Supporting Information

Photothermal-Assisted Photocatalytic Degradation of Tetracycline in Seawater Based on the Black g-C_3N_4 Nanosheets with Cyano Group Defects

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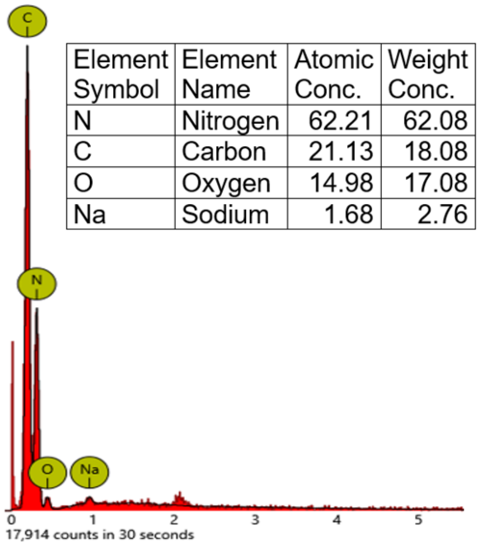
1. Characterizations

The crystalline phase structures of as-prepared CN and CN-B composites were characterized by German Bruker-AXSSM D8 X-ray diffraction (XRD) under Cu-K irradiation at 2θ angles of 10-80°. The morphology and elemental composition of as-prepared samples were detected by a scanning electron microscope (SEM) and an energy dispersive x-ray (EDX) by using an instrument scanning electron microscope (JSM-7001F (Japan). Transmission electron microscope (TEM) was obtained by a FEI-Tecnai TM G2F30 with a field-emission gun operating at 200 kV. The Fourier transform infrared spectroscopy (FT-IR) was obtained using infrared Prestige-21 spectrometer. The X-ray photoelectron spectroscopy (XPS) was measured using a scale 250Xi instrument (K-Alpha, Thermo Fisher Scientific) with a calibration standard of 284.6 eV and the XPS spectra were fitted using XPSPEAK41 software. The UV-vis absorption spectra of powder samples were measured using a UV-2450 with $BaSO_4$ as a reflectometer. Photoluminescence (PL) spectra were obtained by a luminescence spectrometer (RF-5301PC) at 320 nm excitation wavelength. Thermal camera (FLIR C3-X) was used to record the photothermal mapping images during the photocatalytic process.

2. Photoelectrochemical properties measurements

The photoelectrochemical experiments of the samples were all performed in a three-electrode system. Transient photocurrent curves, the Mott-Schottky (MS) curves and the electrochemical impedance spectrum (EIS) plots of the catalysts were measured using the CHI660B workstation. A calomel electrode, as-prepared samples and platinum wire were used as reference, working and counter electrodes, respectively, and a 300 W xenon lamp and saturated Na_2SO_4 solution was employed as the light source and electrolyte.

3. Figures and Tables



Element Symbol	Element Name	Atomic Conc.	Weight Conc.
N	Nitrogen	62.21	62.08
C	Carbon	21.13	18.08
O	Oxygen	14.98	17.08
Na	Sodium	1.68	2.76

Figure S1 Energy dispersive X-ray spectra (EDX) spectrum of CN-B-0.1 sample.

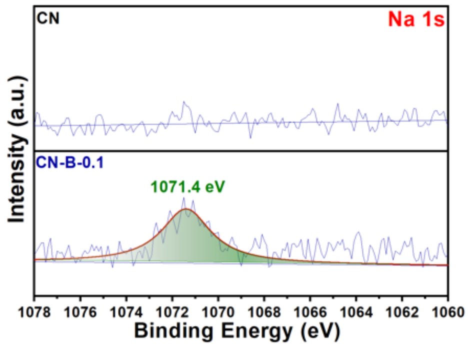


Figure S2 High-resolution XPS spectra of Na 1s for CN and CN-B-0.1 photocatalysts.

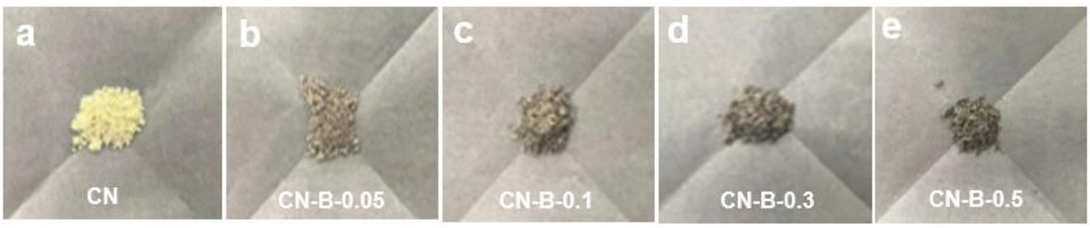


Figure S3 Digital photos of (a) CN, (b) CN-B-0.05, (c) CN-B-0.1, (d) CN-B-0.3 and (e) CN-B-0.5.

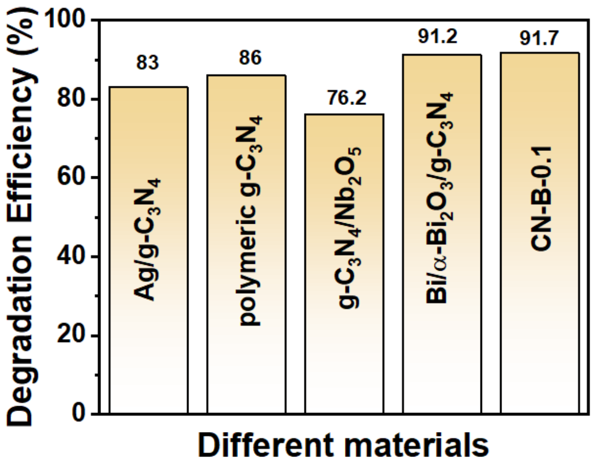


Figure S4 Photocatalytic Tc degradation performance of CN-B-0.1 photocatalyst compared with the previously reported of the different materials.

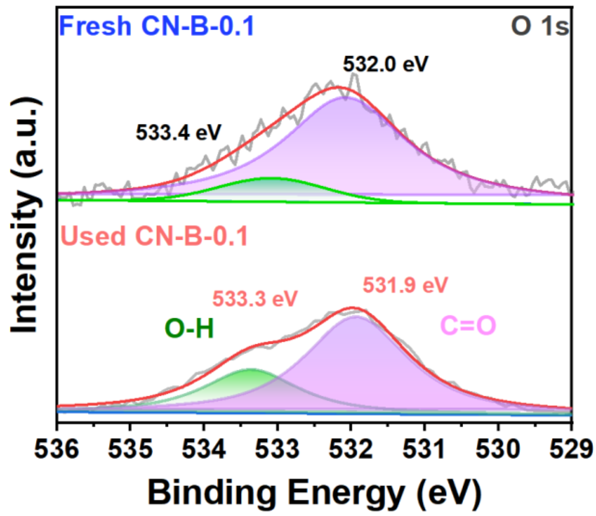


Figure S5 High-resolution XPS spectra of O 1s of CN-B-0.1 photocatalyst before and after photocatalysis**.**

Table S1 Surface relative element content of CN and CN-B-0.1 from XPS characterizes.

Samples	Atomic compositions (%)				
	C	N	O	Na	C/N
CN	45.29	52.14	2.28	0.3	0.87
CN-B-0.1	49.96	46.16	3.65	0.23	1.08

Table S2 Photocatalytic Tc degradation performance of CN-B-0.1 photocatalyst compared with the previously reported of the different materials.

Photocatalyst	**Photocatalyst dose (g/L)**	**TC concentration (mg/L)**	**Light source**	**Degradation(%)/Time (min)**	**Rate constant (min^{-1})**	**Ref.**
Ag/g-C_3N_4	1.67	20	Xenon (300 W)	83/120	0.0120	[72]
polymeric g-C_3N_4	1.0	20	Xenon (35 W)	86/240	0.0051	[73]
g-C_3N_4/Nb_2O_5	0.5	20	Xenon (250 W)	76.2/150	0.0096	[74]
Bi/α-Bi_2O_3/g-C_3N_4	1.0	10	Xenon (300 W)	91.2/180	0.0122	[75]
CN-B-0.1	**0.5**	**30**	**LED (300 W)**	**91.7/120**	**0.0242**	**This work**

References

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