Supplementary Information

High-Conductivity NiFe@Ni@Cu Composite Electrodes for Durable, Efficient Industrial Oxygen Evolution

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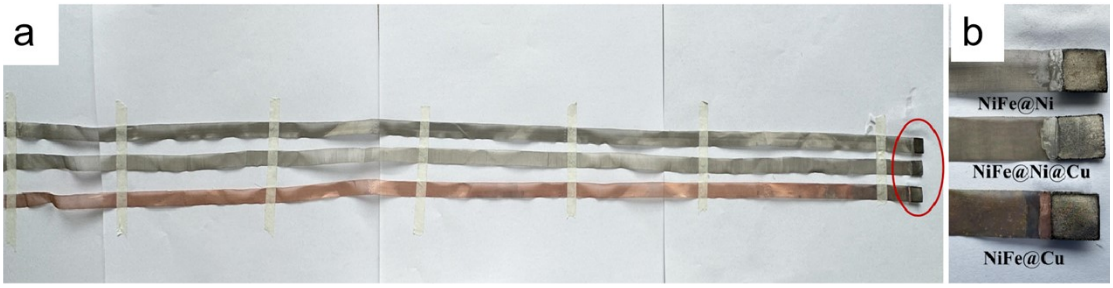


Figure S1. (a) Digital photograph of NiFe@Cu, NiFe@Ni, and NiFe@Ni@Cu. (b) The locally magnified digital photograph of NiFe coating.

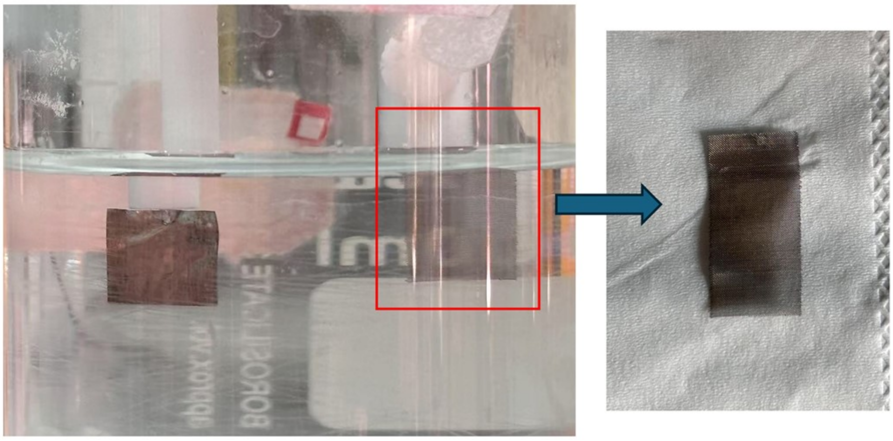


Figure S2. Digital photographs of Ni@Cu after 80-hour stability test.

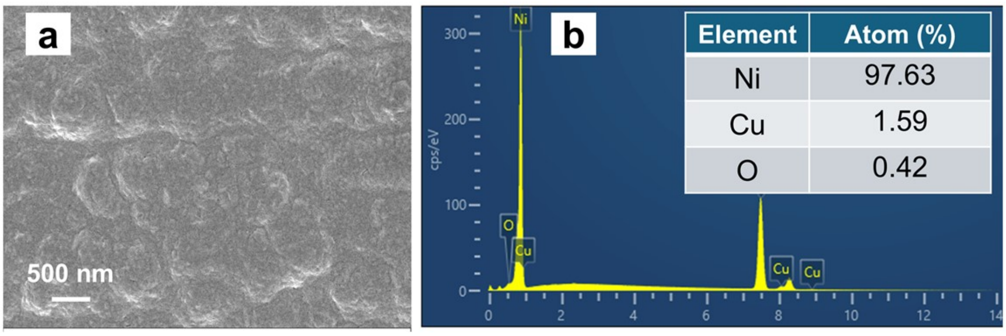


Figure S3. (a) SEM image and (b) EDS spectrum of Ni@Cu after 80-hour stability test.

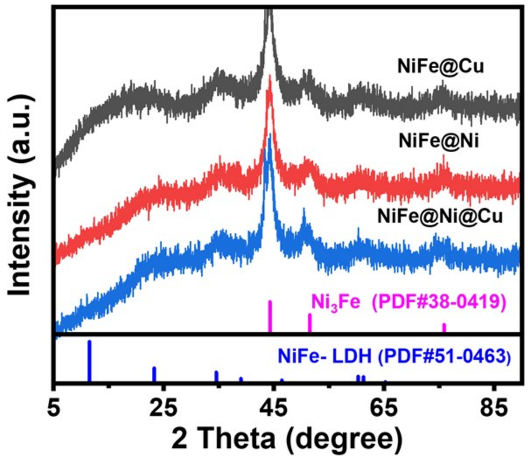


Figure S4. XRD patterns of NiFe@Cu, NiFe@Ni, and NiFe@Ni@Cu powder samples.

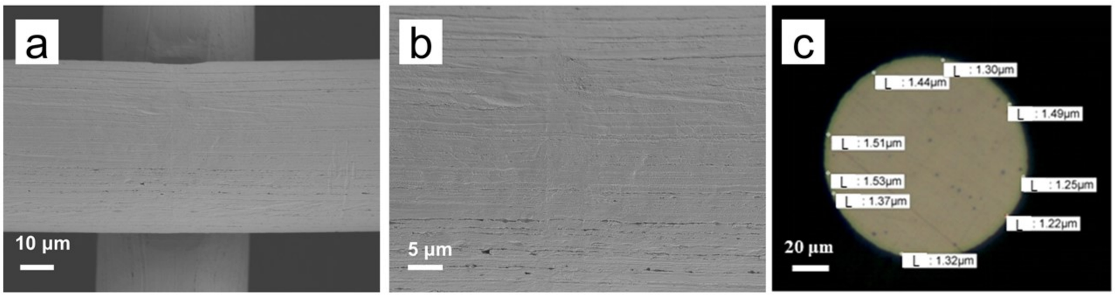
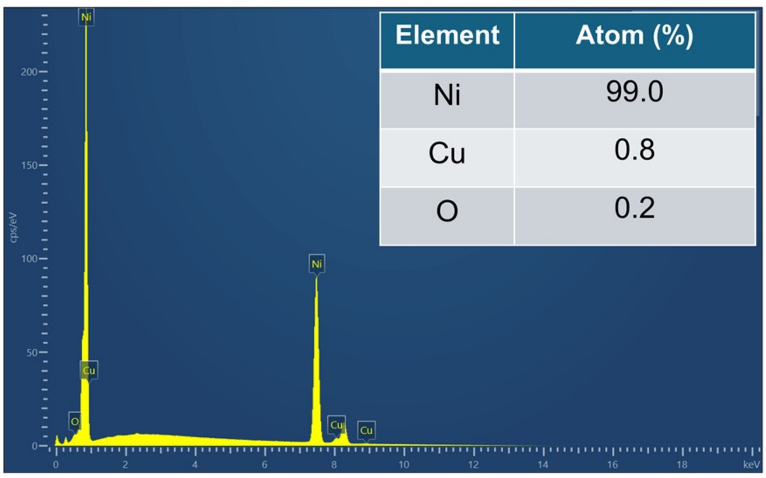


Figure S5. (a, b) SEM images of Cu, (c) Cross-section metallographic diagram of Ni@Cu.



Element	Atom (%)
Ni	99.0
Cu	0.8
O	0.2

Figure S6. EDS spectrum of Ni@Cu.

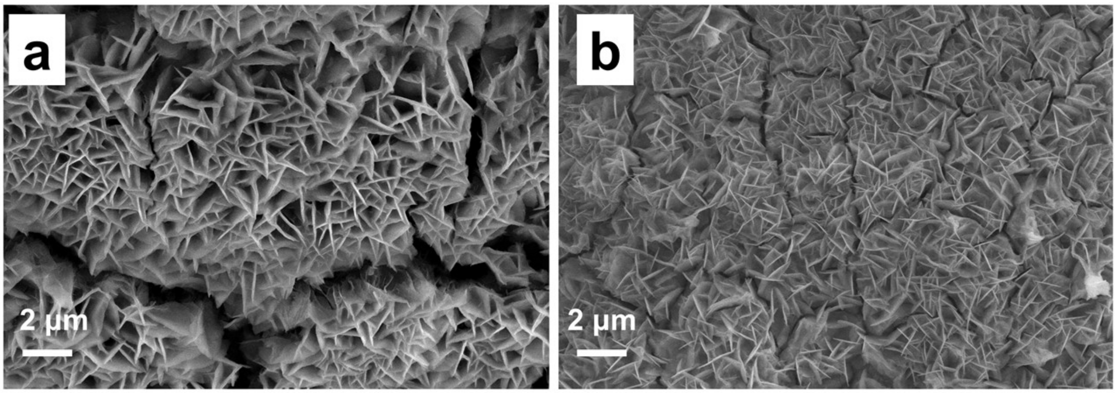


Figure S7. SEM images of (a) NiFe@Cu, and (b) NiFe@Ni.

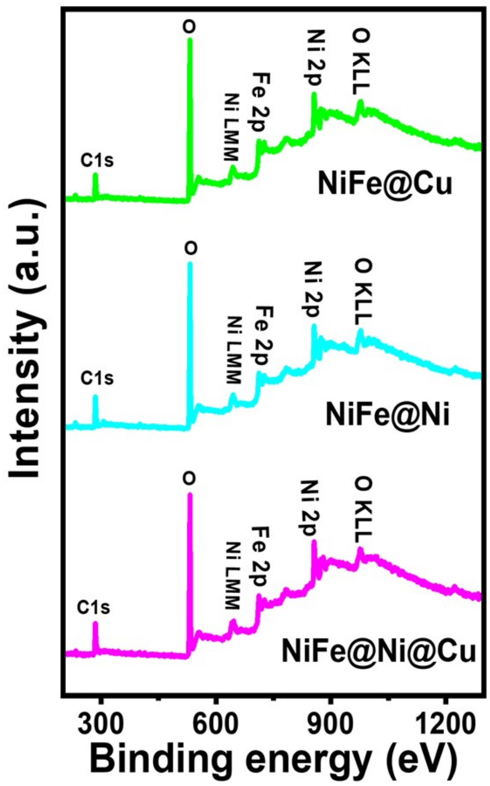


Figure S8. XPS survey spectra.

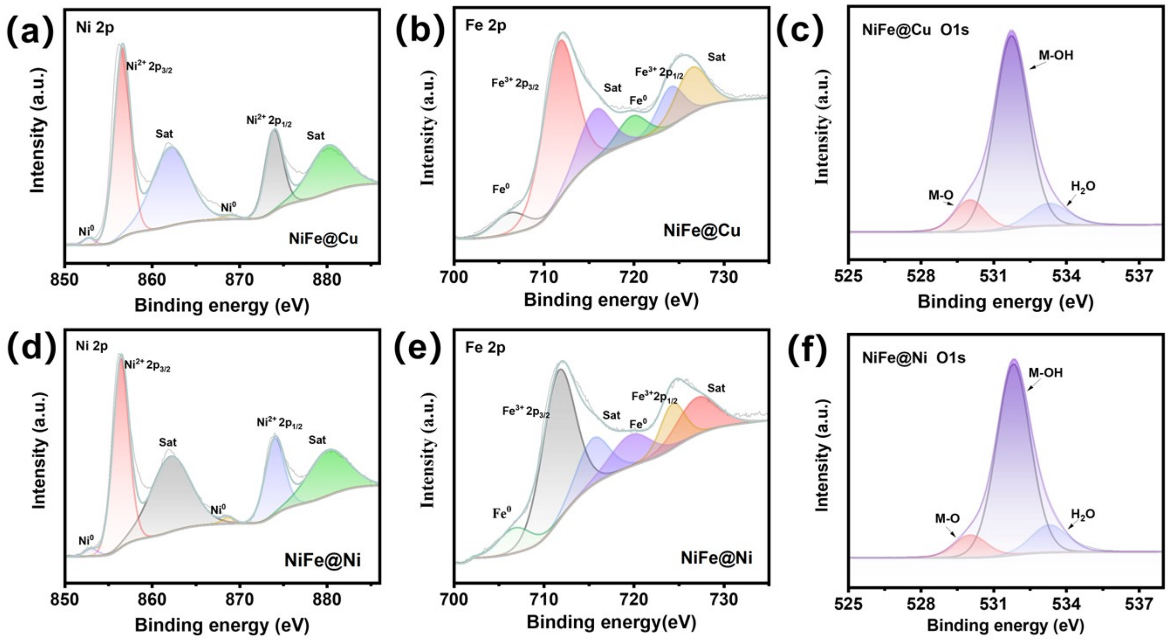


Figure S9. XPS spectra of NiFe@Cu (a) Ni 2p, (b) Fe 2p, (c) O 1s. XPS spectra of NiFe@Ni (d) Ni 2p, (e) Fe 2p, (f) O 1s.

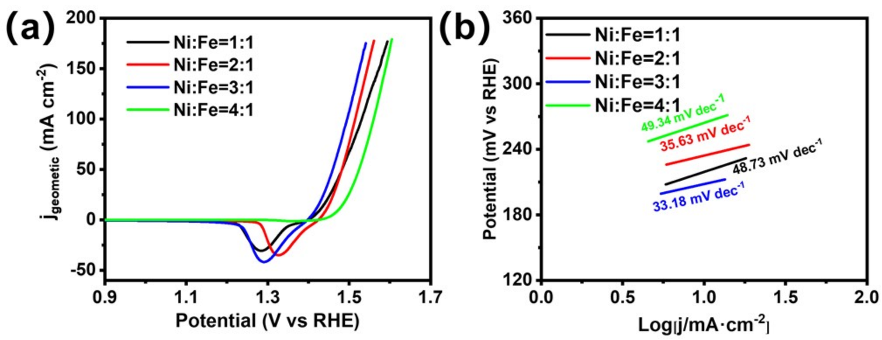


Figure S10. (a) LSV curves and (b) Tafel plots of samples with different Ni^{2+}/Fe^{2+} molar ratios.

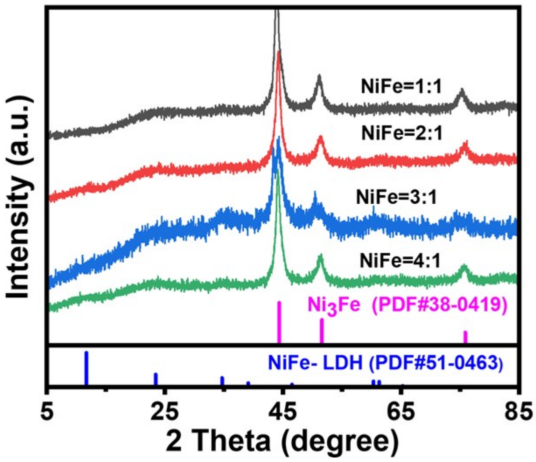


Figure S11. XRD patterns of samples with different Ni^{2+}/Fe^{2+} molar ratios.

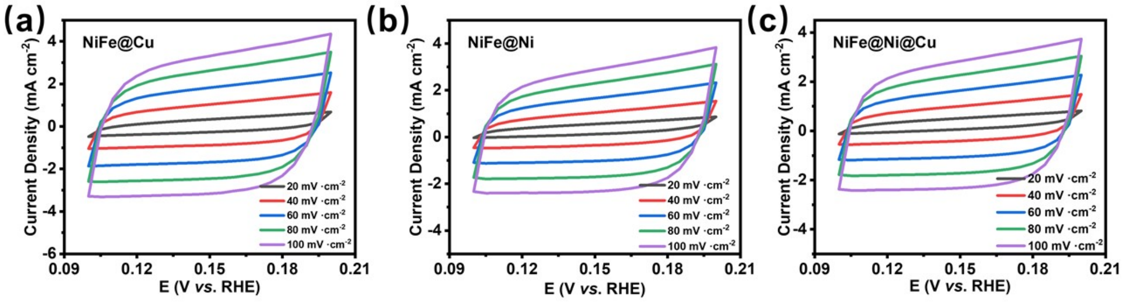


Figure S12. CV curves at different scan rates of (a) NiFe@Cu, (b) NiFe@Ni, and (c) NiFe@Ni@Cu, measured in the non-Faradaic potential region to evaluate double-layer capacitance.

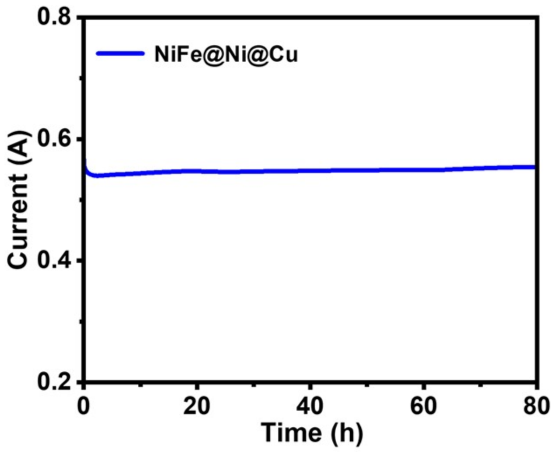


Figure S13. Stability test of NiFe@Ni@Cu.

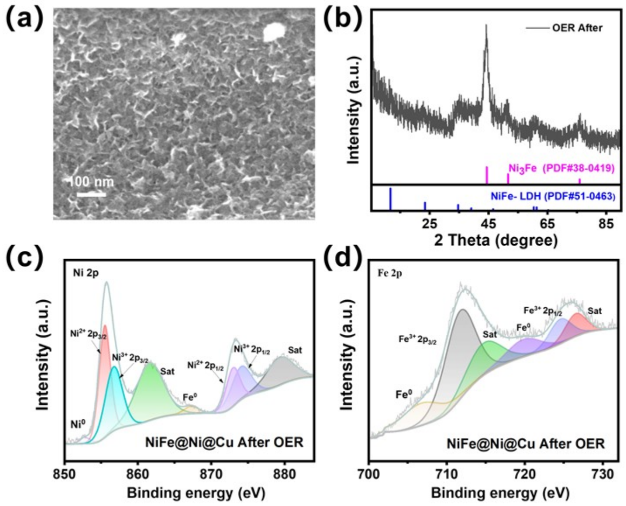


Figure S14. (a) SEM image, (b) XRD pattern, (c) Ni 2p and (d) Fe 2p spectra of NiFe@Ni@Cu after the stability test.

Supporting Tables

Table S1. Tafel fitting results

Sample	E_{corr} (V)	I_{corr} (A cm^{-2})	Corrosion Rate (mm / y)
Cu	-0.48	$1.034*10^{-4}$	0.338
Ni	-0.0313	$8.785*10^{-6}$	0.0575
Ni@Cu	0.0133	$8.855*10^{-6}$	0.0288

Table S2. Comparison table of OER electrocatalysts in 1 M KOH: this work vs. literature

Catalyst	Voltage / mV (10 mA cm^{-2})	Tafel slope (mV dec^{-1})	Reference
NiFe@Ni@Cu	208	36.1	This work
NiFe LDH-D1	241	54.9	1
NiFeMo LDH/NF	220	45.6	2
NiFe-LDH/AISI 304	230	52	3
NiFe-BTC@ CNTs	230	36	4
NiFe LDH@ITO	240	45	5
NiFe ER 5	241	43	6
NiFe-20-H	241	44.2	7
$(Ni_{0.75}Fe_{0.25})_{0.05}Al_{0.05}$	279	38	8
Ni_6Fe_4LDH/NF	280	116	9
hcp-NiFe@NC	226	41	10
NiFe-35–120	242	56.64	11
NiFe-LDH/SnS	310	53.6	12
$Mo_{0.1}$–NiFe-LDH/N,S-rGO (10 wt%）	253	65	13
$SmNi_{0.02}$ Fe-LD/NF	230	76.13	14

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