

Supporting information

Homogenizing of Pt on NiCu film for enhanced HER activity by two-step magneto-electrodeposition

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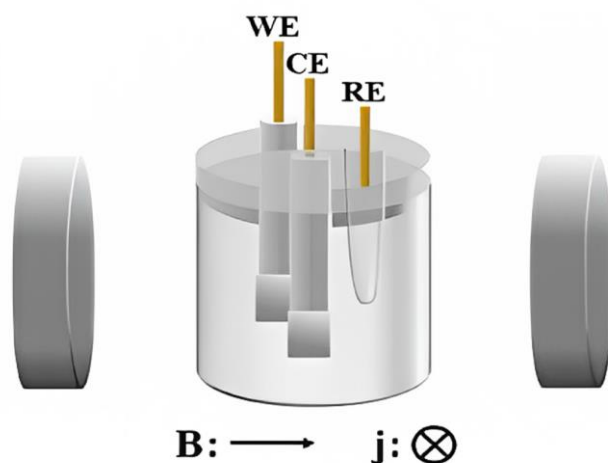


Fig. S1 Schematic diagram of the magneto-electrodeposition device.

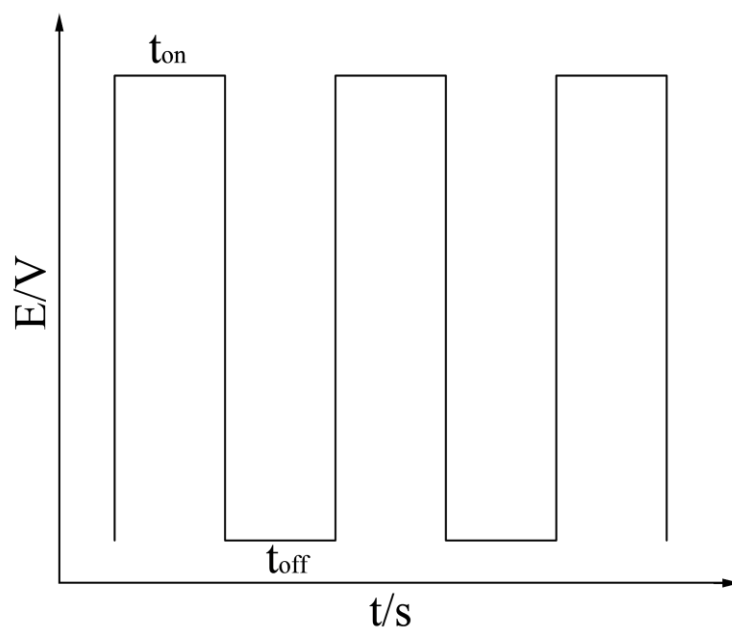


Fig. S2 E-t curve.

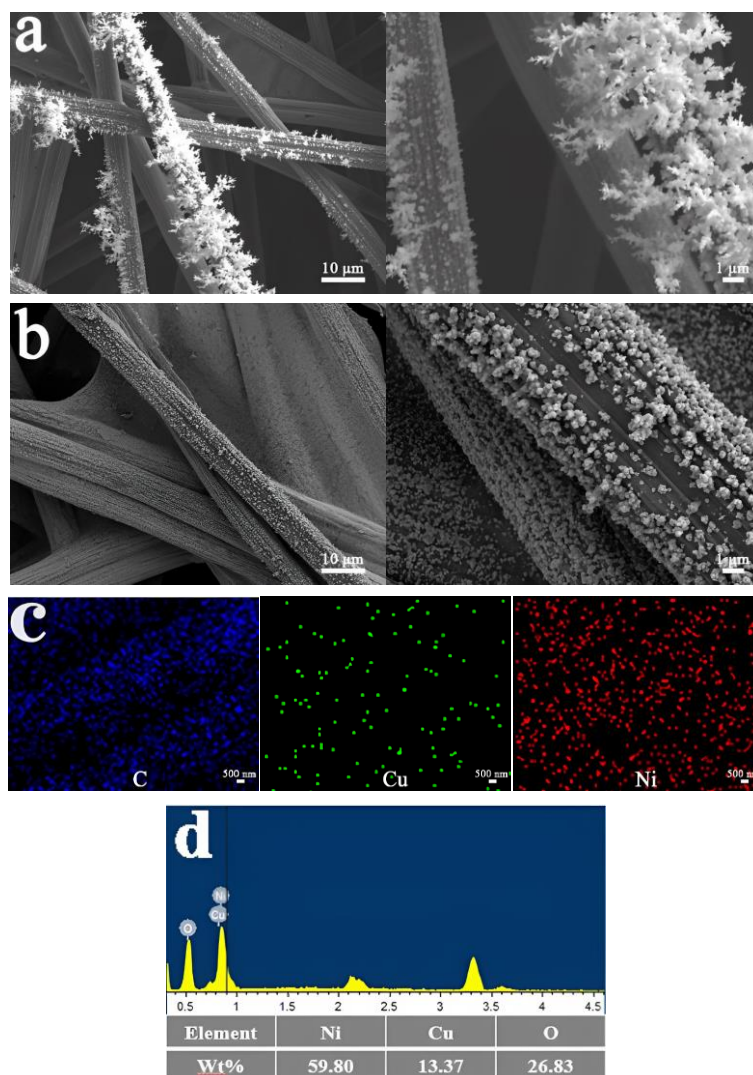


Fig. S3 High and low magnification SEM images of NiCu catalysts. (a) 0 T, (b) 0.5 T, (f) EDS mapping of 0.5T sample.

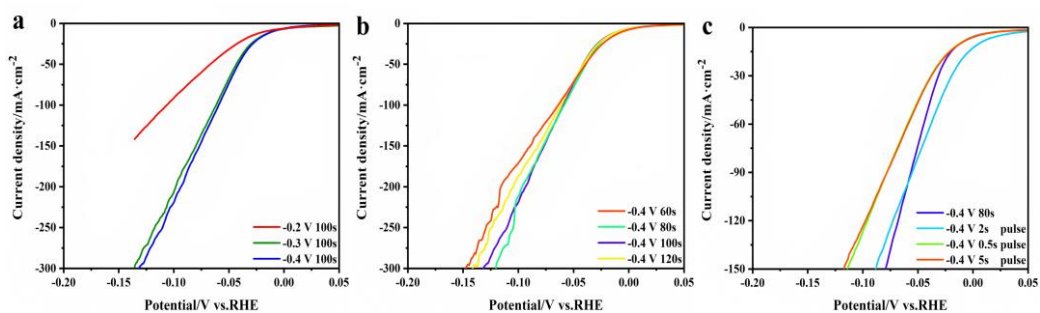


Fig. S4 LSV curves of Pt/Ni-Cu catalysts with different deposition parameters.

Table S1. Comparison of catalytic performance of HER with other Pt-containing HER catalysts under alkaline solutions.

Catalyst samples	Overpotential η_{10}/mV	Overpotential η_{100}/mV	Overpotential η_{200}/mV	Tafel slope/ mV dec^{-1}	References
0.5 T Pt/NiCu	10.6	54.6	87.8	13.4	This work
Pt/C (20 wt%)	10.6	117.2	168.1	106.8	This work
Pt@GO@Ni-Cu@NF	31	128	—	51	[1]
Ni@C-10Pt	40	—	—	31.7	[2]
Pt-Ni NTAs	23	—	71	35	[3]
Pt-NiFe-ED	17	—	81	45	[4]

Table S2. Corrosion parameters of Pt/NiCu catalysts obtained from polarization tests in 1 M KOH.

Catalyst samples	Corrosion potential $E_{\text{corr}}/\text{V vs. SCE}$	Corrosion current density $i_{\text{corr}}/\text{A cm}^{-2}$
0 T NiCu+0 T Pt	-0.468±0.020	6.985×10 ⁻⁵
0.5 T NiCu+0 T Pt	-0.363±0.012	6.995×10 ⁻⁵
0.5 T NiCu+0.3 T Pt	-0.286±0.020	2.450×10 ⁻⁵
0.5 T NiCu+0.5 T Pt	-0.244±0.011	1.720×10 ⁻⁵

Table S3. Equivalent circuit fitting data for Pt/NiCu catalysts at -42.8 mV in 1 M KOH.

Catalysts	Solution resistance $R_s/\Omega \text{ cm}^{-2}$	Capacitance $\text{CPE}_1/\mu\text{Fs}^{n-1} \text{ cm}^{-2}$	Electrode resistance $R_1/\Omega \text{ cm}^{-2}$	n_1	Capacitance $\text{CPE}_2/\mu\text{Fs}^{n-1} \text{ cm}^{-2}$	Charg-transfer resistance $R_2/\Omega \text{ cm}^{-2}$	n_2
0.5 T NiCu+0.5 T Pt	1.146	65600	1.319	0.9089	817.7	0.7137	0.9684
0.5 T NiCu+0.3 T Pt	1.197	29570	5.778	0.9084	609.4	1.5473	0.9949
0.5 T NiCu+0.1 T Pt	1.180	27680	2.193	0.9964	720.5	1.1734	0.9818
0.5 T NiCu+0 T Pt	1.209	29920	3.302	0.8564	511.6	1.5699	0.9268
0 T NiCu+0 T Pt	1.363	15980	4.498	0.9651	376.7	1.7699	0.9089

Notes and references

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