Supporting Information

# In-Situ Fabrication of 2D/2D $WO_3/Bi_5O_7I$ S-Scheme Heterojunction with Enhanced Spatial Charges Separation and Tetracycline Degradation

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**Table S1. Comparisons of this work with literature.**

| Materials | Preparation | Degradation efficiency | Apparent first-order rate constants($min^{-1}$) | Year | Ref. |
|---|---|---|---|---|---|
| 2D/2D $WO_3/Bi_5O_7I$ | One step calcination method | Removal 99.15% tetracycline in 75 min | 0.04814 | 2023 | This work |
| 2D/2D direct Z-scheme $WO_3/Bi_5O_7I$ | Solvothermal-calcination technique. | Removal 99.6% RhB in 80 min | - | 2023 | Ref.[1] |
| Type-II $Bi_5O_7I$ / $WO_3$ | Electrophoresis deposition | Removal 95.2% VOCs in 80 min | 0.02 | 2022 | Ref.[2] |
| $WO_3$/BiOI heterojunction | hydrothermal method | Removal 98.2% RhB in 30 min | 0.1344 | 2021 | Ref.[3] |
| Z-scheme $WO_3$/BiOBr | Solvothermal method | Removal 94.7% ciprofloxacin hydrochloride in 120 min | 0.02581 | 2020 | Ref.[4] |
| $WO_3$/BiOCl heterojunction | Cryolysis | Removal 100% RhB in 180 min | 0.048 | 2011 | Ref.[5] |
| $WO_3$/BiOI heterojunction | Hydrothermal method | Removal 66.8% MO in 100 min | 0.0108 | 2015 | Ref.[6] |
| $WO_3$ nanofibers decorated on BiOCl nanosheets | Sol synthesis and electrospinning technique | Removal 95% RhB in 15 min | 0.259 | 2019 | Ref.[7] |
| $WO_3$ /$Bi_{24}O_{31}Br_{10}$ nanosheet | Hydrothermal method | Removal 80% TC in 60 min | 0.02 | 2018 | Ref.[8] |
| 2D/2D $WO_3$/BiOBr S-scheme heterojunction | a facile hydrothermal method | Removal 98% TC in 60 min | - | 2022 | Ref.[9] |
| Integration of $Bi_5O_7I$ with $TiO_2$ | hydrothermal method | Removal 99.7% RhB in 90 min | 0.0682 | 2021 | Ref.[10] |
| Colored $TiO_2$ nanoparticle-sensitized $Bi_5O_7I$ nanorods | Roasting method | Removal 89% $Hg^0$ in 90 min | - | 2019 | Ref.[11] |
| Z-scheme (001)$TiO_2/Bi_5O_7I$ | Deposition method. | Removal above 90% RhB in 60 min | 0.04315 | 2022 | Ref.[12] |
| BiOBr nanosheets-decorated $TiO_2$ nanofibers | Solvothermal method | Removal 89% RhB in 20 min | 0.103 | 2019 | Ref.[13] |
| Brookite/BiOBr | Hydrothermal method | Removal 100% RhB in 20 min | - | 2021 | Ref.[14] |
| BiOBr/$TiO_2$ nanotube arrays | Successive ionic layer adsorption and reaction method | Removal 85% RhB in 150 min | - | 2021 | Ref.[15] |
| Spherical BiOBr modified $TiO_2$ | Hydrothermal method | Removal 99.5% RhB in 100 min | - | 2022 | Ref.[16] |

**Table S2 Data fitting of EIS in Fig.7c.**

| Samples | Rs (Ω) | $R_{ct}$ (KΩ) |
|---|---|---|
| $WO_3$ | 15.2 | 2.71 |
| $Bi_5O_7I$ | 19.5 | 1.88 |
| 15% $WO_3/Bi_5O_7I$ | 13.5 | 1.33 |

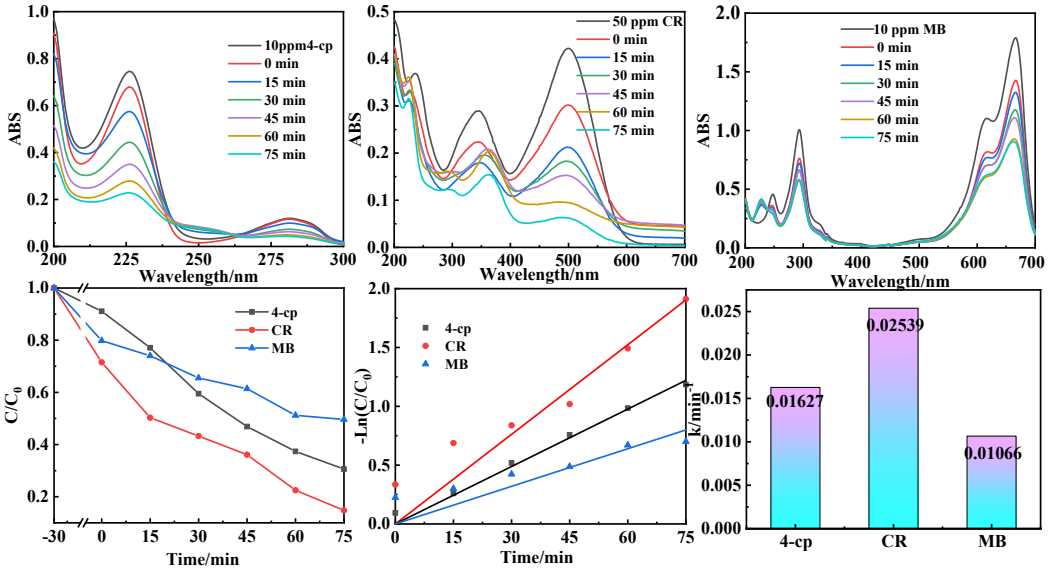


Fig. S1. Degradation plots and First order kinetics constant ($k_{app}$) for photocatalytic degradation of model pollutants

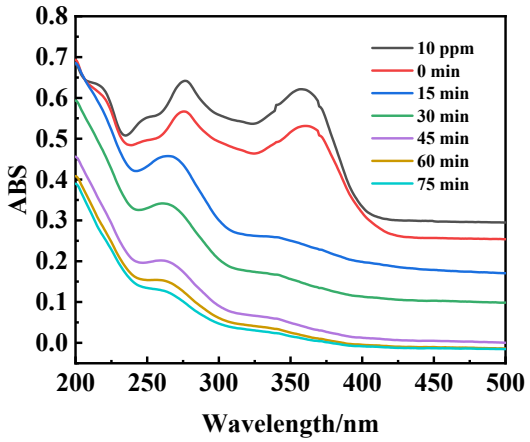


Figure S2 UV-Vis absorption spectrum of the degradation product by 15%$WO_3$/$Bi_5O_7I$

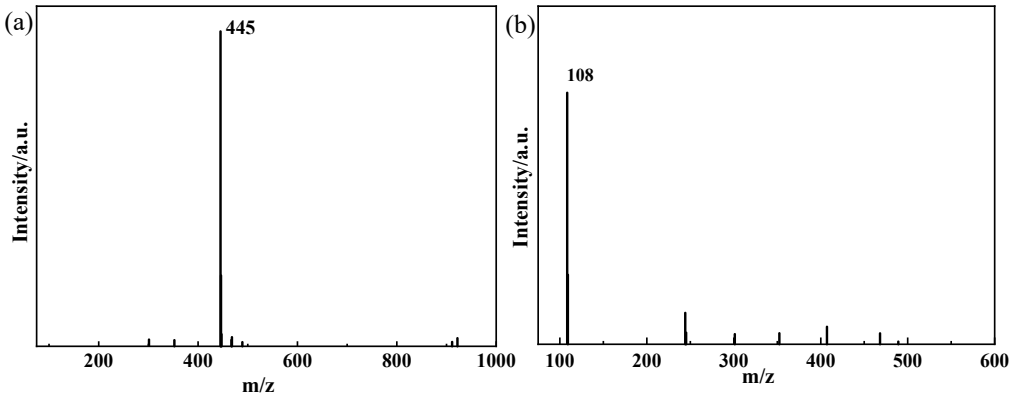


Figure S3 HPLC–MS spectra of (a) tetracycline, (b) Final product obtained after a photo degradation of 75 minutes by 15%$WO_3$/$Bi_5O_7I$

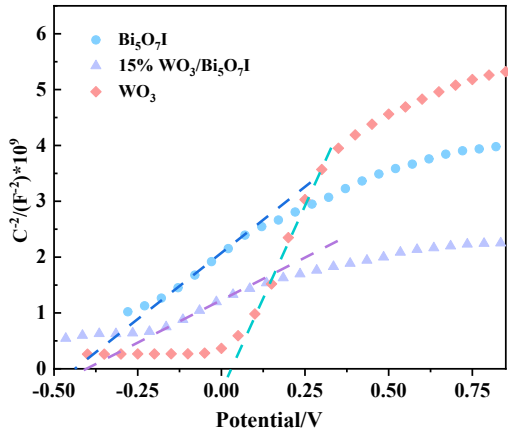


Fig.S4. Mott–Schottky plots of $WO_3$, $Bi_5O_7I$, and 15% $WO_3/Bi_5O_7I$

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