Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supplementary Materials

Synergistic effects of rare earth doping and carbon quantum dots on BiOF/Bi_2MoO_6 heterojunction for enhanced visible-near-infrared photocatalysis

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Texts

Text S1. Synthesis of CQDs and CQDs/BiOF: $Tm3^{+}$, $Yb3^{+}/Bi_2MoO_6$ composites

(1) Synthesis of CQDs

6.912 g citric acid was added to the deionized water of 80 ml. After the citric acid was completely dissolved, the diethylenetriamine solution of 10.41 ml was added drop by drop to the solution and kept stirring for 30 min. After ultrasonic treatment for 30 min, the solution was placed in a100 ml reactor and heated at 200 ℃ for 5 h. After cooling down to room temperature, the CQDs solution was obtained.

(2) Synthesis of CQDs/BiOF: $Tm3^{+}$, $Yb3^{+}/Bi_2MoO_6$ composites

0.97 g (2mmol) anhydrous bismuth nitrate and 0.242 g (1mmol) sodium molybdate dihydrate were dissolved in 20 ml glycol solution, heated and stirred until clarified. 0.305g x ml (x= 2,4,6,8) carbon quantum dots was added to sodium molybdate dihydrate solution, continue stirring for 30 min. Then, dropped sodium molybdate solution with carbon quantum dots into bismuth nitrate solution, stirring for a period of time. After adding 20ml anhydrous ethanol, the solution was poured into the reaction kettle, heated at 160 ℃ for 12 h, then cooling down. The precipitates were obtained by centrifugal washing and then dried at 80 ℃ for 24 h to achieve CQDs/BiOF: $Tm3^{+}$,Yb^{3+}/Bi_2MoO_6 (CQDs/BFYT/B-2) composites with different carbon quantum dots ratios.

Figures

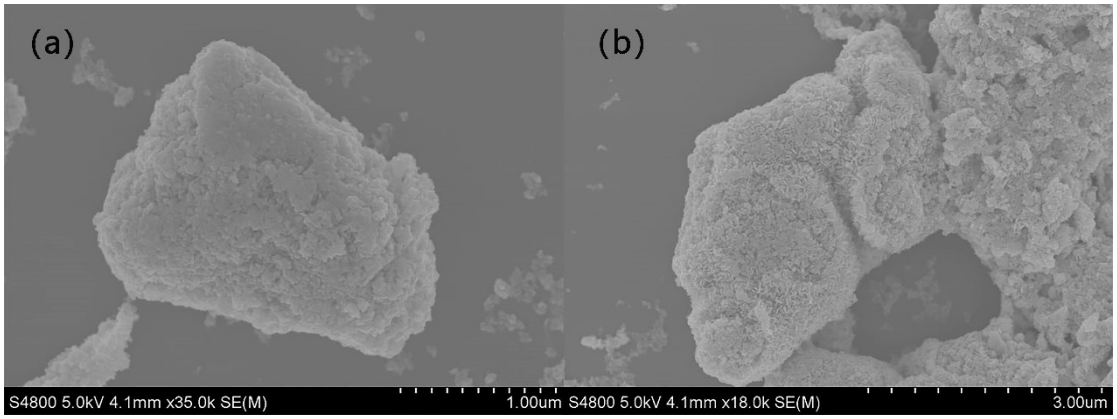

Fig. S1 SEM images of (a) BFYT/B-2, (b) BFYT/B-3

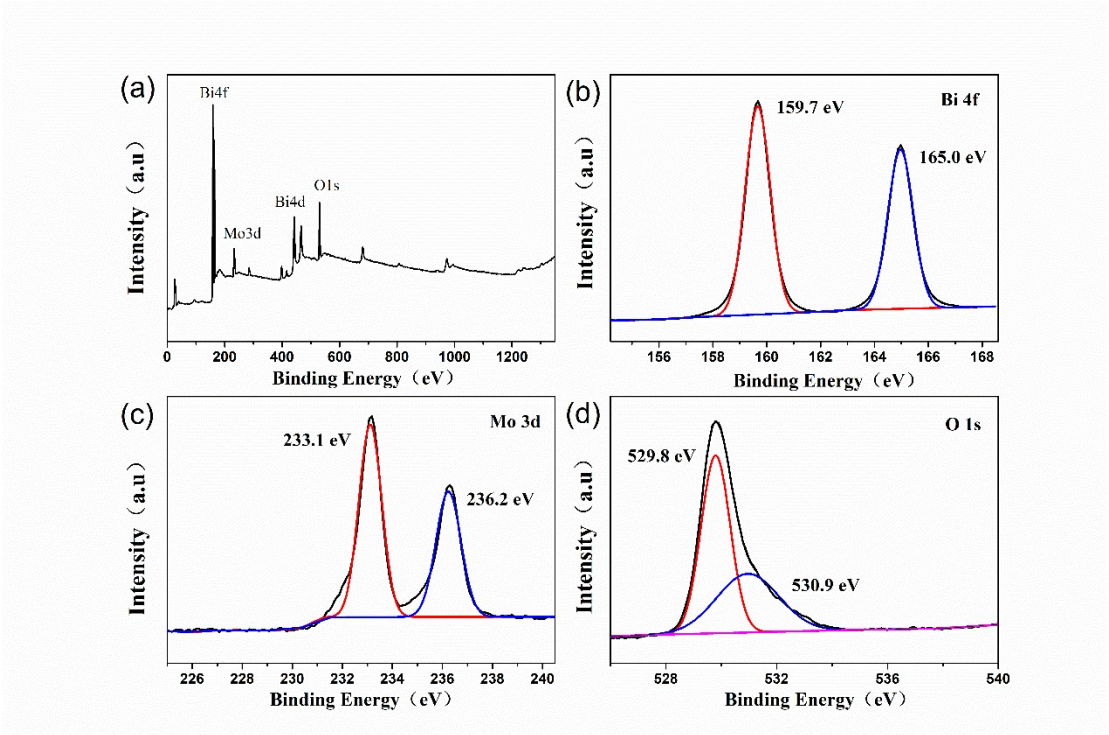

Fig. S2 XPS survey spectrum (a) and high resolution XPS spectra of (b) Bi 4f, (c) Mo 3d, (d) O 1s of Bi_2MoO_6.

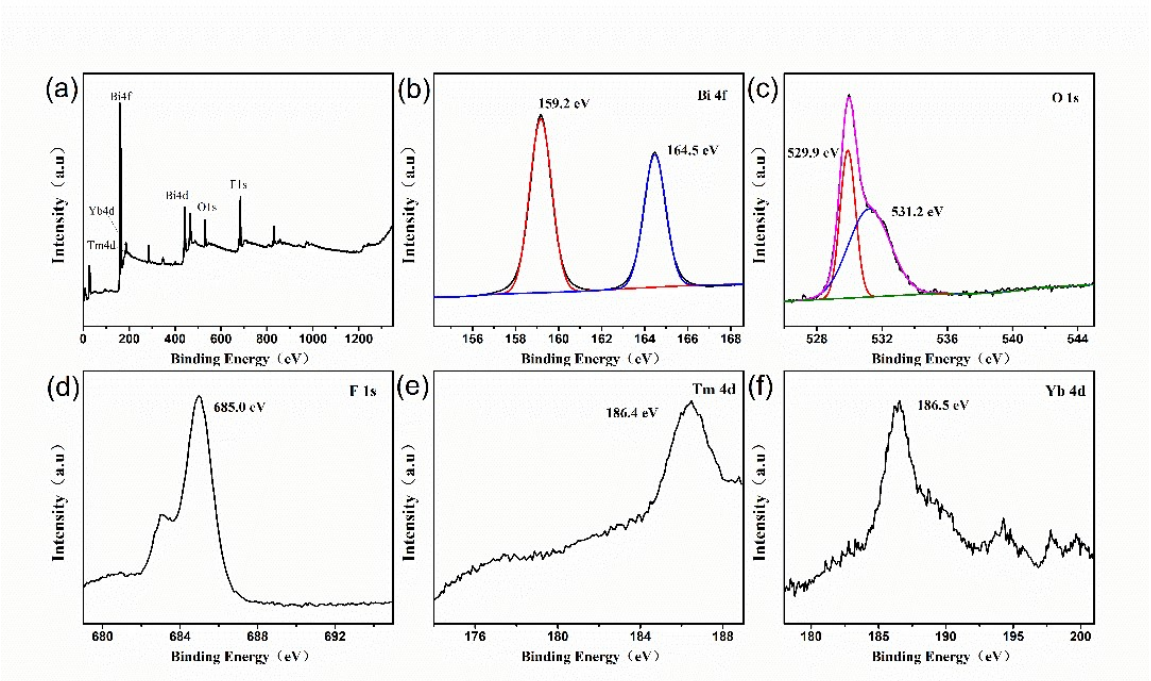

Fig. S3 XPS survey spectrum (a) and high resolution XPS spectra of (b) Bi 4f, (c) O 1s, (d) F 1S, (e) Tm 4d and (f) Yb 4d of BiOF: Tm^{3+}, Yb^{3+}.

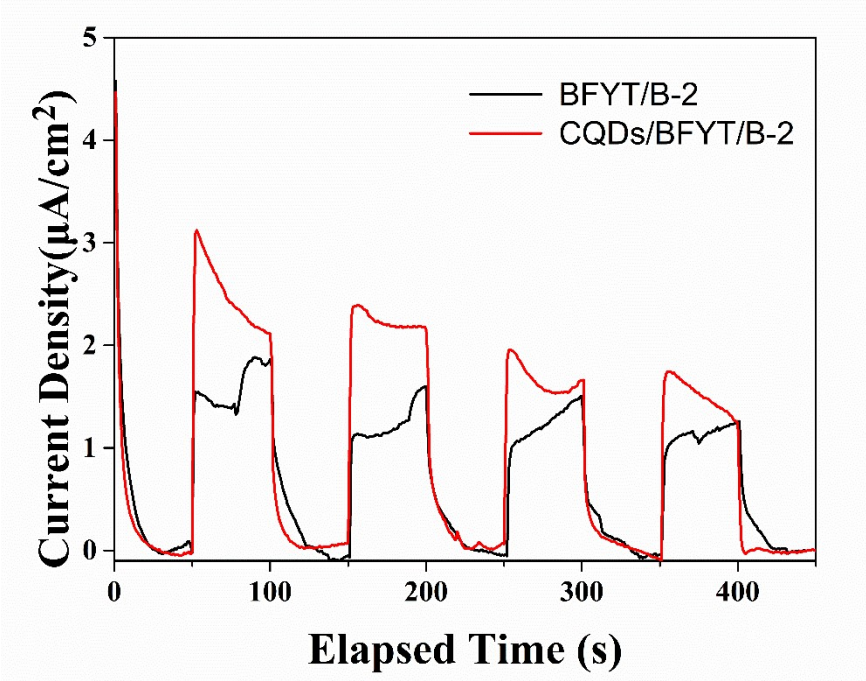

Fig. S4 Transient photocurrent response of the CQDs/BFYT/B-2 sample

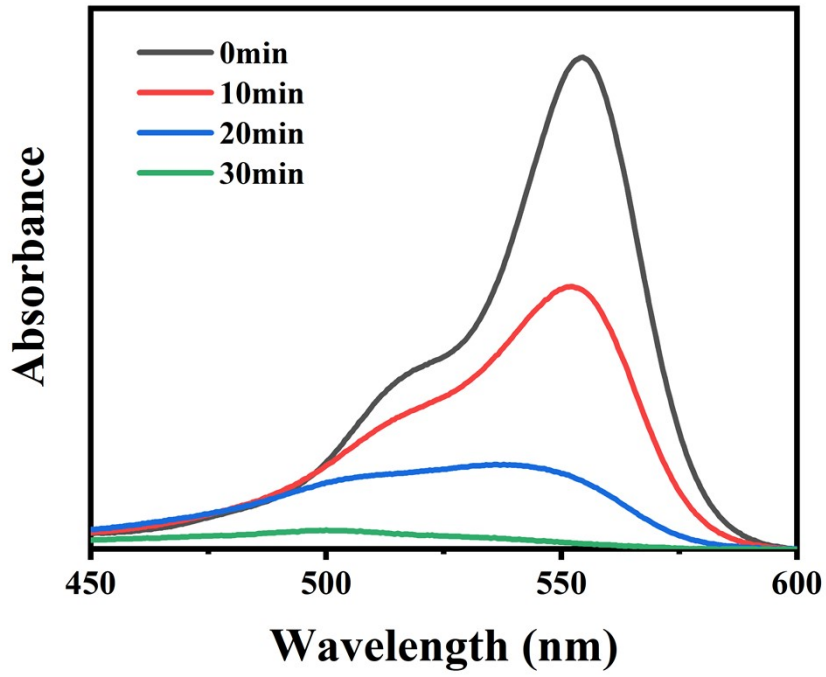

Fig. S5 Absorbance spectra of RhB in BF/BYT sample

Table

Table S1. Pseudo-first order rate constants for RhB degradation under NIR irradiation in different photocatalysts.

Sample	*k* (h^{-1})	R^2
CQDs/BFYT/B-2	0.09763	0.99692
BFYT/B-2	0.0911	0.98885
BFYT/BYT	0.04087	0.97632
Bi_2MoO_6：Tm^{3+}/Yb^{3+}	0.04253	0.99302
BF/BYT	0.0115	0.86787
BFYT	0.00754	0.98116