

## Supporting Materials

### **Interfacial Microenvironment Modulation Enhancing Catalytic Kinetics of CoNiP@NiFe LDH Heterostructures for Highly Efficient Oxygen Evolution Reaction**

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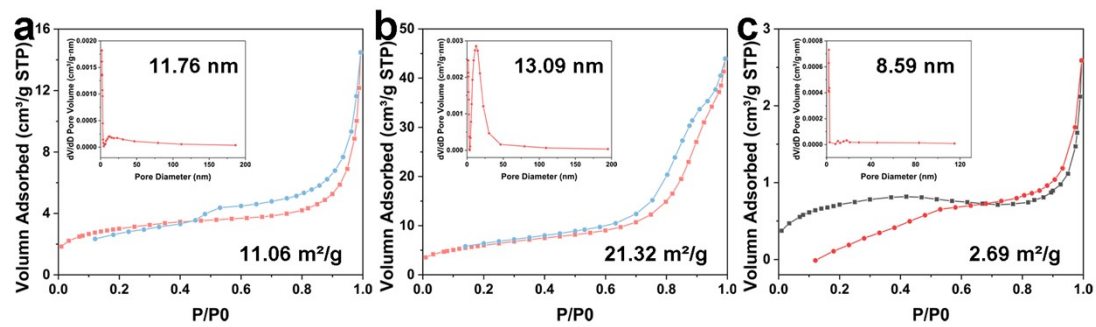
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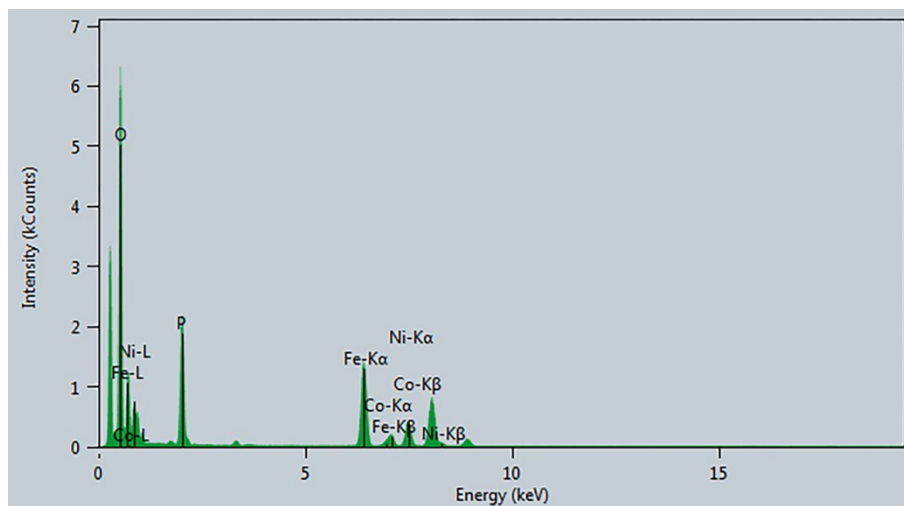
<sup>c</sup> Shanxi Laboratory for Yellow River, Taiyuan 30006, China

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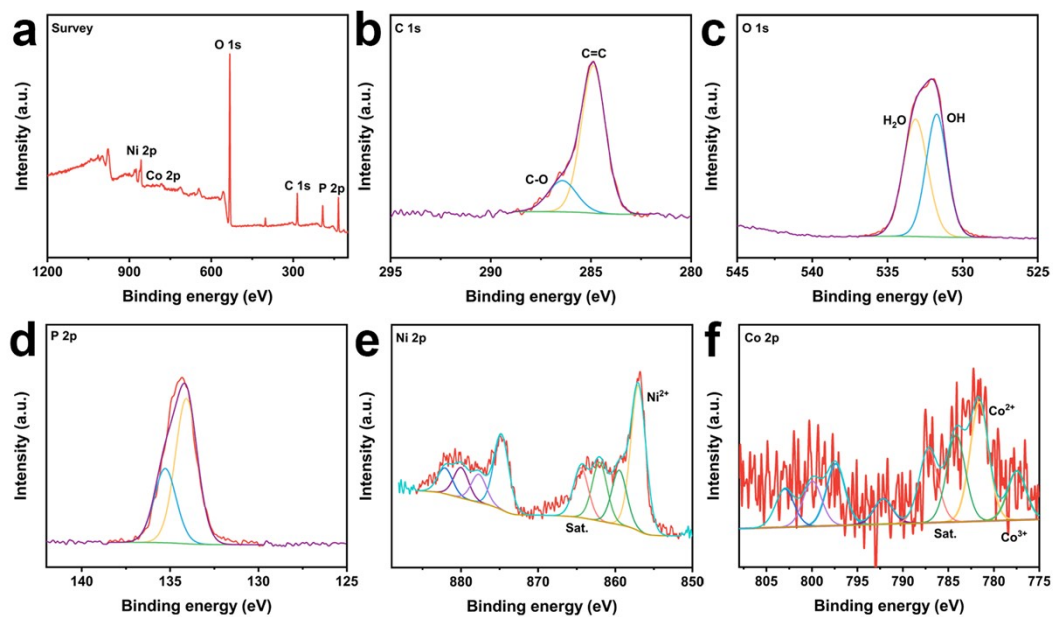
E-mail address: gdghjkx@126.com (Donggang Guo)



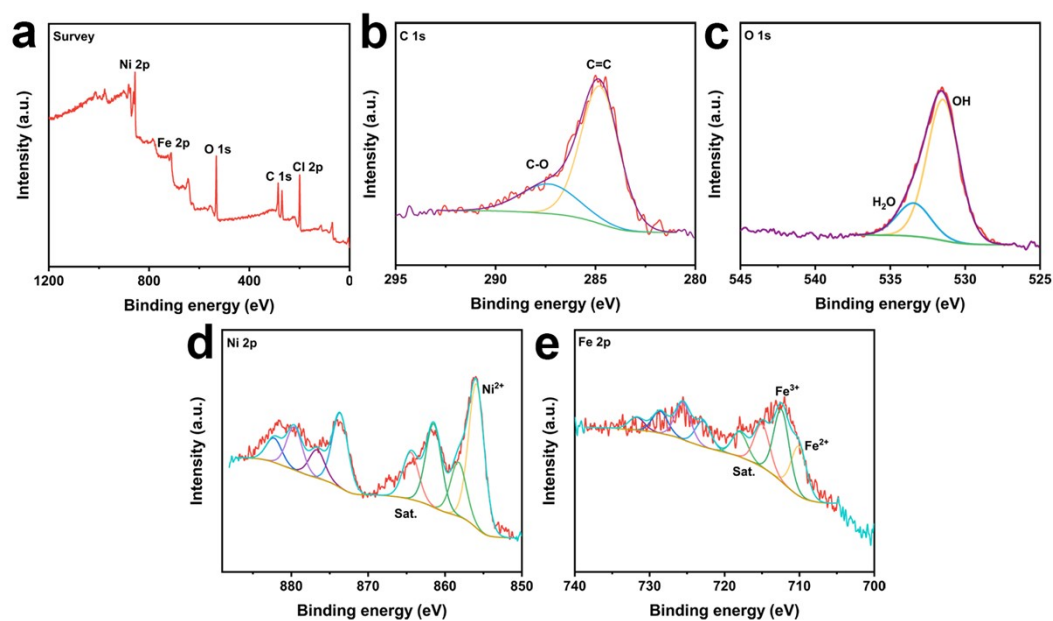
**Fig. S1.** The N<sub>2</sub> adsorption/desorption isotherm of (a) CoNi-pristine/NF, (b) CoNiP/NF, (c) CoNiP@NiFe-LDH/NF (insets are corresponding pore diameter distribution curves).



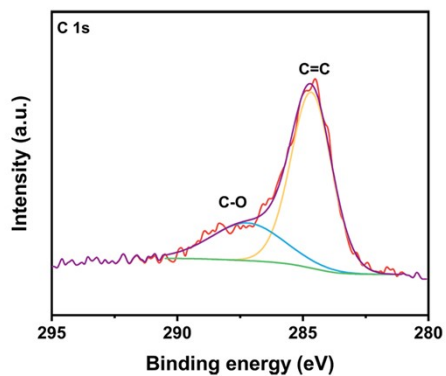
**Fig. S2.** The corresponding energy dispersive X-ray (EDX) spectra of CoNiP@NiFe-LDH/NF.



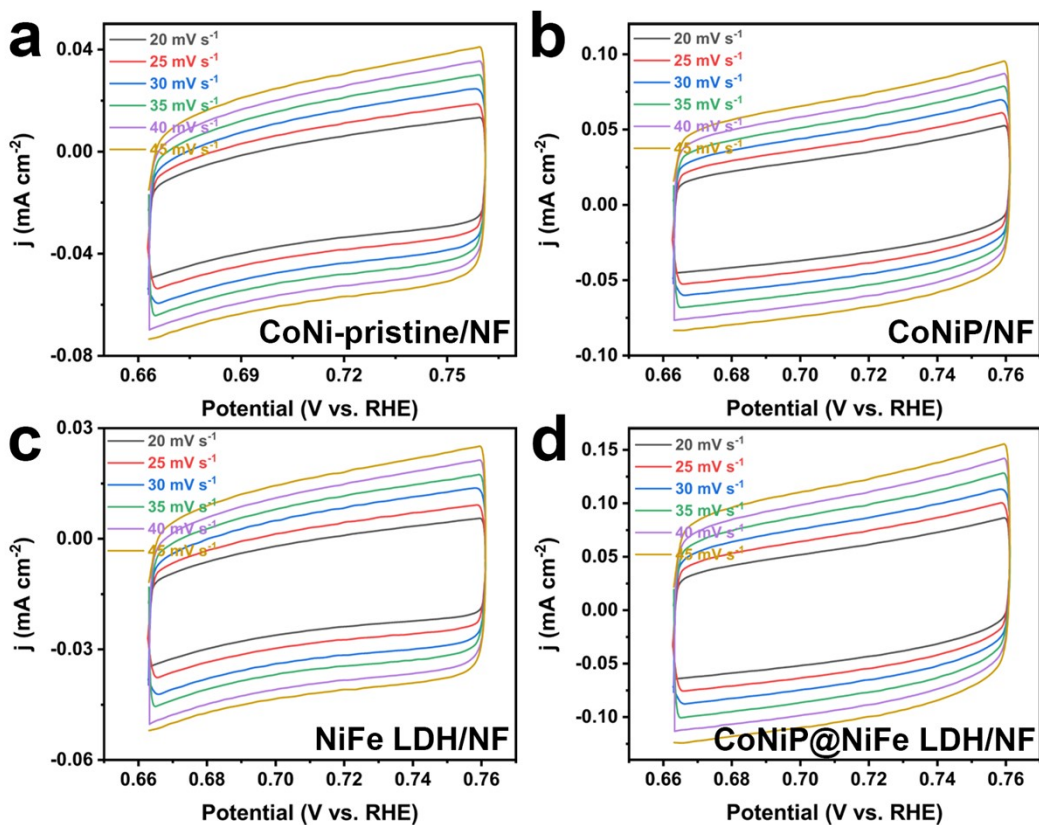
**Fig. S3.** The survey spectra (a), high-resolution X-ray photoelectron spectra of (b) C 1s, (c) O 1s, (d) P 2p, (e) Ni 2p, and (f) Co 2p of CoNiP/NF.



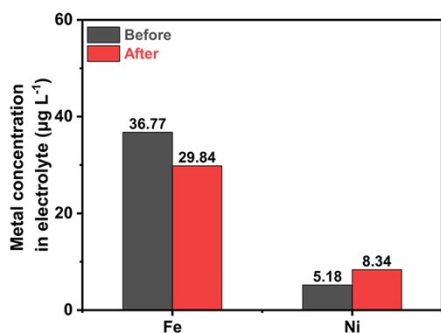
**Fig. S4.** The survey spectra (a), high-resolution X-ray photoelectron spectra of (b) C 1s, (c) O 1s, (d) Ni 2p, and (e) Fe 2p of NiFe-LDH/NF.



**Fig. S5.** The high-resolution X-ray photoelectron spectra of C 1s of CoNiP@NiFe-LDH/NF.



**Fig. S6.** CVs of (a) CoNi-pristine/NF, (b) CoNiP/NF, (c) NiFe LDH/NF, and (d) CoNiP@NiFe LDH.



**Fig. S7.** The concentration of metal in the electrolyte before and after the reaction.

**Table S1.** N<sub>2</sub> adsorption-desorption data of catalysts.

Catalysts	BET Surface Area (m <sup>2</sup> /g)	Pore Size (nm)	Pore Volume (cm <sup>3</sup> /g)
CoNi-pristine/NF	11.06	11.76	0.022394
CoNiP/NF	21.32	13.09	0.067907
CoNiP@NiFe-LDH/NF	2.69	8.59	0.003794

**Table S2.** Summary of OER performances in 1.0 M KOH in this work.

Sample	Overpotential (mV) at 10 mA cm <sup>-2</sup>	Tafel slope (mV dec <sup>-1</sup> )	R <sub>ct</sub> (Ω)	R <sub>s</sub> (Ω)	C <sub>dl</sub> (mF cm <sup>-2</sup> )	ECSA (cm <sup>2</sup> )
RuO <sub>2</sub> /NF	265	52.2	1.127	0.91989	-	-
CoNi-pristine/NF	249	54.5	0.47209	0.78752	0.95	23.75
CoNiP/NF	217	43.5	0.77708	0.86399	1.49	37.25
NiFe LDH/NF	297	47.8	0.41668	0.85138	0.69	17.25
CoNiP@NiFe LDH/NF	207	36.5	0.35476	0.80399	2.33	58.25
NF	279		1.06764	1.00048		

**Table S3.** Summary of OER performances in 1.0 M KOH.

Sample	Overpotential (mV) at 100 mA cm <sup>-2</sup>	Tafel slope (mV dec <sup>-1</sup> )	Reference
CoNiP@NiFe LDH/NF	244	36.5	This work
CoMoO <sub>4</sub> -Ni(OH) <sub>2</sub>	349	67.6	1
NiCoP@NiMn LDH/NF	293	48.4	2
NG-NiFe@MoC <sub>2</sub>	400	31	3
Cu@NiFe LDH/Cu Foam	281	27.8	4
Ni <sub>3</sub> FeN/r-GO	320	54	5
NiCo <sub>2</sub> S <sub>4</sub> /NF	370	40.1	6

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CoFeV LDH/NF	330	57	7
Co <sub>0.8</sub> Fe <sub>0.2</sub> OOH@C	292	33	8
NiZnFeB-LDH	280	48.4	9
CuCo <sub>2</sub> S <sub>4</sub>	310	49	10

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## References

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