Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting Information

Ru doping induces the construction of the unique core-shell microflower self-supporting electrocatalyst for highly efficient overall water splitting

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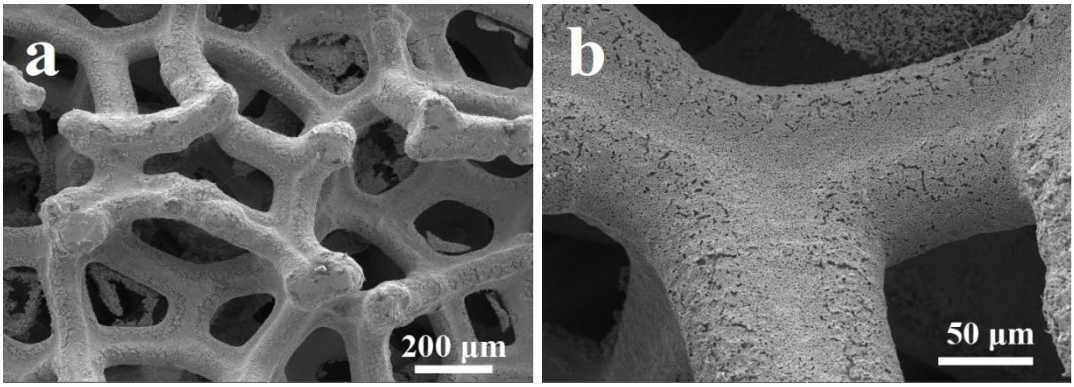

Fig. S1. SEM images of IF.

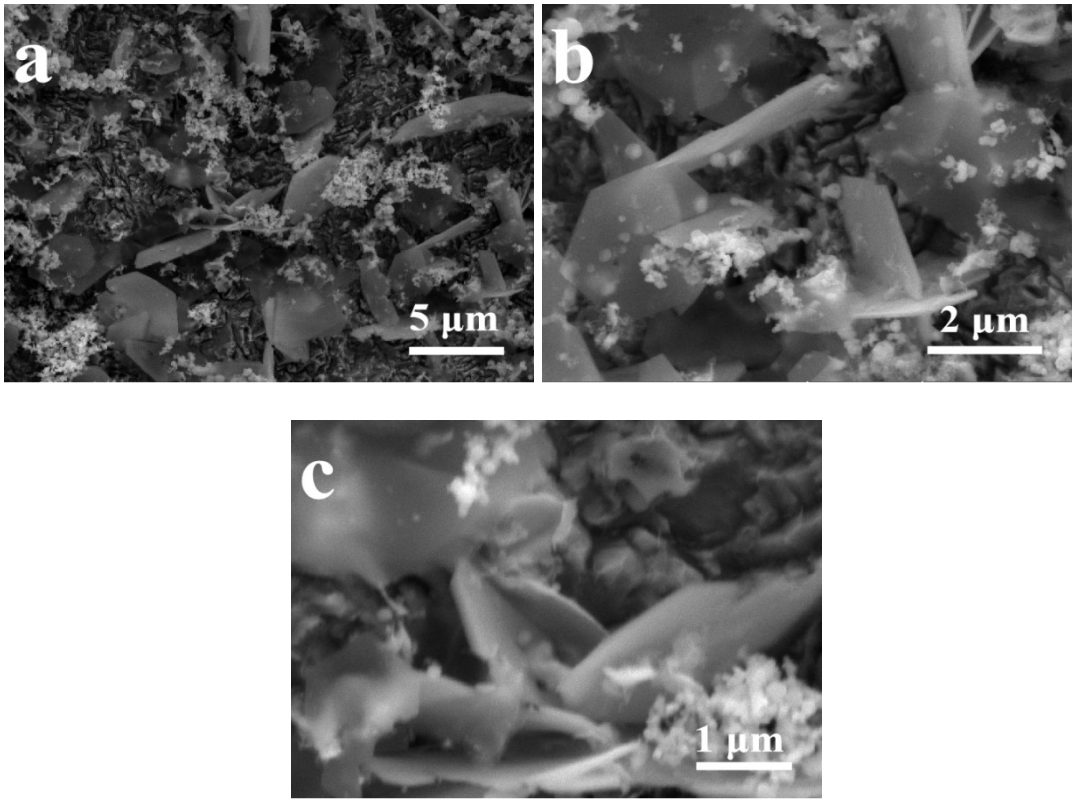

Fig. S2. SEM images of Fe-LDH/IF.

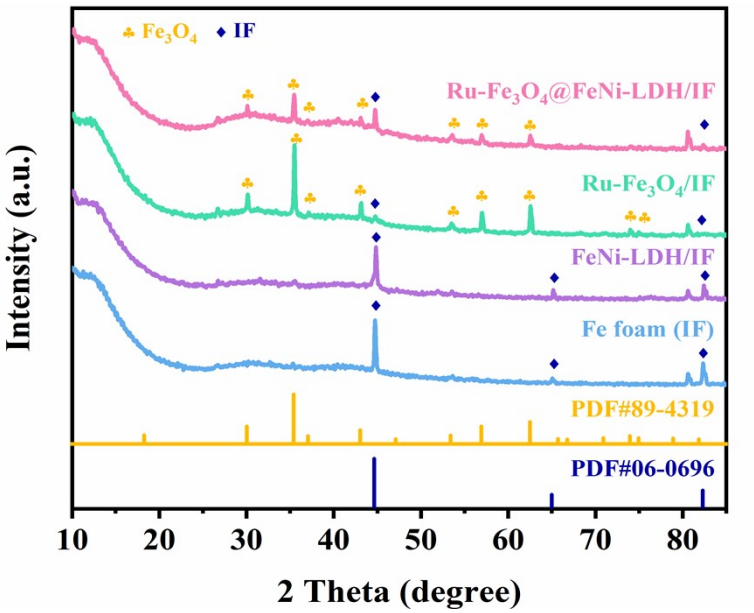

Fig. S3. XRD pattern of different samples.

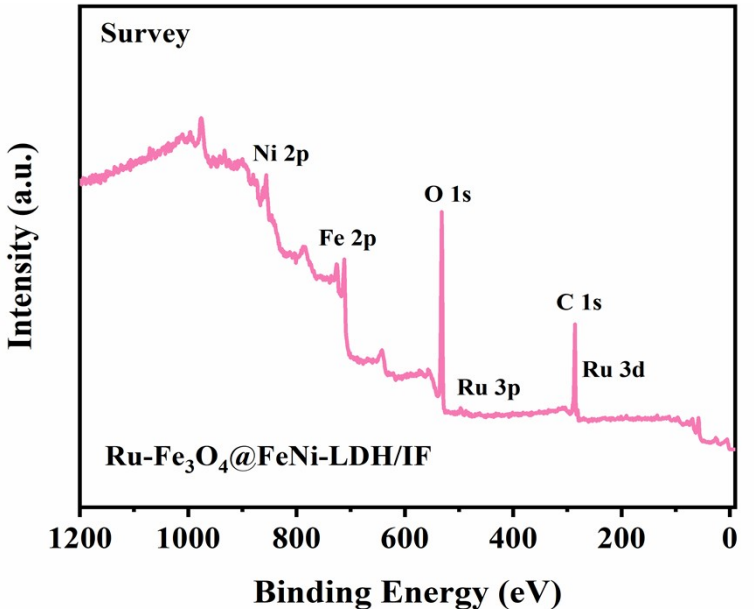

Fig. S4. XPS survey spectrum of Ru-Fe_3O_4@FeNi-LDH/IF.

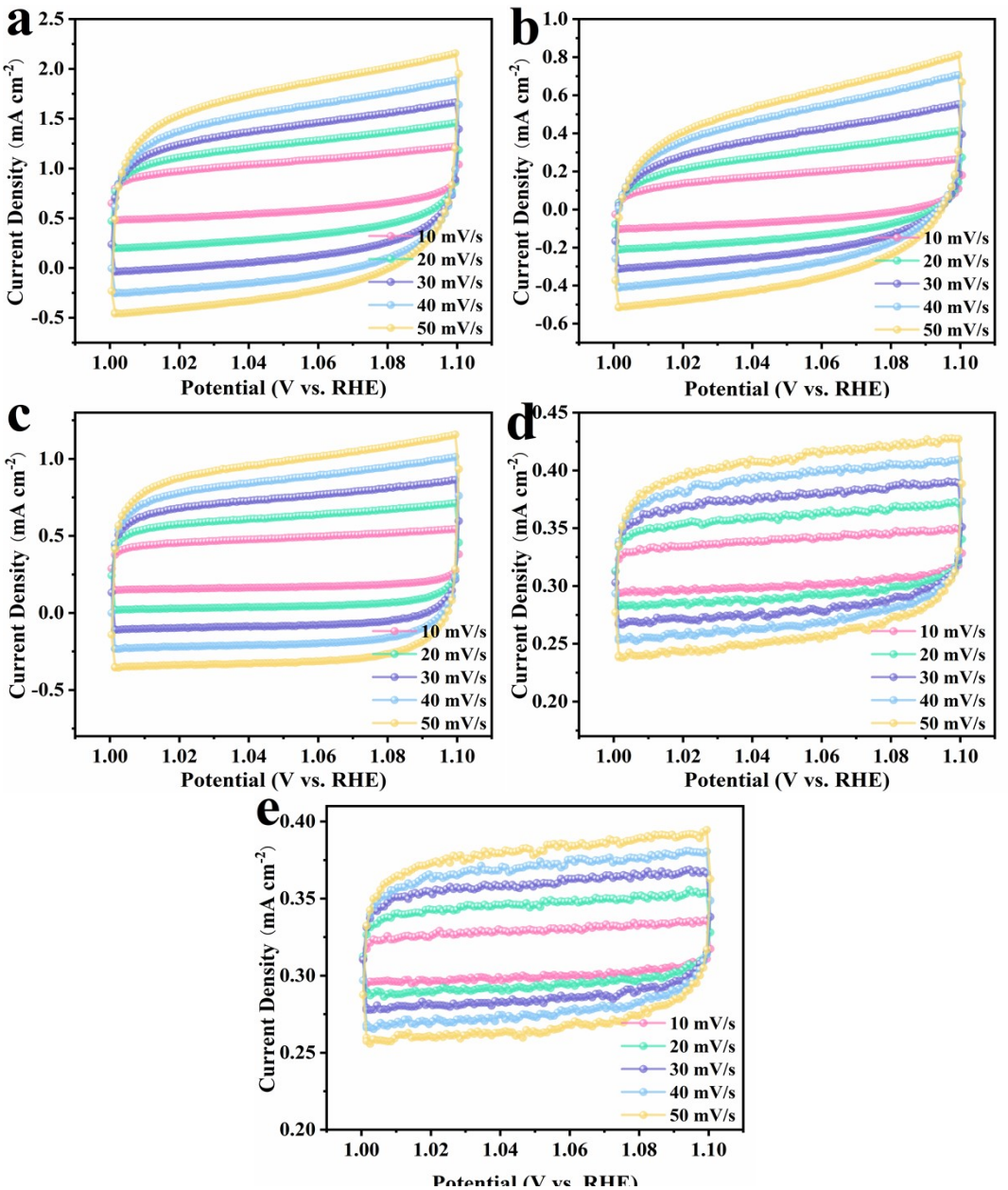

Fig. S5. Cyclic voltammetry curves of (a) Ru-Fe_3O_4@FeNi-LDH/IF, (b) Ru-Fe_3O_4/IF, (c) FeNi-LDH/IF, (d) Fe-LDH/IF and (e) IF toward OER

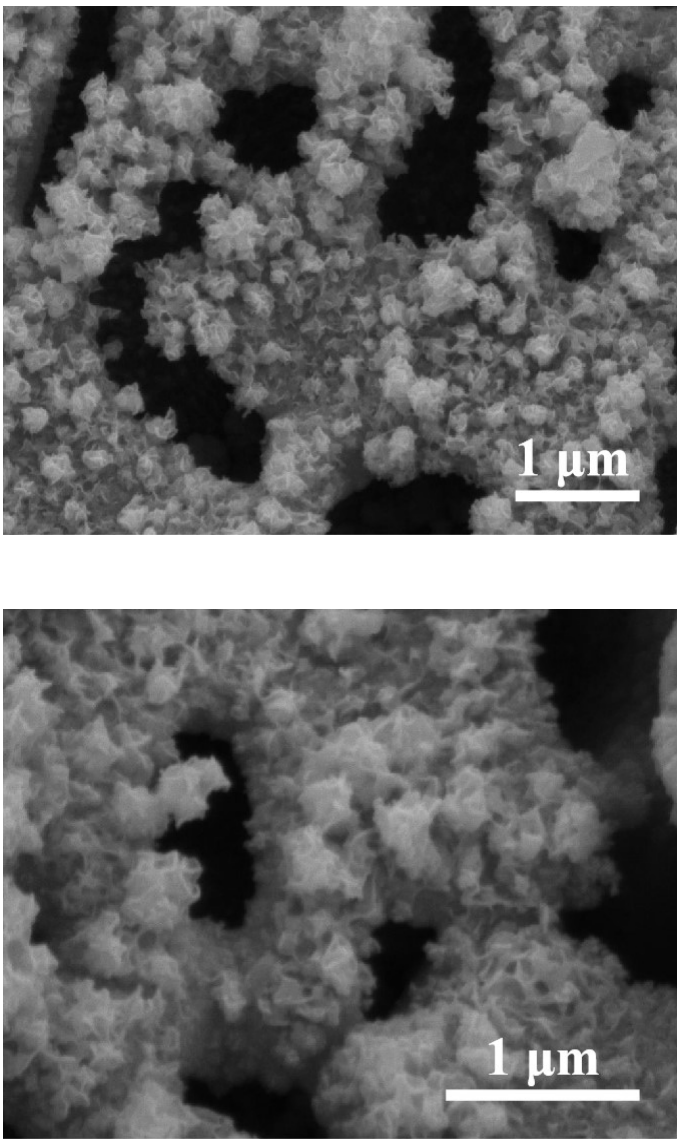

Fig. S6. SEM images of Ru-Fe_3O_4@FeNi-LDH/IF after 25 hours OER stability measurements.

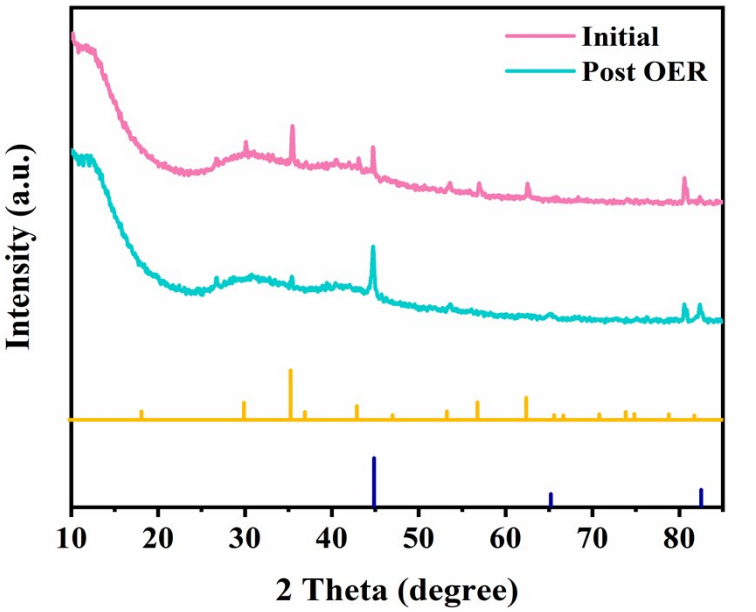

Fig. S7. XRD pattern of Ru-Fe_3O_4@FeNi-LDH/IF before and after OER stability test.

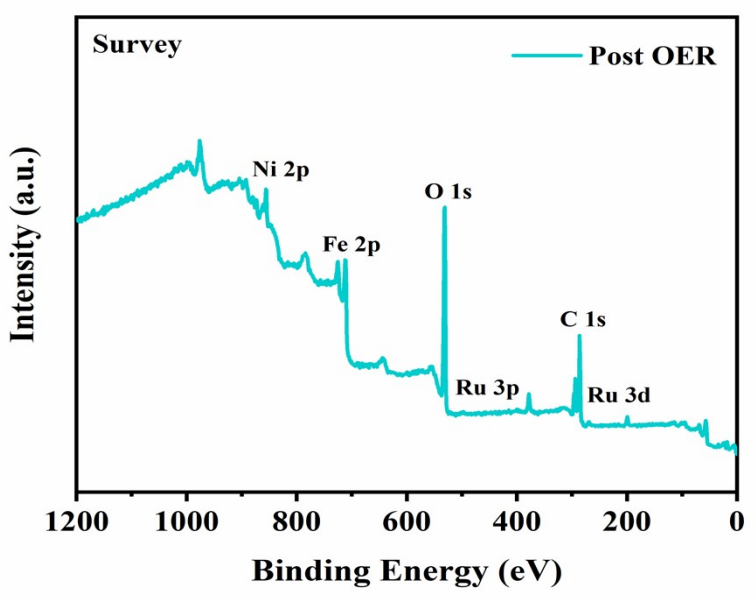

Fig. S8. XPS survey spectrum of Ru-Fe_3O_4@FeNi-LDH/IF after OER stability test.

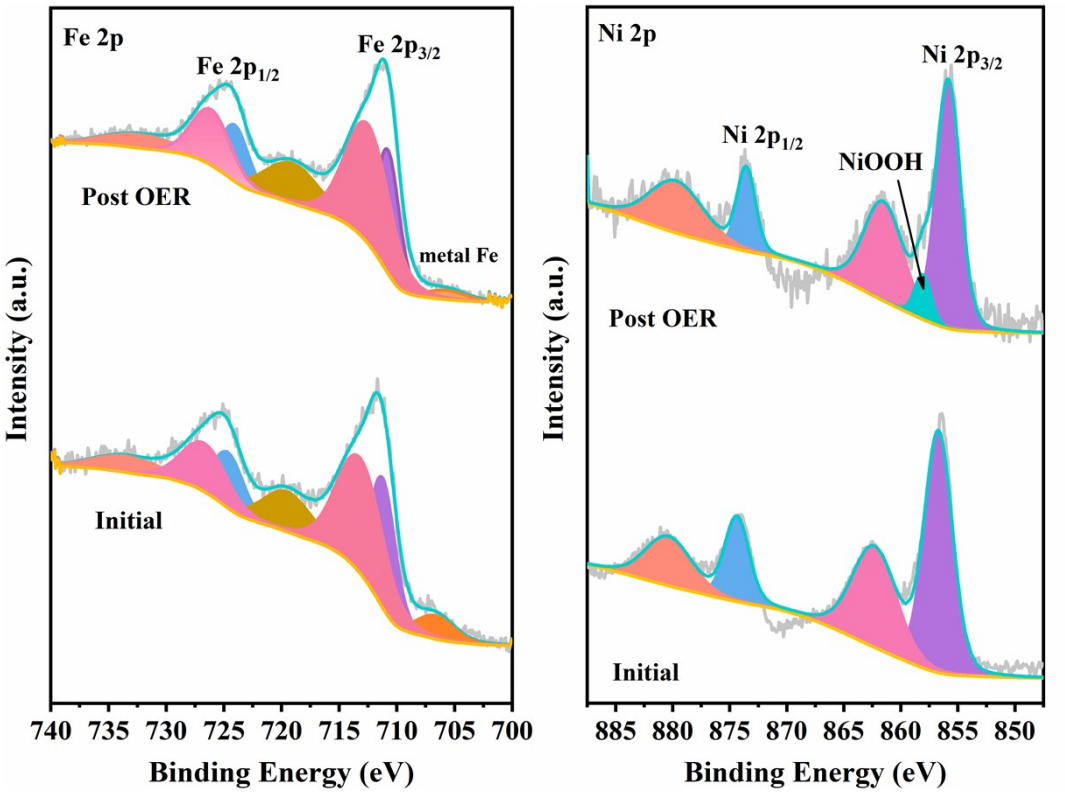

Fig. S9. Comparison of XPS spectra before and after OER stability test.

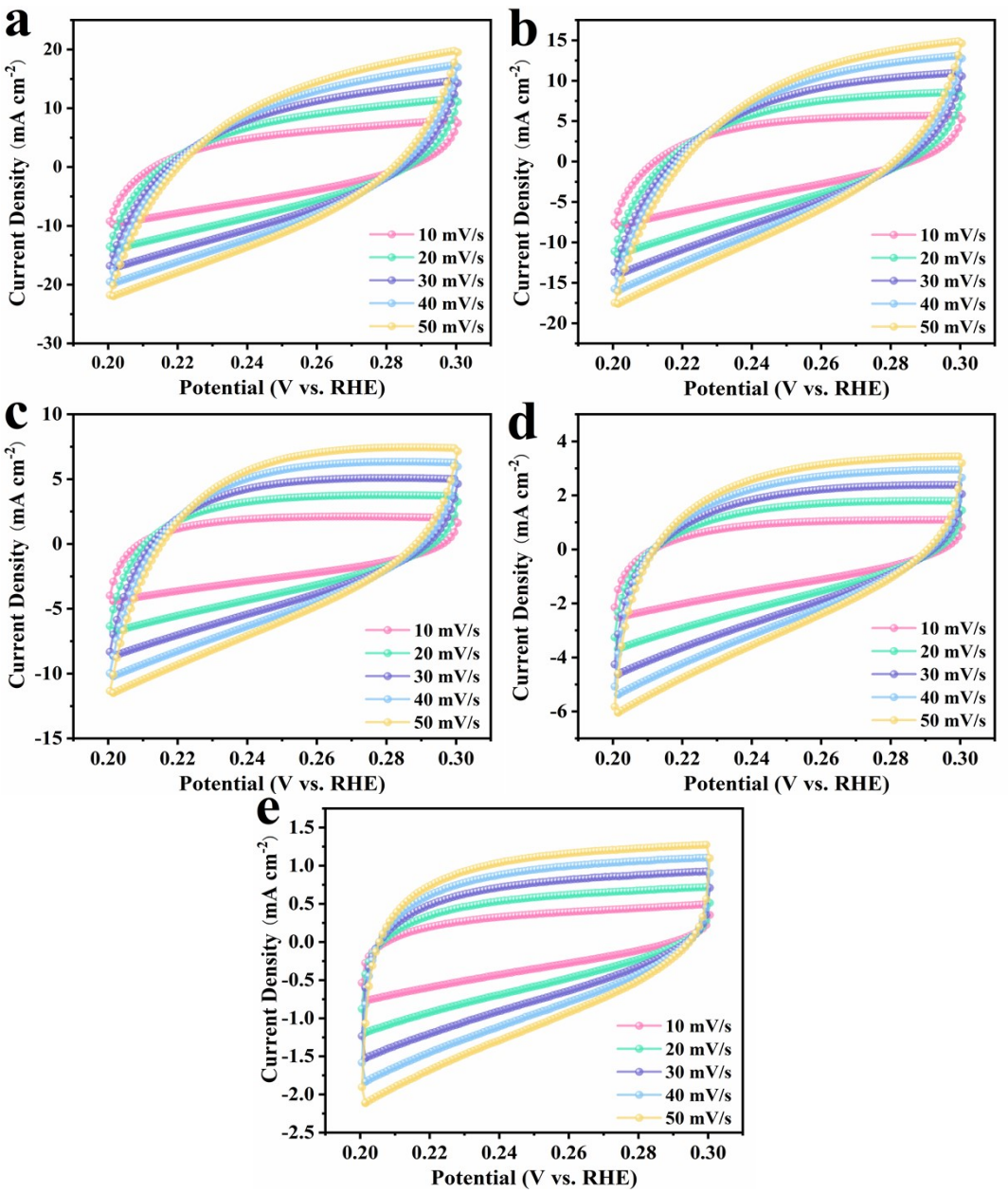

Fig. S10. Cyclic voltammetry curves of (a) Ru-Fe_3O_4@FeNi-LDH/IF, (b) Ru-Fe_3O_4/IF, (c) FeNi-LDH/IF, (d) Fe-LDH/IF and (e) IF toward HER.

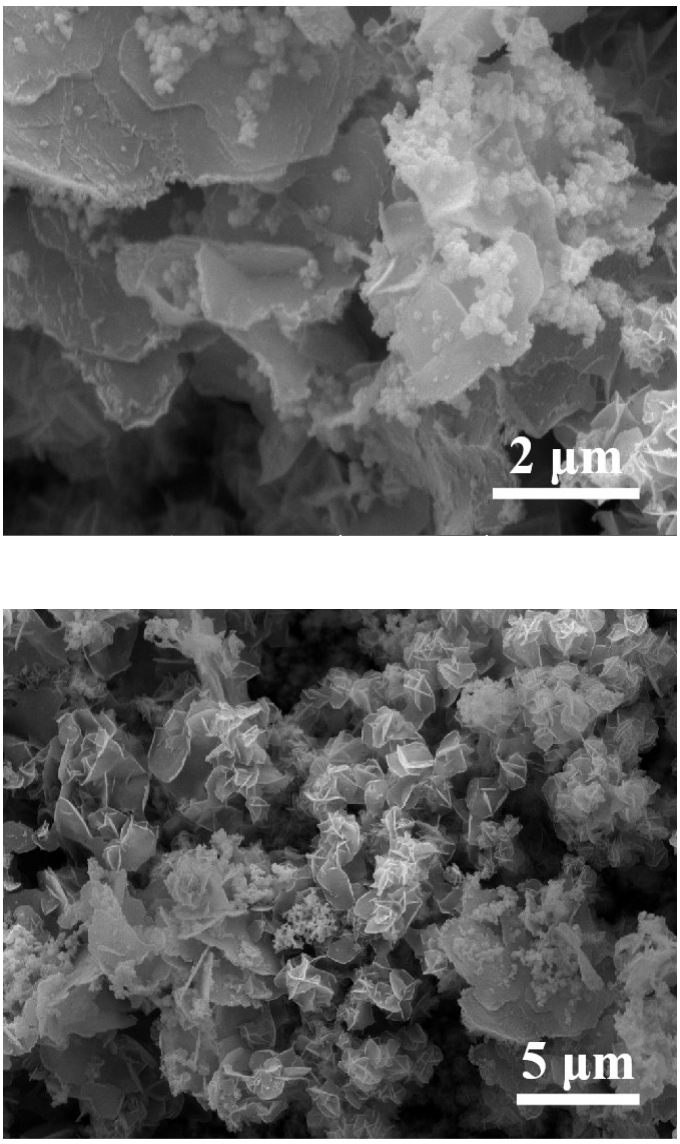

Fig. S11. SEM images of Ru-Fe_3O_4@FeNi-LDH/IF after 25 hours HER stability measurements.

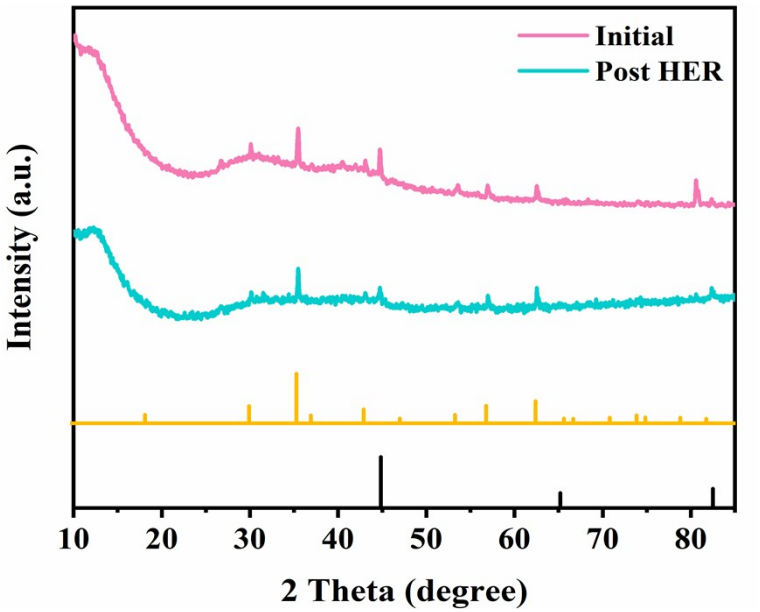

Fig. S12. XRD pattern of Ru-Fe_3O_4@FeNi-LDH/IF before and after HER stability test.

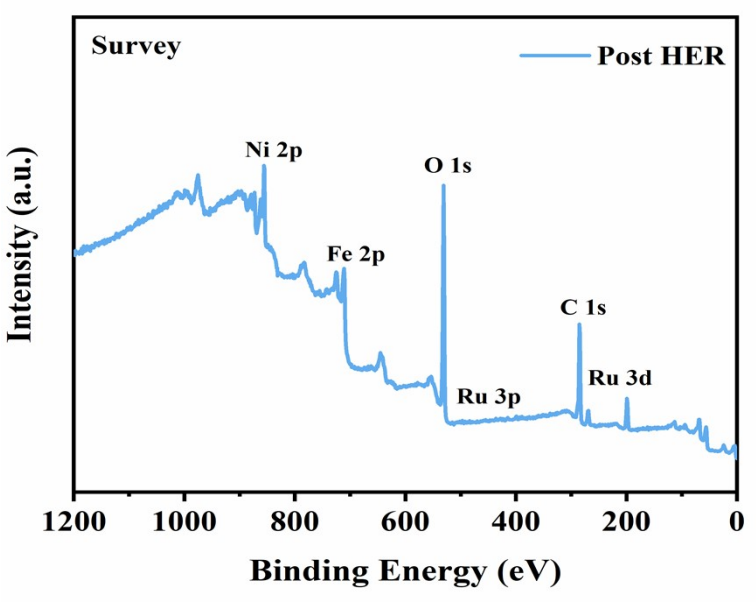

Fig. S13. XPS survey spectrum of Ru-Fe_3O_4@FeNi-LDH/IF after HER stability test.

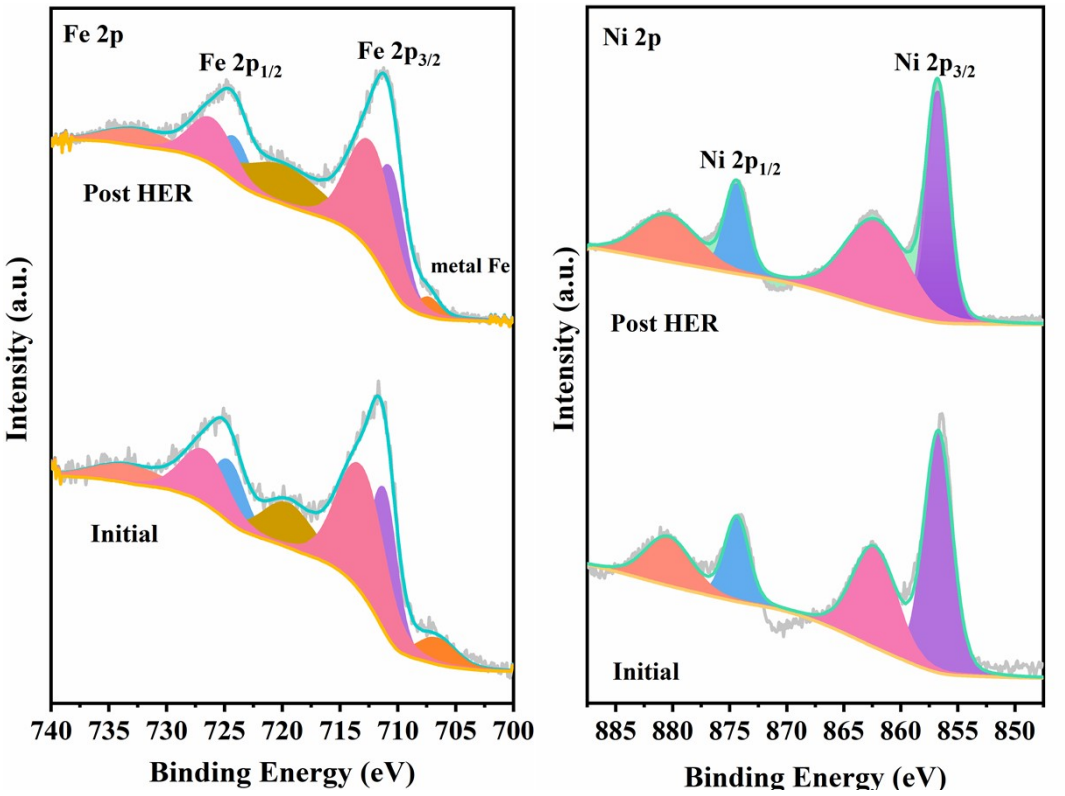

Fig. S14. Comparison of XPS spectra before and after HER stability test.

Fig. S15. Digital photograph of the experimental measurement of the gas production of Ru-Fe_3O_4@FeNi-LDH/IF electrocatalyst at a current density of 100 mA·cm^{-2}.

Table S1 Comparison of OER activity between Ru-Fe_3O_4@FeNi-LDH/IF and other recently reported non noble metal catalysts.

Catalysts	Overpotential (V vs. RHE)	Reference
Ru-Fe_3O_4@FeNi-LDH/IF	189 mV@10 mA cm^{-2}	This work
Ru SAs/AC-FeCoNi	205 mV@10 mA cm^{-2}	1
Ni(OH)2@NiSe2	225 mV@10 mA cm^{-2}	2
NiFe LDH@NiCoP/NF	220 mV@10 mA cm^{-2}	3
Co(OH)2/CNTs-IrCl-0.075	230 mV@10 mA cm^{-2}	4
NiFeCo LDH	200 mV@10 mA cm^{-2}	5
CoFe@NiFe-100/NF	220 mV@10 mA cm^{-2}	6
NiFeP@N-CS	216 mV@10 mA cm^{-2}	7
Co-C@NiFe LDH	249mV@10 mA cm^{-2}	8

Table S2 Comparison of HER activity between Ru-Fe_3O_4@FeNi-LDH/IF and other recently reported non noble metal catalysts.

Catalysts	Overpotential (V vs. RHE)	Reference
Ru-Fe_3O_4@FeNi-LDH/IF	104 mV@10 mA cm^{-2}	This work
NiFe LDH@NiCoP/NF	120mV@10 mA cm^{-2}	3
NiFeP@N-CS	186 mV@10 mA cm^{-2}	7
Fe2O3/NiSe2	132 mV@10 mA cm^{-2}	9
Ni-GF/VC	128 mV@10 mA cm^{-2}	10
CoV/ CF-CWs	118 mV@10 mA cm^{-2}	11
Ni-P/Ni/NF	129 mV@10 mA cm^{-2}	12
WP2 NW/NF	130 mV@10 mA cm^{-2}	13
0.05Mn-MoP NSs	198 mV@10 mA cm^{-2}	14

Table S3. Comparison of overall water splitting performance for the Ru-Fe_3O_4@FeNi-LDH/IF catalyst with other reported electrocatalysts in 1 M KOH.

Catalysts	Overpotential (V vs. RHE)	Reference
Ru-Fe_3O_4@FeNi-LDH/IF	1.52 V@10 mA cm^{-2}	This work
U-Fe-β-$Ni(OH)_2$@/NF-2	1.58 V@10 mA cm^{-2}	15
Fe-FVO-60-act	1.58 V@10 mA cm^{-2}	16
Fe-Ni_2P/MoS_x/NF	1.61 V@10 mA cm^{-2}	17
Ni/$Ni(OH)_2$	1.68 V@10 mA cm^{-2}	18
Ni@NiFe LDH	1.53 V@10 mA cm^{-2}	19
Ni_2P-Fe_2P/NF	1.56 V@10 mA cm^{-2}	20
V-CoP@ a-CeO_2	1.56 V@10 mA cm^{-2}	21
Fe-Ni_5P_4/NiFeOH-350	1.55 V@10 mA cm^{-2}	22
NiFeP@N-CS	1.63 V@10 mA cm^{-2}	23
CoFe@NiFe/NF	1.59 V@10 mA cm^{-2}	24
Ru-NiFeP/NF	1.47 V@10 mA cm^{-2}	25
WP_2 NW/NF	1.65 V@10 mA cm^{-2}	26
NiFe-LDH/$NiCo_2O_4$	1.60 V@10 mA cm^{-2}	27
Ni_1Fe_{10}-LDH@Ni_3S_2/NF	1.65 V@10 mA cm^{-2}	28

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