Supplementary Materials

Removal of Tetracycline Hydrochloride from Water by Visible-Light Photocatalysis Using $BiFeO_3$/BC Materials

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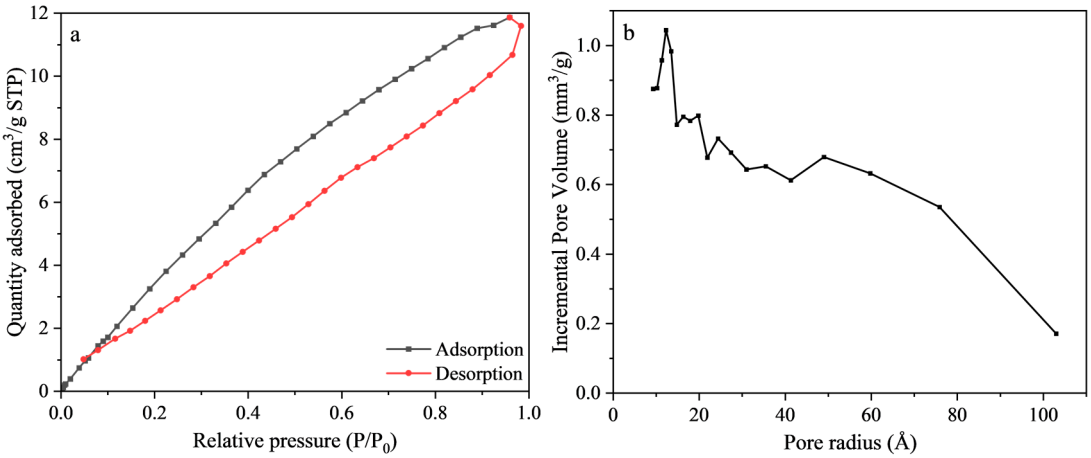

Figure S1. (a) Plot of N_2 adsorption-desorption isotherms, (b) Pore size distribution curve of $BiFeO_3$/BC.

The N_2 adsorption-desorption isotherms at 77K was displayed in Figure S1a. Measured specific surface areas was 26.739 m^2/g. Compared to other previous studies, $BiFeO_3$/BC showed a larger surface area [17,56]. We speculate that the co-pyrolysis process with biomass promotes the generation of pores on the material surface. Another study also reported an increase in specific surface area due to the incorporation of biochar [57].

Figure S1b plots the pore size distribution adopting BJH adsorption method calculations. We can conclude that micropores with pore sizes between 1 and 5 nm

contributed the most to the specific surface area. They are the main sites where the reaction takes place and complement the catalytic performance of the material.

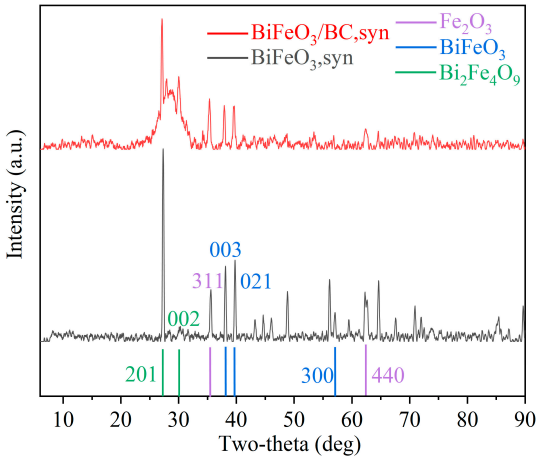

Figure S2. XRD patterns of $BiFeO_3$/BC and $BiFeO_3$.

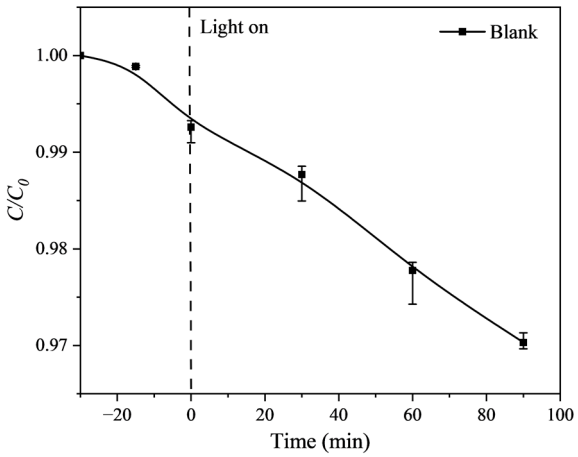

Figure S3. Photolysis curve of TCH (3 replicates; pH = 4; $C_{0(TCH)}$ = 10 mg/L).

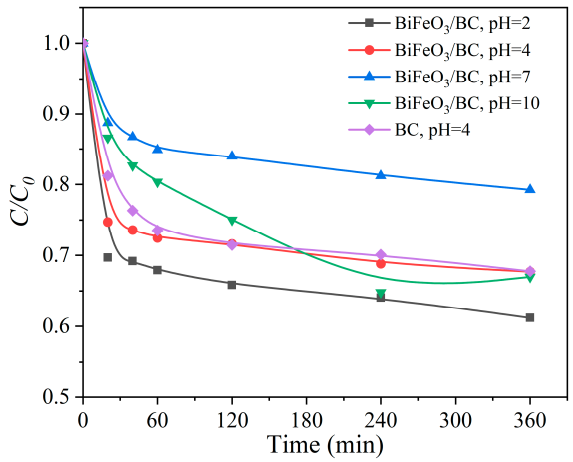

Figure S4. TCH adsorption by BC and $BiFeO_3$/BC at different pH values.(Dosage of $BiFeO_3$/BC: 0.5 g; $C_{0(TCH)}$ = 30 mg/L).

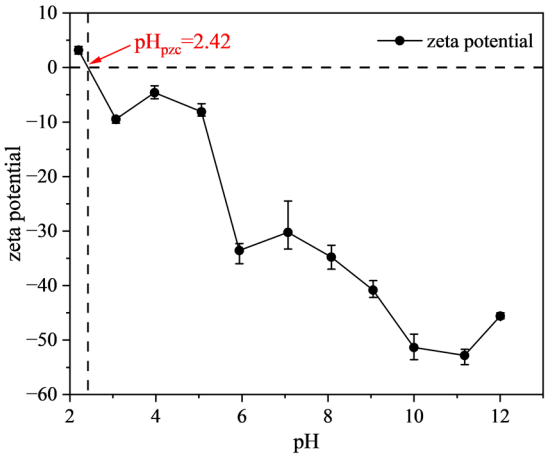

Figure S5. Zeta potential of $BiFeO_3$/BC.

The results of zeta potentials of $BiFeO_3$/BC under different pH were shown by Figure S3. The point of zero charge (pH_{pzc}) of $BiFeO_3$/BC material was indicated. At pH < 2.42, $BiFeO_3$/BC was positively charged, while it became negatively charged at pH > 2.42. Meanwhile, followed by pH changes, TCH exhibited various surface charge as reported [19,58]. Therefore, at pH < 2.42, existence of repulsive force was expected between TCH cationic particles and $BiFeO_3$/BC. Whereas at pH > 2.42, $BiFeO_3$/BC had a negative charge on its surface and TCH was positively charged, with electrostatic attraction force working, TCH molecules were more likely to be absorbed onto $BiFeO_3$/BC. Therefore, degradation efficiency reached highest at pH = 4.

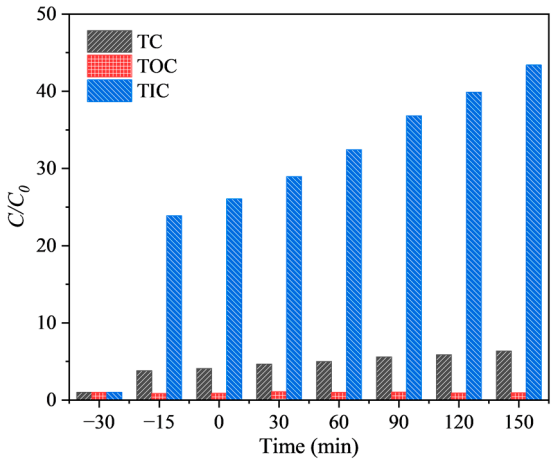

Figure S6. TOC photocatalytic removal efficiencies of TCH. (Dosage of $BiFeO_3$/BC: 0.5 g; pH = 4; $C_{0(TCH)}$ = 10 mg/L).

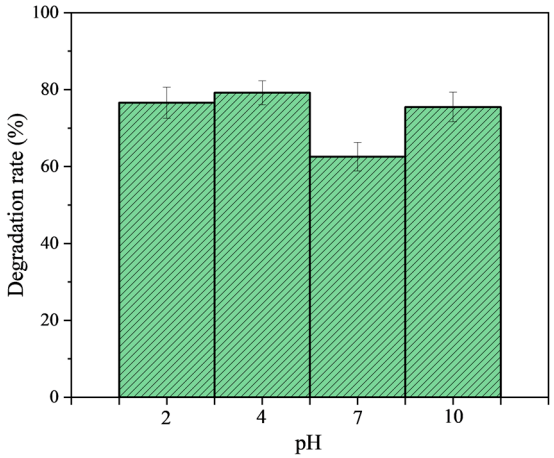

Figure S7. Comparison of the degradation efficiency of TCH after 90 minutes of reaction at different pH values. (3 replicates; Dosage of $BiFeO_3$/BC: 0.5 g; $C_{0(TCH)}$ = 30 mg/L).

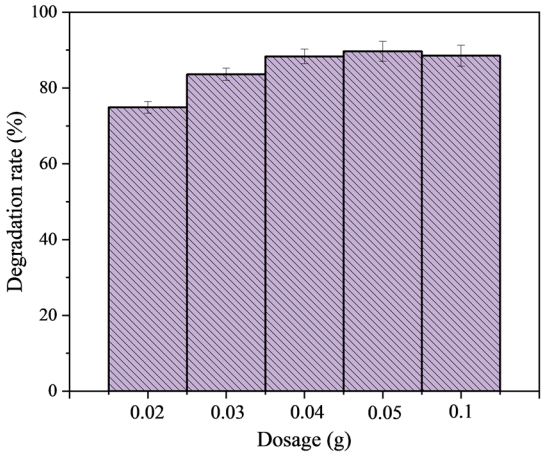

Figure S8. Comparison of the degradation rate of TCH after 90 minutes of reaction at different dosing rates (3 replicates; pH = 4; $C_{0(TCH)}$ = 10 mg/L)

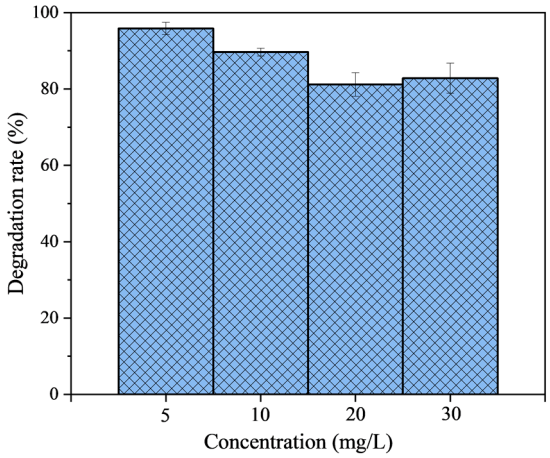

Figure S9. Comparison of the degradation rate of TCH after 90 min of reaction at different initial concentrations. (3 replicates; Dosage of $BiFeO_3$/BC = 0.05 g; pH = 4).

References:

56. Gao, F.; Chen, X.Y.; Yin, K.B.; Dong, S.; Ren, Z.F.; Yuan, F.; Yu, T.; Zou, Z.; Liu, J.M. Visible-light photocatalytic properties of weak magnetic $BiFeO_3$ nanoparticles. *Advanced Materials* **2007**, *19*, 2889, doi:https://doi.org/10.1002/adma.200602377.

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