

Supplementary Information

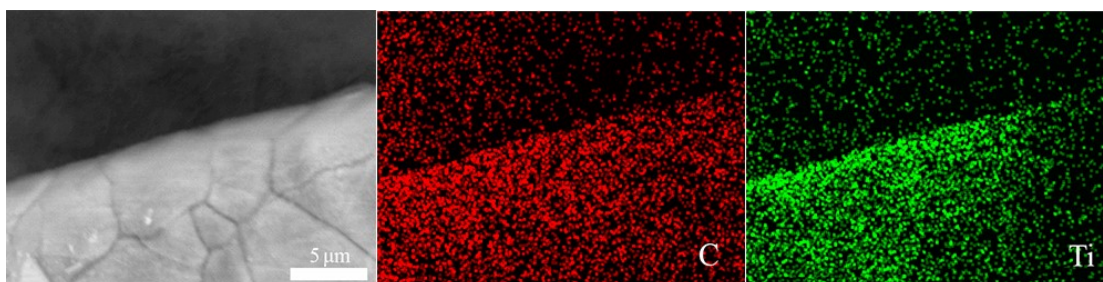


Fig. S1. Element mapping images of MXene/NF.

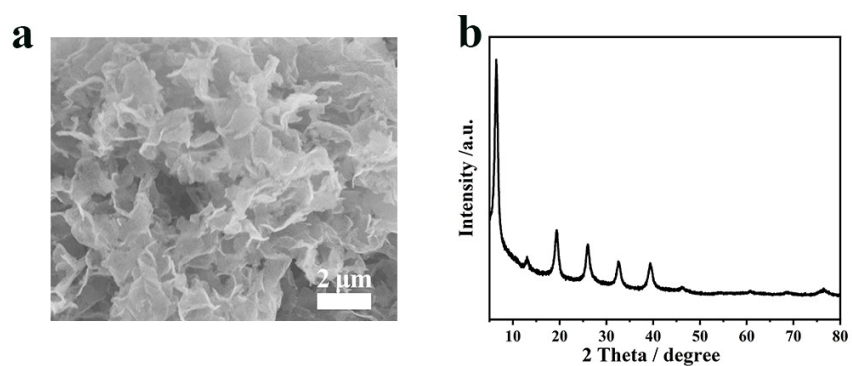


Fig. S2. (a) SEM image of MXene. (b) XRD spectrum of MXene.

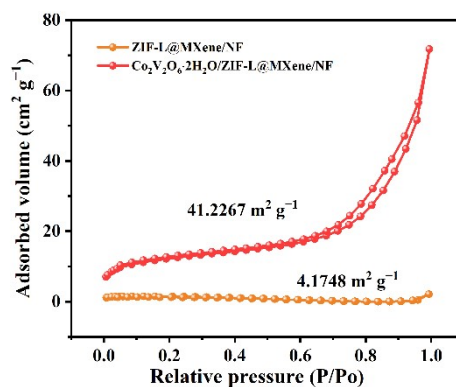


Fig. S3. Brunauer-Emmett-Teller isotherms of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L@MXene/NF}$ and ZIF-L@MXene/NF .

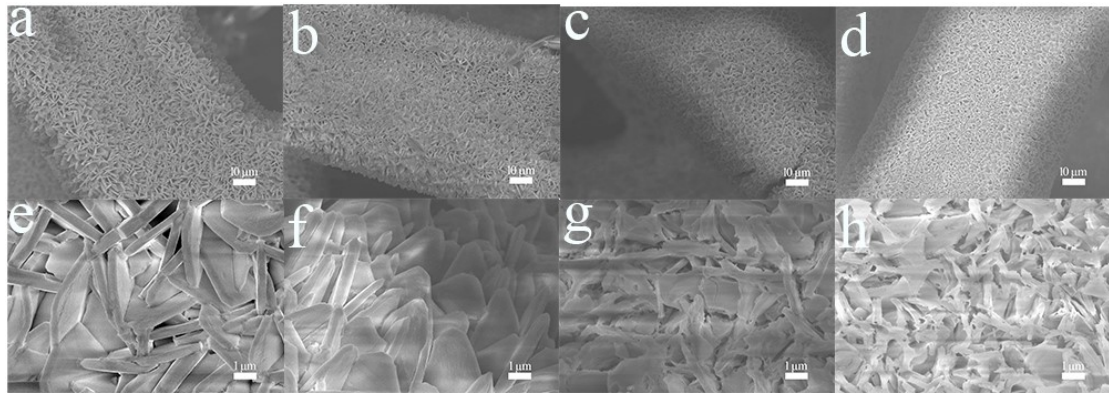


Fig. S4. SEM images of (a), (e) Co₂V₂O₆·2H₂O/ZIF-L@MXene/NF-5, (b), (f) Co₂V₂O₆·2H₂O/ZIF-L@MXene/NF, (c), (g) Co₂V₂O₆·2H₂O/ZIF-L@MXene/NF-15 and (d), (h) Co₂V₂O₆·2H₂O/ZIF-L@MXene/NF-20.

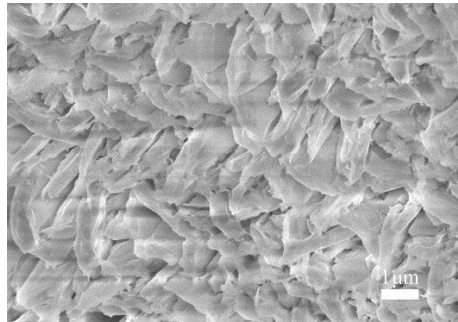


Fig. S5. SEM image of Co₂V₂O₆·2H₂O/ZIF-L/NF.

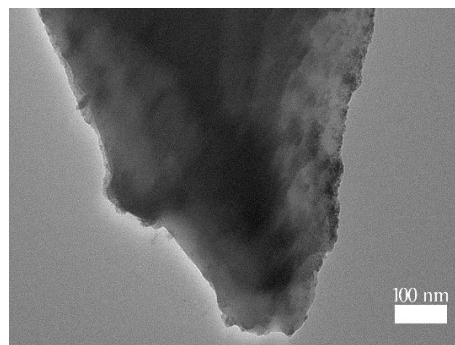


Fig. S6. TEM image of Co₂V₂O₆·2H₂O/ZIF-L@MXene/NF.

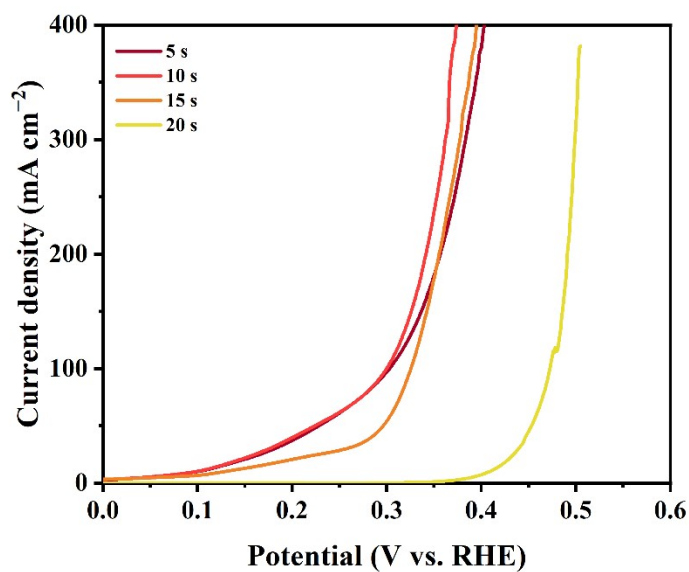


Fig. S7. OER performance: LSV polarization curves of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ obtained by 5 s, 10 s, 15 s and 20 s reaction times.

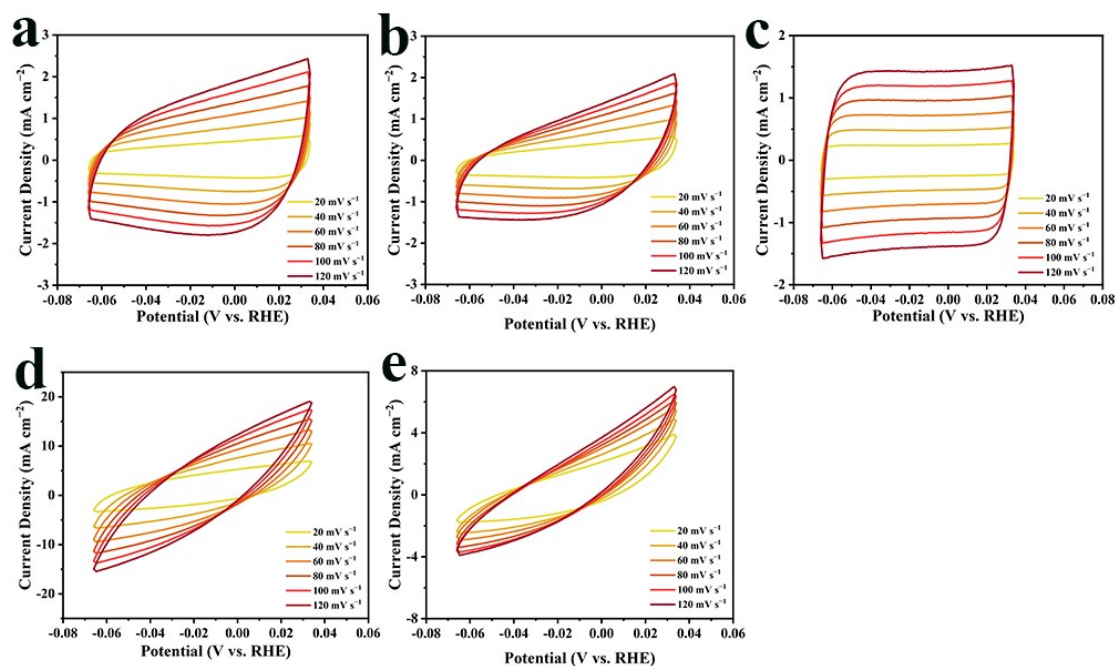


Fig. S8. OER performance: CV curves recorded at different scan rates within the non-Faradaic potential range for (a) NF, (b) MXene/NF, (c) ZIF-L@MXene/NF, (d) $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ and (e) $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}/\text{NF}$.

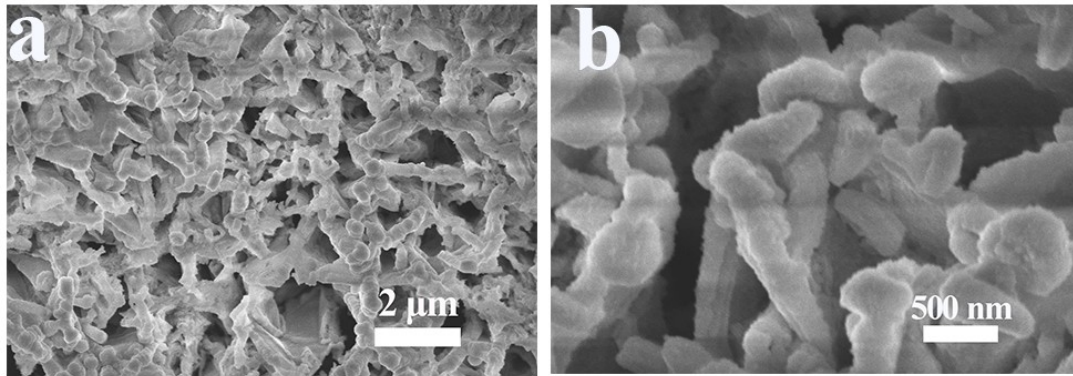


Fig. S9. SEM images of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L@MXene}/\text{NF}$ after OER 1000 CV cycles.

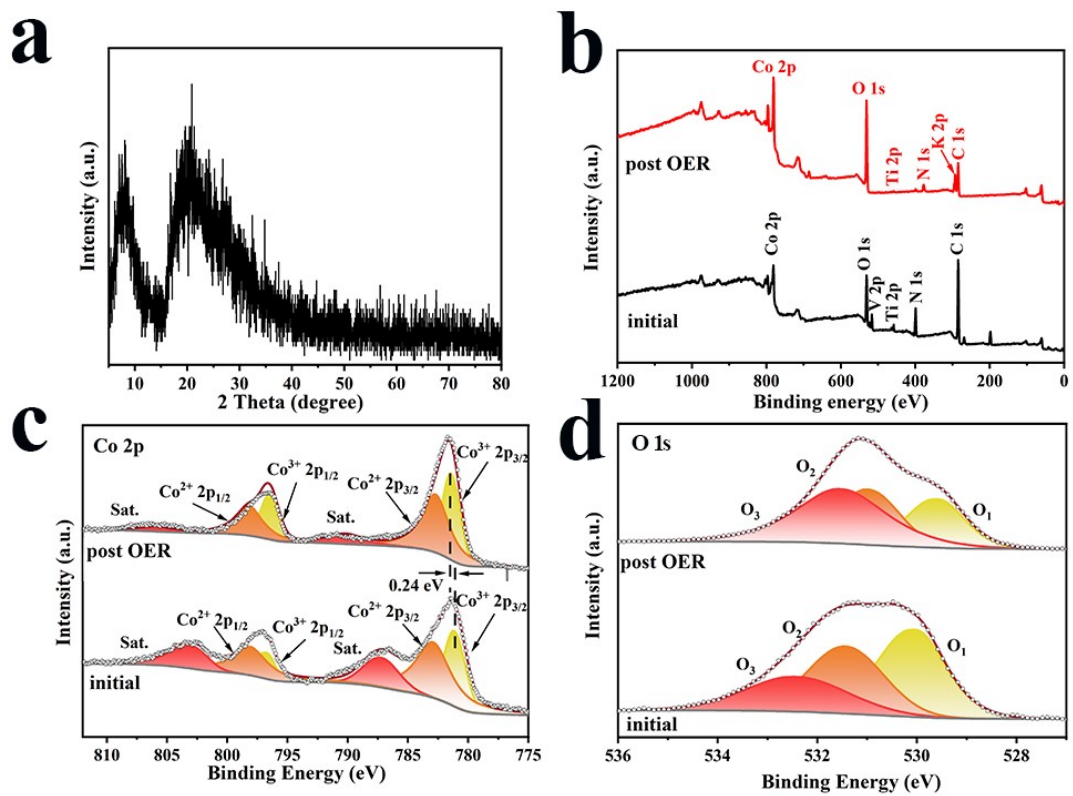


Fig. S10. (a) XRD spectrum of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L@MXene}/\text{NF}$ before and after 1000 cycles. (b) XPS survey spectra of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L@MXene}/\text{NF}$ before and after 1000 cycles. XPS spectra of (c) Co 2p and (d) O 1s of different catalysts before and after 1000 cycles.

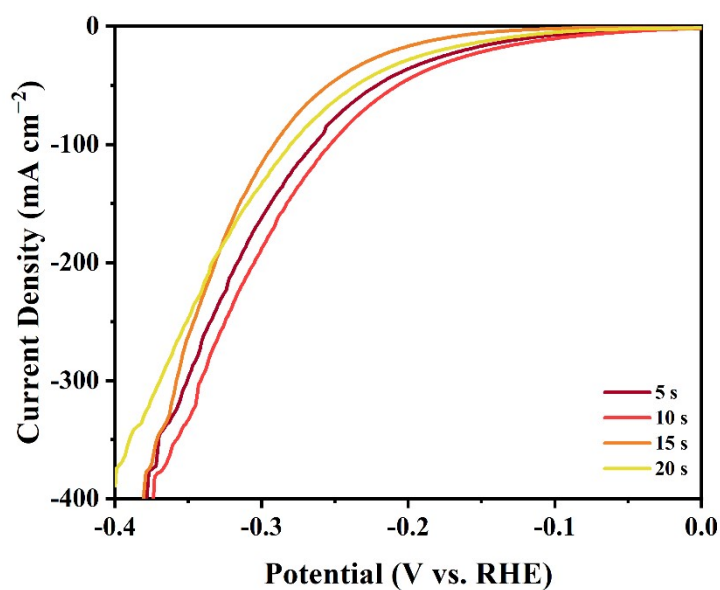


Fig. S11. HER performance: LSV polarization curves of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L@MXene}/\text{NF}$ obtained at 5 s, 10 s, 15 s and 20 s reaction times.

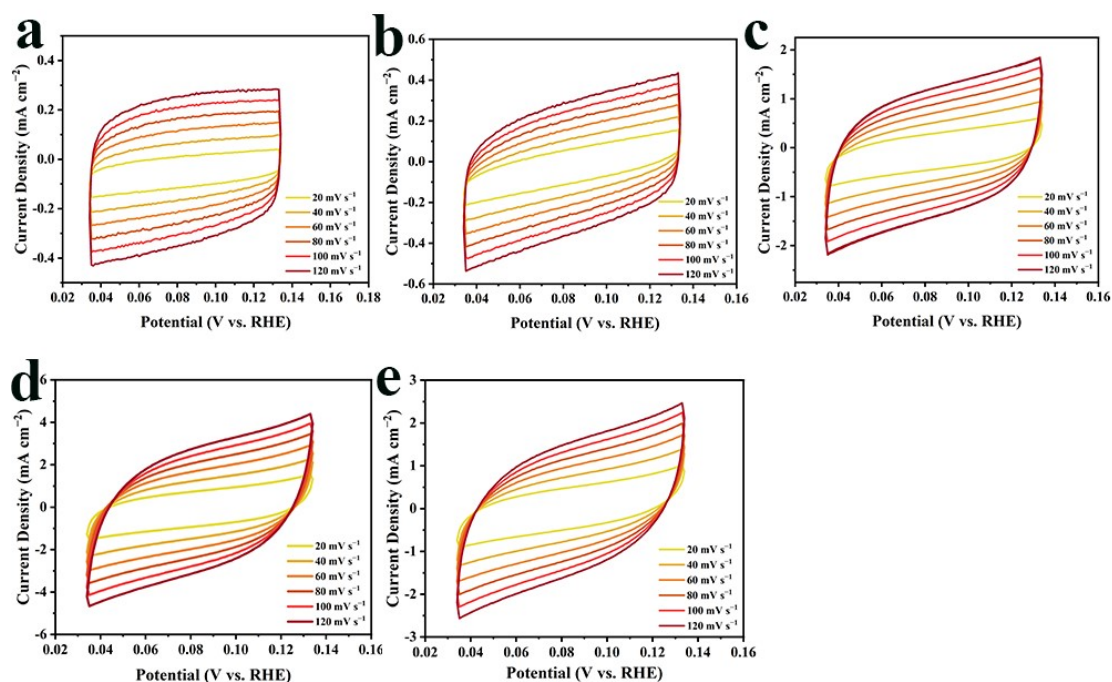


Fig. S12. HER performance: CV curves recorded at different scan rates within the non-Faradaic potential range for (a) NF, (b) MXene/NF, (c) ZIF-L@MXene/NF, (d) $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L@MXene}/\text{NF}$ and (e) $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}/\text{NF}$.

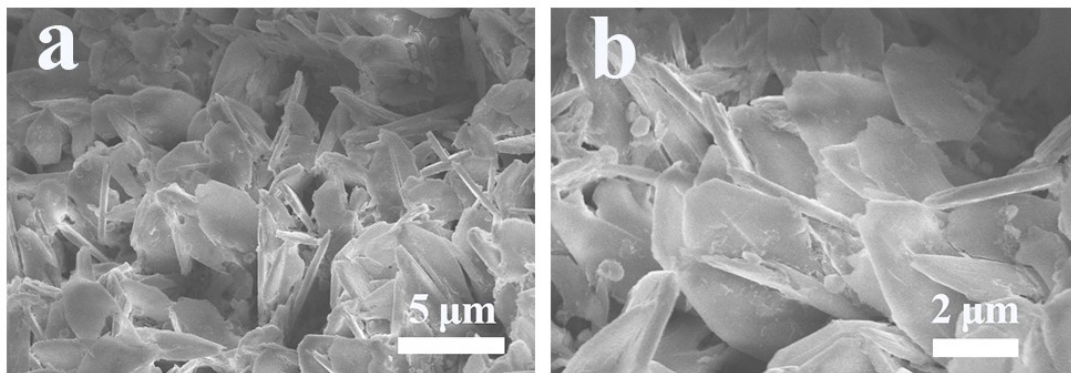


Fig. S13. SEM images of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ after HER 1000 CV cycles.

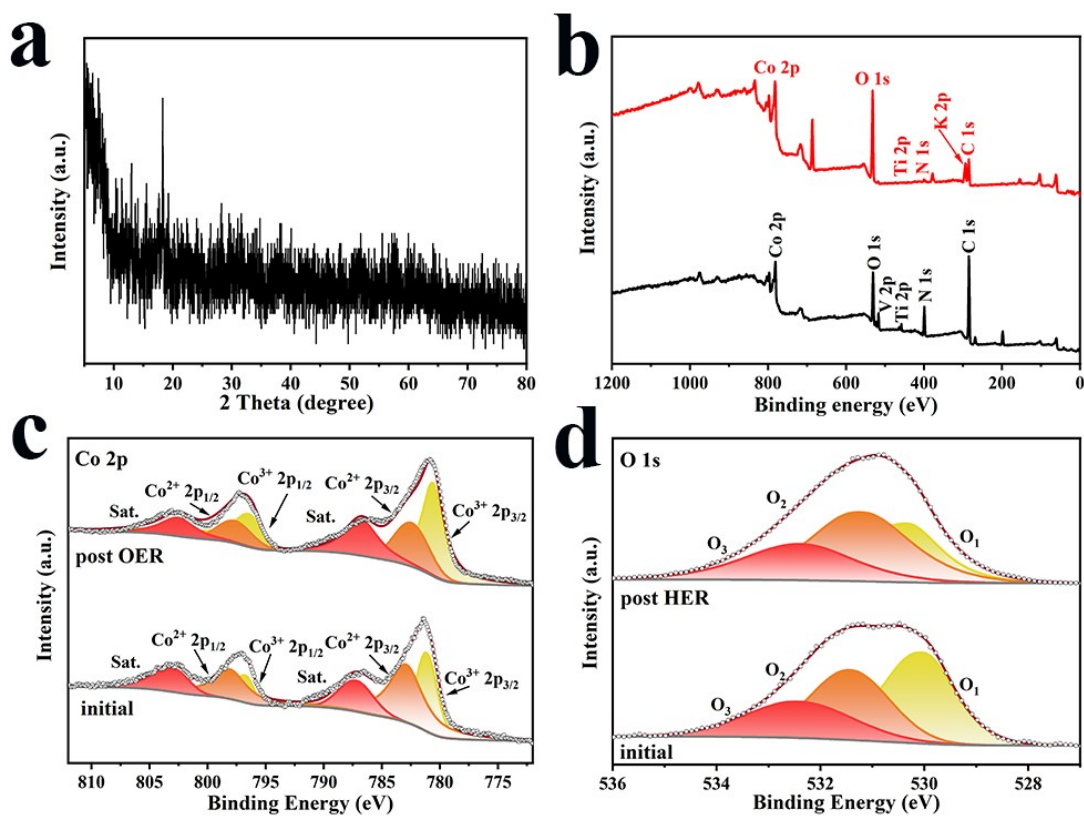


Fig. S14. (a) XRD spectrum of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ before and after HER 1000 cycles. (b) XPS survey spectra of $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ before and after HER 1000 cycles. XPS spectra of (c) Co 2p and (d) O 1s of different catalysts before and after HER 1000 cycles.

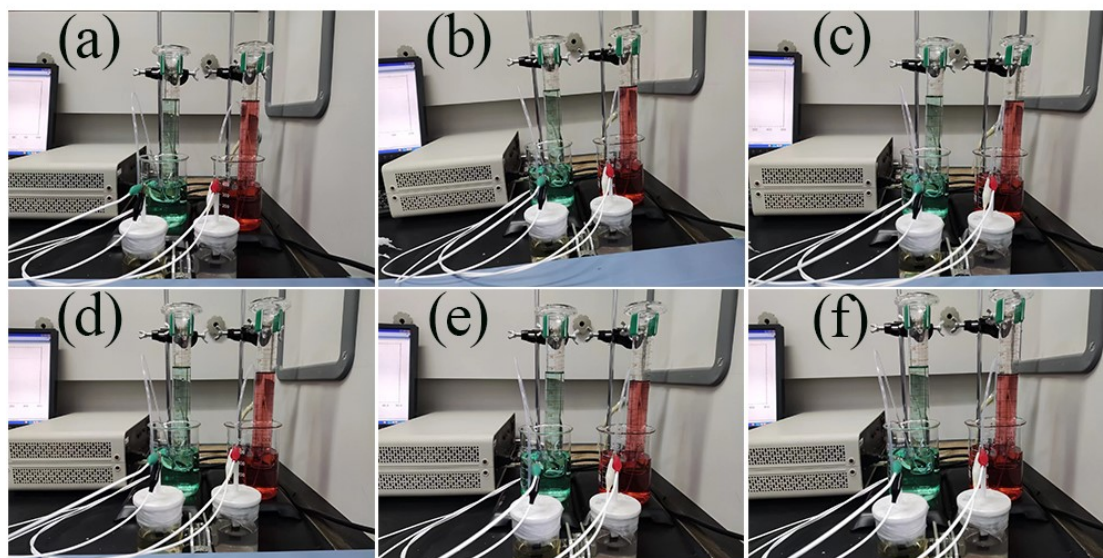


Fig. S15. Corresponding gas volume generated at (a) 0 s, (b) 400 s, (c) 800 s, (d) 1200 s, (e) 1600 s and (f) 2000 s.

Table S1. Comparison of the OER activities between $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ in this work and various electrocatalysts recently reported.

Materials	η_{50} (mV)	Electrolyte	Ref
This work	224	1.0 M KOH	This work
V-CoP	300	1.0 M KOH	[1]
Ru-CoV-LDH/NF	290	1.0 M KOH	[2]
CoV/CF-CWs	230	1.0 M KOH	[3]
Ti₃C₂T_x MXene @NiCo₂(OH)_{x-p}	310	1.0 M KOH	[4]
Ti₃C₂@SrTiO₃	400	1.0 M KOH	[5]

Table S2. Comparison of the HER activities between $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ in this work and various electrocatalysts recently reported.

Materials	η_{10} (mV)	Electrolyte	Ref
This work	98	1.0 M KOH	This work
$\text{Co}_3\text{O}_4/\text{Ti}_3\text{C}_2$ MXene	124	1.0 M KOH	[6]
$\text{NiFeP}/\text{Ti}_3\text{C}_2$ Mxene	122	1.0 M KOH	[7]
$\text{MoNiS}/\text{Mo}_2\text{TiC}_2\text{T}$ x	153	1.0 M KOH	[8]
$\text{MX}@\text{RG}$	121	1.0 M KOH	[9]
$\text{MXene}@\text{Ce-MOF}$	220	1.0 M KOH	[10]

Table S3. Comparison of the OWS activities between $\text{Co}_2\text{V}_2\text{O}_6 \cdot 2\text{H}_2\text{O}/\text{ZIF-L}@\text{MXene}/\text{NF}$ in this work and various electrocatalysts recently reported.

Materials	η_{10} (mV)	Electrolyte	Ref
This work	1.478	1.0 M KOH	This work
CoVS NBs	1.56	1.0 M KOH	[11]
MOF-V-$\text{Ni}_3\text{S}_2/\text{NF}$	1.58	1.0 M KOH	[12]
NiCoVP	1.5	1.0 M KOH	[13]
V-doped CoP/NF	1.53	1.0 M KOH	[14]
CP-NCP-T	1.54	1.0 M KOH	[15]

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