Supporting Information

Bifunctional Electrocatalyst for Alkaline Seawater Splitting using Ruthenium Doped Nickel Molybdenum Phosphide Nanosheets

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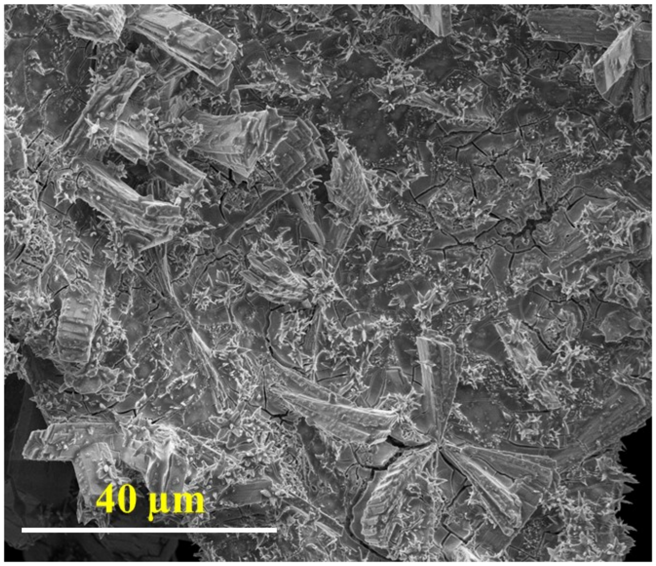

Fig. S1. HR-SEM image of $NiMoP_2$.

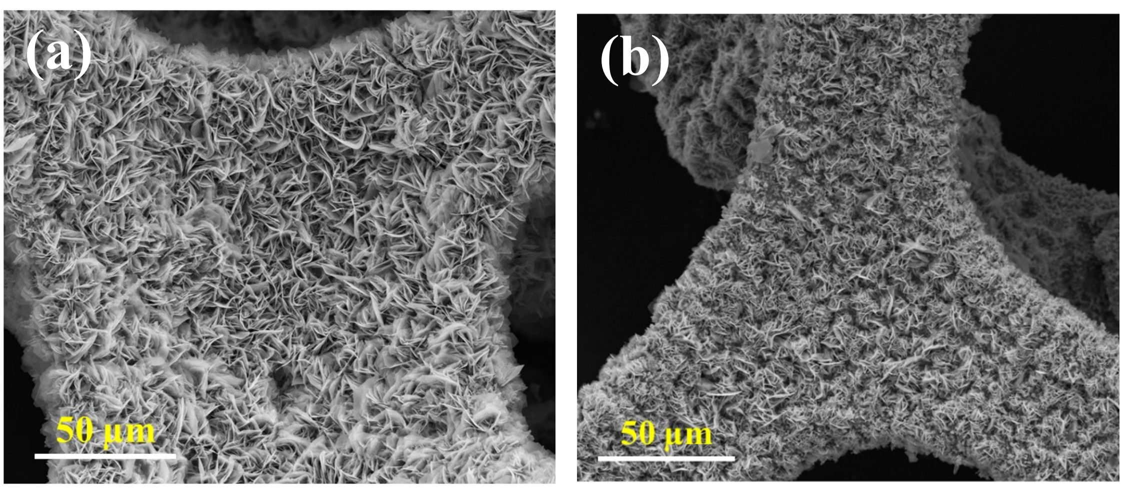

Fig. S2. (a and b) HR-SEM images of $Ru_{11}NiMoP_2$ and $Ru_{33}NiMoP_2$.

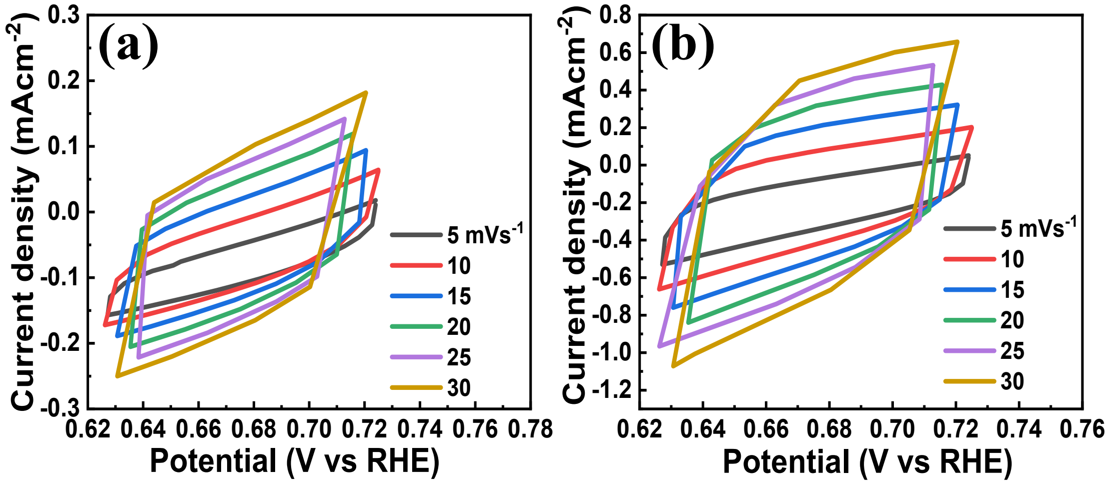

Fig. S3. For HER ECSA: (a and b) CV curves for $NiMoP_2$/NF and $Ru_{22}NiMoP_2$/NF at different scan rates in 1M KOH.

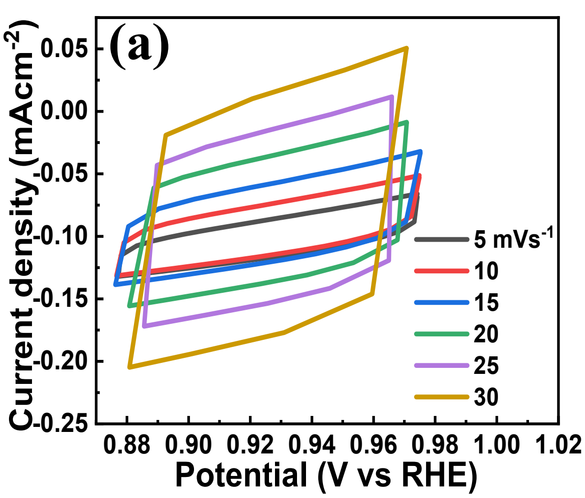

Fig. S4. For OER ECSA: (a and b) CV curves for $NiMoP_2$/NF and $Ru_{22}NiMoP_2$/NF at different scan rates in 1M KOH.

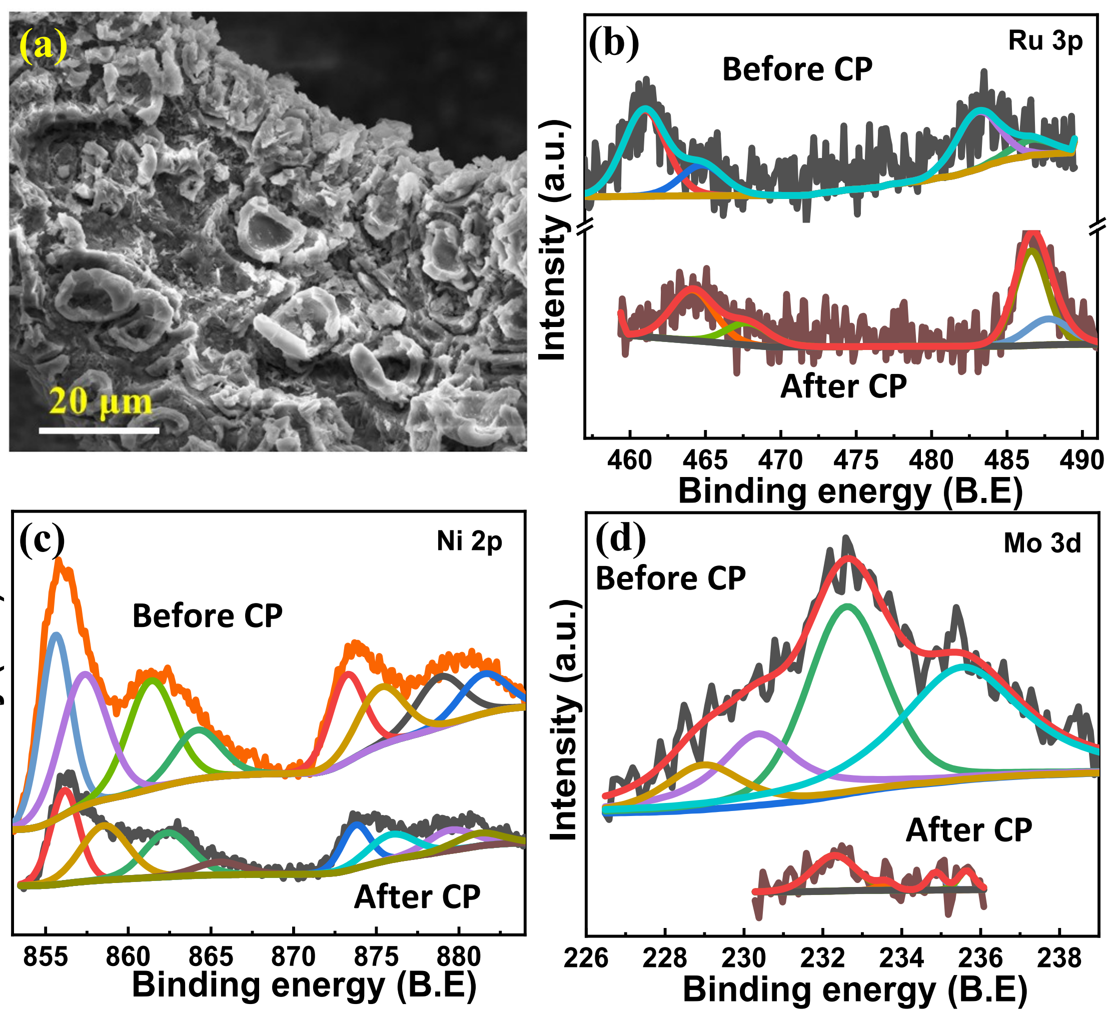

Fig. S5. (a) HR-SEM image, (b-d) Ru 3p, Ni 2p and Mo 3d XPS spectra of $Ru_{22}NiMoP_2$/NF after chronopotentiometry study in 1M KOH.

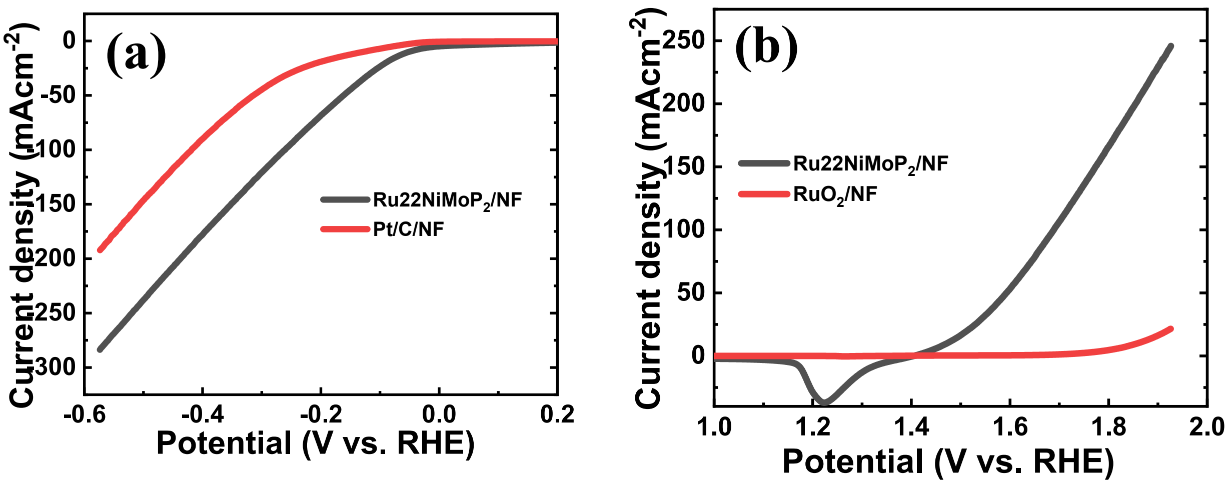

Fig. S6. (a and b) HER LSV and OER CV curves for $Ru_{22}NiMoP_2$/NF & Pt/C/NF and RuO_2/NF in alkaline sea water.

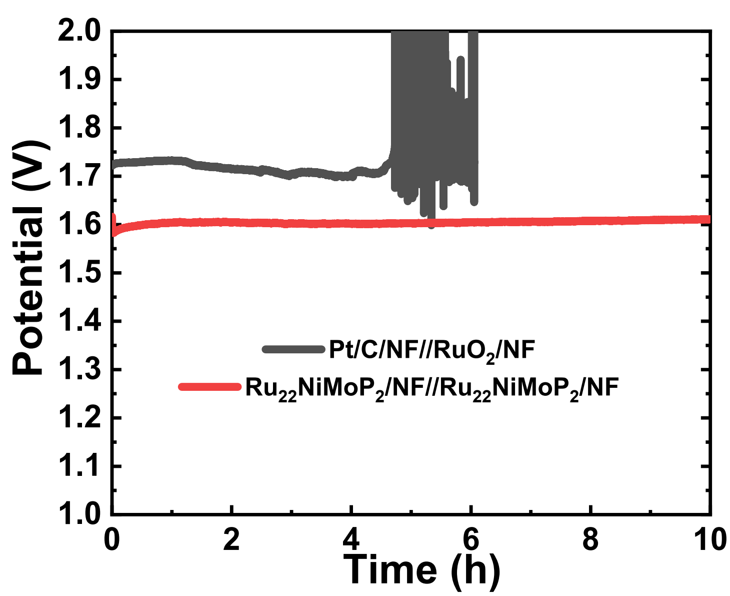

Figure S7. Chronopotentiometry study in alkaline sea water.

Table S1. Comparison of reported electrocatalysts with Ru22NiMoP2/NF for alkaline sea water splitting.

S. No	Catalyst	Potential	OER(TOF)	HER(TOF)	Ref
1.	NiCoP/NF	1.58V/ 10 $mAcm^{-2}$	3.88 s^{-1}/300 mV	8.93 s^{-1}/-100 mV	1
2.	CoFe/NF	1.64V/ 10 $mAcm^{-2}$	0.017 s^{-1}/350 mV		2
3.	CoFe@NiFe/NF	1.59 V/ 10 mA cm^{-2}	11.9 s^{-1}/300 mV	15.7 s^{-1}/220 mV	3
4.	$CoMoN_x$-500 NSAs/NF	1.55 V/ 10 mA cm^{-2}	1.57 s^{-1}	4.29 s^{-1}/-200 mV	4
5.	Sn–Ni_3S_2/NF	1.46 V/ 10 mA cm^{-2}		8.7 s^{-1}/-155mV	5
6.	Fe-CoP/NF	1.49 V/ 10 mA cm^{-2}	3.09 min^{-1}/300 mV	4.14 min^{-1}/200 mV	6
7.	G@$MoNi_4$-$NiMoO_4$/NF	1.44 V/ 10 mA cm^{-2}	0.97 s^{-1}/200 mV	11.9 s^{-1}/200 mV	7
8.	NiFeOH/CoS_x/NF	1.56 V/ 10 mA cm^{-2}	0.52 s^{-1}/ 200 mV	0.71 s^{-1}/ 200 mV	8
9.	V–$Ni(OH)_2$/NF	1.58/100 mA cm^{-2}	14.2 s^{-1} /300 mV	17.2 s^{-1}/300 mV	9
10.	NiSe@CoFe LDH/NF	1.69 /100 mA cm^{-2}	0.078 s^{-1}/250 mV		10
12	Ru-$NiMoP_2$ (KOH + Seawater)	1.53@10mA cm^{-2}	1.6 s^{-1}/100 mV	5 s^{-1}/100 mV	This work

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