catalysts

MDPI

Supporting Information

A "Superaerophobic" Se-Doped CoS_2 Porous Nanowires Array for Cost-Saving Hydrogen Evolution

Yan Tan [1], Yijun Yin [1], Xianhong Yin [1], Chenghao Lan [1], Yu Wang [1], Feilong Hu [1,2], Qin Huang [1,*] and Yan Mi [1]

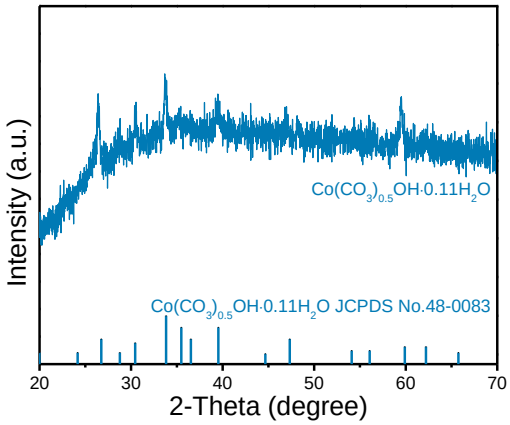

Figure S1. XRD spectrum of $Co(CO_3)_{0.5}OH{\cdot}0.11H_2O$ NW/CF.

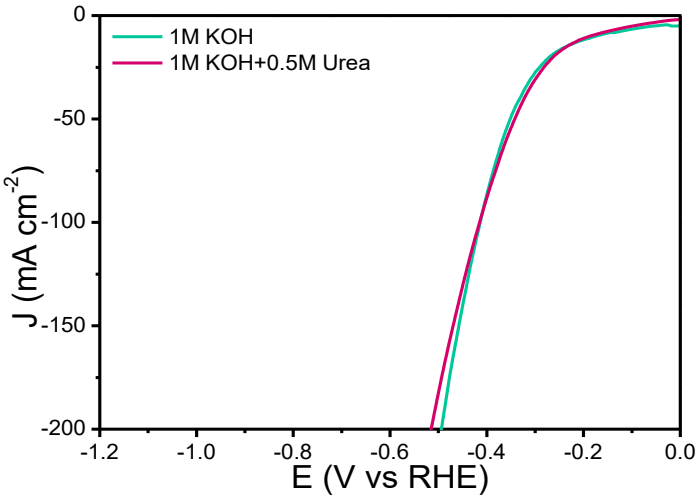

Figure S2. HER polarization curves of Se-CoS_2 NW/CF in 1.0 M KOH with and without 0.5 M urea.

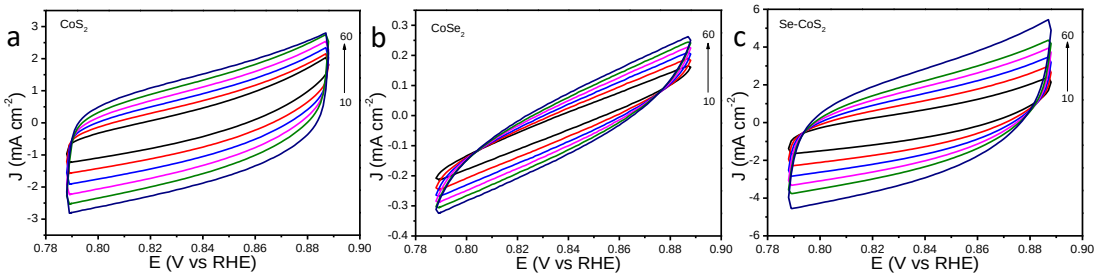

Figure S3. CV curves of (a) CoS_2 NW/CF, (b) $CoSe_2$ NW/CF, and (c) Se-CoS_2 NW/CF in 1.0 M KOH with 0.5 M urea.

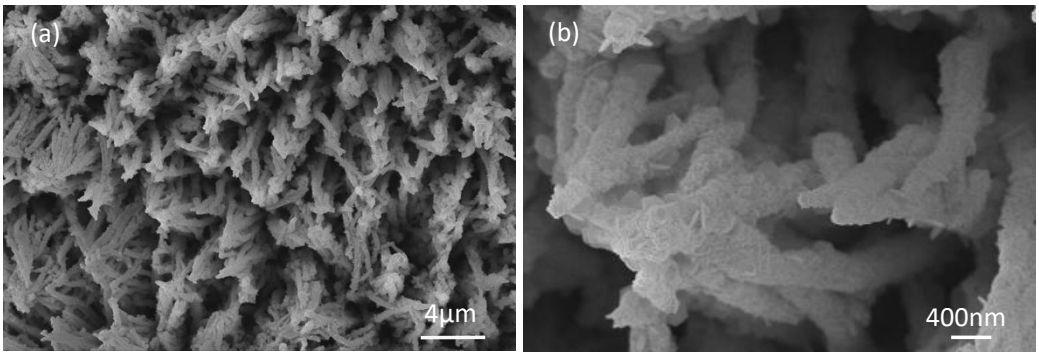

Figure S4. (a) Low- and (b) high-magnification SEM images of Se-CoS_2 NW/CF after I-t test.

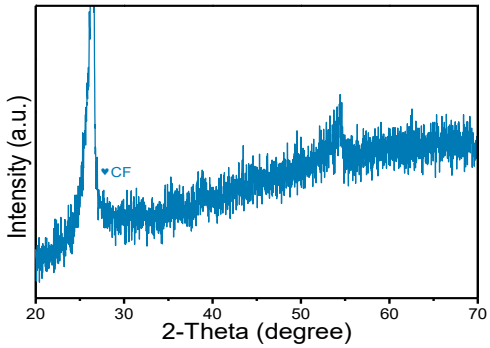

Figure S5. XRD spectrum of Se-CoS_2 NW/CF after I-t test.

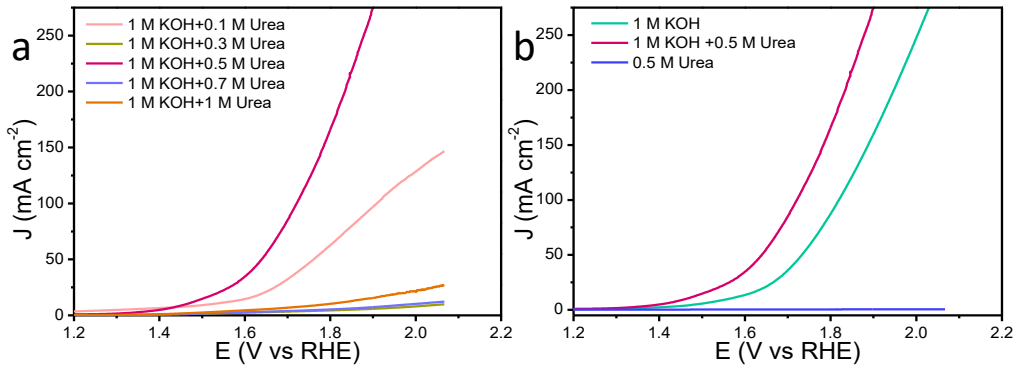

Figure S6. (a) UOR polarization curves of Se-CoS_2 NW/CF catalyst in 1 M KOH with various urea concentrations. (b) UOR polarization curves of Se-CoS_2 NW/CF in 1.0 M KOH with 0.5 M urea, 1.0 M KOH, and 0.5 M urea.

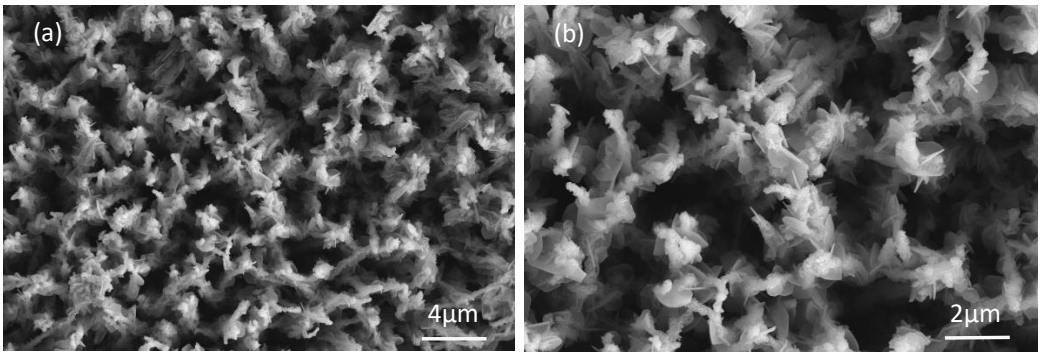

Figure S7. (a) Low- and (b) high-magnification SEM images of Se-CoS_2 NW/CF after UOR test.

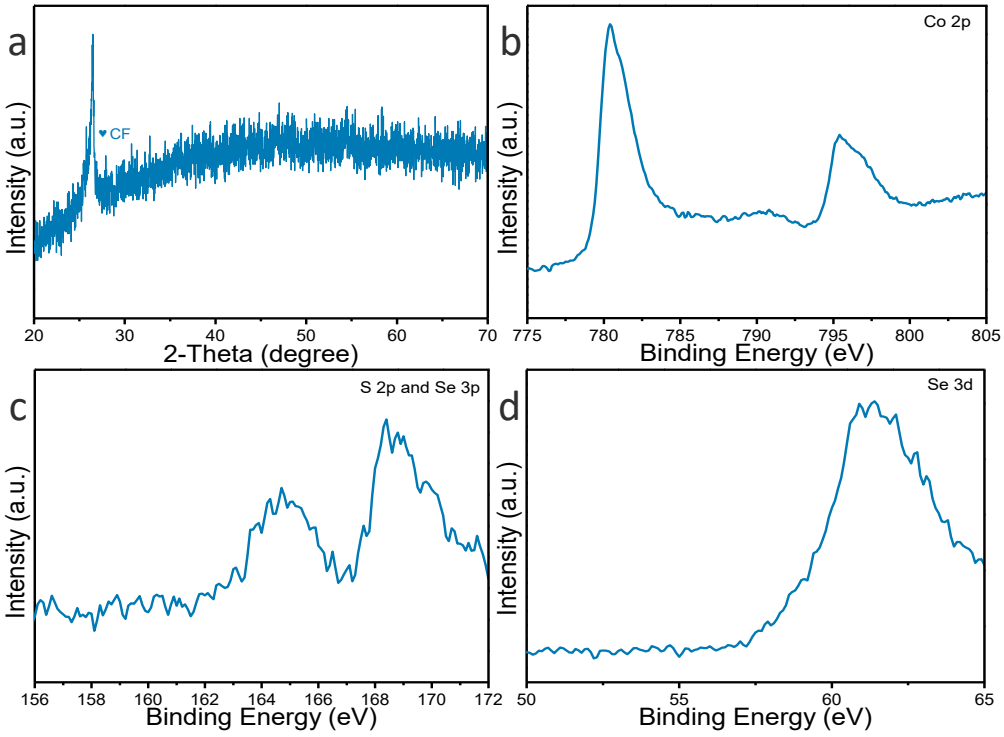

Figure S8. (a) XRD spectrum of Se-CoS_2 NW/CF after UOR test. XPS spectra of (b) Co 2p, (c) S 2p and Se 3p, and (d) Se 3d of Se-CoS_2 NW/CF after UOR test.

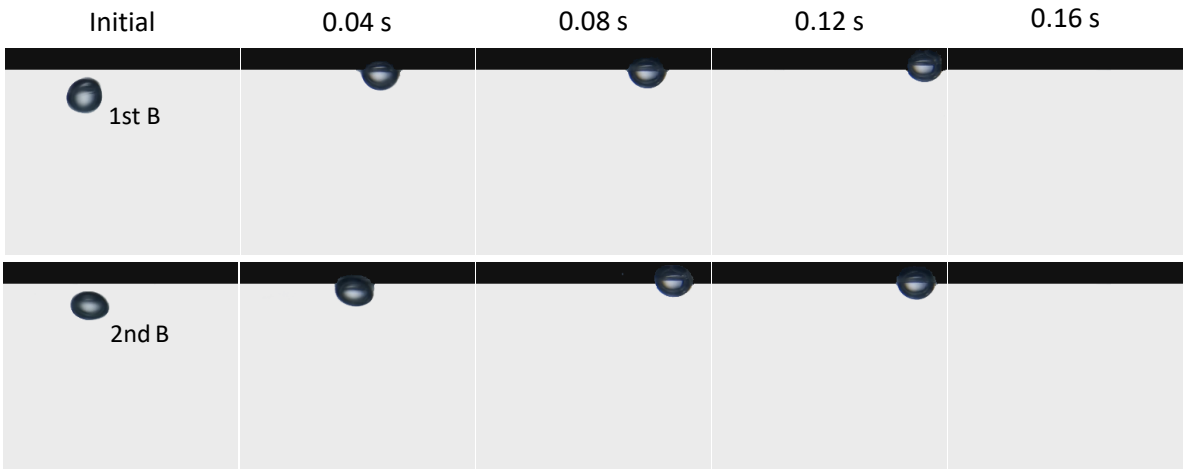

Figure S9. High-speed photographs of air bubbles escaping on the surface of Se-CoS_2 NW/FC after UOR test.

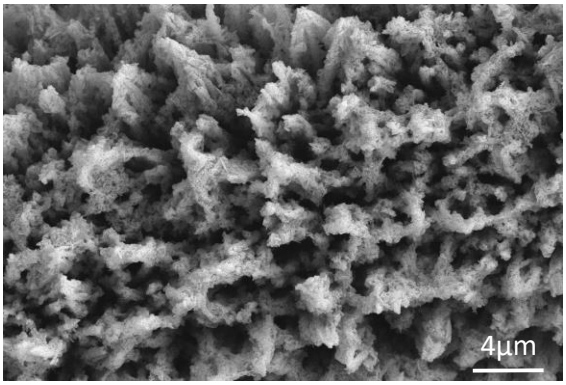

Figure S10. SEM image of Se-CoS_2 NW/CF after I-t test.

Table S1. Comparison of the HER performance of Se-CoS_2 NW/CF with other reported catalysts.

Catalyst	η_j = 10 mA cm^{-2} (mV)	electrolyte solution	Reference
Se-CoS_2 NW/CF	188	1 M KOH with 0.5 M Urea	This work
CNTs@$CoSxSe_{2(1-x)}$	225	1 M KOH	[1]
$Co_3S_4/MoS_2/Ni_2P$	214	1 M KOH	[2]
$CoS_2@Co_3O_4$	320	1 M KOH	[3]
CoS_2@N-GN	204	1 M KOH	[4]
CoS_2 HNSs	193	1 M KOH	[5]
Zn-Co-S NN/CFP	234	1 M KOH	[6]
$NiCo_2S_4$ NW/NF	210	1 M KOH	[7]
CoS_2 NTA/CC	193	1 M KOH	[8]
CNTs@Co-S	190	1 M KOH	[9]

Table S2. Comparison of the UOR performance of Se-CoS_2 NW/CF catalyst with other reported UOR catalysts.

Catalyst	η_j = 10 mA cm^{-2} (mV)	electrolyte solution	Reference
Se-CoS_2 NW/CF	1.46	1 M KOH with 0.5 M Urea	This work
Pt/C	1.48	1 M KOH with 0.5 M Urea	[10]
ZIF-67-S	1.49	1 M KOH with 0.5 M Urea	[11]
Ni-MOF-8	1.483	1 M KOH with 0.5 M Urea	[12]
$Co(OH)_2$&Co+3O(OH)/Ti	1.536	1 M KOH with 0.3 M urea	[13]
IrO_2	1.54	1 M KOH with 0.5 M Urea	[14]

Table S3. Comparison of the activity of urea electrocatalysis with other reported ones.

Catalyst	η_j = 10 mA cm^{-2} (mV)	electrolyte solution	Reference
Se-CoS_2 NW/CF	1.44	1 M KOH with 0.5 M Urea	This work
CoS_x/Co-MOF	1.48	1 M KOH with 0.5 M urea	[11]
HC-NiMoS/Ti	1.59	1 M KOH with 0.5 M urea	[15]
Ni-Co_9S_8	1.52	1 M KOH with 0.33 M urea	[16]
$NiCo_2S_4$ NS/CC	1.45	1 M KOH with 0.33 M urea	[17]
Ni-MOF-0.5	1.52	1 M KOH with 0.5 M urea	[12]
$Ni_{0.9}Fe_{0.1}O_x$	1.455	1 M KOH with 0.33 M urea	[18]
MOF-Ni@MOF-Fe-S	1.539	1 M KOH with 0.5 M urea	[19]
NiFeCo LDH/NF	1.49	1 M KOH with 0.33 M urea	[20]
$MnO_2/MnCo_2O_4$/Ni	1.55	1 M KOH with 0.5 M urea	[21]
FQD/CoNi-LDH/NF	1.45	1 M KOH with 0.5 M urea	[22]

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