was 1 mL/min and the injection volume was 20 μL at 25 ℃. The concentrations of PMSO and $PMSO_2$ were monitored using high performance liquid chromatography (HPLC, UltiMateTM3000, Japan) equipped with a C18 column (4.6 mm × 250 mm × 5 μm) and a UV detector at 215 nm. The mobile phase was 30:70 (v/v) acetonitrile and water at a flow rate of 1.0 mL/min.

Table. S1 Liquid chromatography-mass spectrometry analysis data

	m/z	Molecular formula	Chemical structure
OFX	361.14	$C_{18}H_{20}FN_3O_4$	
P1	347.13	$C_{17}H_{18}FN_3O_4$	
P2	329.14	$C_{17}H_{19}N_3O_4$	

P3	301.14	$C_{16}H_{19}N_3O_3$	
P4	321.11	$C_{15}H_{16}FN_3O_4$	
P5	278.07	$C_{13}H_{11}FN_2O_4$	
P6	335.13	$C_{16}H_{18}FN_3O_4$	
P7	301.11	$C_{15}H_{15}N_3O_4$	
P8	258.10	$C_{14}H_{14}N_2O_3$	
P9	204.09	$C_{11}H_{12}N_2O_2$	
P10	167.02	$C_7H_5NO_4$	

P11	149.05	$C_8H_7NO_2$