Supporting Information

BiOI Nanoparticle/PCN-222 Heterojunctions for Self-Decontaminating Photocatalyst with Efficient Tetracycline Visible-Light Degradation

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Content

Section S1. Experiment Section

All the chemicals were commercially available and used without further purification. PCN-222 was synthesized according to a previously reported procedure. Powder X-ray diffraction (PXRD) patterns were taken on a Bruker Advance D8 Powder X-ray Diffractometer with Ni-filtered Cu Kα radiation operating at 40 kV and 40 mA. The microstructural morphologies of the materials were characterized by a Zeiss Sigma 500 scanning electron microscopy (SEM) and a JEM-2100 transmission electron microscopy (TEM). Inductively coupled plasma emission spectroscopy (ICP-OES) was recorded on an PerkinElmer 8300 spectrometer. The N_2 adsorption and desorption isotherms dates were collected at a MicrotracBEL Corp at 77 K and the Pore-size distributions were obtained using DFT calculations using a carbon slit-pore model with a N_2 kernel. UV-vis Diffuse Reflectance Spectra (UV-vis DRS) was measured at the JASCO V-750 UV-vis spectrophotometer.Luminescence spectra was carried out on the Instrument JASCO FP-8300 fluorescence spectrometer.X-ray photoelectron spectroscopy (XPS) measurements were performed on an ESCALAB 250Xi-type instrument with the excitation source of monochrome aluminum Kα ray source.Electron Spin Resonance (ESR) measurements were detected by a Bruker A300E spectrometer and the signals of the spin-trapped radicals were examined using the 5,5-dimethyl-1-pyrroline N-oxide (DMPO) and 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO) under xenon lamp irradiation. Photoelectrochemical measurements were performed on a CHI660E electrochemical workstation using a standard three-electrode system.

The Synthesis of PCN-222.

$ZrOCl_2 \cdot 8H_2O$ (108.6 mg, 0.338 mmol), tetrakis(4-carboxyphenyl) porphyrin (H_2TCPP) ligand (30 mg, 0.0379 mmol), CF_3COOH (0.45mL) in 10 mL DMF were ultrasonically dissolved in a 20 mL Pyrex vial and the mixture was heated in 120°C for 16 h. After cooling down to room

temperature, purple needle shaped crystals were harvested by filtration, washed with DMF and acetone, and then dried at 80 °C under vacuum.

Synthesis of BiOI

194.04 mg $Bi(NO_3)_3.5H_2O$ (0.4 mmol) were added into 38 mL ethylene glycol solution with ultrasonication for 30 minutes to fully dispersed suspensiona suspension. After then 1 mL KI solution (0.4 mol/L) was dropped wise into the above solution with power ultrasound. The suspension was transferred to a 50 mL Teflon-lined autoclave and heated at 120℃ for 6 h. After cooling down to room temperature, the powders were collected by filtration, washed with H_2O and ethanol, and then dried under vacuum.

Section S2. Tables

Table S1 The comparison of elemental analysis, band gaps and specific surface area for PCN-222，BP-1 and BP-3.

Sample	Zr_6:Bi (atomic ratio)	Band gap (eV)	BET surface area (m^2/g)
PCN-222	None	1.84	2069
BP-1	1.3:1	1.72	650
BP-3	3.2:1	1.78	660
BP-5	5.3:1	1.77	630

Zr_6:Bi atomic ratio were measured by ICP-OES.

Band gaps were obtained from UV-vis DRS.

BET surface areaa were detected by the N_2 adsorption and desorption isotherms dates.

Section S3. XRD patterns

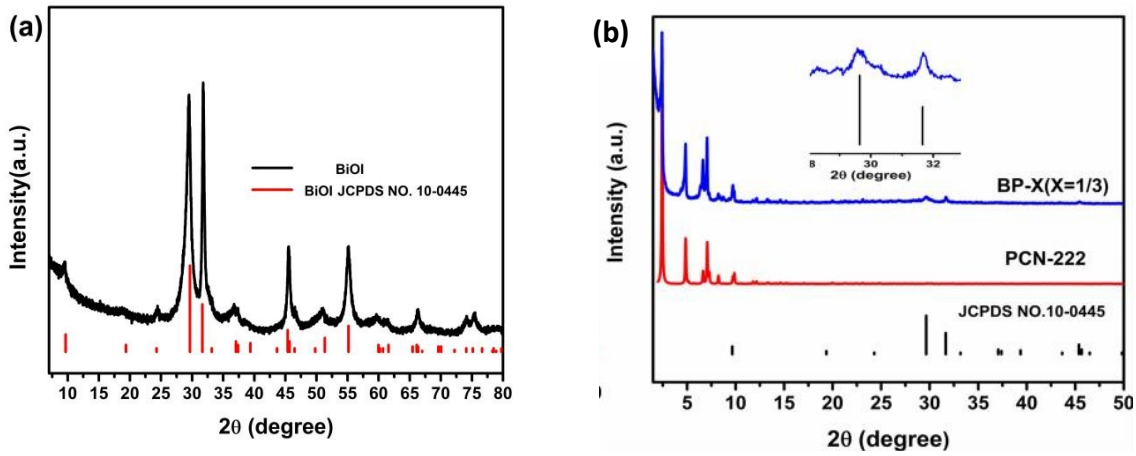

Figure S1. PXRD patterns of (a) BiOI and (b) BP-X (X = 1/3).

Section S4. Tauc plot curves

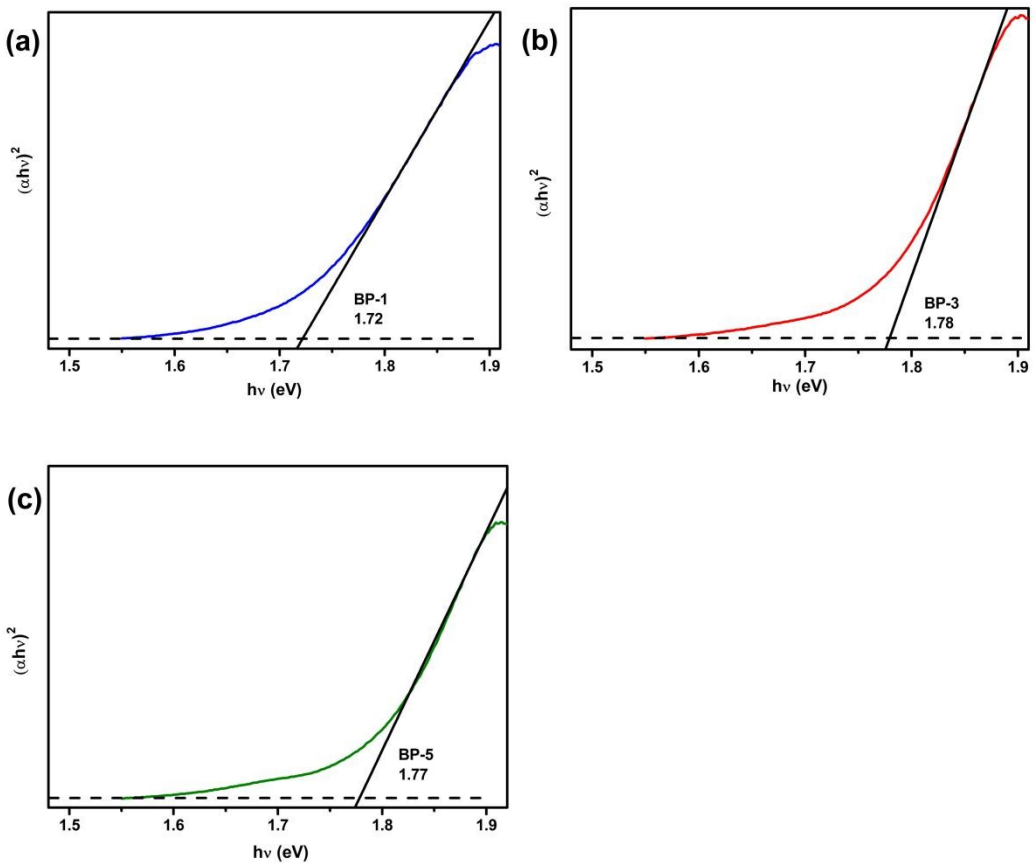

Figure S2. The Tauc plots of (a) BP-1, (b) BP-3 and (c) BP-5.

Section S5. Mott-Schottky plots

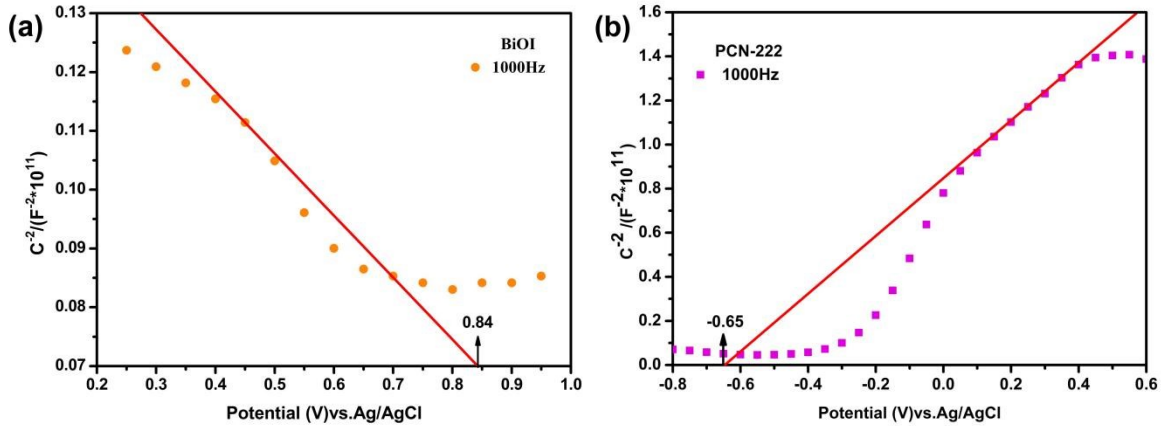

Figure S3. The Mott-Schottky of (a) BiOI and (b) PCN-222.

Section S6. Catalytic experiments

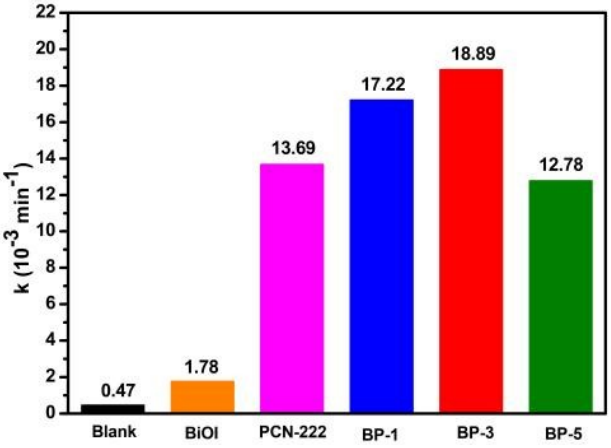

Figure S4. Comparison of the rate constants k for the photocatalytic degradation of tetracyclines according to the pseudo-first-order kinetic equation $\ln(C_t/C_0) = k_0 t$ (C_t is the concentration of TC at time t during photocatalytic process, C_0 is the initial concentration of TC after adsorption, k_0 stands for the pseudo-first order reaction rate constant (min^{-1}) and t is the photocatalytic reaction time (min)).

Section S7. Cyclic experiment

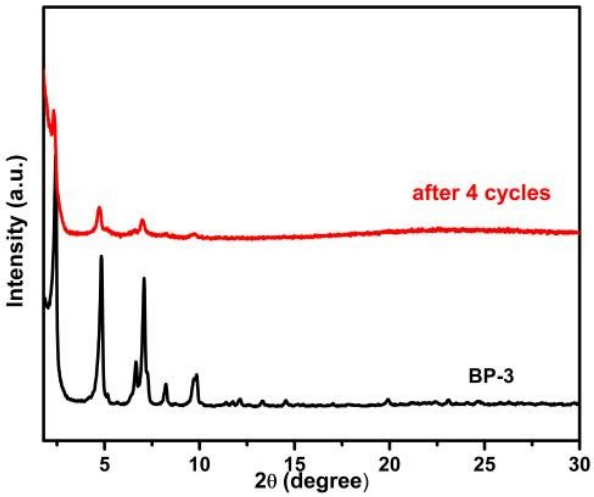

Figure S5. PXRD patterns of BP-3 before and after 4 rounds of photocatalytic reaction.