Supplementary material

Upcycling Textile White Mud to Fabricate MIL-125-Derived Amorphous TiO_2@C: Effective Electrocatalyst for Cathodic Reduction of Antibiotics

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Text S1. Working electrode preparation

Carbon papers (20 × 20 mm) were firstly soaked into 0.5 M H_2SO_4 solution for 5 h to improve their hydrophilicity, and were washed in ultrasonic bath with DI water and ethanol for 20 min in sequence to remove impurities. For a specific working electrode, 7.5 mg sample (e.g. TiO_2@C-W) was added into a solution of 5 mL ethanol and 1.5 mL isopropanol containing 7.5 μL Nafion® (5 wt.%) to form a mixture. The mixture was ultrasonicated for 10 min to form an ink. The ink was transferred onto the pretreated carbon paper on a heating plate using a brush. Aforementioned steps were repeated to coat uniform films on both sides of the carbon paper

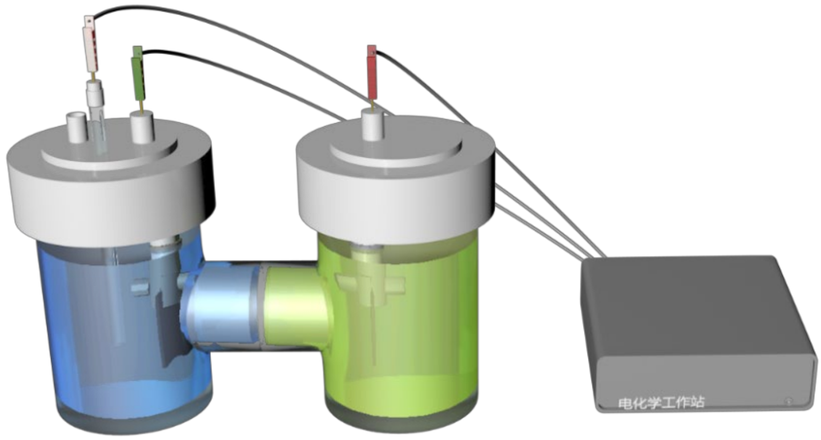

Figure S1. H-type cell for cathodic reduction test

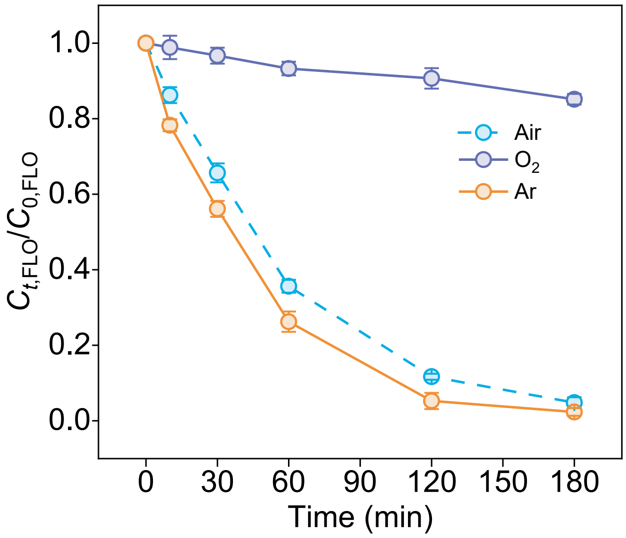

Figure S2. Cathodic reduction test of FLO under Air, O_2 and N_2 atmospheres (reaction conditions: $[FLO]_0$=20 mg L^{-1}, applied bias=0 V, $[Na_2SO_4]$=50 mM).

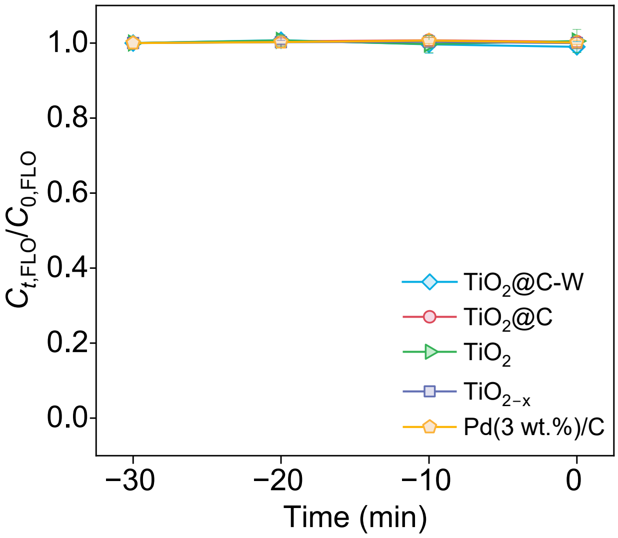

Figure S3. Adsorption of FLO by different electrocalysts (reaction conditions: $[FLO]_0$=20 mg L^{-1}, applied bias=0 V, $[Na_2SO_4]$=50 mM)

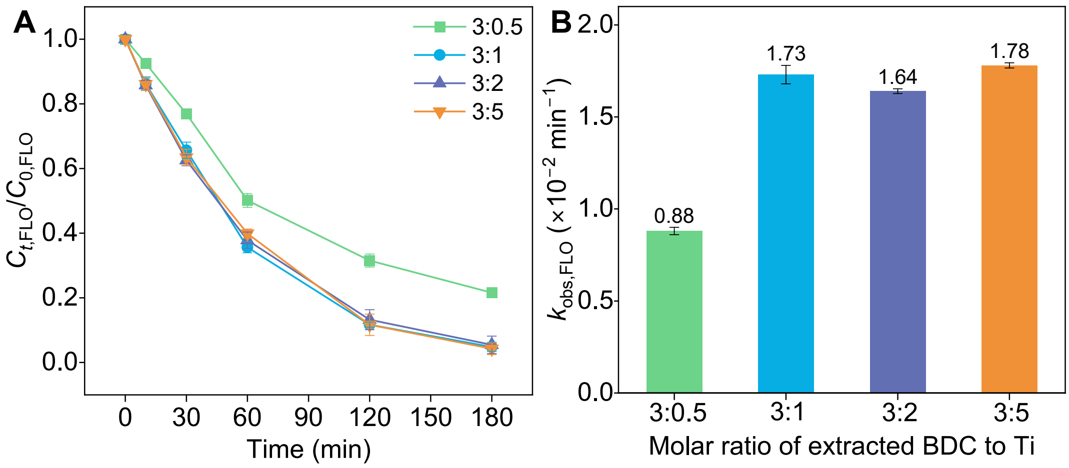

Figure S4. Effect of molar ratio of BDC: Ti on the electro-reductive degradation efficiency of FLO; (A) $C_{t,FLO}/C_{0,FLO}$ and (B) $k_{obs,FLO}$ of dechlorinating. (reaction conditions: $[FLO]_0$=20 mg L^{-1}, applied bias=−1.2 V, $[Na_2SO_4]$=50 mM).

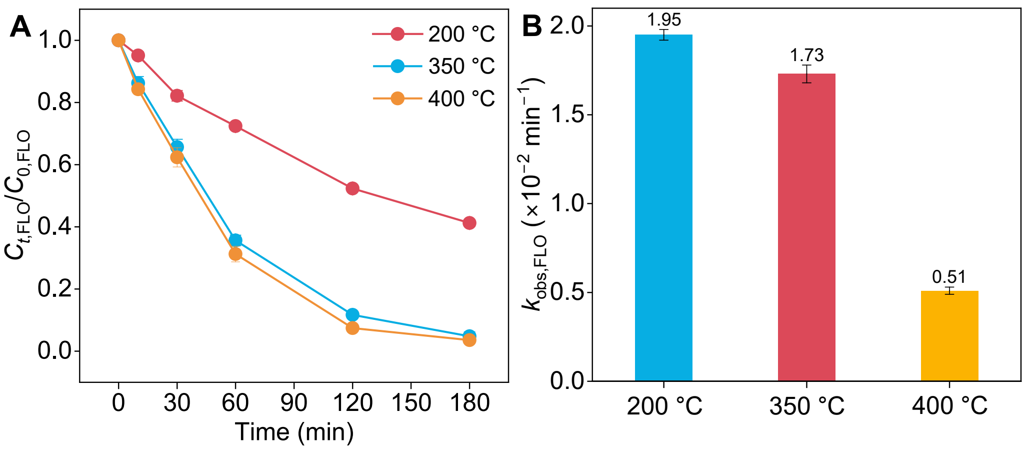

Figure S5. Effect of temperature calcination of TiO_2 and $NaBH_4$ mixtures during TiO_2@C-W fabrication on the electro-reductive degradation efficiency of FLO (reaction conditions: $[FLO]_0$=20 mg L^{-1}, applied bias=−1.2 V, $[Na_2SO_4]$=50 mM).

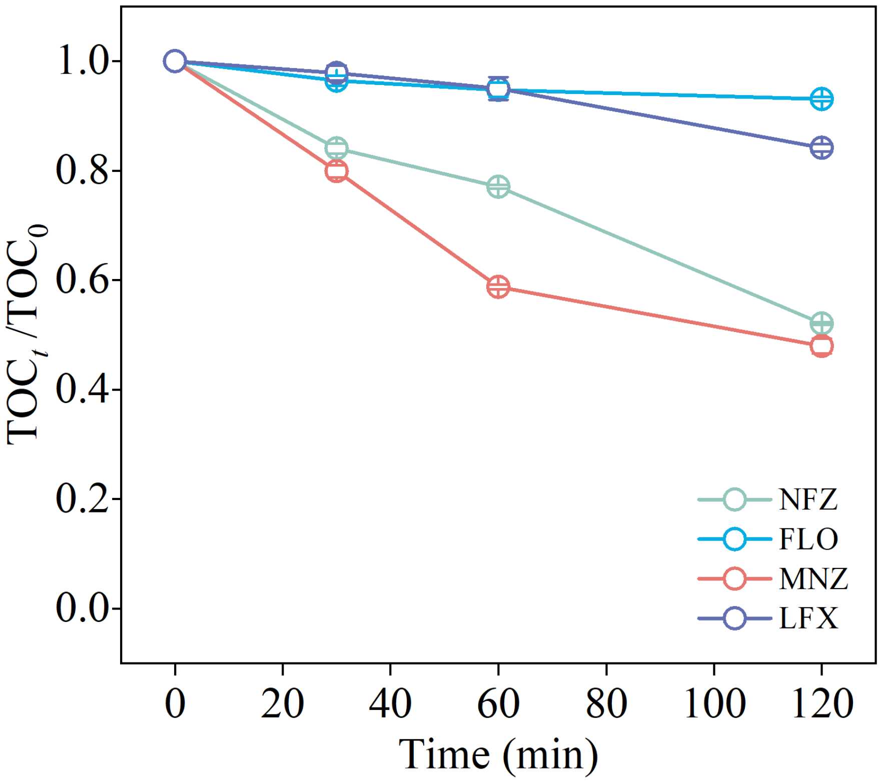

Figure S6. Evolution of solution TOC removal (as mineralization efficiency) as a function of treatment time in cathodic reduction process for florfenicol (FLO), nitrofurazone (NFZ), metronidazole (MNZ) and levofloxacin (LFX) removal by TiO_2@C-W (reaction conditions: $[NFZ]_0=[MNZ]_0=[FLO]_0=20$ mg L^{-1}, applied bias=−1.2 V, $[Na_2SO_4]=50$ mM).

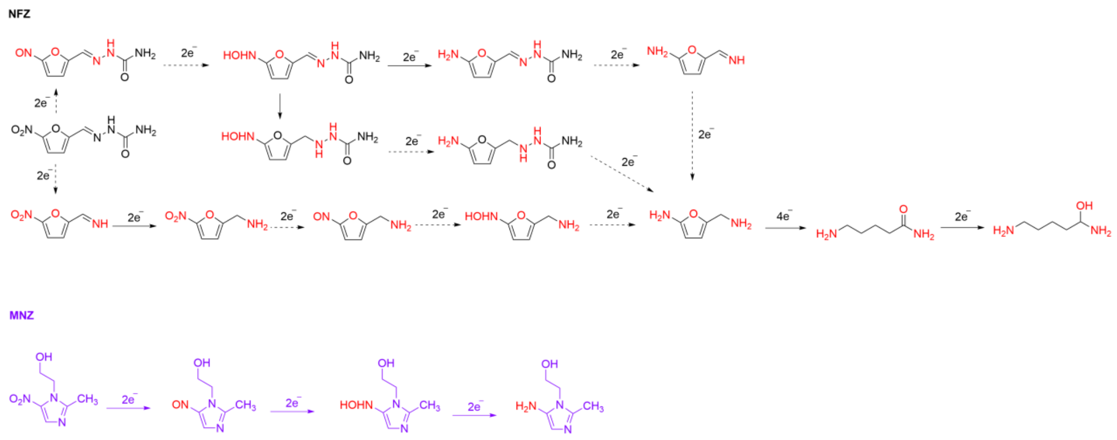

Figure S7. Proposed pathways of the cathodic degradation of nitrofurazone (NFZ) and metronidazole (MNZ)

Table S1 Comparison of removal efficiency and k_{obs} with the previous reports

Antibiotic	Elimination Technology	removal efficiency	k_{obs} (min^{-1})	Ref.
NFZ	cathodic reduction with TiO_2@C-W as electrode	95% (3h)	0.019	This study
	Cathodic degradation Graphite fiber brushtwisted by titanium wire	98.8% (9 h)	0.016	[1]
	Biocathodic degradation	70% （1 h）	0.020	[2]
	Zr(IV)-Based Metal-Organic Frameworks	95%	-	[3]
MNZ	cathodic reduction with TiO_2@C-W as electrode	93%	0.015	This study
	Cathodic degradation Graphite fiber brushtwisted by titanium wire	98% (9 h)	0.013	[1]
	reduction reaction by nanoscale zero-valent iron particles	95% (1.5 h)	-	[4]
	Oxidatic degradation by granular activated carbon	80% (4 h)	0.023	[5]
	UV/TiO_2 photocatalysis	88% (0.5 h)	0.052	[6]
LFX	cathodic reduction with TiO_2@C-W as electrode	68% (3 h)	0.006	This study
	sonochemical degradation using carbon tetrachloride	99% (15 min)	-	[7]
	Photocatalytic degradation using highly crystalline TiO_2 nanoparticles	90% (2 h)	-	[8]
	Electrochemical degradation by PbO_2 electrode	100% (160 min)	0.028	[9]

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