Supplementary Information

Oxygen vacancy rich BiO_{2-x}/ COF heterojunction for photocatalytic

degradation of diclofenac

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Photocatalytic tests

Using 300W xenon lamp (λ >420nm, CEL-HXF300) as light source, the photocatalytic performance of the composite was investigated by the degradation of diclofenac (DCF) under visible light irradiation. The specific reaction system is as follows: The 50 mg photocatalyst was added into 50 mL DCF aqueous solution (20 mg/L), dispersed evenly, and stirred in the dark for 30 min to reach equilibrium. After that, the light source was turned on, samples were taken once every 10 min, and 0.45 µm microporous filter membrane was used for filtration to remove the catalyst in the obtained solution.

Analytical methods

The product of DCF degradation pathway was detected by LC-MS (UPLC/Premier), a triple quadrupole detector equipped with an electrospray ionization source was utilized for analysis. The scan range extended from m/z 50 to 400. Methanol /0.1% formic acid aqueous solution (80/20) was selected as mobile phase. The molecular ion peaks of potential degradation by-products detected by LC-MS can be utilized to infer their degradation pathways.^{1–4}

Characterization

Elemental surface distribution of the samples was ascertained using X-ray photoelectron spectroscopy (XPS; Thermo Scientific K-Alpha). The C 1s of COF and composite materials were analyzed and carbon corrected by XPS C spectrum(Fig. S2).^{5,6}

Flat-band potential (Efb).can be obtained through Mott-Schottky analysis (M-S)(Fig. S4), the distance between flat-band potential and valence band can be obtained through XPS valence band test (Fig. S5), and the position of conduction band can be calculated by the band gap width (Eg). The values are listed in Table 1.⁷



Fig. S1 Calculated and experimental PXRD pattern of COF.



Fig. S2 XPS C 1s spectra of COF and 1COF :9BiO_{2-x}.



Fig. S3 Comparison of DCF degradation by $1COF:9BiO_{2-x}$ under dark and visible light conditions.



Fig. S4 Mott-Schottky plots of (a)COF and (b)BiO_{2-x}.



Fig. S5 XPS valence band spectra of (c) COF and (d) BiO_{2-x}.

	$\mathbf{E_{f}}$	XPS-VB	VB	Eg	CB
BiO _{2-x}	-0.53 eV(-0.31(vs. NHE))	0.80	0.49	1.62	-1.13
COF	-0.51 eV(-0.29(vs. NHE))	1.70	1.41	2.26	-0.85

Table 1 Conduction band (CB) and valence band (VB) values of COF and BiO_{2-x}.



Fig. S6 LC-MS/MS chromatogram of degradation intermediate.



Fig. S7 BiO_{2-x}/COF the degradation of tetracycline hydrochloride in visible light.



Fig. S8 The N_2 adsorption-desorption curves of COF and BiO_{2-x} / COF.



Fig. S9 Pore size distribution of COF and BiO_{2-x}/ COF.

Referance

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