# Supporting Information

In situ-growth Mo-doped MOFs-derived phosphide supported nanosheets as efficient bifunctional electrocatalyst towards urea-water electrolysis

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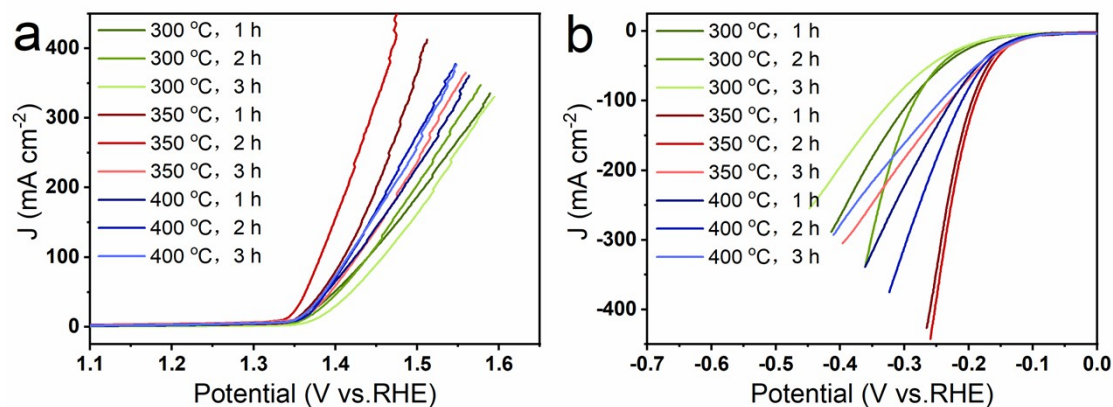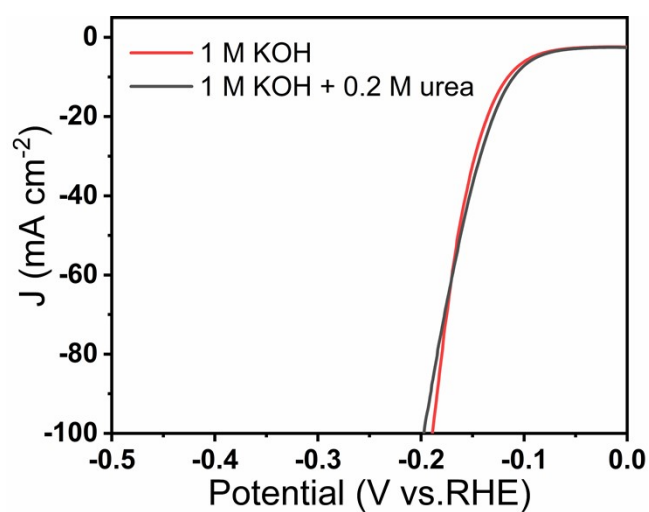
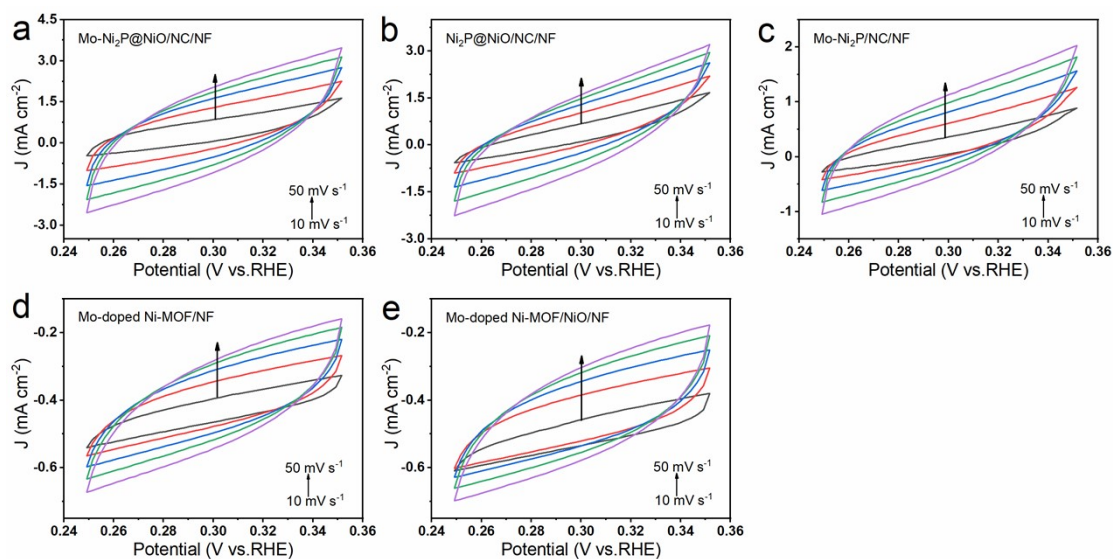**Fig. S1** LSV curves of Mo-Ni$_2$P@NiO/NC/NF samples under different phosphating conditions. (a) UOR; (b) HER.
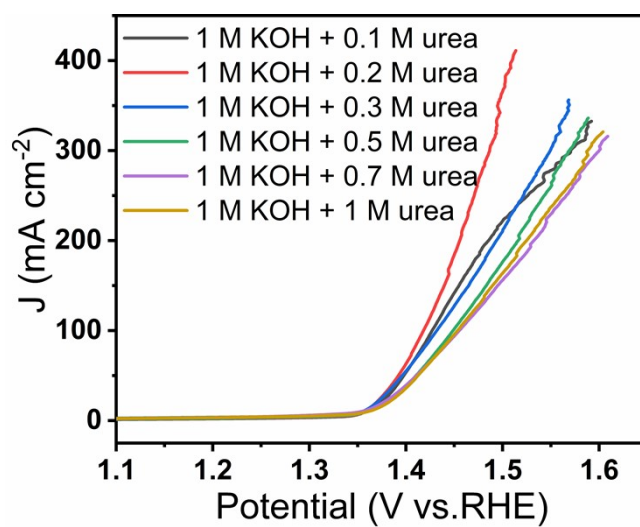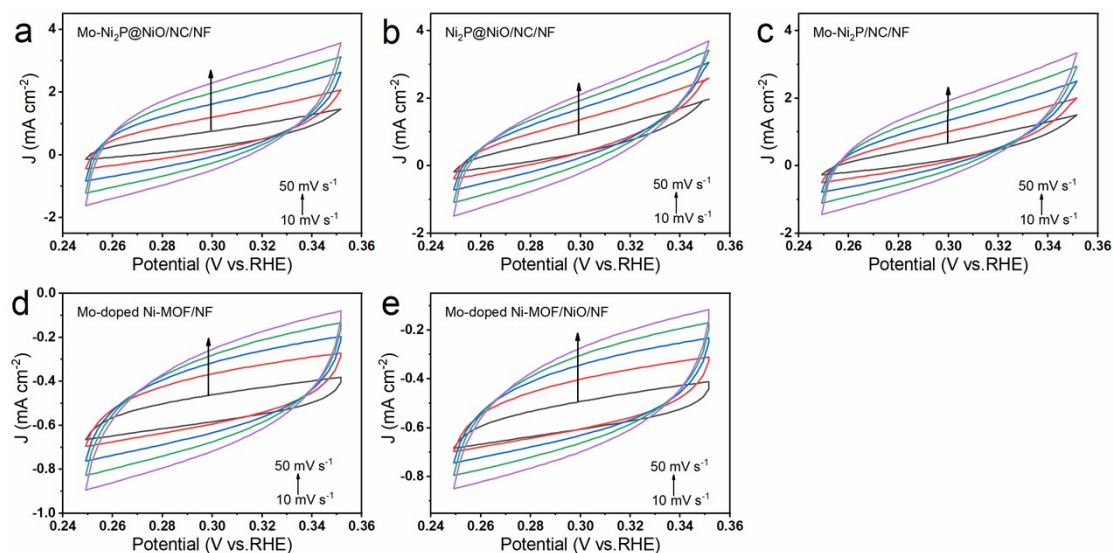
Fig. S2 LSV curves of Mo-Ni$_2$P@NiO/NC/NF in the electrolyte of 1 M KOH + x M urea.


Fig. S3 HER polarization curves of Mo-Ni$_2$P@NiO/NC/NF tested in 1 M KOH electrolyte with or

without 0.2 M urea.

Fig. S4 CV curves of (a) Mo-Ni$_2$P@NiO/NC/NF, (b) Ni$_2$P@NiO/NC/NF, (c) Mo-Ni$_2$P/NC/NF, (d) Mo-doped Ni-MOF/NF, and (e) Mo-doped Ni-MOF/NiO/NF tested in 1 M KOH with 0.2 M urea electrolyte at the non-faradic potential region (0.25-0.35 V) with different scan rates (10 to 50 mV s^{-1}).

Fig. S5 CV curves of (a) Mo-Ni$_2$P@NiO/NC/NF, (b) Ni$_2$P@NiO/NC/NF, (c) Mo-Ni$_2$P/NC/NF, (d) Mo-doped Ni-MOF/NF, and (e) Mo-doped Ni-MOF/NiO/NF tested in 1 M KOH electrolyte at 0.25-0.35 V potential window with different scan rates (10 to 50 mV s^{-1}).
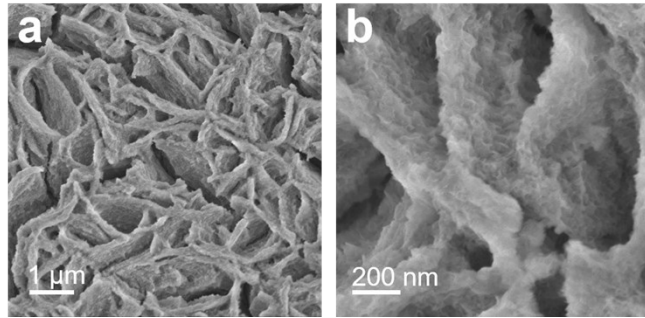
Fig. S6 (a, b) SEM images of Mo-Ni$_2$P@NiO/NC/NF after 20 h UOR long-term test.
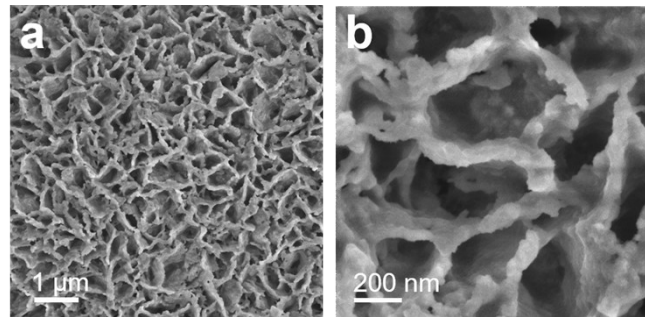
Fig. S7 (a, b) SEM images of Mo-Ni$_2$P@NiO/NC/NF after 20 h HER performance.

Table S1 Comparison of UOR performance for Mo-Ni$_2$P@NiO/NC/NF with other reported Ni-based electrocatalysts.

Catalyst	Electrolyte	E@J (V @mA cm^{-2})	Tafel slope (mV dec^{-1})	Ref.
Mo-Ni$_2$P@NiO/NC/NF	1 M KOH+ 0.2 M urea	1.335@10 1.381@100	35.34	This work
NF/NiMoO-Ar	1 M KOH+ 0.5 M urea	1.37@10	19	[1]
Ni-MOF-0.5	1 M KOH+ 0.5 M urea	1.381@10	52	[2]
MoS$_2$/Ni$_3$S$_2$/NiFeLDH/NF	1 M KOH+ 0.5 M urea	1.396@100	36	[3]
MoP@NiCo-LDH/NF	1 M KOH+ 0.5 M urea	1.392@100	40	[4]
Mo-doped Ni$_3$S$_2$/NF	1 M KOH+ 0.3 M urea	1.33@10	28.05	[5]
NiMo@ZnO/NF	1 M KOH+ 0.33 M urea	1.405@10	60.2	[6]
Ni-MOF	1 M KOH+ 0.33 M urea	1.36 @10	23	[7]
PBA@MOF-Ni/Se	1 M KOH+ 0.5 M urea	1.319@10	64	[8]
NiFeMo/NF	1 M KOH+ 0.33 M urea	1.38@10	43.3	[9]
Ni$_9$S$_8$/CuS/Cu$_2$O/NF	1 M KOH+ 0.33 M urea	1.424@50	64	[10]

Table S2 Comparison of HER performance for Mo-Ni$_2$P@NiO/NC/NF with other reported Ni-based electrocatalysts in 1 M KOH solution.

Catalyst	η_{j10} (mV)	Tafel slope (mV dec^{-1})	Ref.
Mo-Ni$_2$P@NiO/NC/NF	115	69.26	This work
MoS$_2$-Ni$_5$Fe$_4$S$_8$/Fe/NF	122	45.1	[11]
NiPS$_3$/Ni$_2$P	85	82	[12]
P-CoNi$_2$S$_4$ YSSs	135	65	[13]
Mo-doped Ni$_3$S$_2$/NF	90	81.66	[5]
PBA@MOF-Ni/Se	138	87	[8]
Ni$_2$P/ZnP$_4$/NF-300	255	167	[14]
Ni$_9$S$_8$/CuS/Cu$_2$O/NF	146	163	[10]

Table S3 Comparison of the electrocatalytic activity for bifunctional Mo-Ni$_2$P@NiO/NC/NF with other reported Ni-based electrocatalysts towards urea electrolysis.

Catalyst	Electrolyte	Voltage (V) @j=10 mA cm^{-2}	Ref.
Mo-Ni$_2$P@NiO/NC/NF‖Mo-Ni$_2$P@NiO/NC/NF	1 M KOH+0.2 M urea	1.496	This work
Ni-MOF-0.5‖Ni-MOF-0.5	1 M KOH+0.5 M urea	1.52	[2]
Ni-NiO-Mo$_{0.84}$Ni$_{0.16}$/NF‖Ni-NiO-Mo$_{0.84}$Ni$_{0.16}$/NF	1 M KOH+0.5 M urea	1.37	[15]
P-CoNi$_2$S$_4$ YSSs‖P-CoNi$_2$S$_4$ YSSs	1 M KOH+0.5 M urea	1.402	[13]
NiMo@ZnO/NF‖NiMo@ZnO/NF	1 M KOH+0.33 M urea	1.549	[6]
PBA@MOF–Ni/Se‖PBA@MOF–Ni/Se	1 M KOH+0.5 M urea	1.491	[8]
NiF$_3$/Ni$_2$P@CC-2‖NiF$_3$/Ni$_2$P@CC-2	1 MKOH+0.33 M urea	1.54	[16]
Ni@Mo$_2$C/CN‖Ni@Mo$_2$C/CN	1 M KOH+0.5 M urea	1.51	[17]
Ni$_2$P/ZnP$_4$/NF-300‖Ni$_2$P/ZnP$_4$/NF-300	1 M KOH+0.5 M urea	1.521	[14]

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