Electronic Supplementary Material (ESI) for New Journal of Chemistry.


# Supporting Information

## Visible-light persulfate activation by a BiOI/BiOCOOH composite photocatalyst for accelerated organic pollutant degradation

Yanan Duan, Jianjiang Lu*, Yujun Yan*, Yanbin Tong, Yalong Song, Jinfeng Xiao

School of Chemistry and Chemical Engineering/Key Laboratory of Environmental Monitoring and Pollutant Control, Shihezi University, Shihezi 832003, China

*Corresponding author.

E-mail address: lujianjiang2021@163.com (J.J Lu), yyj_tea@shzu.edu.cn (Y.J Yan).

**Text:S1** LC-MS test conditions

The CIP degradation intermediates were determined using a liquid-mass combination instrument (agilent 1100 + thermos TSQ quantum Ultra AM). The electrospray ionization source (ESI) worked in positive ion mode, in which the capillary voltage was set at 3.0 kV, the desolubilization temperature was 350℃, and the desolubilization gas was nitrogen. MS spectrum was obtained by full scan mode (*m/z* 50-700). The compounds were isolated using a welch ultimate XB-C18 column (2.1 × 100 mm, 3 μm). Mobile phase: A 0.1% formic acid water, B acetonitrile. The gradient elution conditions were 0 min and 95% A was maintained. 0-9 min, A decreased from 95% to 7%; 9-10.5 min, A remained at 7%. After 10.5 min, A linearly increased to 95%. The flow rate was 0.3 ml/min and the sample volume was 10 μL.

**Table S1** Structural parameters of the samples

| Sample | $S_{BET}$ ($m^2/g$) | Pore volume ($cm^3/g$) | Mean pore diameter (nm) |
|---|---|---|---|
| **BOI** | 15.854 | 0.0849 | 26.024 |
| **BOCH** | 12.537 | 0.0618 | 16.455 |
| **0.5 IB** | 33.162 | 0.1709 | 18.761 |

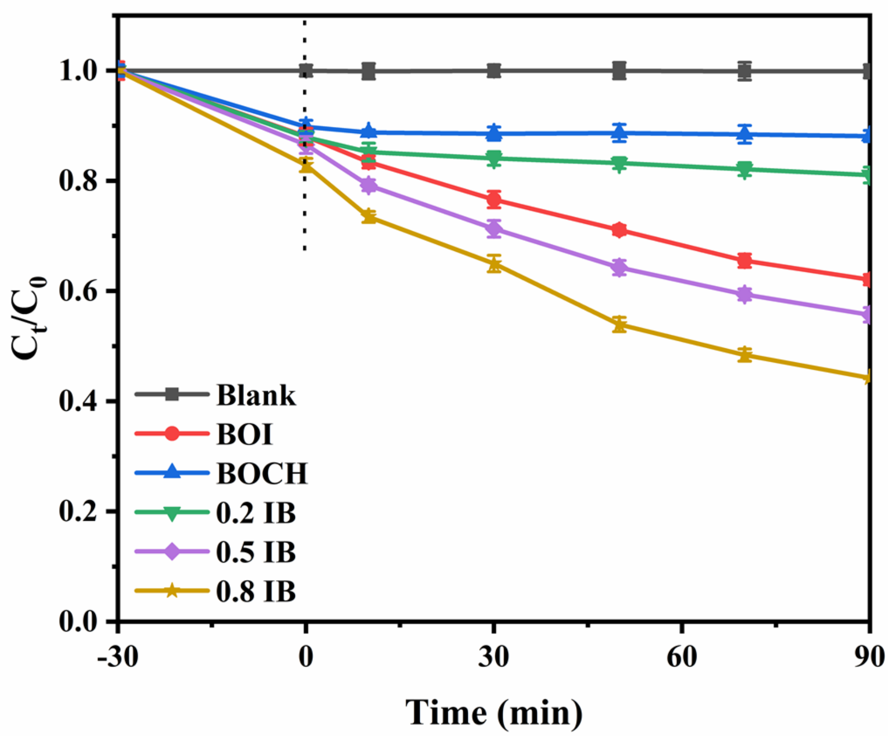



**Fig S1** Photocatalytic degradation of CIP in different samples.

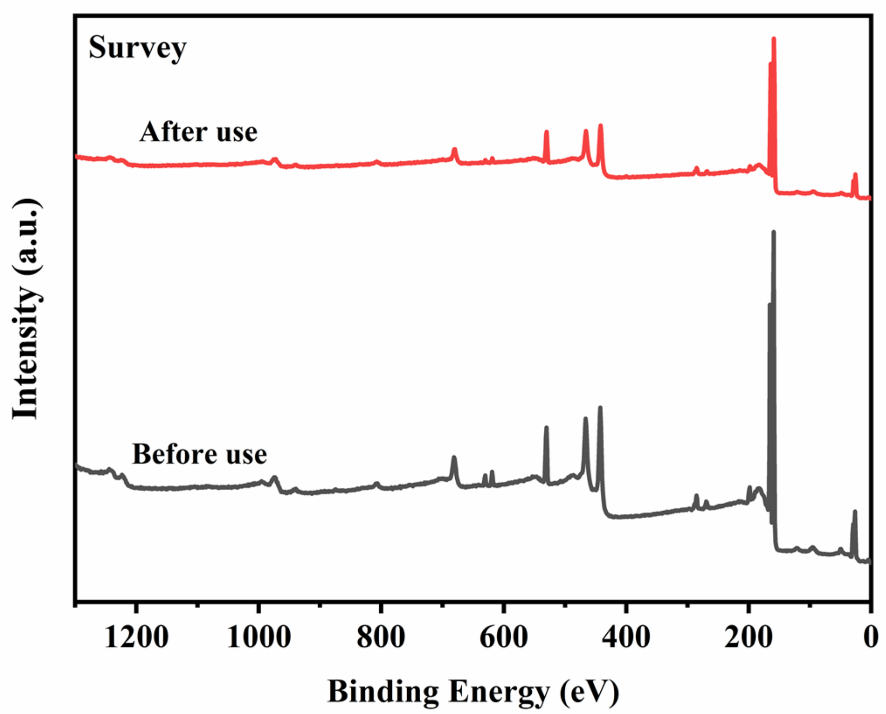



**Fig.S2** XPS spectrum before and after cycling.

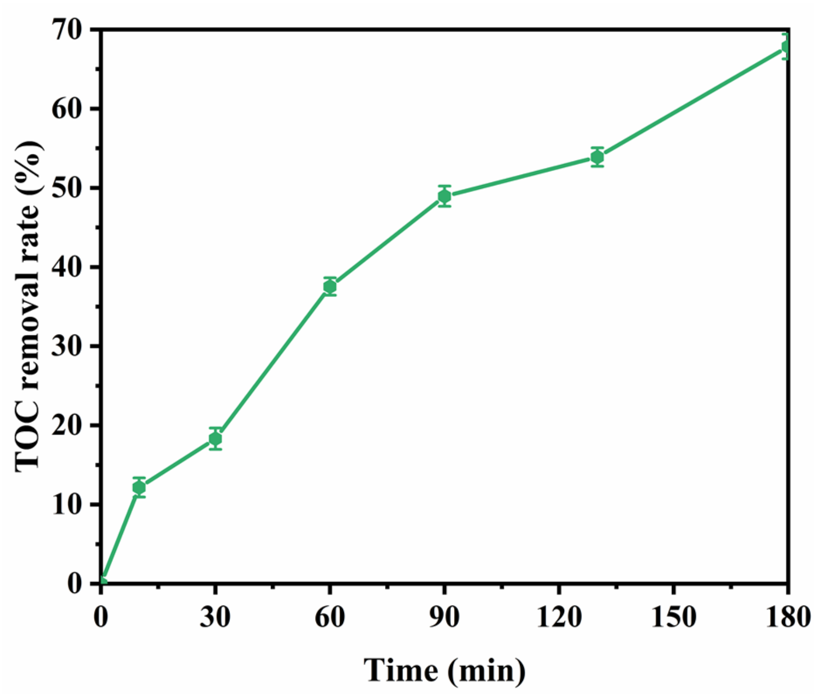



**Fig. S3** TOC removal efficiency during CIP degradation by 0.5 IB/PS system.

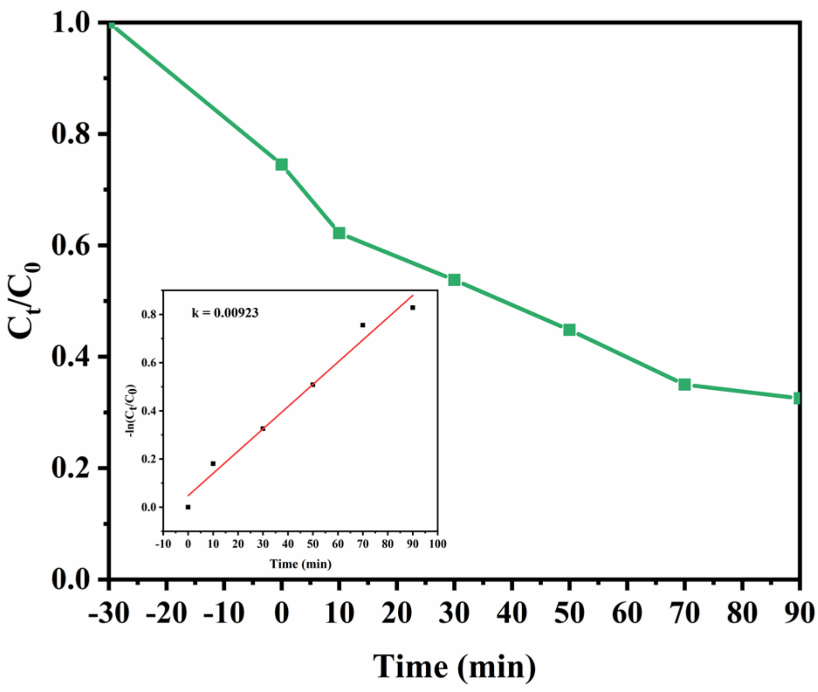
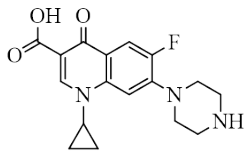
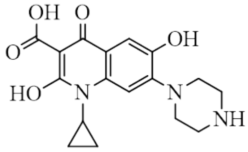
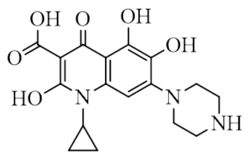


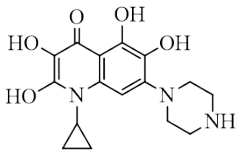
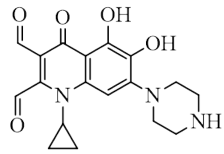
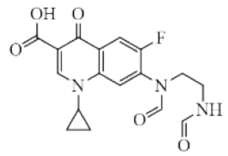
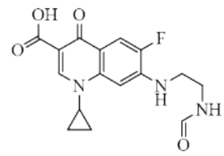
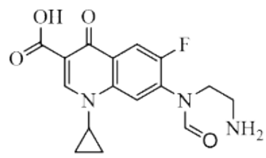
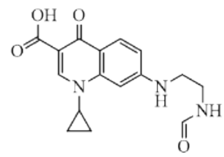
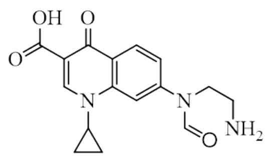
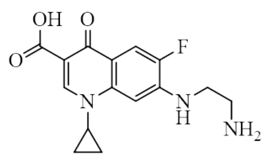
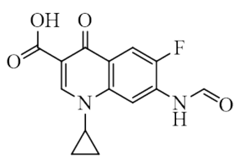
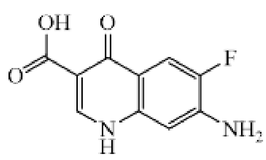
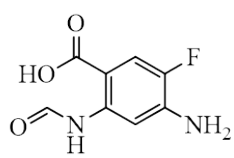

**Fig. S4** Degradation curve and pseudo-first order kinetic curve of NBT in 0.5 IB/PS system under visible light.

**Table.S2** Comparison of the results of this study with those of previous studies.

| Sample | $C_0$ | Parameters | Degradation rate | References |
|---|---|---|---|---|
| $CuS/Fe_2O_3/Mn_2O_3$ | (CIP) 0.2 g/L | catalyst (0.6 g/L); PMS (0.6 g/L); pH (5.84) | 88% (120 min) | 1 |
| 2 wt% **CQDs/**BiOCOOH | (RhB) 4 mg/L | catalyst (0.6 g/L); pH (7) | 73% (60 min) | 2 |
| 3% RP/BP/BiOCOOH | (TC-HCl) 20 mg/L | catalyst (0.4 g/L) | 60.5% (120 min) | 3 |
| $(BiOCOOH)_{0.25}(Bi_2MoO_6)_{0.75}$-US | (TC-HCl) 35 mg/L | catalyst (1 g/L) | 82.2% (180 min) | 4 |
| 0.5 $g\text{-}C_3N_4$/BiOCOOH | (CIP) 10 mg/L | catalyst (0.3 g/L) | 72.1% (120 min) | 5 |
| $BiOI/Fe_3O_4$ (5:1) | (RhB) 20 mg/L | catalyst (0.5 g/L); PS (1 mM); pH (4.6) | 98.4% (30 min) | 6 |
| $g\text{-}C_3N_4/Ag_2CrO_4$ | (RhB; MB) 10 mg/L | catalyst (0.67 g/L) | 99.2% (90 min) 99.1% (120 min) | 7 |
| rGO-$BiVO_4$-ZnO | (CIP) 10 mg/L | catalyst (0.2 g/L); PMS (0.5 g/L) | 98.4%(60 min) | 8 |
| $TiO_2/\gamma\text{-}Fe_2O_3$/GO | (CIP) 10 mg/L | catalyst (0.4 g/L); pH (6.6) | 99% (140 min) | 9 |
| $Cu_{0.84}Bi_{2.08}O_4$ | (CIP) 40 mg/L | catalyst (1 g/L); PS (4 mM) | >90% (400 min) | 10 |
| $Mn_3O_4$-$MnO_2$ | (CIP) 16.6 mg/L | catalyst (0.1 g/L); PMS (1 mM) | 97.6% (25 min) | 11 |
| 0.5 BiOI/BiOCOOH | (CIP; TC RhB) 10 mg/L | catalyst (0.6 g/L); PS (1 mM); pH (7.3) | 95.1% (90 min); 83.17% (60 min); 92.23% (5 min) | **This work** |

**Table S3** Properties of intermediates that may be formed during CIP degradation

| Compound | m/z | Formula | Proposed structure |
|---|---|---|---|
| **CIP** | 331.96 | $C_{17}H_{18}FN_3O_3$ |  |
| **P1** | 344.8 | $C_{17}H_{19}N_3O_5$ |  |
| **P2** | 361.94 | $C_{17}H_{19}N_3O_6$ |  |

| | | | |
|---|---|---|---|
| **P3** | 333.84 | $C_{16}H_{19}N_3O_5$ |  |
| **P4** | 333.84 | $C_{16}H_{19}N_3O_5$ |  |
| **P5** | 361.94 | $C_{17}H_{16}FN_3O_5$ |  |
| **P6** | 333.84 | $C_{16}H_{16}FN_3O_4$ |  |
| **P7** | 333.84 | $C_{16}H_{16}FN_3O_4$ |  |
| **P8** | 316 | $C_{16}H_{17}N_3O_4$ |  |
| **P9** | 316 | $C_{16}H_{17}N_3O_4$ |  |
| **P10** | 305.95 | $C_{15}H_{16}FN_3O_3$ |  |
| **P11** | 290.10 | $C_{14}H_{11}FN_2O_4$ |  |
| **P12** | 226.78 | $C_{10}H_7FN_2O_3$ |  |
| **P13** | 200.09 | $C_8H_7FN_2O_3$ |  |

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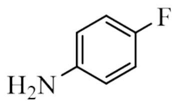
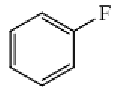
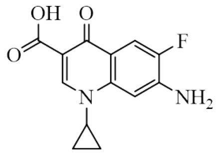
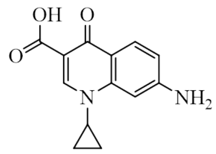
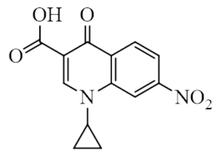
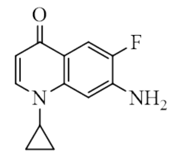
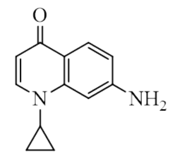
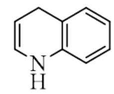
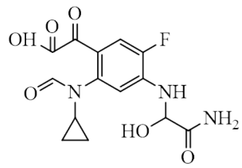
|---|---|---|---|
| **P14** | 110.92 | $C_6H_6FN$ |  |
| **P15** | 94.65 | $C_6H_5F$ |  |
| **P16** | 262.06 | $C_{13}H_{11}FN_2O_3$ |  |
| **P17** | 243.04 | $C_{13}H_{12}N_2O_3$ |  |
| **P18** | 274.09 | $C_{13}H_{10}N_2O_5$ |  |
| **P19** | 218.05 | $C_{12}H_{11}FN_2O$ |  |
| **P20** | 200.09 | $C_{12}H_{12}N_2O$ |  |
| **P21** | 130.1 | $C_9H_9N$ |  |
| **P22** | 340.14 | $C_{14}H_{14}FN_3O_6$ |  |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