Supporting Information

Upconversion assisted BiOI/$ZnWO_4$: Er^{3+}, Tm^{3+}, Yb^{3+} heterostructures with enhanced visible and near-infrared photocatalytic activities

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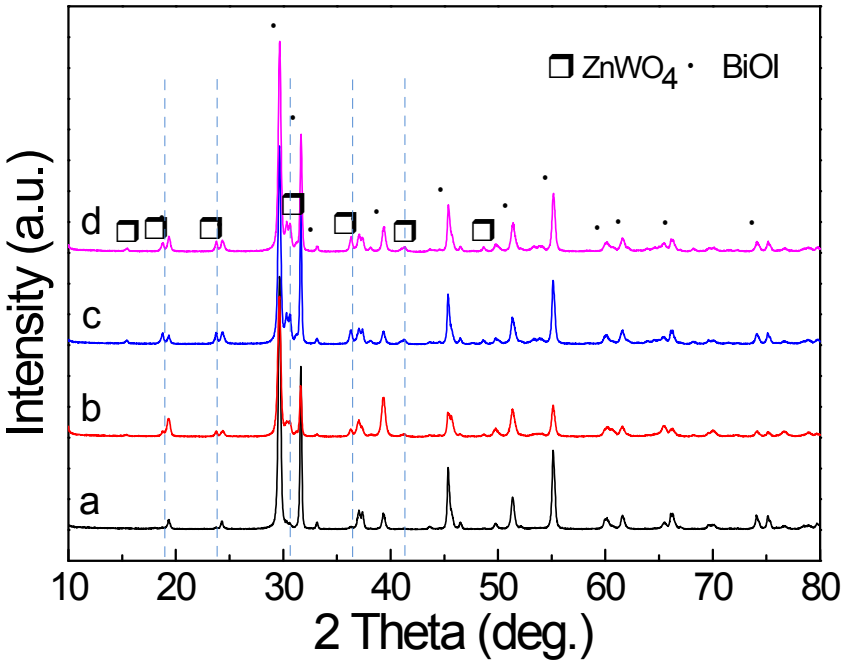

Fig. S1 XRD patterns of (a) BOI/10%ZWOETY (BOI/ZWOETY), (b) BOI/30%ZWOETY, (c) BOI/50%ZWOETY, and (d) BOI/70%ZWOETY.

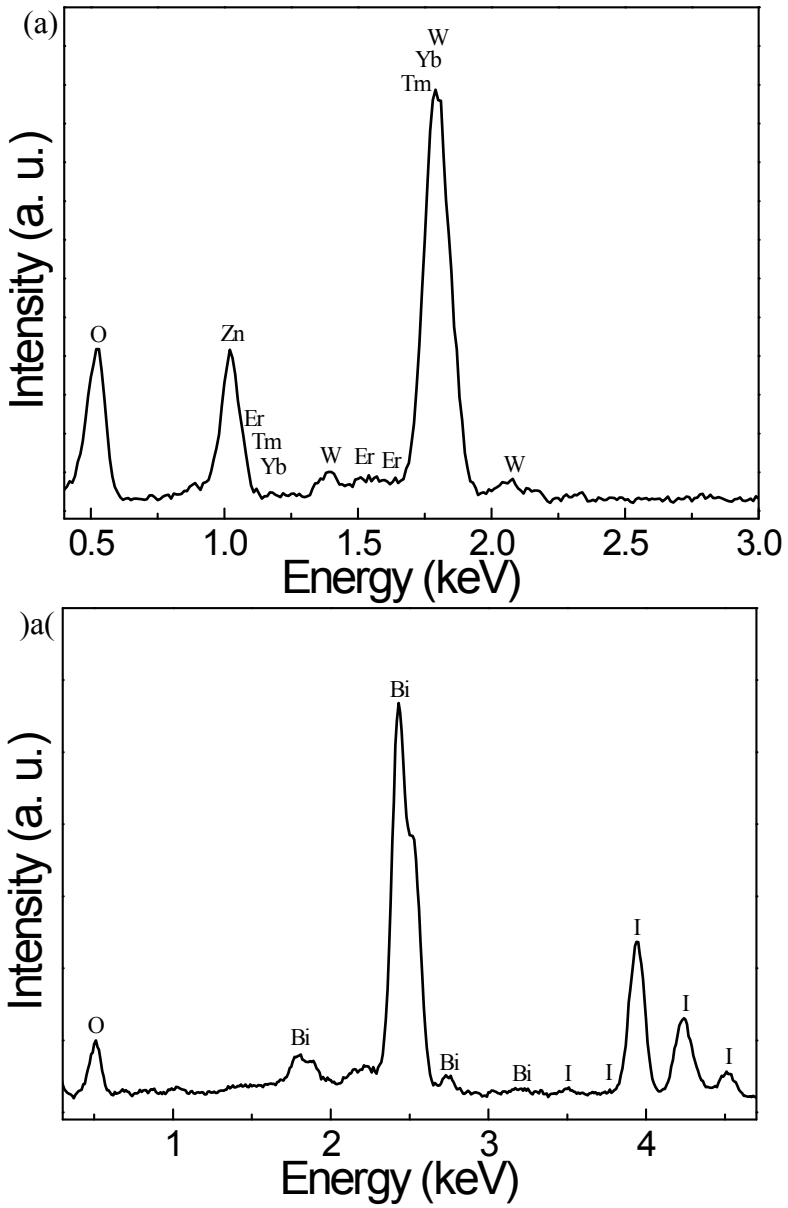

Fig. S2 EDS spectra of (a) ZWOETY and (b) pure BOI.

Table S1 Chemical element contents of the samples obtained from EDS.

Samples	Element contents (Atomic %) from EDS							
	Zn	Yb	Er	Tm	Bi	I	W	O
ZWOETY	28.66	2.12	0.21	0.24	-	-	11.29	57.48
BOI	-	-	-	-	24.75	25.10	-	50.15
BOI/ZWOETY	1.18	0.12	0.02	0.02	12.36	11.33	1.14	73.83

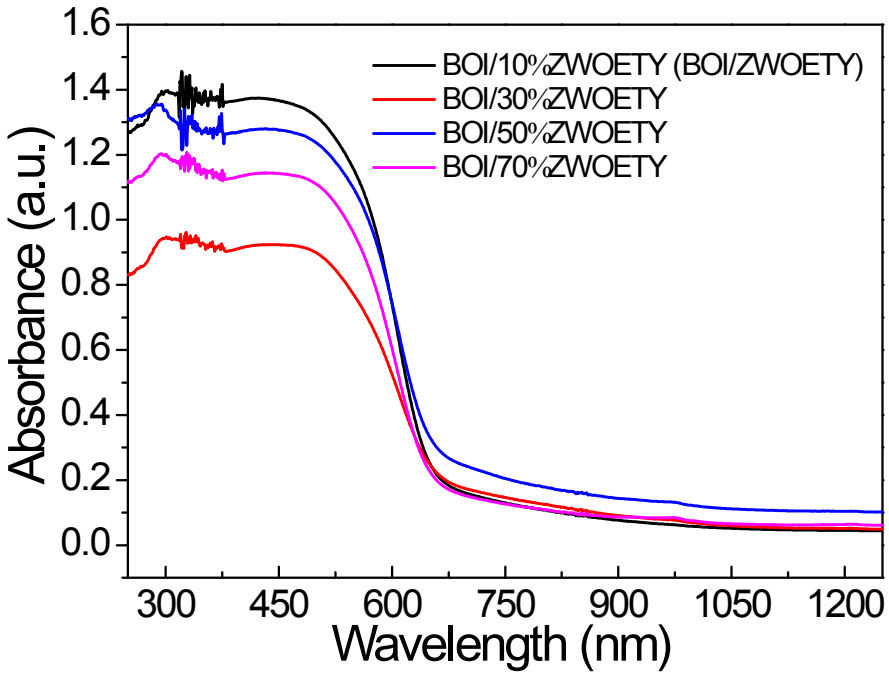

Fig. S3 UV-Vis-NIR diffuse reflectance spectra of BOI/10%ZWOETY (BOI/ZWOETY), BOI/30%ZWOETY, BOI/50%ZWOETY, and BOI/70%ZWOETY.

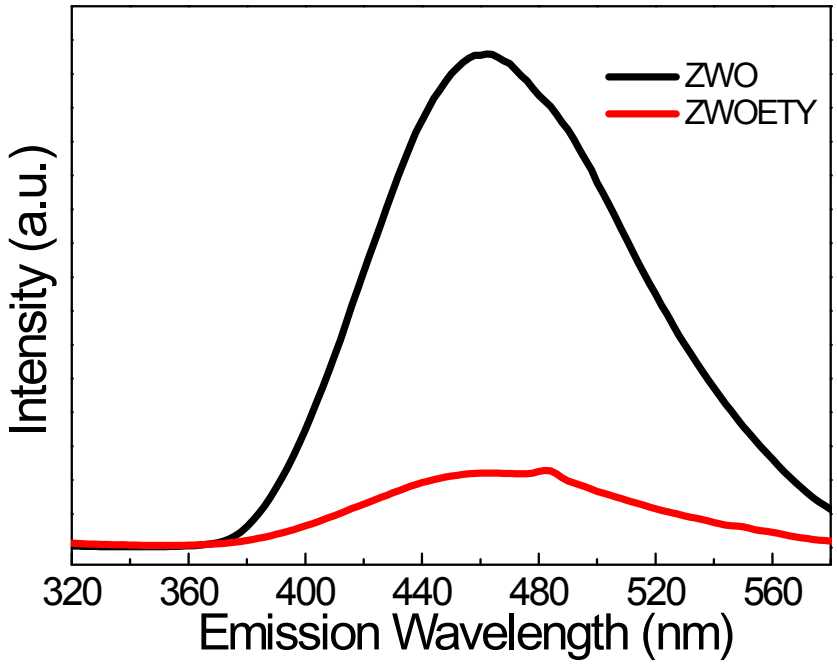

Fig. S4 PL emission spectra of pure ZWO and ZWOETY excited at 300 nm at room temperature.

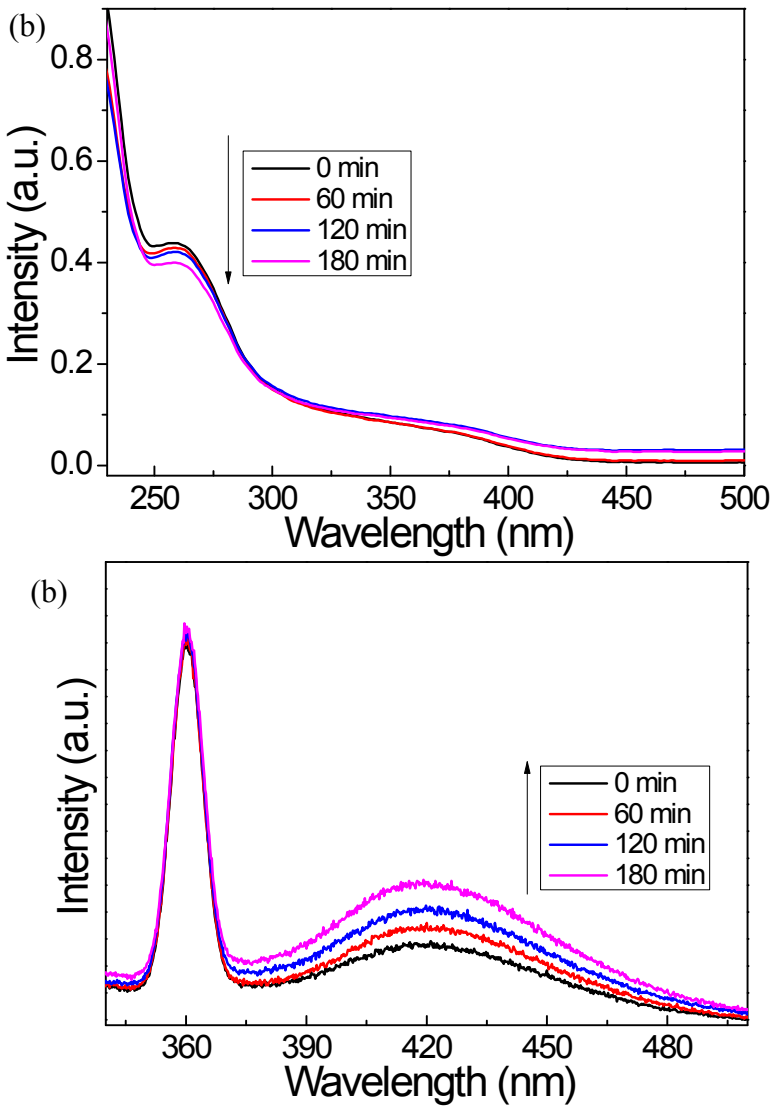

Fig. S5 (a) Time-dependent absorption spectra of NBT for BOI/ZWOETY under Vis-NIR light irradiation ($\lambda \geq 400$ nm) provided by a 1000 W high pressure mercury lamp. (b) Time-dependent fluorescence spectra of the terephthalic acid solution over BOI/ZWOETY under Vis-NIR light irradiation ($\lambda \geq 400$ nm) provided by a 1000 W high pressure mercury lamp.

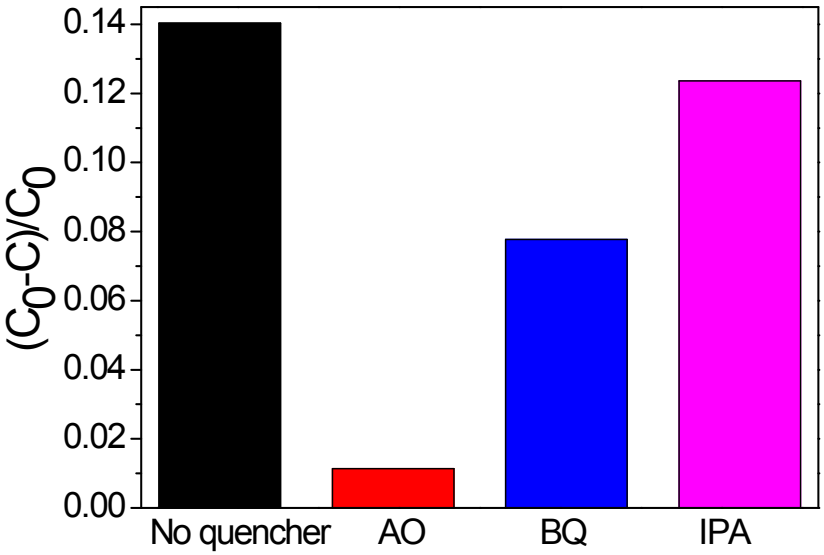

Fig. S6 The effects of different scavengers (AO, BQ, and IPA) on the photocatalytic degradation of SA over BOI/ZWOETY with 30 min Vis-NIR light irradiation ($\lambda \geq$ 400 nm) provided by a 1000 W high pressure mercury lamp.