Supplementary materials

A visible and near-infrared driven Yb^{3+}/Tm^{3+} co-doped $InVO_4$ nanosheets for highly efficient photocatalytic applications

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Table S1 Band gap energies of the obtained samples

Samples	Band gap (E_g/eV)	Samples	Band gap (E_g/eV)
IV	2.070	0.5YT-IV	1.955
2.5 YT-IV	1.945	5 YT-IV	1.953
10 YT-IV	1.964	20 YT-IV	1.952

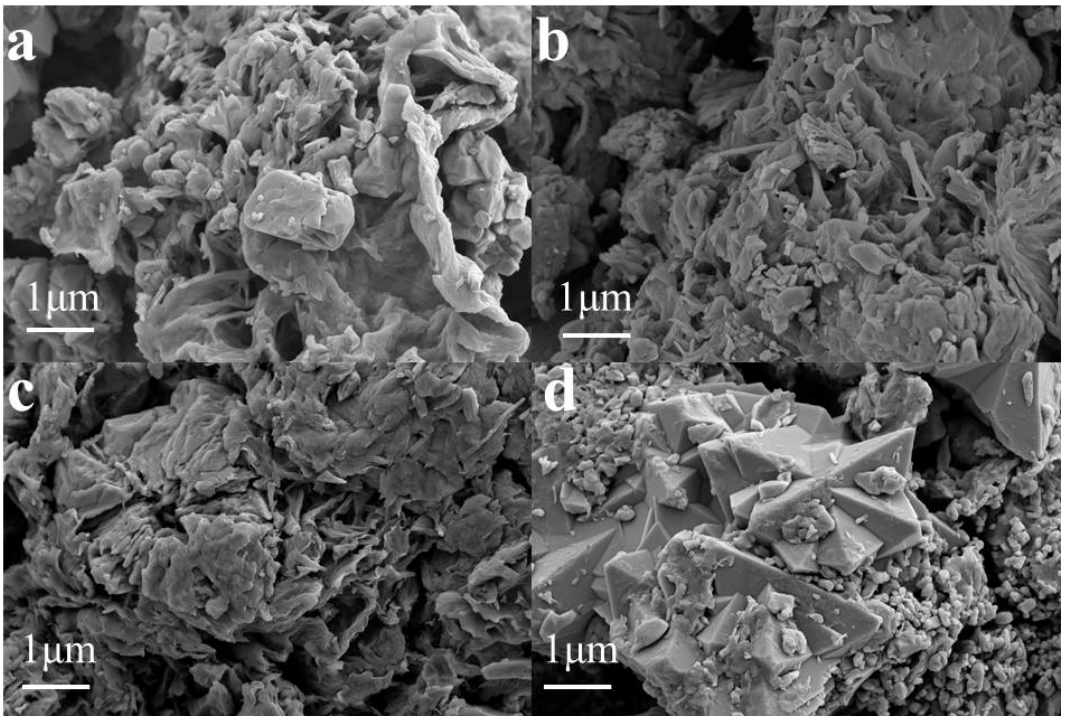

Fig. S1 SEM images of 0.5YT-IV (a), 2.5 YT-IV (b), 10 YT-IV (c) and 20YT-IV (d) samples.

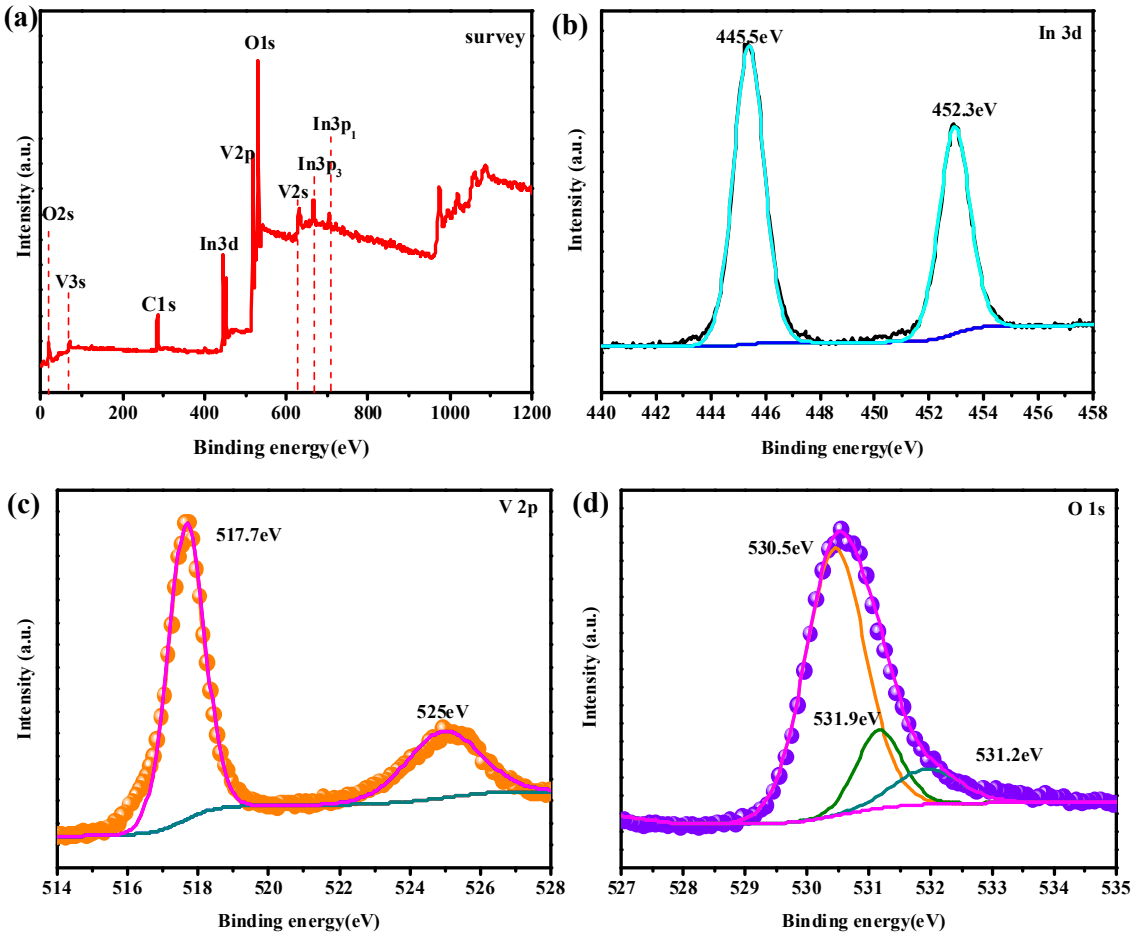

Fig. S2 XPS spectra of IV nanosheets: (a) Survey, (b) In 3d, (c) V 2p, (d) O 1s.

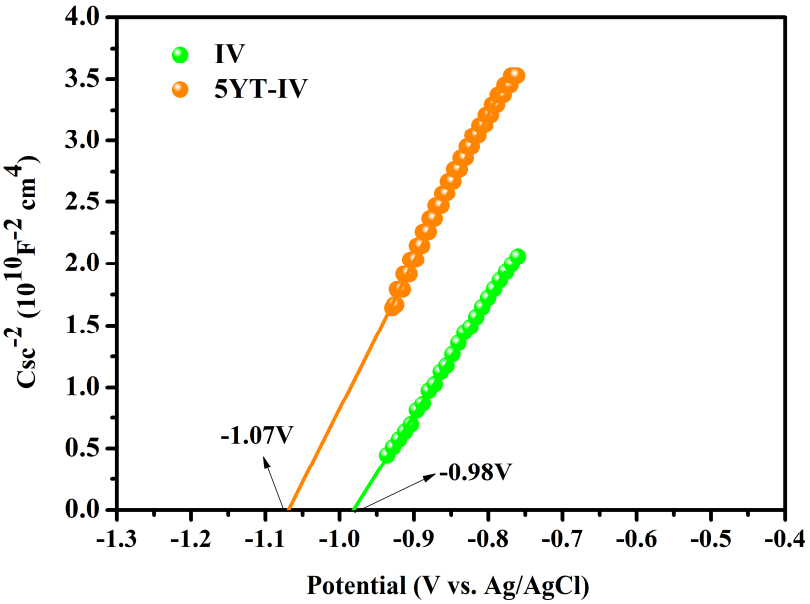

Fig. S3 Mott–Schottky plots of bare IV and 5YT-IV samples.

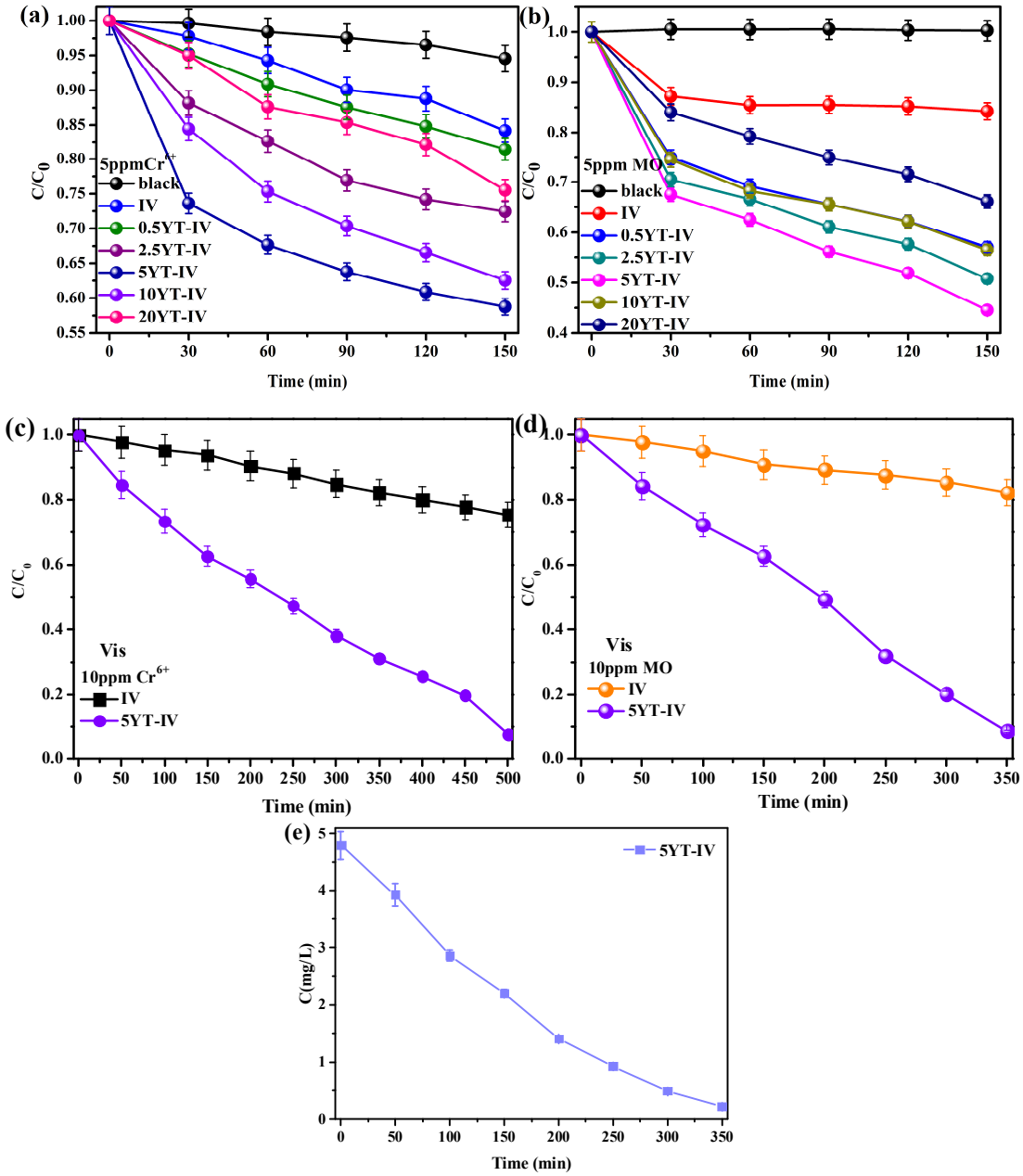

Fig. S4 The photocatalytic performance of 5 ppm (a) and 10 ppm (c) Cr(VI) reduction as well as 5 ppm (b) and 10 ppm (d) MO degradation under visible light irradiation; Plot of the change of TOC of MO as the time over 5YT-IV sample (e).

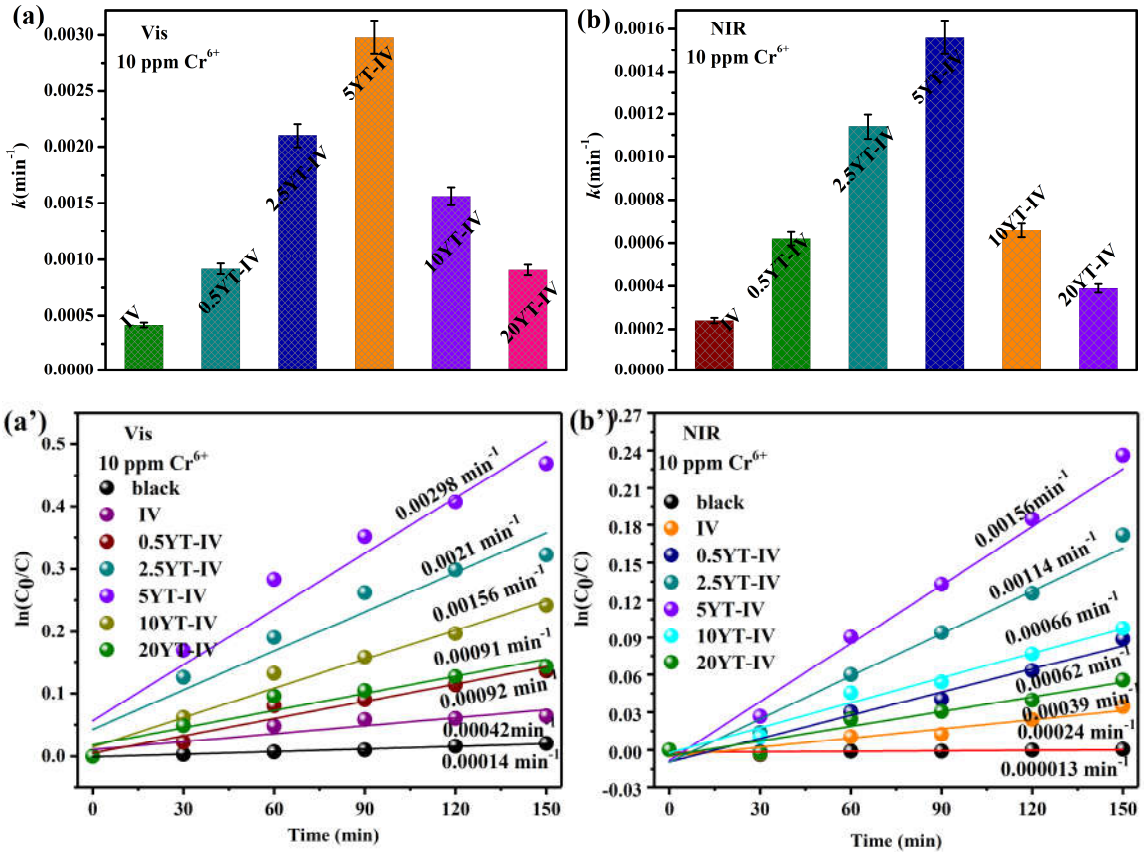

Fig. S5 The reaction rate constant (a and b) and first–order–kinetics (a' and b') of Cr(VI) reduction over as-synthesized YT-IV photocatalysts under visible and NIR light irradiation.

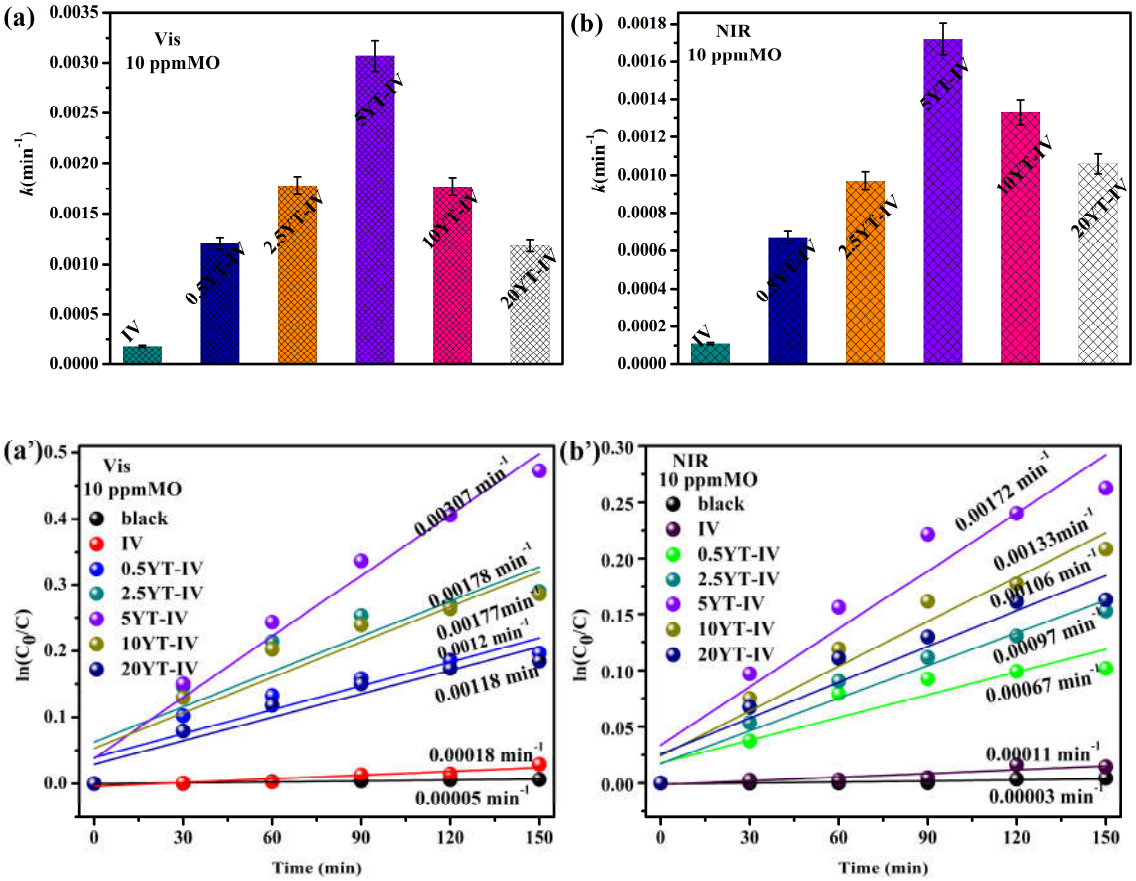

Fig. S6 The reaction rate constant (a and b) and first–order–kinetics (a' and b') of MO degradation over as-synthesized YT-IV photocatalysts under visible and NIR light irradiation.

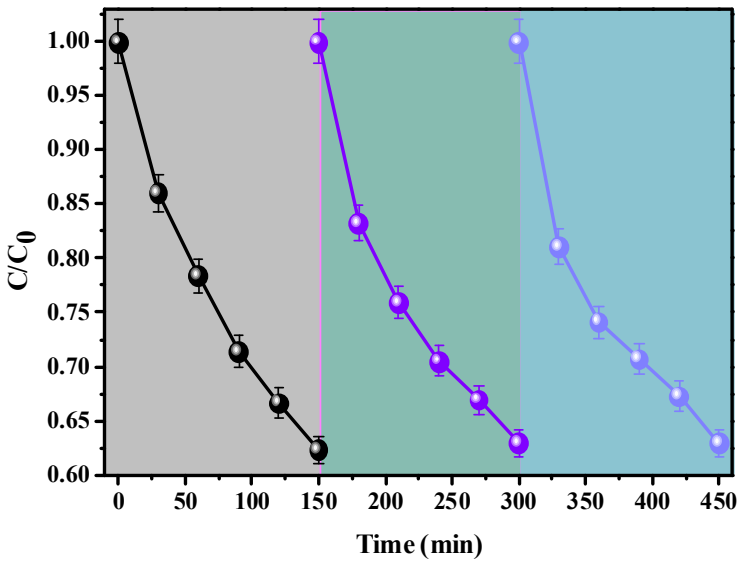

Fig. S7 The photocatalytic stability for the recycling reaction for the MO degradation over 5YT-IV.

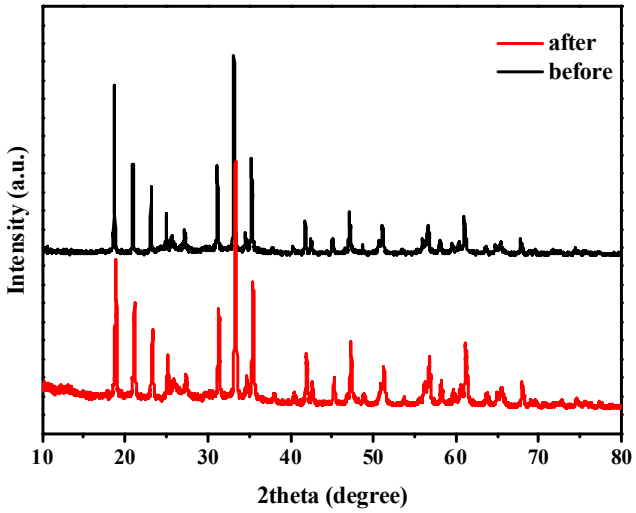

Fig. S8 The comparison of the XRD patterns of before and after used 5YT-IV samples.

Table S2 Comparison of dye degradation between our material and similar reported Yb^{3+}/Tm^{3+} co-doped materials in the literature

Photocatalyst	Light source	Light source pollutant (mg/ mL)	Degradation rate/Time (min)	Ref
$BiOI/ZnWO_4:Er^{3+}$, Tm^{3+}, Yb^{3+}	NIR light	MO (40mg/10ppm)	15%/150	1
$BiVO_4/CaF_2:Er^{3+}$,Tm^{3+}, Yb^{3+}	NIR light	MO (20mg/10ppm)	4%/150	2
YF_3 :Yb^{3+},Tm^{3+}/TiO_2	NIR light	MB(0.5 mg/15ppm)	20.8%/150	3
$BiPO_4:Yb^{3+}$,$Tm^{3+}/BiVO_4$	NIR light	MB(30 mg/5ppm)	3.5%/150	4
β-$NaYF_4:Yb^{3+}$,Tm^{3+}@TiO_2	NIR light	MO(5 mg /20 ppm)	5% /150	5
Ti_3C_2-OH/Bi_2WO_6: Yb^{3+},Tm^{3+}	NIR light	RhB(10 mg/10 ppm)	30%/150	6
$InVO_4$: Yb, Tm	NIR light	MO(15 mg /10 ppm)	21.3%/150	**This work**

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