## Autologous growth of Nickel Oxyhydroxides with In Situ Electrochemical Iron Doping for Efficient Oxygen Evolution Reactions

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OER Electrode	Onset potentials (V vs. RHE)	Tafel Slope (mV.dec <sup>-1</sup> )	Current density (mA cm <sup>-2</sup> ) @ overpotential (mV)	Reference
Autologous r-NiFe/NF	1.42	34.7	400 @ 310	This work
Autologous NiFe/NF	1.42	48.1	250 @ 310	This work
NiFe/roughened NF	1.47	50.1	500 @ 329	1
Electrodeposited NiFe/NF	1.44	28	80 @ 270	2
r-NiCo <sub>2</sub> O <sub>4</sub> *	1.46	63.4	10 @ 379	3
Autologous Fe:Ni(OH) <sub>2</sub> /NF	-	48.5	511 @ 300	4
Ni <sub>x</sub> Fe <sub>1-x</sub> Se <sub>2</sub> /NF	-	28	10 @ 195	5
Autologous Ni:Pi-Fe/NF	-	37	500 @ 290	6
NiFe-LDH/NF	1.46	43	200 @ 270	7
NiFe/NiCo <sub>2</sub> O <sub>4</sub> /NF	1.47	38.8	1200 @ 340	8
NiO-Fe/FTO	1.48	30	10 @ 480	9
$Ni_3S_2$ nanorods/NF*	1.387	159.3	10 @ 187	10

 Table S1. OER activities of some benchmark NiFe electrocatalysts in 1 M KOH

\* In 0.1 M KOH



Figure S1. Several cycles of Ni in 6 M KOH at the potential of 0.7 and -0.8 V at 25°C and scan rate of 200 mV s<sup>-1</sup>



**Figure S2.** Optical image of the a) NF, b) roughened NF with graphite counter electrode, c) roughened NF with iron counter electrode



**Figure S3.** Double-layer capacitance measurements for determining ECSA of reduced NiFe-OOH/NF electrode in 1 M KOH, a) cyclic voltammetry in a non-Faradaic region of the voltammogram at scan rates of 0.005, 0.01, 0.02, 0.025, 0.05, 0.1, 0.2, 0.4, and 0.8 V s<sup>-1</sup>, b) cathodic and anodic currents at 0.09 V vs. Ag/AgCl versus scan rate, c) comparison of the double layer capacitance of NF before and after roughening



Figure S4. Energy-dispersive X-ray spectroscopy of fabricated NiFe electrode



**Figure S5.** a) High resolution Fe 2*p* and b) Ni 2*p* XPS spectrum of roughened nickel foams



Figure S6. TEM images of the nanostructured Ni-Fe oxyhydroxide formed on the roughened NF by iron counter electrode



**Figure S7.** a) XRD, b) SEM, c) TEM images of the roughened NF (with iron counter electrode) after NaBH<sub>4</sub> reduction treatment



**Figure S8.** High resolution Ni 2*p* XPS spectrum of roughened nickel with iron counter electrode, before and after the NaBH<sub>4</sub> treatment



Figure S9. EPR spectra of Ni, roughened Ni, and reduced roughened Ni by NaBH<sub>4</sub>



Figure S10. EIS response at potentials of 1.55 V vs. RHE of roughened NiFe-OOH/NF and electrodeposited NiFe-OOH/NF



Figure S11. OER polarizations obtained with the roughened NFs and pristine NF at scan rate of 5 mV s<sup>-1</sup> in 1 M KOH



Figure S12. Tafel slopes of the prepared electrodes in 1 M KOH



Figure S13. Electrochemical stability of reduced NiFe-OOH/NF electrode at potential of 1.6 V vs. RHE in 30 wt.% KOH



**Figure S14.** a) High resolution Fe 2*p* and b) Ni 2*p* XPS spectrum, c) SEM images of the reduced roughened nickel with iron counter electrode after stability test in Figure S13

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