

Supporting Information

Synthesis of rattle-type magnetic mesoporous $\text{Fe}_3\text{O}_4@m\text{SiO}_2@m\text{BiOBr}$ hierarchical photocatalyst and its photoactivity investigation in degradation of methylene blue

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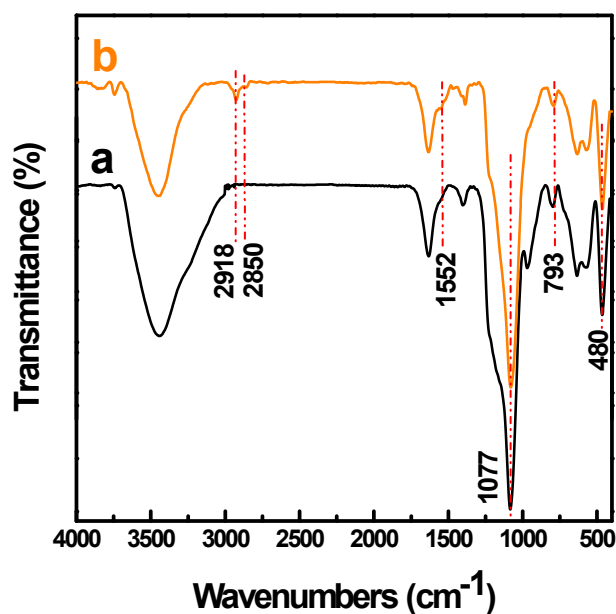


Fig.S1 FTIR spectra of rattle-type $\text{Fe}_3\text{O}_4@m\text{SiO}_2$ (a) and $\text{R-Fe}_3\text{O}_4@m\text{SiO}_2\text{-NH}_2$ (b).

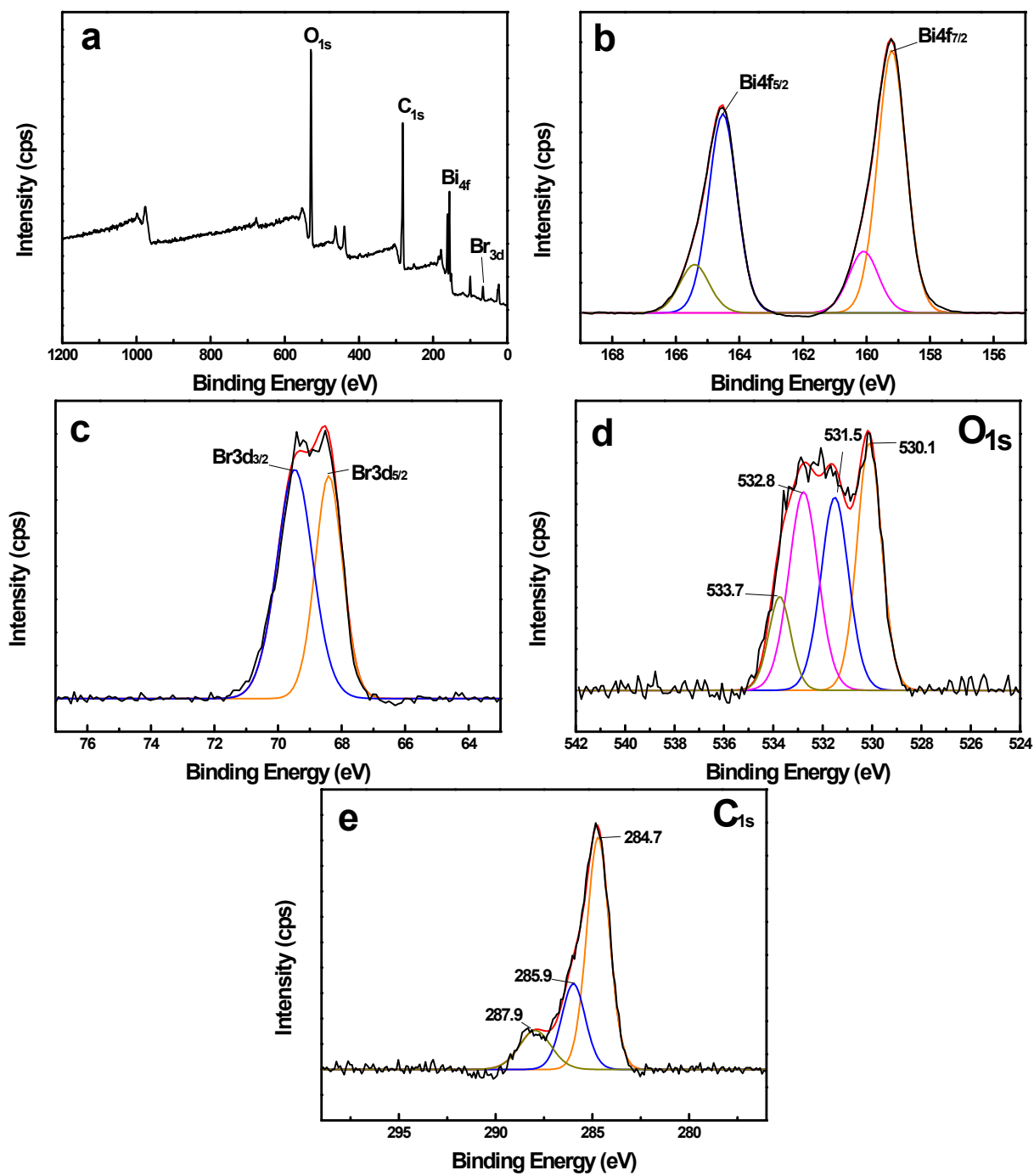


Fig.S2 XPS spectra of the R- $Fe_3O_4@mSiO_2@BiOBr$ -1-4 hierarchical photocatalyst.

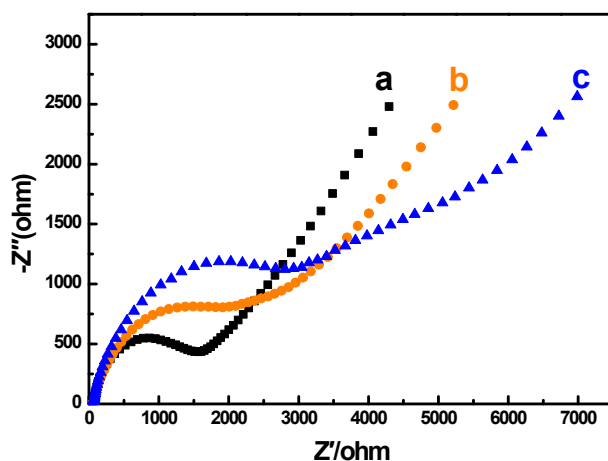


Fig.S3 EIS of R-Fe₃O₄@mSiO₂@BiOBr-1-4 (a), R-Fe₃O₄@mSiO₂@BiOBr-0.4-4 (b) and pure BiOBr (c), respectively.

Electrochemical impedance spectroscopy (EIS) measurements were also employed to investigate the charge transfer resistance and the separation efficiency between the photogenerated electrons and holes. Using Fe(CN)₆^{3-/4-} as the electrochemical probe, the Nyquist plots of different electrodes were obtained (Fig.S3). Obviously, the charge transfer resistance (*R*_{ct}) at the R-Fe₃O₄@mSiO₂@BiOBr-1-4 hierarchical photocatalyst (Fig.S3a) is smaller than that of R-Fe₃O₄@mSiO₂@BiOBr-0.4-4 (Fig.S3b) and pure BiOBr (Fig.S3c) alone. Generally, the smaller the arc radius on the EIS Nyquist plot, the lower the charge transfer resistance. Therefore, the EIS results demonstrated that the R-Fe₃O₄@mSiO₂@BiOBr-1-4 hierarchical photocatalyst exhibited more excellent charge transfer ability than the R-Fe₃O₄@mSiO₂@BiOBr-0.4-4 and pure BiOBr alone, which can effectively inhibit the recombination of photoexcited electron-hole pairs and is very beneficial to the enhanced photoactivity.

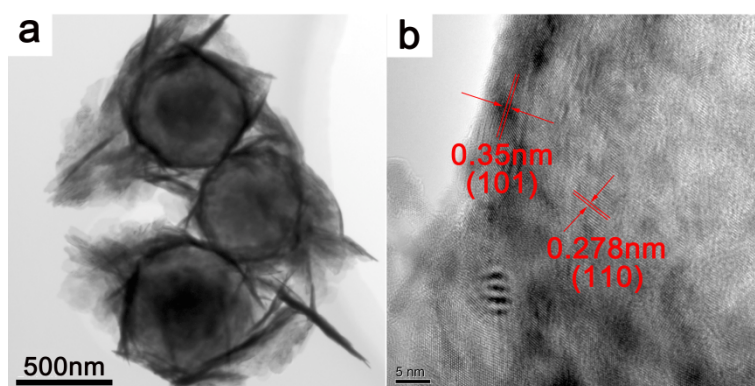


Fig.S4 TEM (a) and HRTEM (b) images of the recovered R-Fe₃O₄@mSiO₂@BiOBr-1-4 hierarchical photocatalyst.