Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting information

Ni_5P_4-embedded FeV LDH porous nanosheets for enhancing oxygen evolution and urea oxidation reaction

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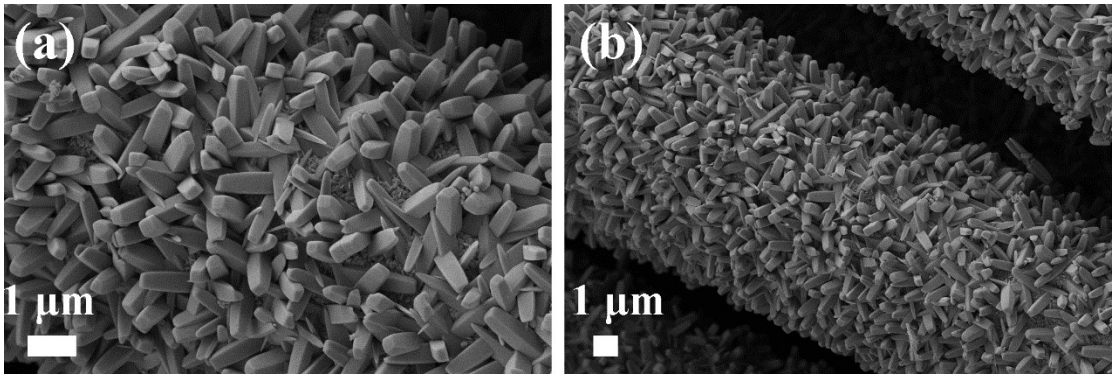

Fig. S1 (a-b) SEM images of FeV LDH.

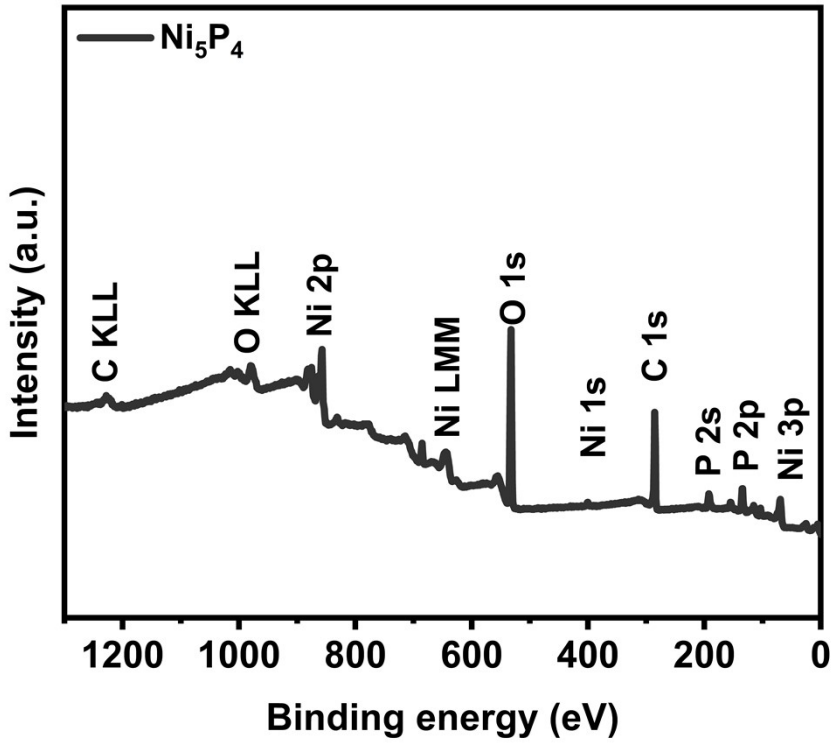

Fig. S2 XPS survey spectrum of Ni_5P_4.

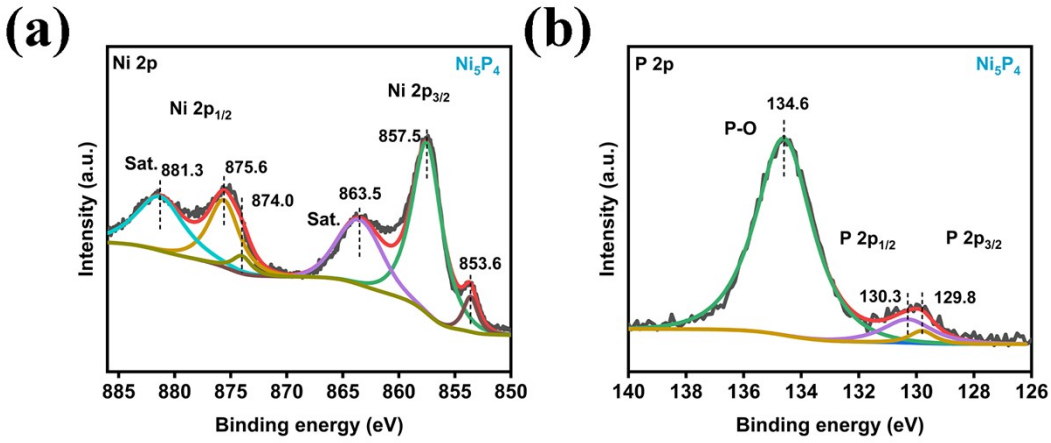

Fig. S3 (a-b) XPS spectra of Ni 2p and P 2p for Ni_5P_4.

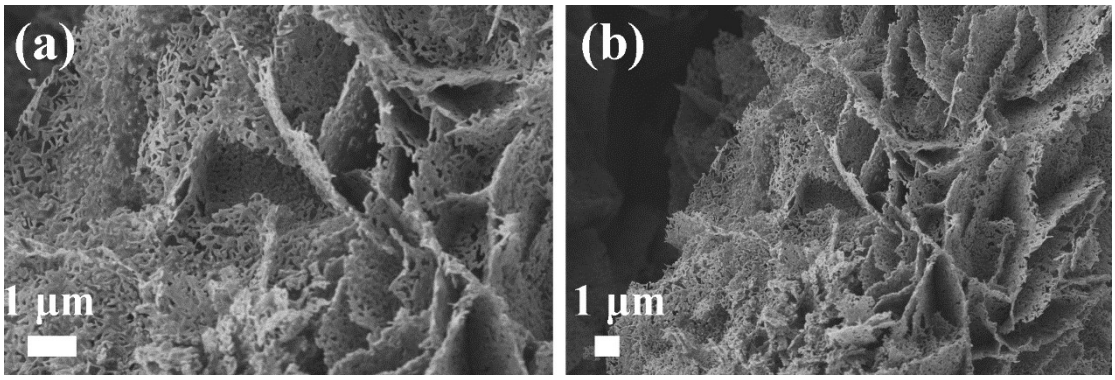

Fig. S4 (a-b) SEM images of Ni_5P_4.

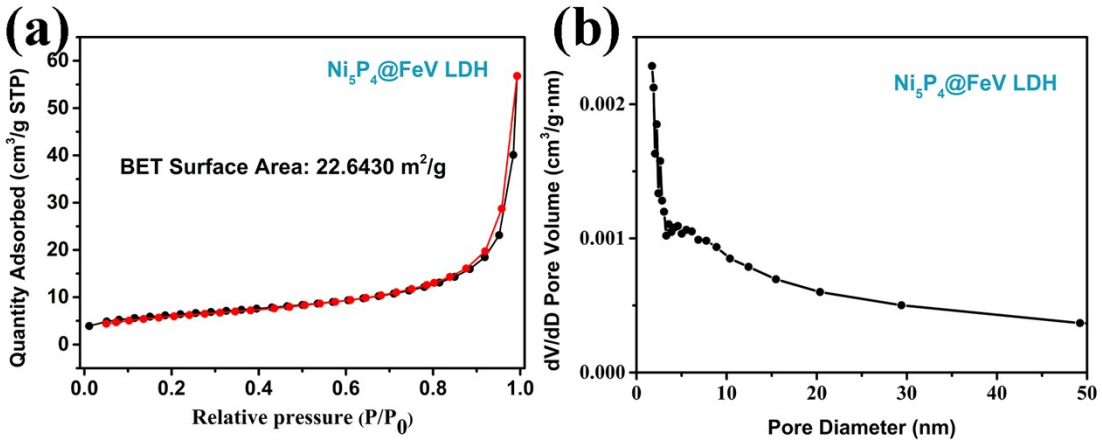

Fig. S5 (a) Nitrogen adsorption-desorption isotherm of Ni_5P4@FeV LDH; (b) the pore size distribution of Ni_5P4@FeV LDH.

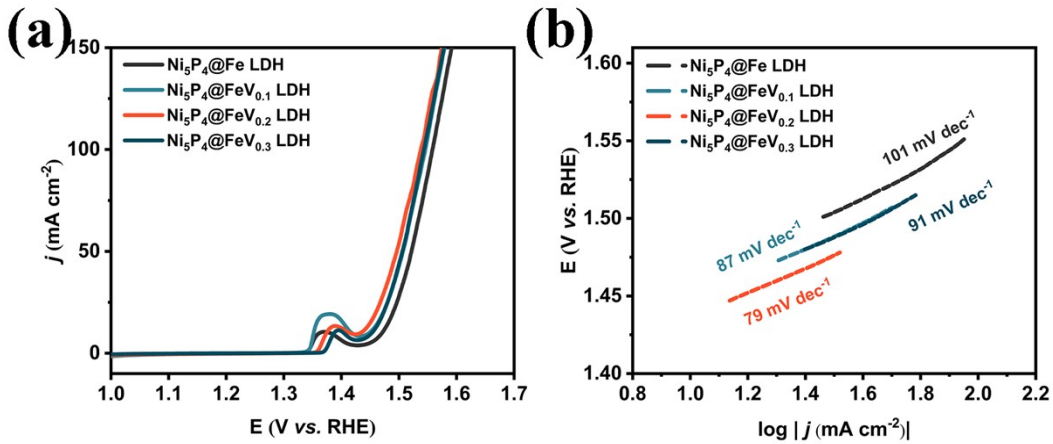

Fig. S6 (a-b) The LSV curves and tafel slope for OER for Ni_5P_4@FeV LDH with different amount of V element.

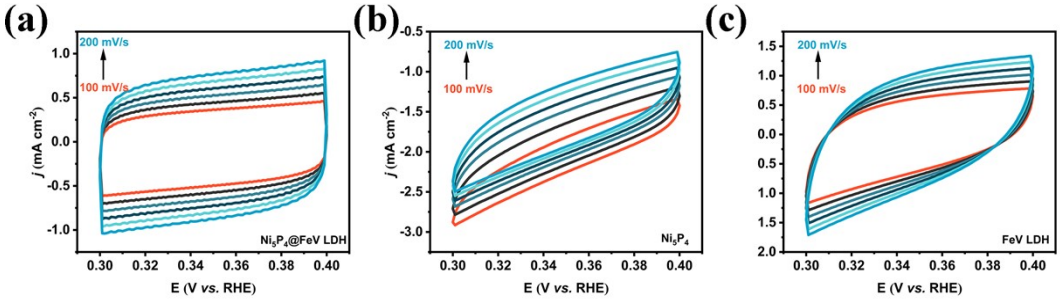

Fig. S7(a-c) Cyclic voltammograms at the scan rates from 100 to 200 mV dec^{-1} for different catalyst.

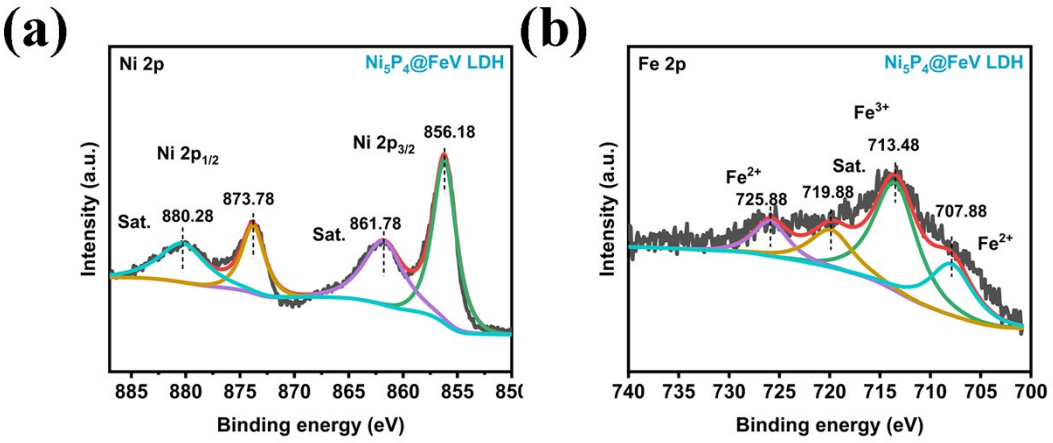

Fig. S8 (a-b) XPS spectra of Ni 2p and Fe 2p for Ni_5P_4 after electrocatalysis stability test.

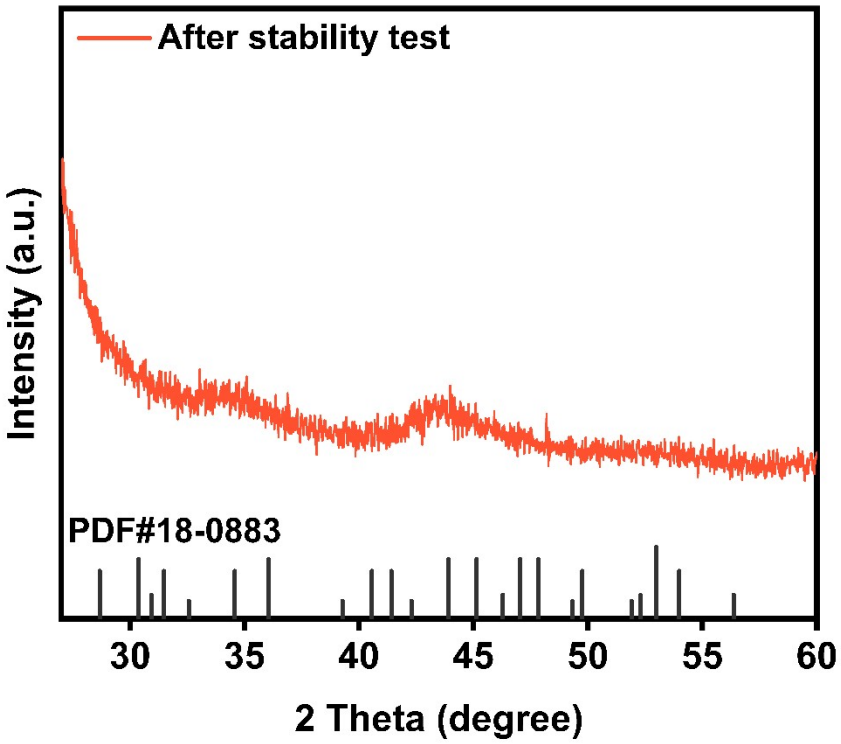

Fig. S9 (a) XRD pattern of Ni_5P_4@FeV LDH after stability test.

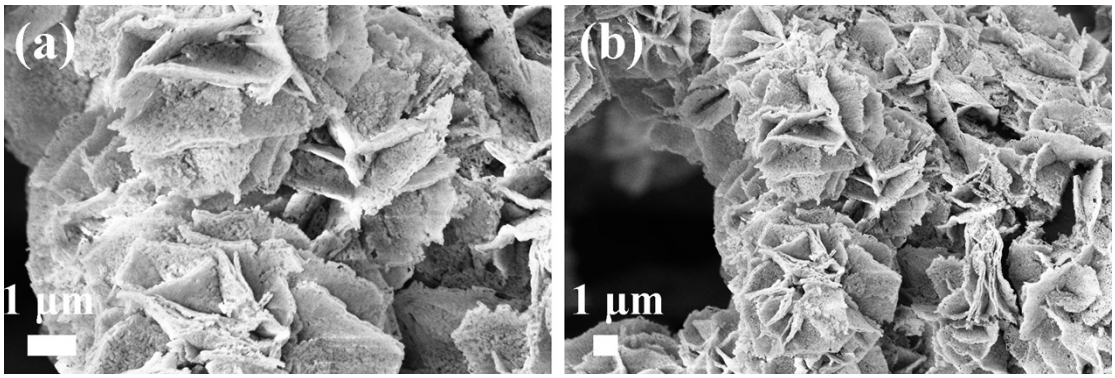

Fig. S10 (a-b) SEM images of Ni_5P_4@FeV LDH after stability test.

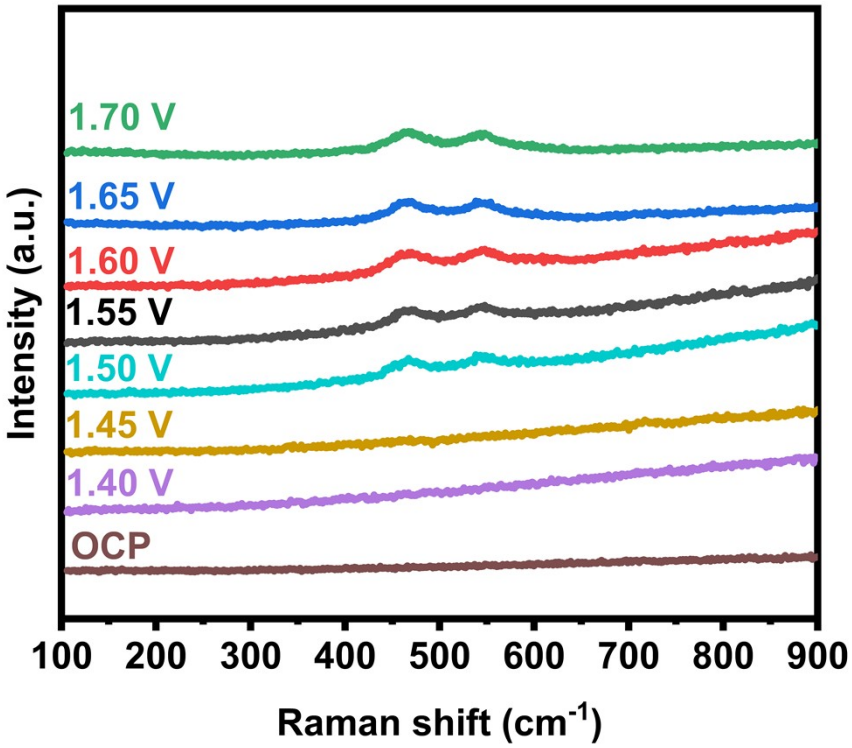

Fig. S11 The in-situ Raman spectra of Ni_5P_4@FeV LDH in 1 M KOH.

Table S1. The atomic percentage of each element in the sample of Ni_5P_4@FeV LDH.

Element	Mass (%)	Atomic (%)
P	30.73	45.53
Ni	62.61	48.95
Fe	6.06	4.98
V	0.60	0.54

Table S2. Comparison of the OER activity of several recently catalysts.

Catalysts	Electrolyte	Overpotential / 10 mA cm^{-2}	Reference
Ni_5P_4@FeV LDH	1 M KOH	204 mV	**This work**
Cobalt substituted NiFe	1 M KOH	290 mV	[1]
Ag-CoFe@NC	1 M KOH	320 mV	[2]
CoFe@NC/NCHNSs-700	1 M KOH	285 mV	[3]
NiCo-LDH@FeOOH/CFP	1 M KOH	224 mV	[4]
CoNiN@NiFe LDH	1 M KOH	227 mV	[5]
CoFe-P/NF	1 M KOH	287 mV	[6]
NiFe-LDH-0.4M HMS	1 M KOH	290 mV	[7]
CoNi-LDH@PCPs	1 M KOH	350 mV	[8]
Ag@NiFe LDH	1 M KOH	246 mV	[9]
CrCoFe LDHs/NF	1 M KOH	238 mV	[10]

Table. S3 Comparison of the UOR activity of several recently catalysts.

Catalysts	Electrolyte	Potential (V vs. RHE) / mA cm^{-2}	Reference
Ni_5P_4@FeV LDH	1 M KOH + 0.33 M urea	1.38 V@10 mA cm^{-2} 1.44 V@50 mA cm^{-2}	**This work**
Co_3S_4 nanowires/NF	1 M KOH + 0.33 M urea	1.54 V@50 mA cm^{-2}	[11]
Ni_2P/CFC	1 M KOH + 0.33 M urea	1.42 V@10 mA cm^{-2}	[12]
Fe-Ni_3S_2@$FeNi_3$-8	1 M KOH + 0.33 M urea	1.40 V@10 mA cm^{-2}	[13]
Fe_3O_4-NiO/NF	1 M KOH + 0.33 M urea	1.44 V@10 mA cm^{-2}	[14]
NiMo@ZnO/NF	1 M KOH + 0.33 M urea	1.405 V@10 mA cm^{-2}	[15]
NiF_3/Ni_2P@CC-2	1 M KOH + 0.33 M urea	1.36 V@10 mA cm^{-2}	[16]
V_8C_7/CoP-0.11	1 M KOH + 0.33 M urea	1.40 V@10 mA cm^{-2}	[17]
CoFe LDH/MOF-0.06	1 M KOH + 0.33 M urea	1.45 V@10 mA cm^{-2}	[18]
Ni@NCNT-3	1 M KOH + 0.5 M urea	1.38 V@10 mA cm^{-2}	[19]
Ni-MOF-0.5	1 M KOH + 0.5 M urea	1.38 V@10 mA cm^{-2}	[20]

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