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Supporting information

Preparation of network-like ZnO/$FeWO_4$ mesoporous heterojunctions with tunable band gaps and their enhanced visible light photocatalytic performance

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Photocatalysts	$FeWO_4$	0.5Zn/ $FeWO_4$	1Zn/ $FeWO_4$	1.5Zn/ $FeWO_4$	2Zn/ $FeWO_4$
S_{BET} (m^2 g^{-1})	15.15	14.45	53.32	22.04	24.29
Average pore size (nm)	3.359	3.271	22.25	26.32	34.68

Table S1 Summary of BET surface areas and pore size of the prepared photocatalysts.

Sample	$FeWO_4$	0.5Zn/$FeWO_4$	1Zn/$FeWO_4$	1.5Zn/$FeWO_4$	2Zn/$FeWO_4$	ZnO
Degradation (%)	11	30	56	87	48	23
rate constant (min^{-1})	0.0002	0.0008	0.0012	0.0058	0.0015	0.0006
E_g (eV)	2.1	2.25	2.5	2.9	3.1	3.2
$FeWO_4$ Size (nm)	_	11	7	5	4	_

Table S2 Textural properties of $FeWO_4$, ZnO, and Zn/$FeWO_4$ heterojunctions

Semiconductor	Absolute electronegativity(X)	energy band gap E_g (eV)	Conduction band edge (eV)	Valence band edge (eV)
$FeWO_4$	6.31	2.1	0.76	2.86
ZnO	5.7	3.2	-0.40	2.80

Table S3 Absolute electronegativity, estimated band gap (Eg), conduction band edge and valence band for ZnO and $FeWO_4$

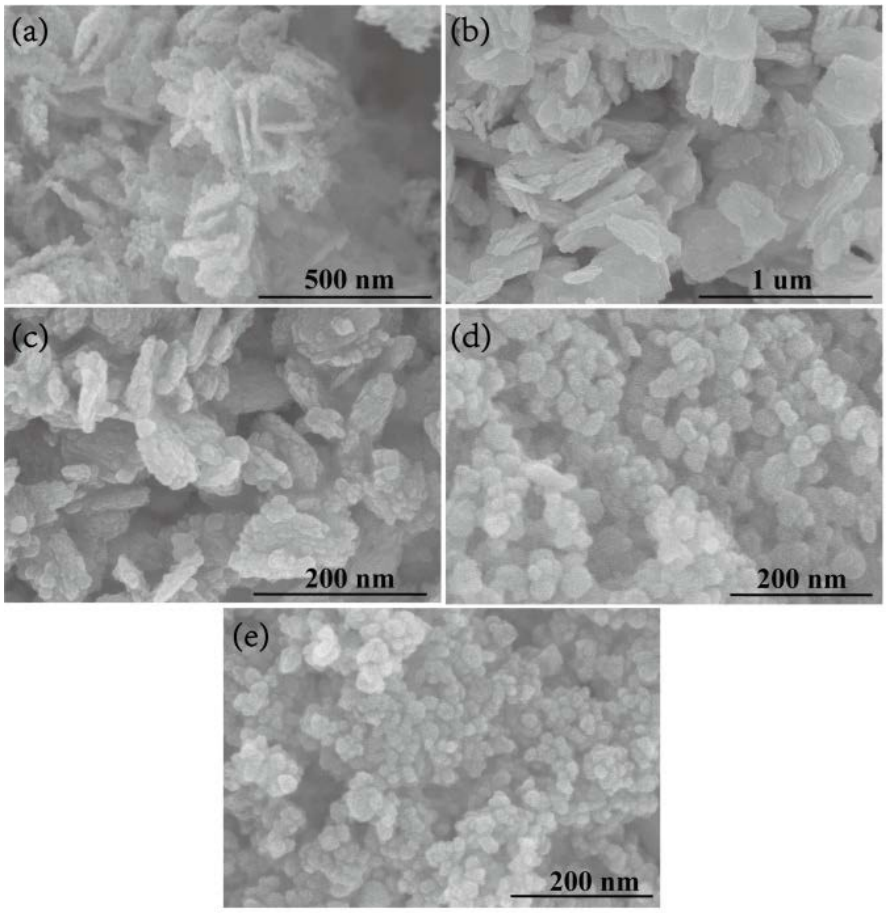

Fig. S1 SEM images of the prepared products: (a) ZnO, (b) $FeWO_4$, (c) 0.5Zn/$FeWO_4$, (d) 1Zn/$FeWO_4$ and (e) 2Zn/$FeWO_4$.

As shown in Fig. S1a, the ZnO samples consisted of nanosized particles. Besides, the pure $FeWO_4$ sample is consisted of large numbers of irregular plates with coarse surfaces (Fig. S1b). It can be seen from Fig. S2c, the whole morphology of the 0.5Zn/$FeWO_4$ product was similar to that of pure $FeWO_4$. However, with further adding of ZnO, the morphology of Zn/$FeWO_4$ sample has nanosphere morphology (Fig. S1c-e).

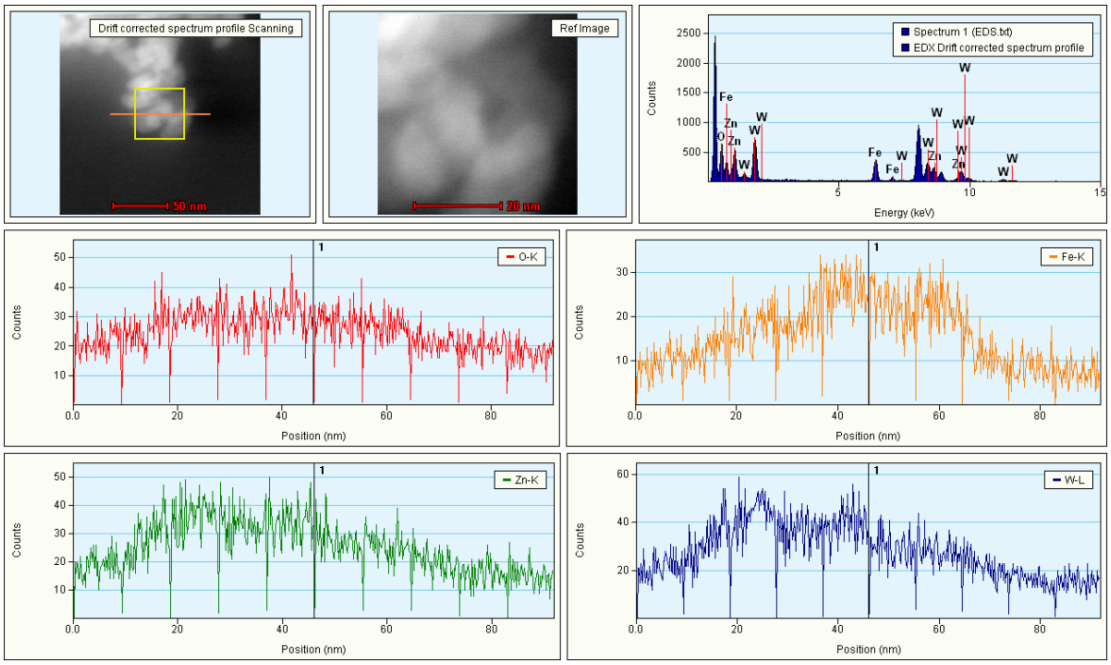

Fig. S2 The cross-sectional compositional line profiles of the 1.5Zn/FeWO4 heterojunction.

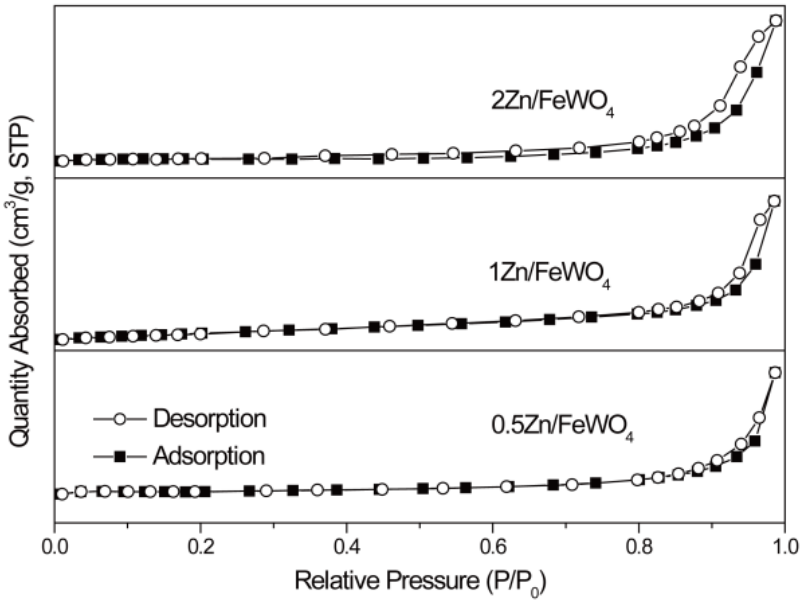

Fig. S3 N_2 adsorption-desorption isotherms of the 0.5Zn/$FeWO_4$, 1Zn/$FeWO_4$ and 2Zn/$FeWO_4$ heterojunctions.

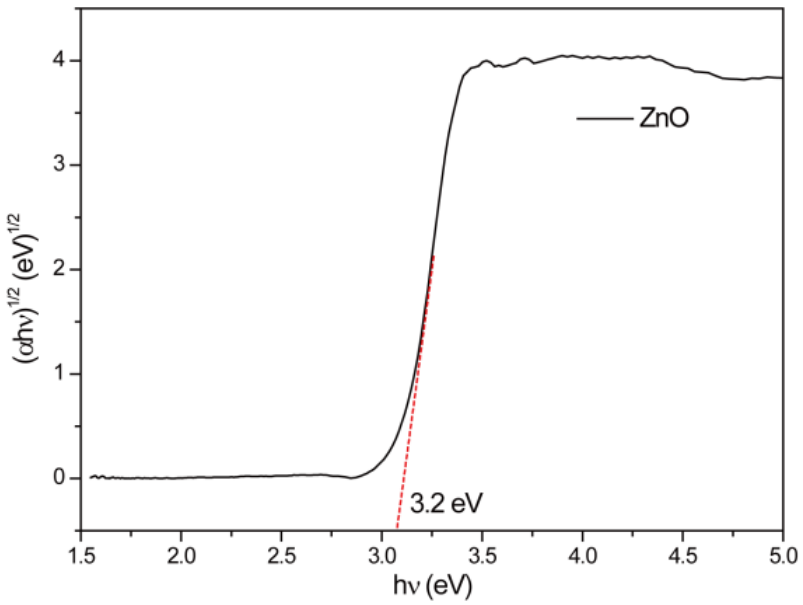

Fig. S4 The plot of $(\alpha h\nu)^{1/2}$ versus (hv) for the as-prepared ZnO.

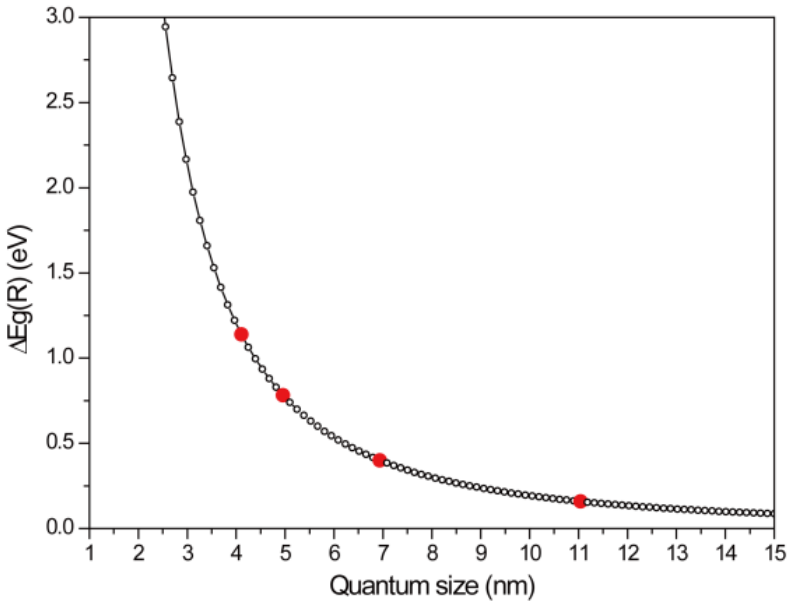

Fig. S5 The relationship between band gap shift ΔEg(R) and the crystal radius R.

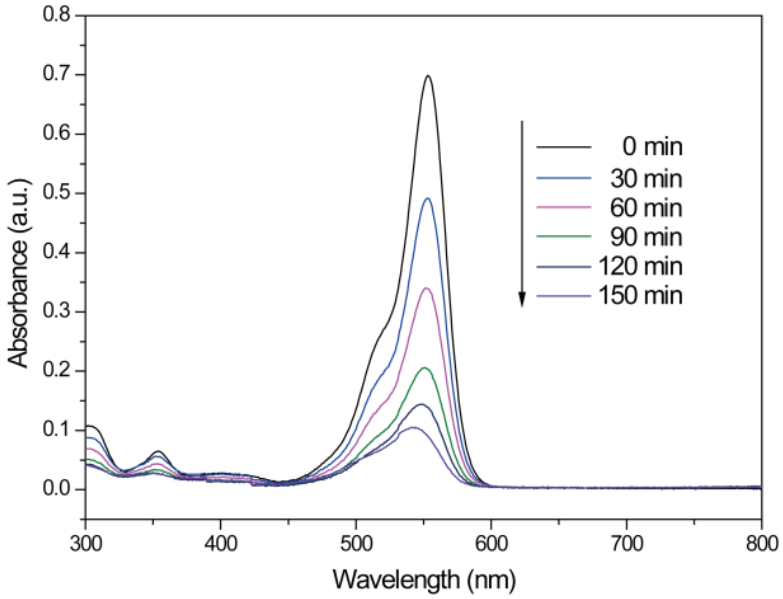

Fig. S6 The absorption spectra of the RhB solution in the presence of 1.5Zn/$FeWO_4$ photocatalyst under exposure to visible light (λ≥420 nm).

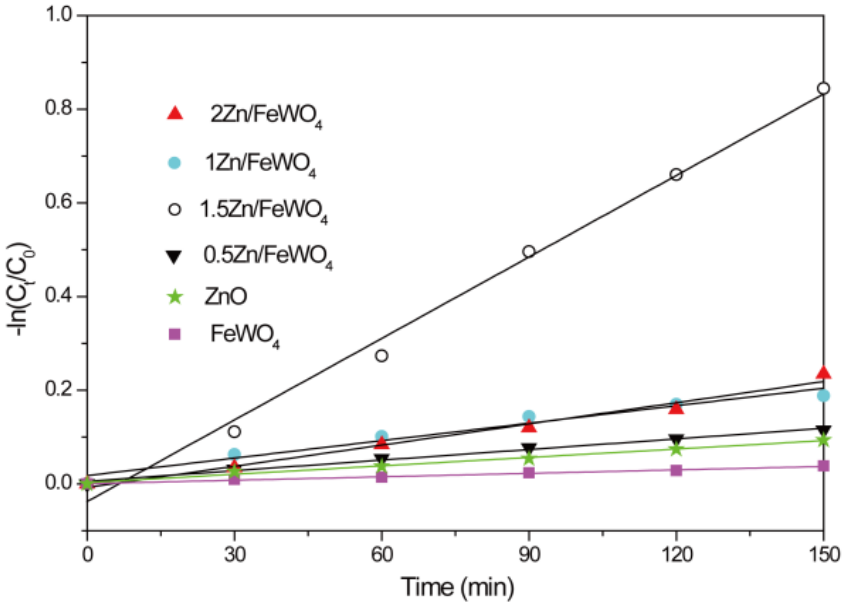

Fig. S7 Pseudo-first-order kinetics of the prepared photocatalysts.

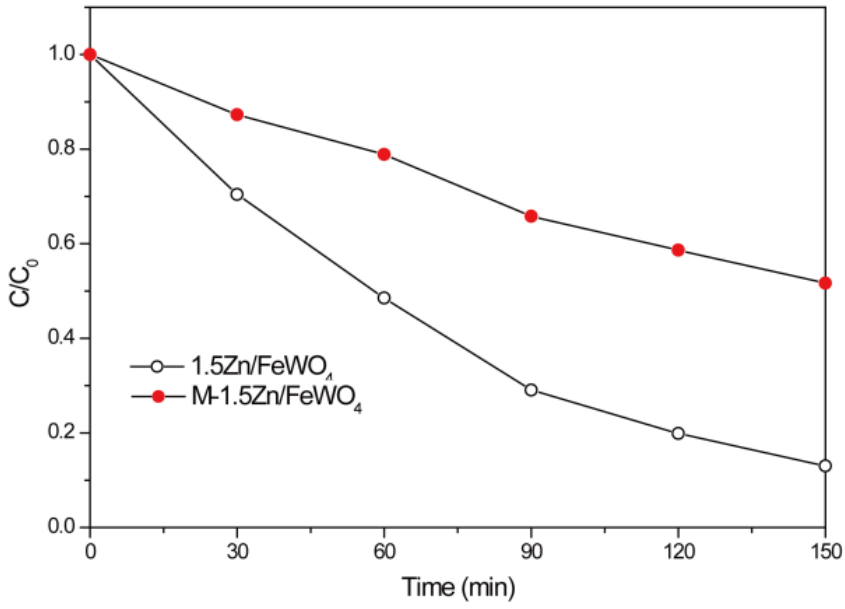

Fig.S8 The comparison of photocatalytic degradation of RhB over 1.5Zn/$FeWO_4$ and M-1.5Zn/$FeWO_4$.