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Electronic Supplementary Information

High loading of NiFe active sites on melamine formaldehyde carbon-based aerogel towards efficient bi-functional electrocatalysis for water splitting

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Key words: bi-functional electrocatalyst, high loading, aerogel, water splitting, NiFe

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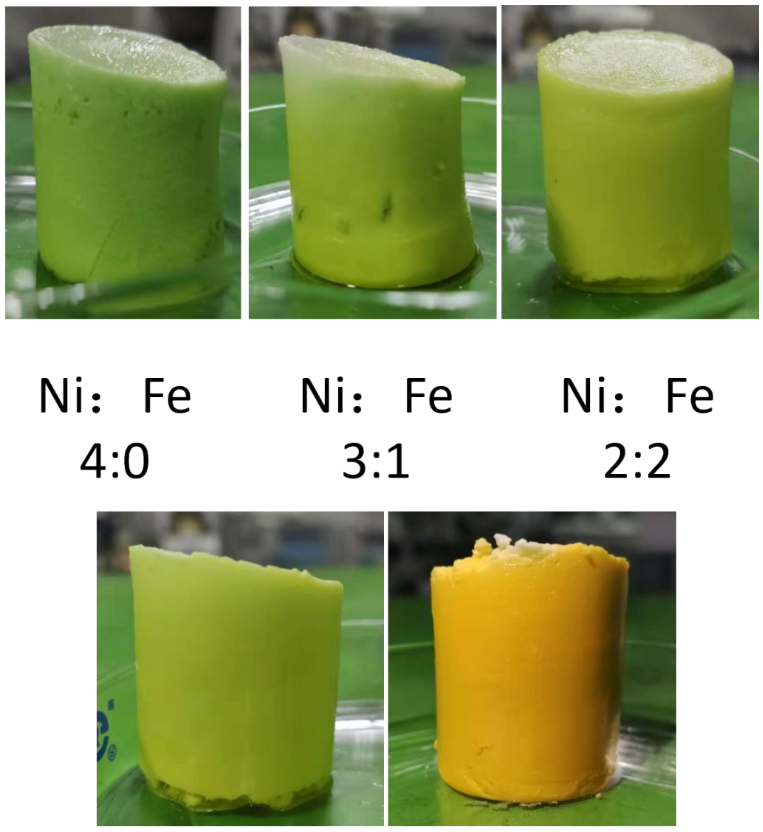

Figure S1. Optical photograph of wet hydrogels with different Ni/Fe ratio.

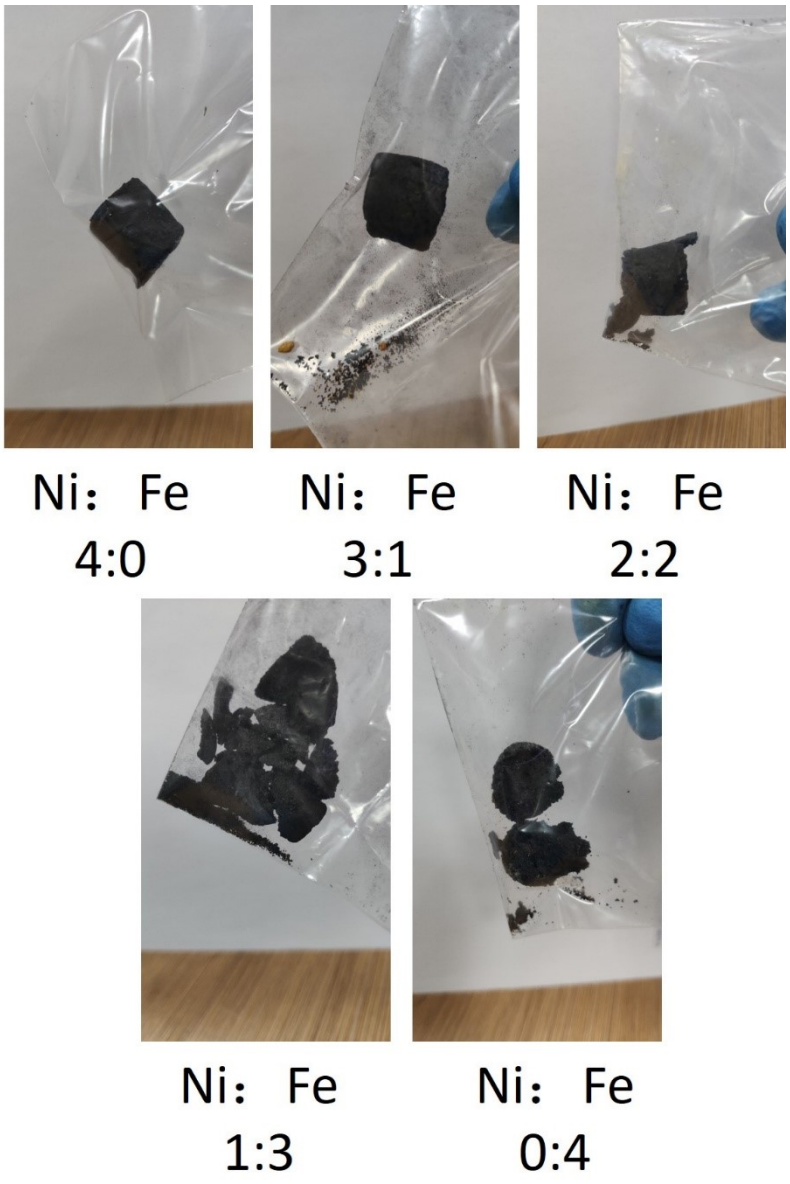

Figure S2. Optical photograph of carbon aerogels with different Ni/Fe ratio.

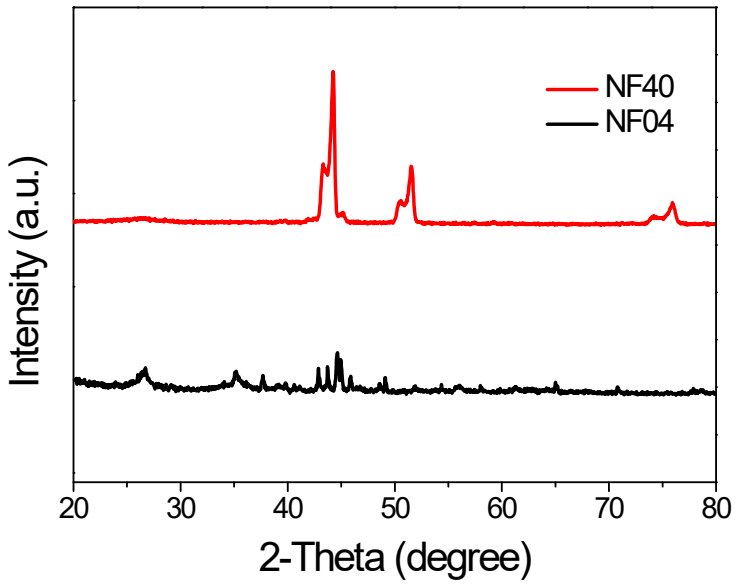

Figure S3. XRD patterns of NF40 and NF04.

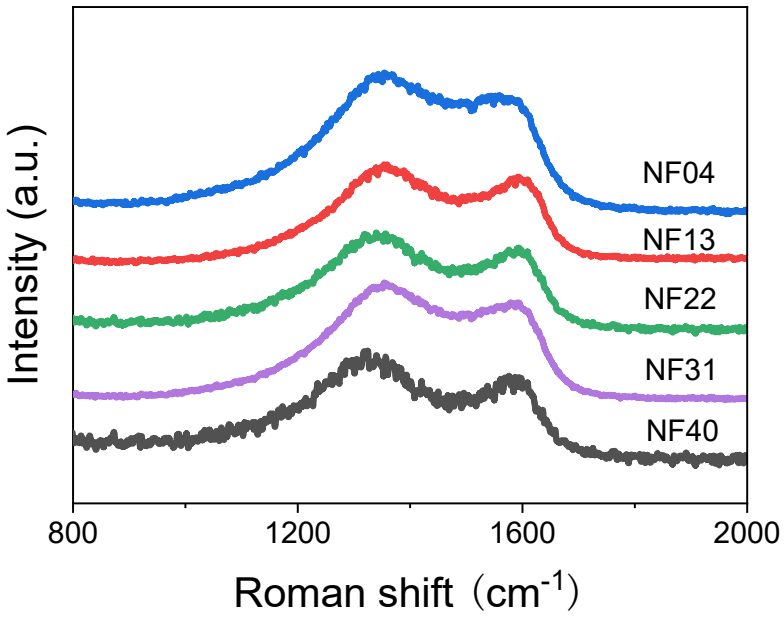

Figure S4. Raman spectra of NF40, NF31, NF22, NF13 and NF04.

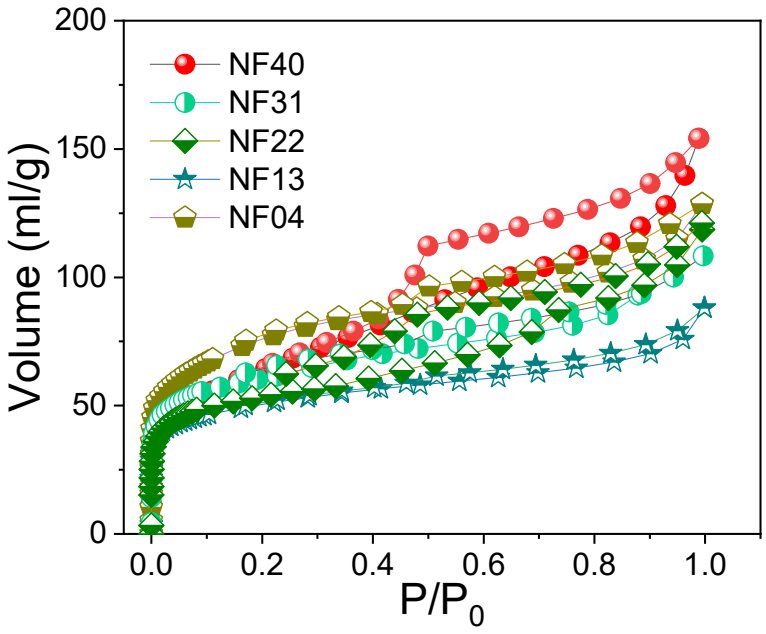

Figure S5. The nitrogen adsorption-desorption isotherms NF40, NF31, NF22, NF13 and NF04.

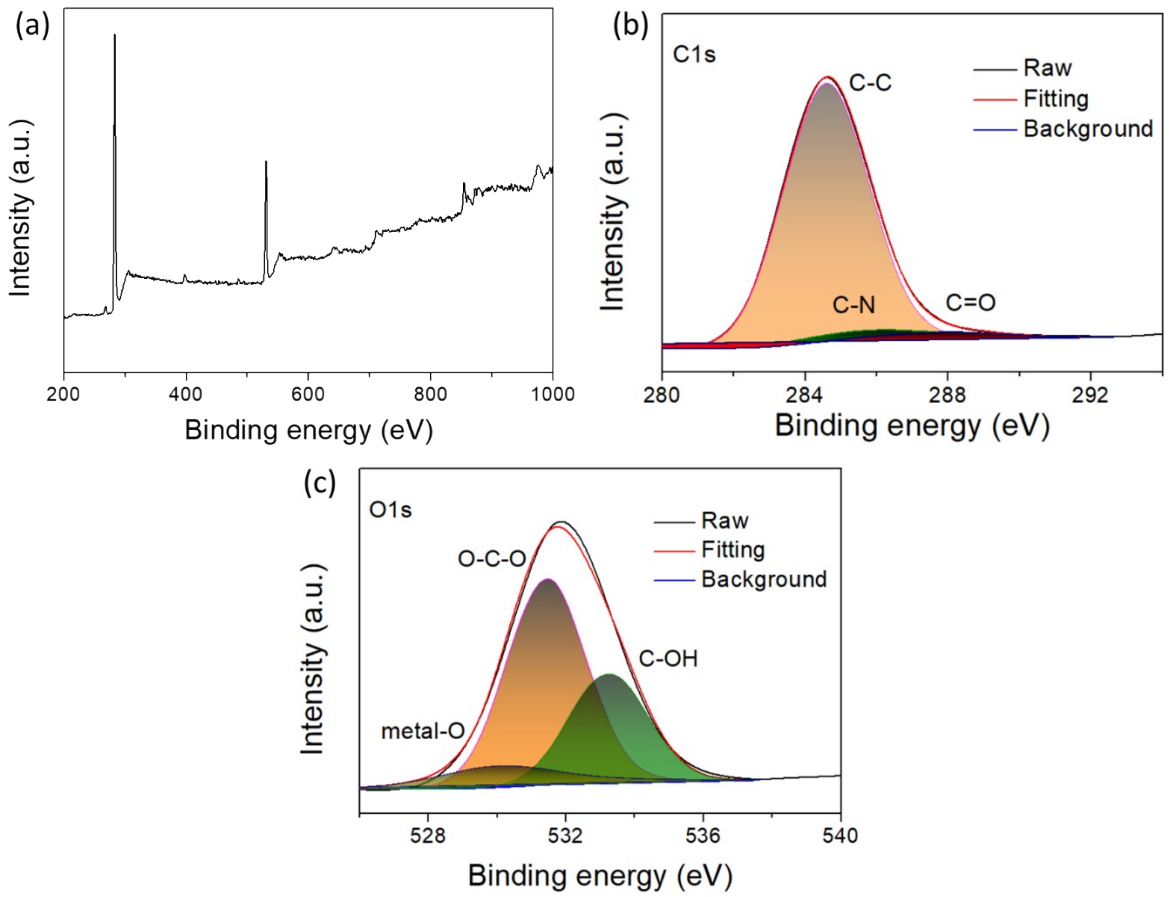

Figure S6. XPS spectra of the NF13 (a) survey scan, (b) C1s and (c) O1s.

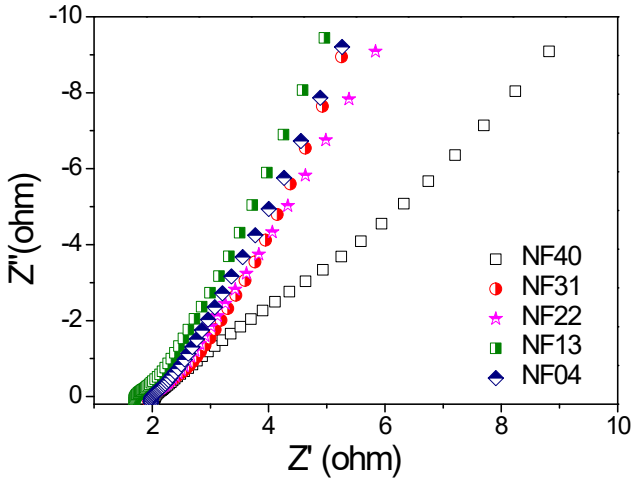

Figure S7. Nyquist plots obtained at 200 mV overpotential.

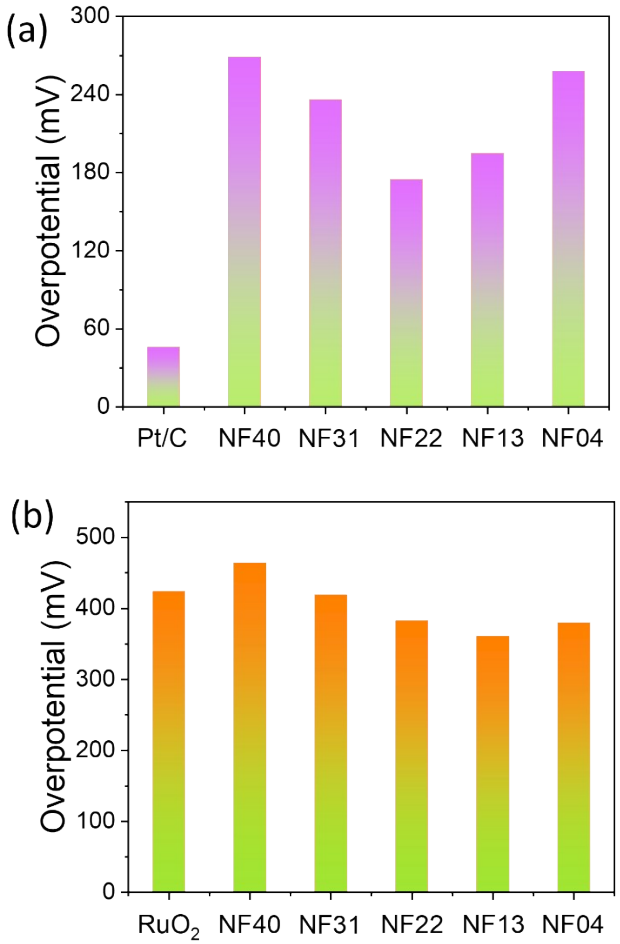

Figure S8. Overpotential of prepared samples and commercial catalysts at the current density of 20 mA/cm^2.

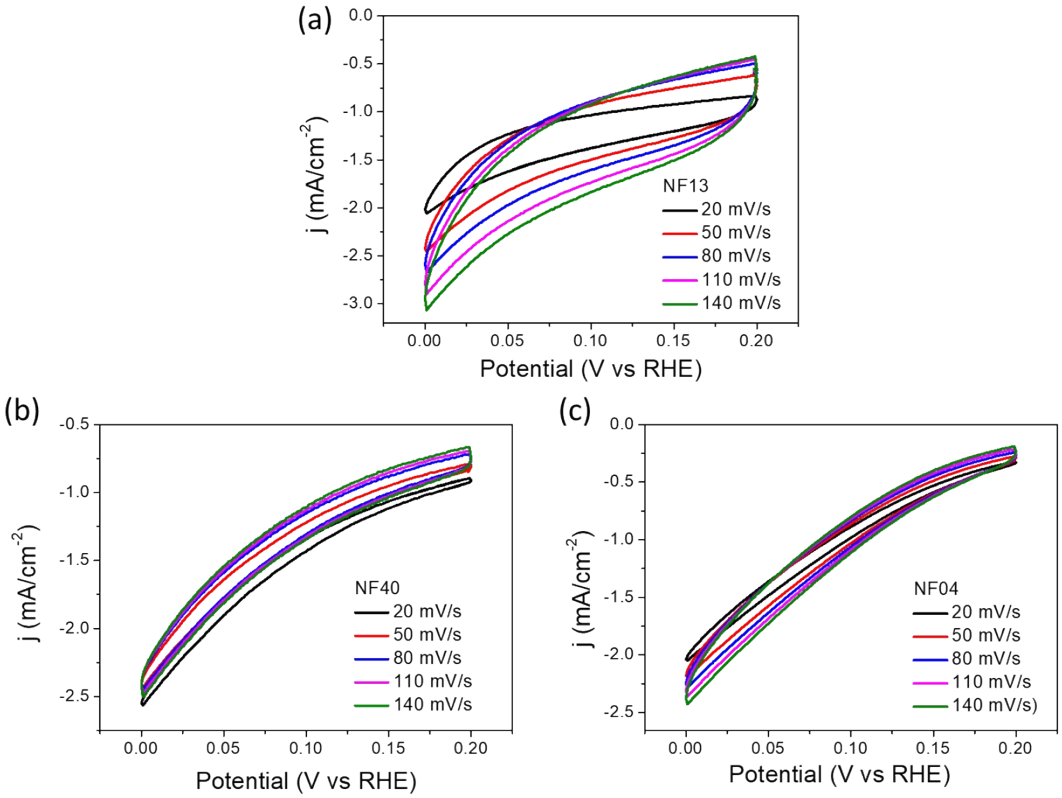

Figure S9. CV conducted at potential from 0 V to 0.2 V vs RHE at scan rates of 20 mV/s, 50 mV/s, 80 mV/s, 110 mV/s and 140 mV/s.

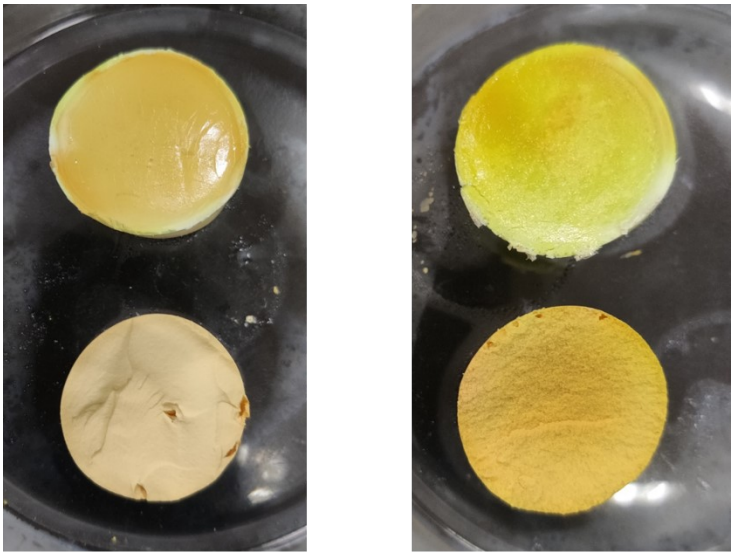

Figure S10. Optical photograph of wet hydrogel with different metal content.

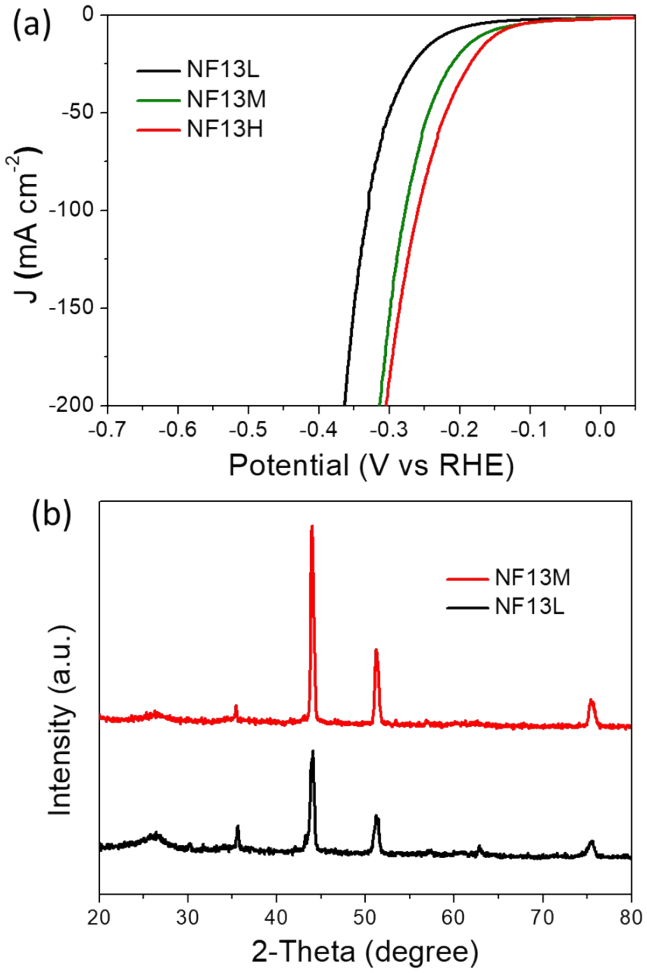

Figure S11. HER performance (a) and XRD patterns (b) of samples with different metal content.

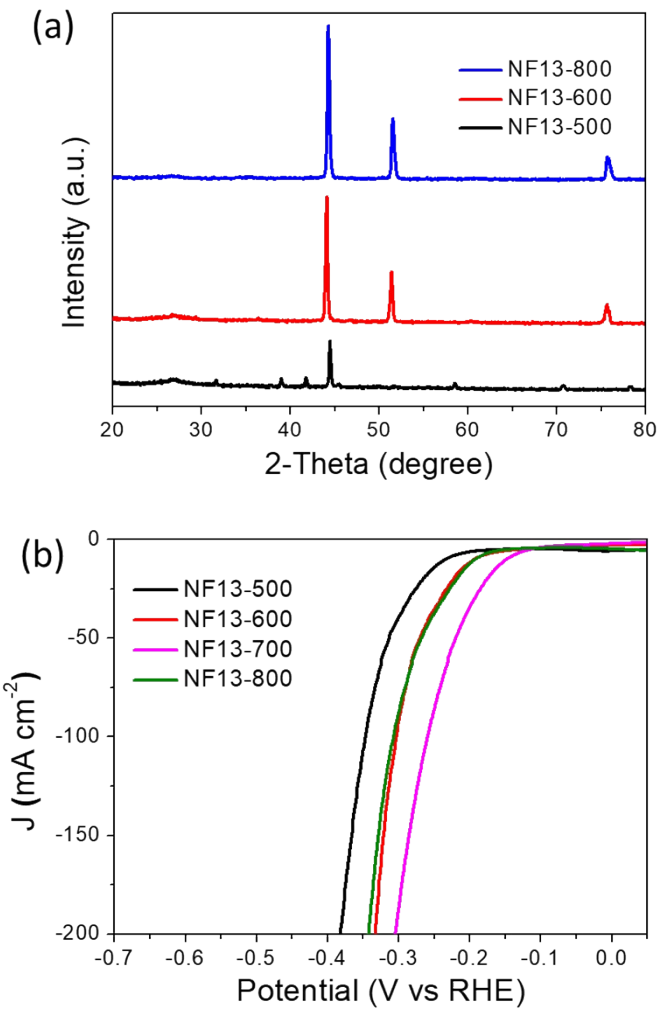

Figure S12. XRD (a) and HER performance (b) of samples with different carbonization temperatures.

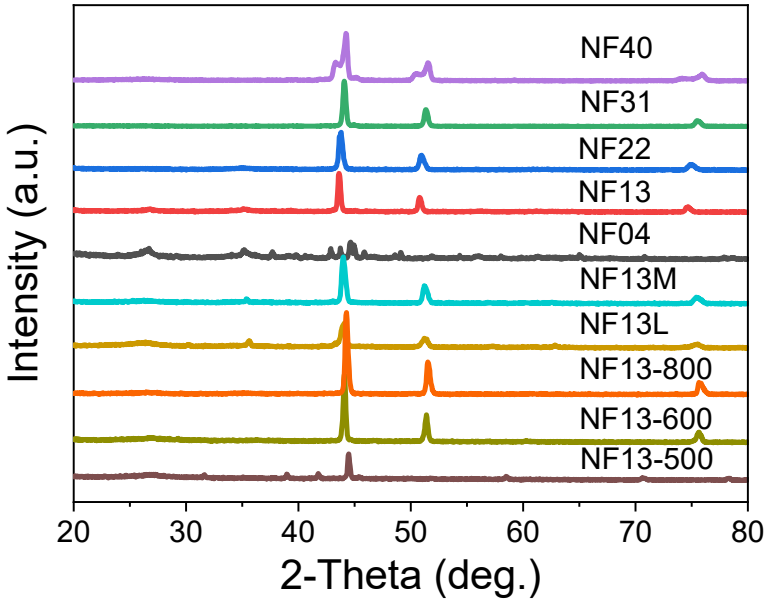

Figure S13. XRD patterns of all samples with different experimental conditions.

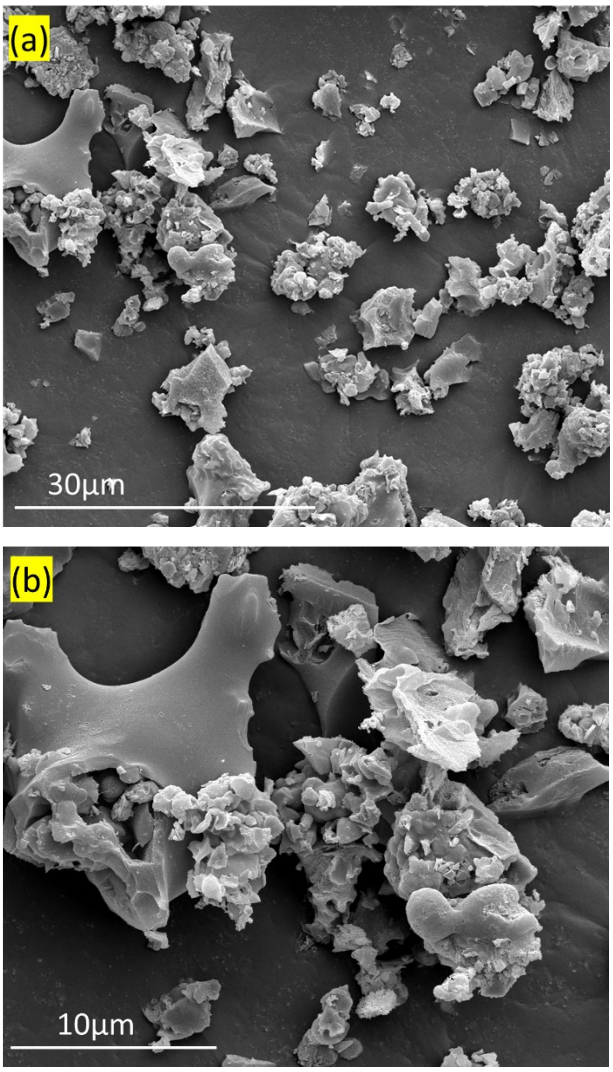

Figure S14. SEM images of catalyst after 100h long-term stability test.

Table S1 The comparison of the HER and OER performance with previously reported catalysts

Materials system	**HER**	**OER**	**Ref.**
Transition Metal Phosphides	10 mA cm^{-2} / 160 mV	10 mA cm^{-2} / 260 mV	1
Two-Dimensional Bimetallic Ni–Co Phosphate Nanoplates	/	10 mA cm^{-2} / 400 mV	2
Manganese-cobalt phosphide yolk-shell spheres	/	10 mA cm^{-2} / 330 mV	3
Ni–Co hydrogen phosphate	/	10 mA cm^{-2} / 320 mV	4
Al-doped MoS2@graphene aerogel	10 mA cm^{-2} / 212 mV	/	5
Platinum–rhodium aerogels	10 mA cm^{-2} / 55 mV	/	6
N-doped carbon aerogel-nickel	10 mA cm^{-2} / 270 mV	/	7
MoS2 Quantum Dot/Polyaniline Aerogel	10 mA cm^{-2} / 196 mV	/	8
CoFe-based active sites on 3D heteroatom doped graphene aerogel	10 mA cm^{-2} / 116 mV	10 mA cm^{-2} / 248 mV	9
Ni3FeN/r-GO Aerogel	10 mA cm^{-2} / 94 mV	10 mA cm^{-2} / 270 mV	10
Cobalt Carbonate Hydroxides by Mn Doping	10 mA cm^{-2} / 180 mV	30 mA cm^{-2} / 294 mV	11
NiFe active sites on MF aerogel	100 mA cm^{-2} / 254 mV	100 mA cm^{-2} / 382 mV	This work

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