Supplementary Information (SI) for Green Chemistry.

$Ni(OH)_2$ nanosheet array modified with Fe-phytate complex layer as corrosion resistant catalyst for seawater electrolysis at ampere-level current density

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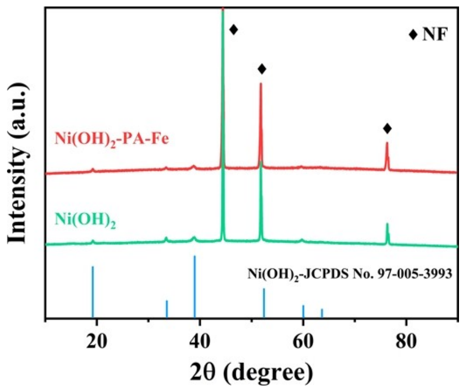

Fig. S1. XRD patterns of Ni(OH)$_2$ and Ni(OH)$_2$-PA-Fe.

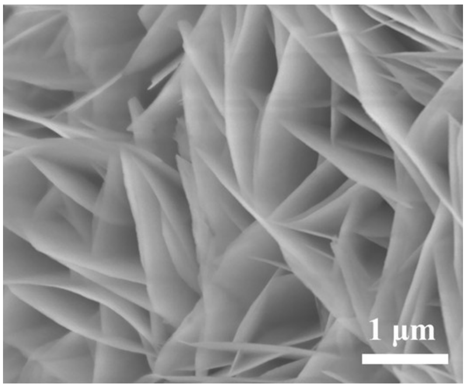

Fig. S2. SEM image of Ni(OH)$_2$.

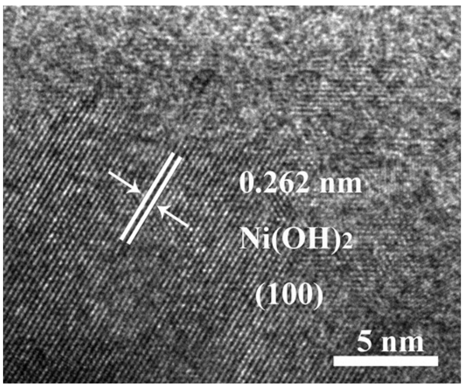

Fig. S3. HRTEM image of Ni(OH)$_2$.

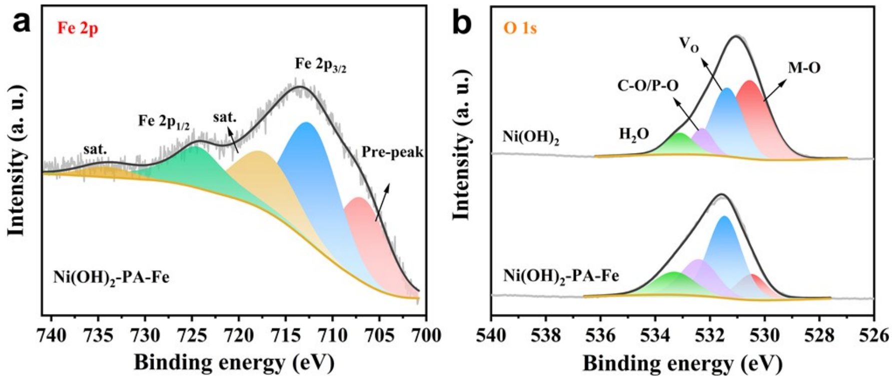

Fig. S4. The high-resolution XPS spectra of $Ni(OH)_2$-PA-Fe in (a) Fe 2p and (b) O 1s regions.

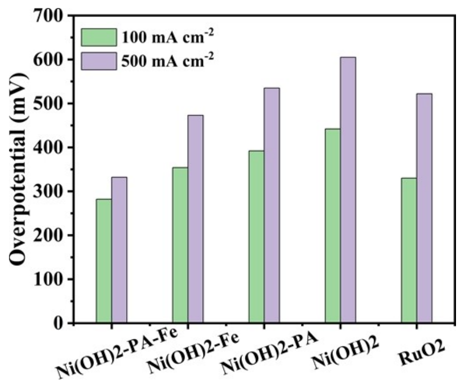

Fig. S5. The overpotentials required to achieve current densities of 100 and 500 mA cm^{-2} for the various samples in 1 M KOH.

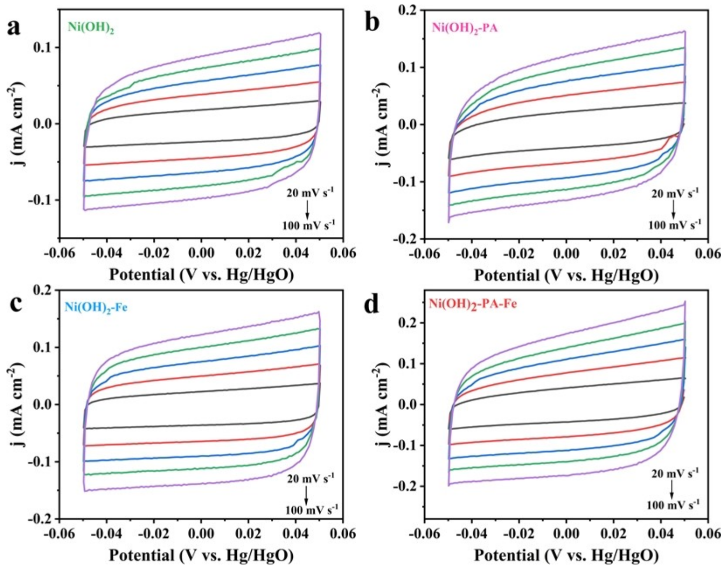

Fig. S6. CVs of (a) $Ni(OH)_2$, (b) $Ni(OH)_2$-PA, (c) $Ni(OH)_2$-Fe, and (d) $Ni(OH)_2$-PA-Fe at different scan rates of 20, 40, 60, 80 and 100 mV S^{-1} in 1.0 M KOH.

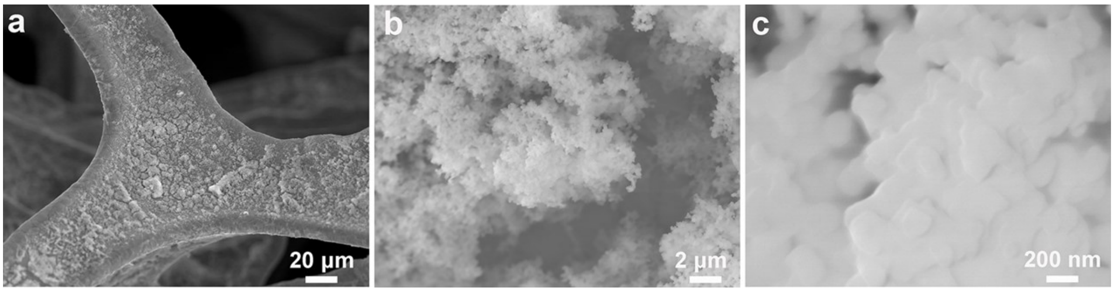

Fig. S7. SEM images at different magnifications of NF-PA-Fe.

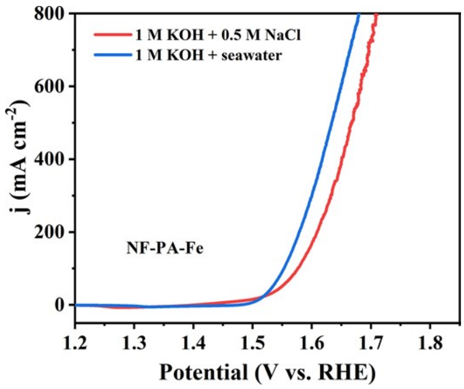

Fig. S8. Polarization curves for NF-PA-Fe electrode tested in different electrolytes.

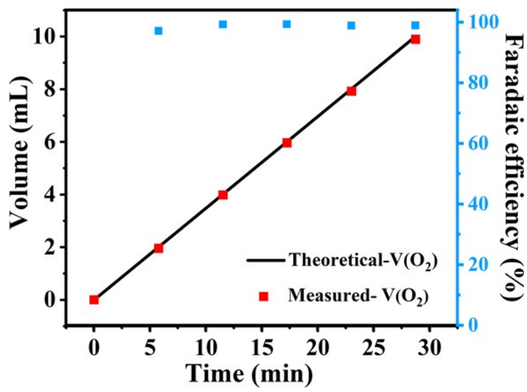

Fig. S9. Comparison between the amount of collected and theoretical gaseous products for OER at a constant current density of 200 mA cm^{-2} in 1 M KOH + seawater.

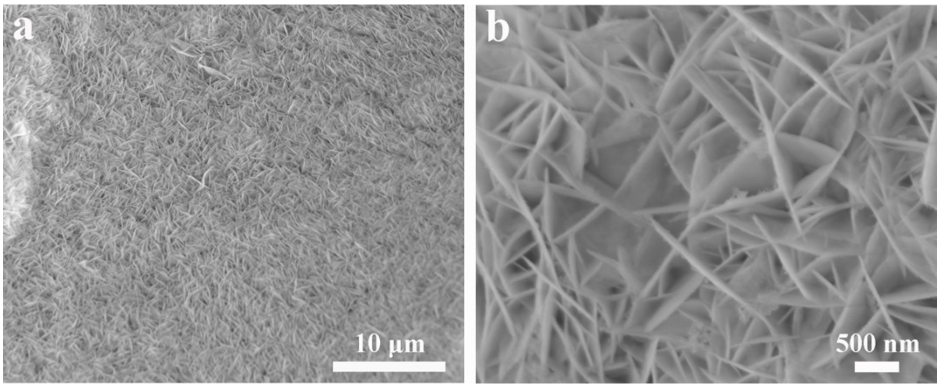

Fig. S10. (a, b) SEM images of $Ni(OH)_2$-PA-Fe after OER test in 1.0 M KOH + seawater.

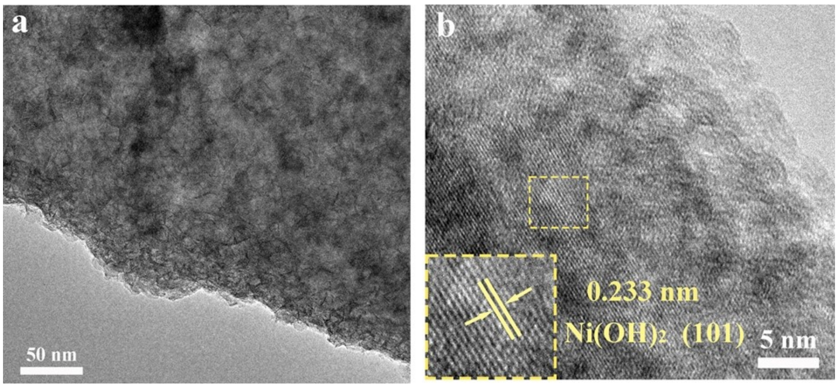

Fig. S11. (a) TEM image and (b) HRTEM of $Ni(OH)_2$-PA-Fe after OER test in 1.0 M KOH + seawater.

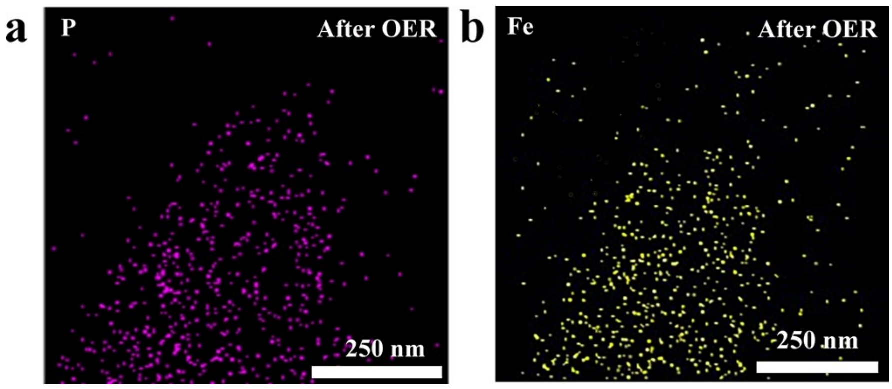

Fig. S12. TEM elemental mapping images of (a)P element and (b) Fe element in $Ni(OH)_2$-PA-Fe catalyst after OER.

Table S1. Equivalent circuit fitting parameters of EIS curves for OER on $Ni(OH)_2$-PA-Fe, $Ni(OH)_2$-Fe, $Ni(OH)_2$-PA and $Ni(OH)_2$.

Catalyst	$Ni(OH)_2$-PA-Fe	$Ni(OH)_2$-Fe	$Ni(OH)_2$-PA	$Ni(OH)_2$
R_s (Ω)	1.60	1.60	1.80	1.70
R_{ct} (Ω)	2.72	23.7	50.3	75.2

Table S2. Comparison of the OER performance in alkaline condition of $Ni(OH)_2$-PA-Fe and other reported catalysts.

Catalysts	Electrolyte	η_{100} (mV)	Stability (h)	References
$Ni(OH)_2$-PA-Fe	1 M KOH + seawater	320	j_{1000}=1200	**This work**
Ni_2P-Fe_2P	1 M KOH + seawater	305	j_{500}=38	*Adv. Funct. Mater.*, 2021, **31**, 2006484
B-Co_2Fe LDH	1 M KOH +seawate r	310	j_{500}=100	*Nano Energy*, 2021, **83**, 105838
NiIr-LDH	1 M KOH + seawater	315	j_{500}=650	*J. Am. Chem. Soc.*, 2022, **144**, 9254-9263
Ni_3FeN@C/NF	1 M KOH + seawater	314	j_{500}=100	*J. Mater. Chem. A*, 2021, **9**, 13562–13569
NiMoN@NiFeN	1 M KOH + seawater	307	j_{500}=100	*Nat. Commun.*, 2019, **10**, 5106
NiCoS/NF	1 M KOH + seawater	360	j_{100}=100	*Appl. Catal. B-Environ.*, 2021, **291**, 120071
NiCoHPi@Ni_3N/NF	1 M KOH + seawater	396	-/-	*ACS Appl. Mater. Interfaces*, 2022, **14**, 22061–22070
MoO_3@CoO/CC	1 M KOH + seawater	404	j_{600}=1000 (Real seawater)	*Nature Commun.*, 2024, **15**, 2481
$NiFeB_x$ alloy	1 M KOH + 0.5 M NaCl	328	j_{500}=100	*Adv. Funct. Mater.*, 2021, **31**, 2101820
NiFe-PBA-gel-cal	1 M KOH + 0.5 M NaCl	329	j_{500}=100	*Nano Energy*, 2021, **83**, 105838
NiCr-LDH	1 M KOH	319	j_{100}=30	*Nanoscale*, 2018, **10**, 19484
NiFe-LDH NSs	1 M KOH	η_{30}=370	j_{30}=8	*Nano Research*, 2018, **11**, 1883