Supporting information

Self-Supported CoFe LDH/$Co_{0.85}Se$ Nanosheet Arrays as Efficient Electrocatalytsts for Oxygen Evolution Reaction

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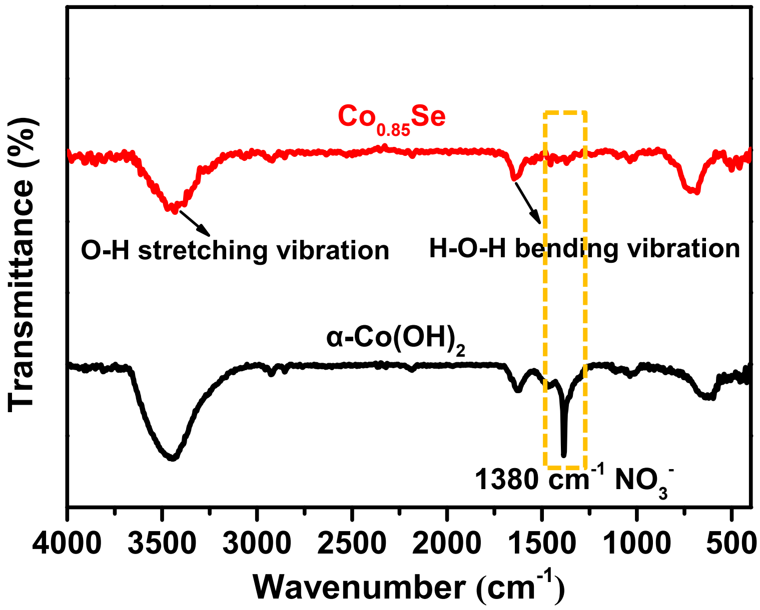


Figure S1. The FTIR spectra of α-$Co(OH)_2$ and $Co_{0.85}Se$.

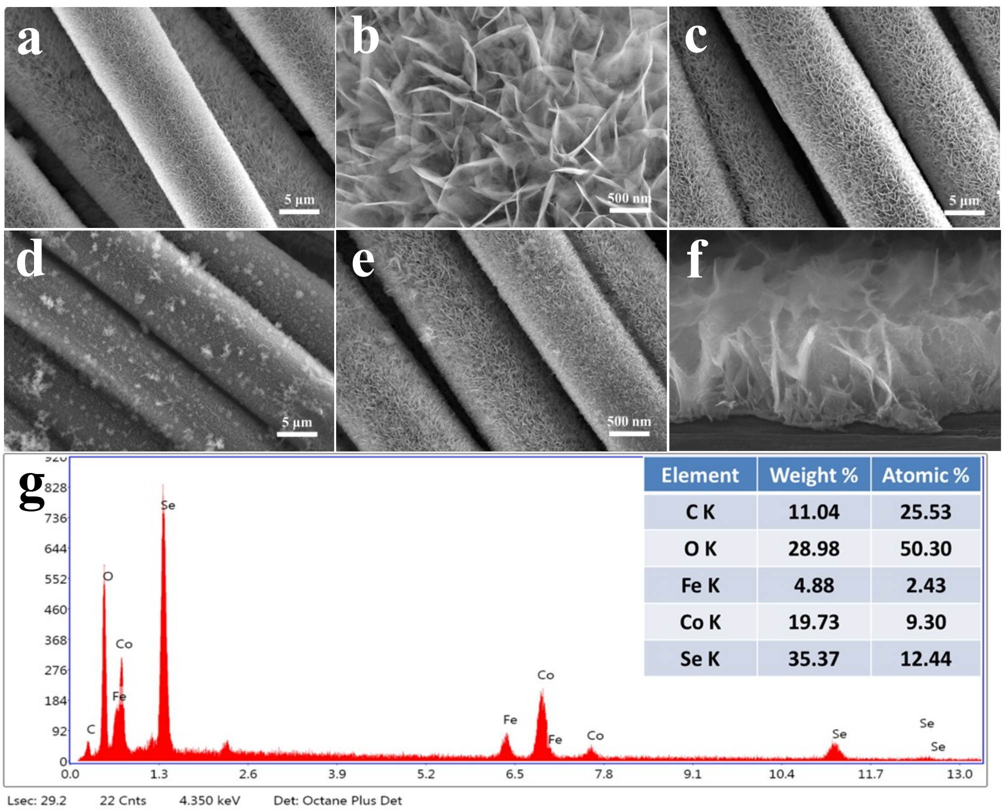


Figure S2. (a, b) The SEM images of α-$Co(OH)_2$/CC, (c) the low resolution SEM image of $Co_{0.85}Se$/CC, (d) the SEM image of CoFe LDH/CC (e-f) the low resolution

SEM image of CoFe LDH/$Co_{0.85}Se$/CC and its edgea and (g) EDS spectra for CoFe LDH/$Co_{0.85}Se$/CC.

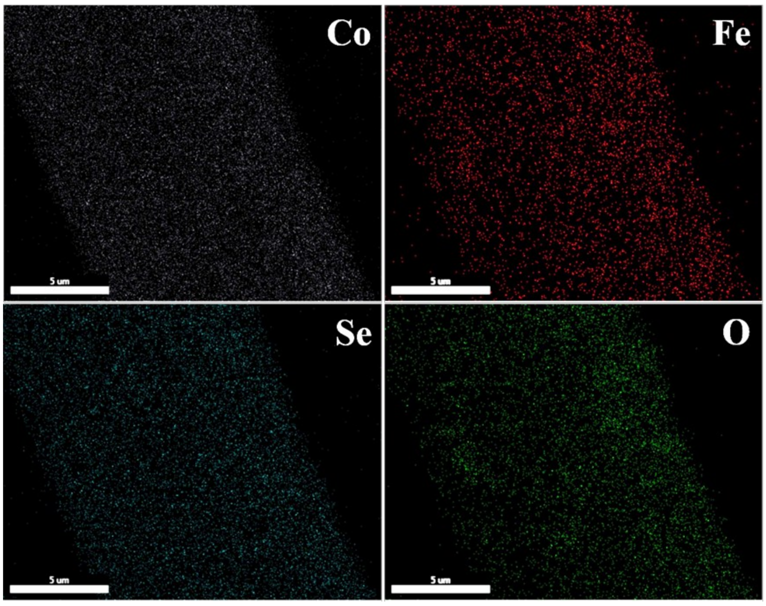


Figure S3. The elemental mappings of CoFe LDH /$Co_{0.85}Se$/CC.

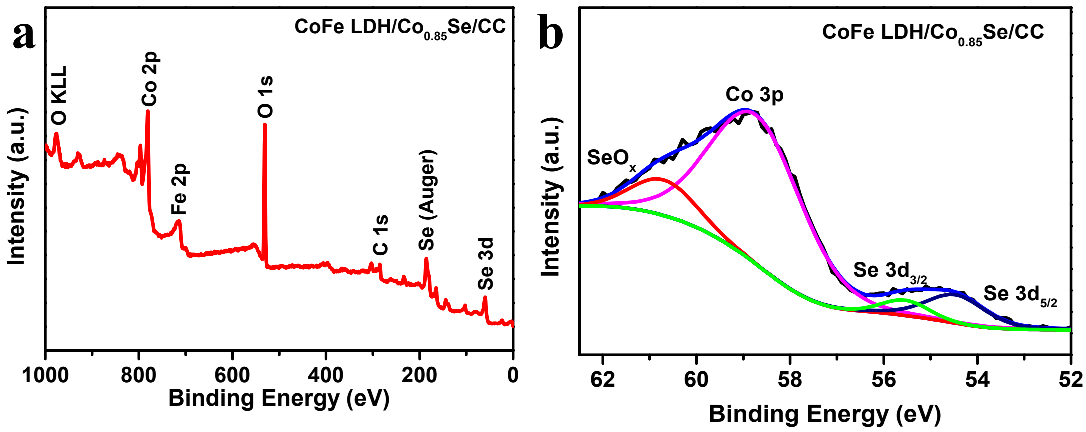


Figure S4. (a) XPS survey spectrum and (b) Se 3d spectra of CoFe LDH/$Co_{0.85}Se$/CC.

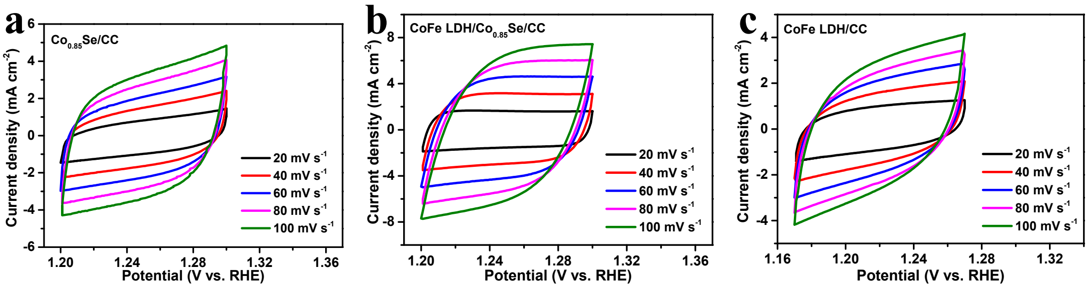


Figure S5. Different scan rates of CV of (a) $Co_{0.85}Se$/CC, (b) CoFe LDH/$Co_{0.85}Se$/CC, (c) CoFe LDH/CC for OER.

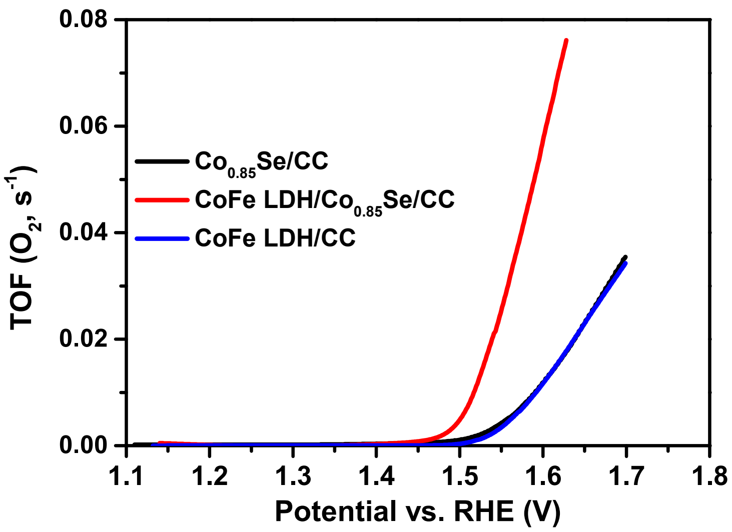


Figure S6. TOF values of the as-made $Co_{0.85}Se$/CC, CoFe LDH/$Co_{0.85}Se$/CC, and CoFe LDH/CC at different potentials.

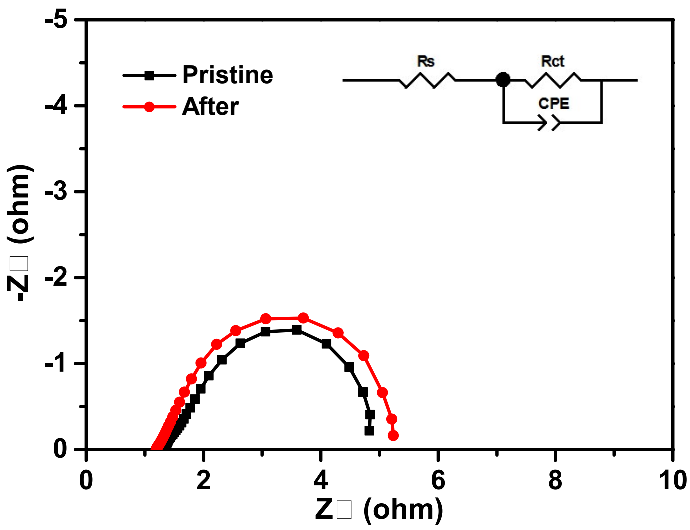


Figure S7. Nyquist plots of the CoFe LDH/$Co_{0.85}$Se/CC before and after long term OER in 10 mA cm^{-2} for 40 h.

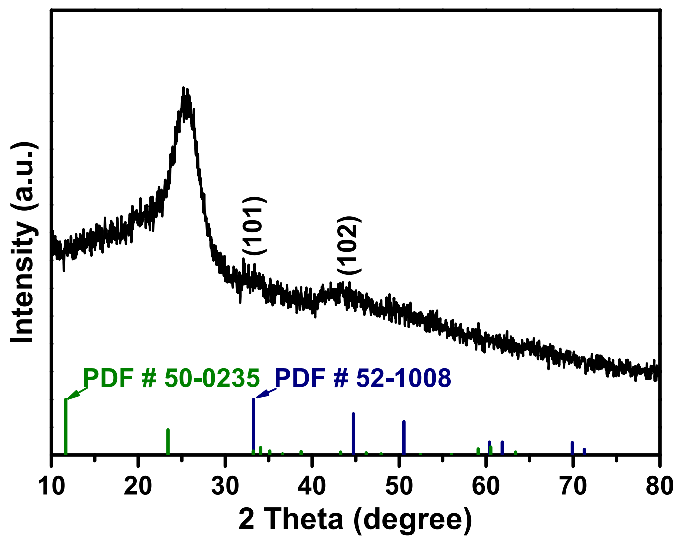
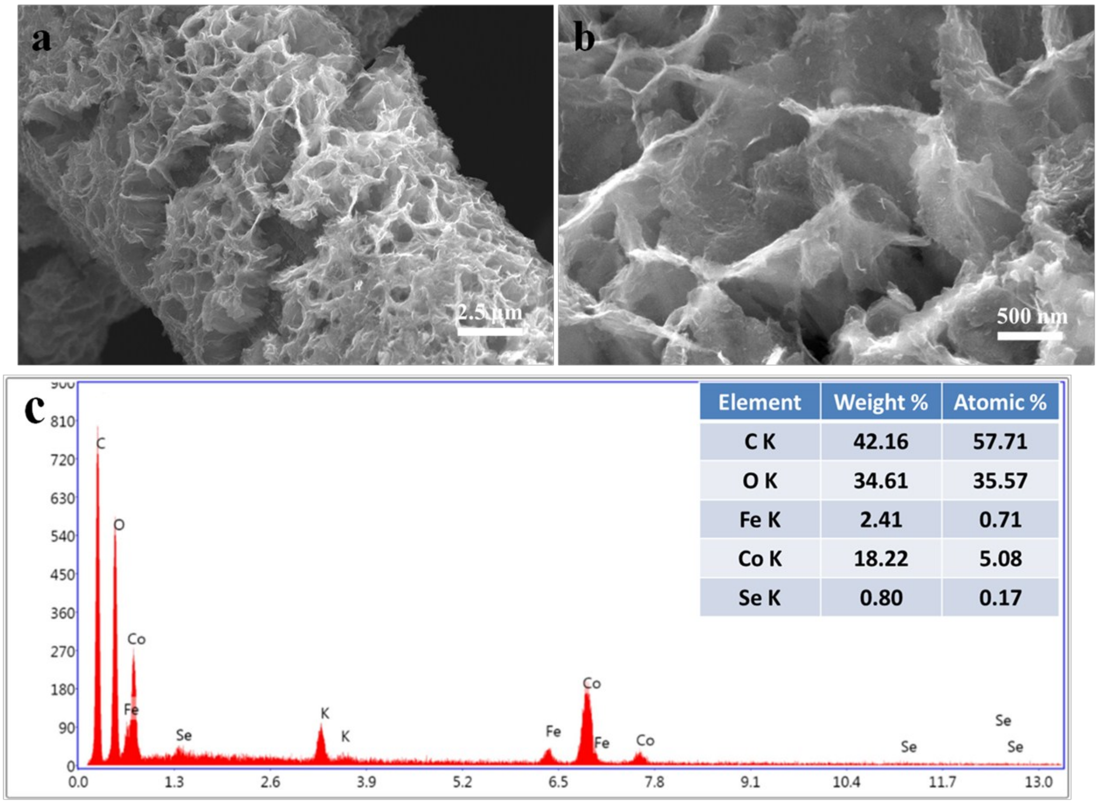


Figure S8. (a) The XRD pattern of CoFe LDH/$Co_{0.85}$Se/CC after long term OER in 10 mA cm^{-2} for 40 h.



Element	Weight %	Atomic %
C K	42.16	57.71
O K	34.61	35.57
Fe K	2.41	0.71
Co K	18.22	5.08
Se K	0.80	0.17

Figure S9. (a, b) The SEM image and (c) EDS spectra of CoFe LDH/$Co_{0.85}Se$/CC after long term OER in 10 mA cm^{-2} for 40 h.

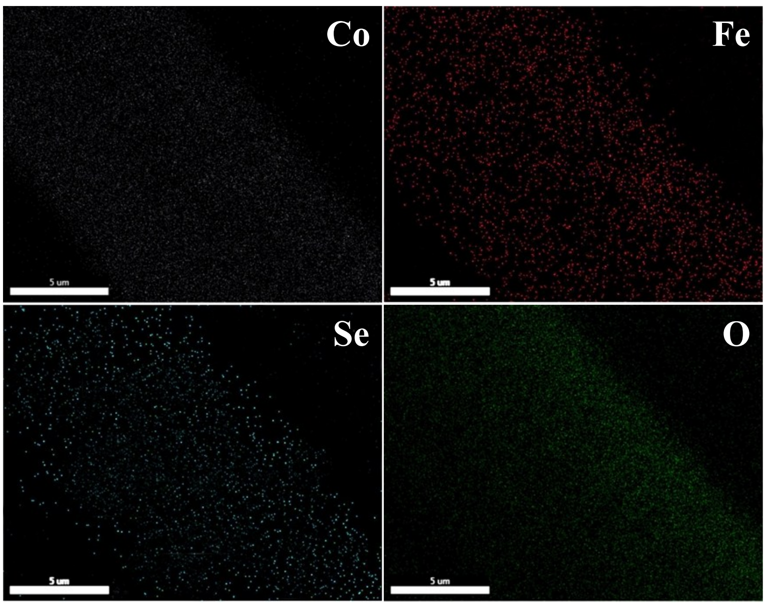


Figure S10. The elemental mappings of CoFe LDH /$Co_{0.85}Se$/CC after long term OER in 10 mA cm^{-2} for 40 h.

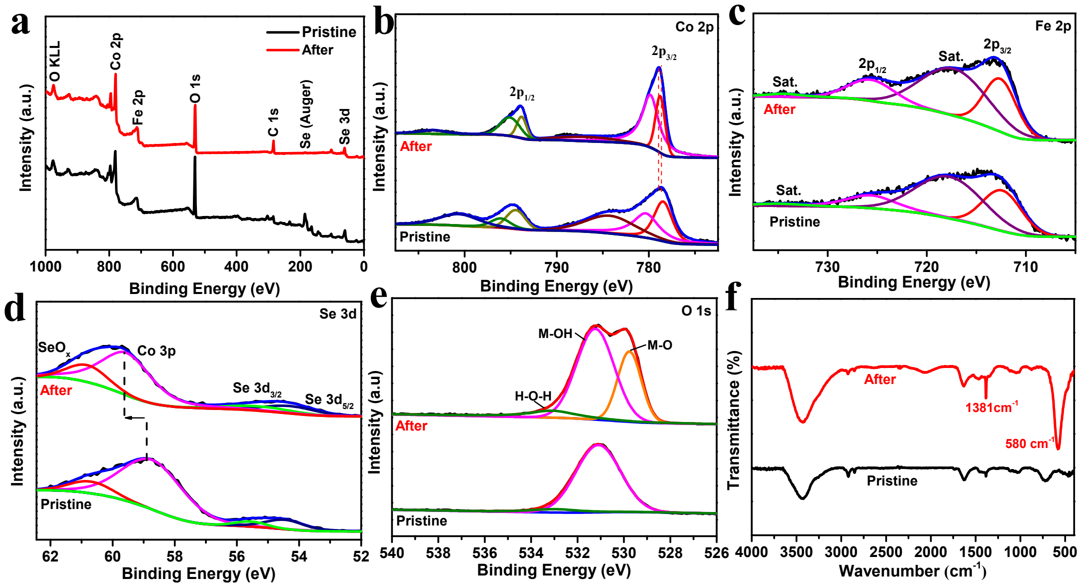


Figure S11. (a) XPS survey spectra, (b) Co 2p, (c) Fe 2p, (d) Se 3d, (e) O 1s and (f) FTIR spectra of CoFe LDH/$Co_{0.85}Se$/CC after long term OER in 10 mA cm^{-2} for 40 h.

Table S1. Comparison of BET surface area of samples.

Catalyst	Specific surface area (m^2 g^{-1})
$Co0_{.85}Se$/CC	4.379
CoFe LDH/CC	4.379
CoFe LDH/$Co_{0.85}Se$/CC	4.876

Table S2. Comparison of OER performances of CoFe LDH/$Co_{0.85}Se$/CC with previously reported non-precious metal OER electrocatalysts.

Catalyst	Substrate	Electrolyte	J (mA cm^{-2})	η (mV vs RHE)	Tafel slope (mV dec^{-1})	Ref.
CoFe LDH/$Co_{0.85}Se$	CC[a]	1M KOH	10 300	241 355	48	This work
CoFe LDH	GCE[b]	1M KOH	10	286	45	1
$Co_{0.85}Se$/NC	GCE	1M KOH	10	320	75	2
CoFe-oxyhydroxide	CP[c]	1M KOH	10	330	37	3
C@NiCo Nw	CC	1M KOH	10	302	43.6	4
CoFe DH/NCNTs	GCE	1M KOH	10	270	56.88	5
SnCoFe hydroxide -Ar plasma	NF[d]	1M KOH	10	270	-	6
Ultrathin CoFe LDH with vacancies	GCE	1M KOH	10 50	266 313	37.85	7
Ultrathin CoFe LDH	GCE	1M KOH	10	270	58.3	8
Co_3O_4/Co-Fe oxide	GCE	1M KOH	10	297	61	9
NiFe LDH /$Co_{0.85}Se$	EGF[e]	1M KOH	150	270	57	10
CoFe LDH/CoFe alloy	GCE	1M NaOH	10	286	48	11
Ag-$CoSe_2$ Nanobelts	GCE	0.1M KOH	10	320	56	12
α-$Co_4Fe(OH)_x$	GCE	1M KOH	10	295	52	13
CoS-$Co(OH)_2$@aMoS_{2+x}	NF	1M KOH	10	380	68	14
$CoFe_2O_4$ Ns	GCE	0.1M KOH	10	308	36.8	15

CC[a]: Carbon cloth
GCE[b]: Glassy carbon electrode
CP[c]: Carbon paper
NF[d]: Ni foam
EGF[e]: Exfoliated graphene foil

Reference

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