

Supplementary Information

Enhanced visible light photocatalytic performance of Er, Mn co-doped monoclinic BiVO₄ for efficient organic pollutant degradation

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Table S1 Cell parameters, cell volume, Raman frequency, and bond length of photocatalysts.

Sample	Cell parameters			Cell volume (Å ³)	Raman frequency (cm ⁻¹)	Bond length V- O (Å)
	<i>a</i> (Å)	<i>b</i> (Å)	<i>c</i> (Å)			
BiVO ₄	5.199	11.72	5.107	310.75	828.3	1.695
Er _{6%} /BiVO ₄	5.191	11.71	5.105	310.36	810.8	1.706
Mn _{6%} /BiVO ₄	5.186	11.71	5.106	310.12	826.6	1.696
Er _{6%} Mn _{2%} /BiVO ₄	5.187	11.71	5.099	310.37	812.3	1.705

Table S2 Specific surface area, pore volume, and average pore size of photocatalysts.

Sample	Specific surface area (m ² /g)	Pore volume (cm ³ /g)	Average pore size (nm)
BiVO ₄	1.39	0.0046	14.9
Er _{6%} /BiVO ₄	1.93	0.0071	13.2
Mn _{6%} /BiVO ₄	1.68	0.0053	14.6
Er _{6%} Mn _{2%} /BiVO ₄	2.53	0.0094	12.5

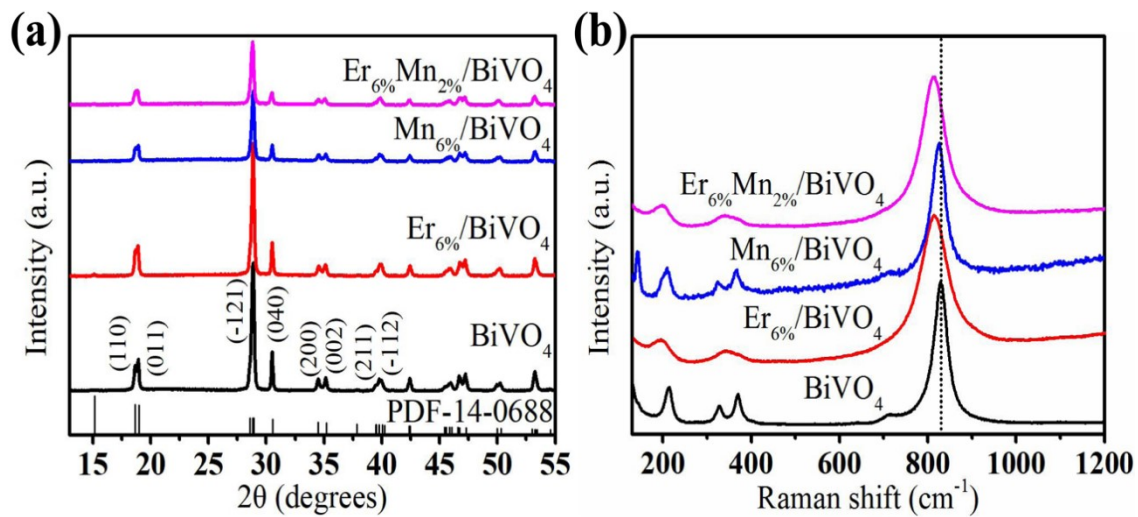


Fig. S1. XRD curves (a) and Raman spectra (b) of BiVO_4 , $\text{Er}_{6\%}/\text{BiVO}_4$, $\text{Mn}_{6\%}/\text{BiVO}_4$, and $\text{Er}_{6\%}\text{Mn}_{2\%}/\text{BiVO}_4$.

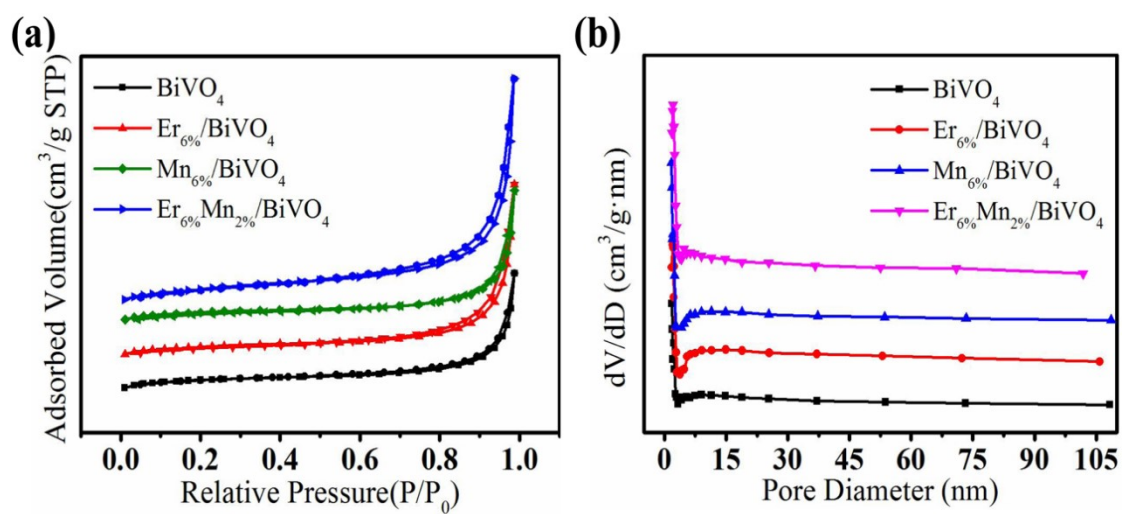


Fig. S2. N_2 adsorption-desorption curves (a) and pore size distribution curves (b) of BiVO_4 , $\text{Er}_{6\%}/\text{BiVO}_4$, $\text{Mn}_{6\%}/\text{BiVO}_4$, and $\text{Er}_{6\%}\text{Mn}_{2\%}/\text{BiVO}_4$.

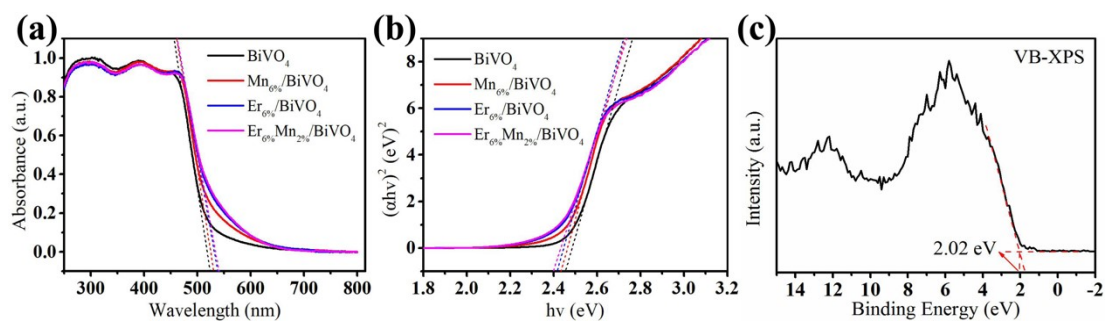


Fig. S3. UV-vis DRS (a) and the curves of $(\alpha h\nu)^2$ versus $(h\nu)$ (b) of BiVO₄, Er_{6%}/BiVO₄, Mn_{6%}/BiVO₄, and Er_{6%}Mn_{2%}/BiVO₄. (c) XPS-VB energy spectrum of Er_{6%}Mn_{2%}/BiVO₄.

Table S3 Comparison of properties of different doped BiVO₄-based photocatalysts.

Photocatalyst	Pollutant	Concentration (mg/L)	Light Source	Time (min)	Degradation (%)	Refs
Br/BiVO ₄	RhB	10	Visible	240	76.9	1
C/BiVO ₄	RhB	10	Visible	120	82	2
Bi/BiVO ₄	RhB	10	Visible	360	85	3
Y/BiVO ₄	RhB	10	Visible	180	91	4
Er/BiVO ₄	RhB	10	Visible	180	88	4
Sm/BiVO ₄	RhB	10	Visible	180	97.7	5
Er- Mn/BiVO ₄	RhB	10	Visible	100	97.8	This work

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