Supporting Information

Electronic engineering of $CoSe/FeSe_2$ hollow nanosphere for efficient water oxidation

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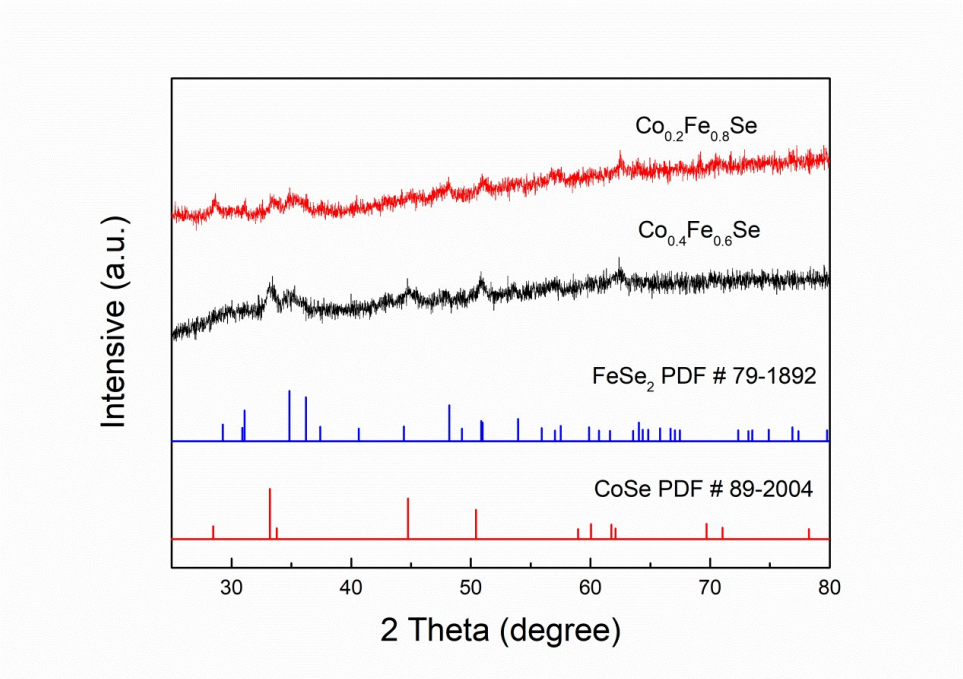

Fig. S1 XRD patterns of Co-Fe selenides with different metal atomic ratios (2:3 and 1:4).

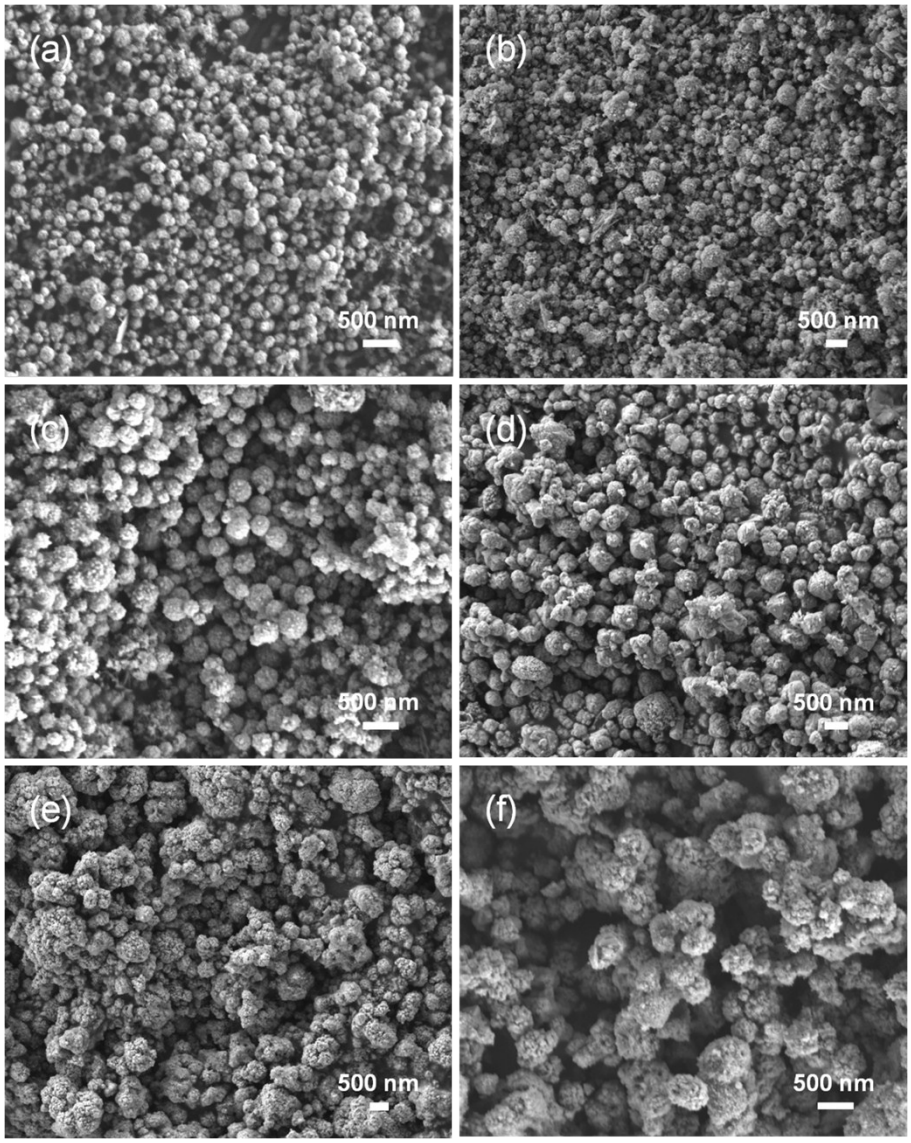

Fig. S2 FE-SEM images of (a) CoSe, (b) $Co_{0.8}Fe_{0.2}$-Se, (c) $Co_{0.6}Fe_{0.4}$-Se, (d) $Co_{0.4}Fe_{0.6}$-Se, (e) $Co_{0.2}Fe_{0.8}$-Se and (f) $FeSe_2$.

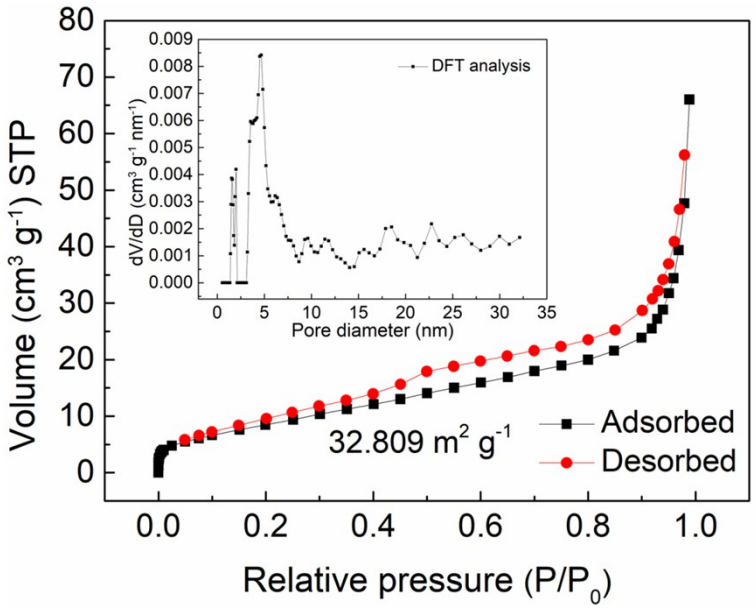

Fig. S3 (a) N_2 adsorption-desorption isotherm of CoSe@$FeSe_2$. (b) The corresponding pore distribution curve.

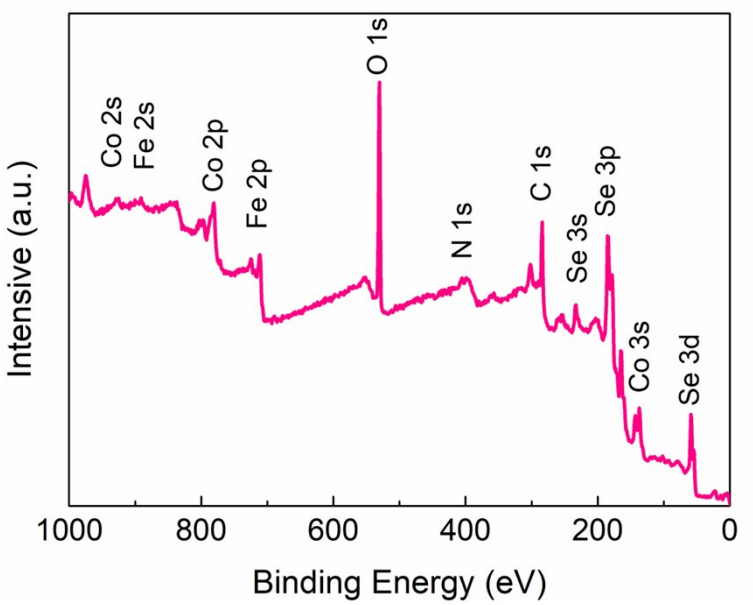

Fig. S4 XPS survey spectrum of CoSe@$FeSe_2$**.**

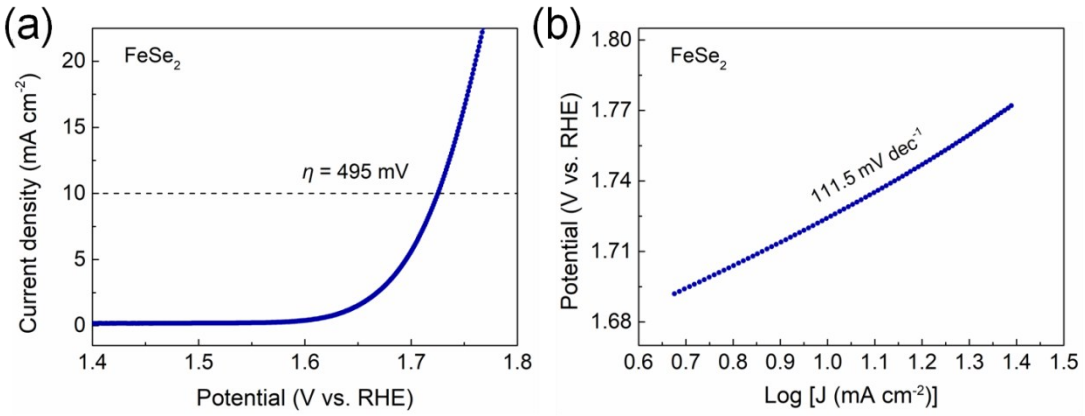

Fig. S5 (a) Polarization curves with *i*R compensation and (b) Tafel slope curves of $FeSe_2$.

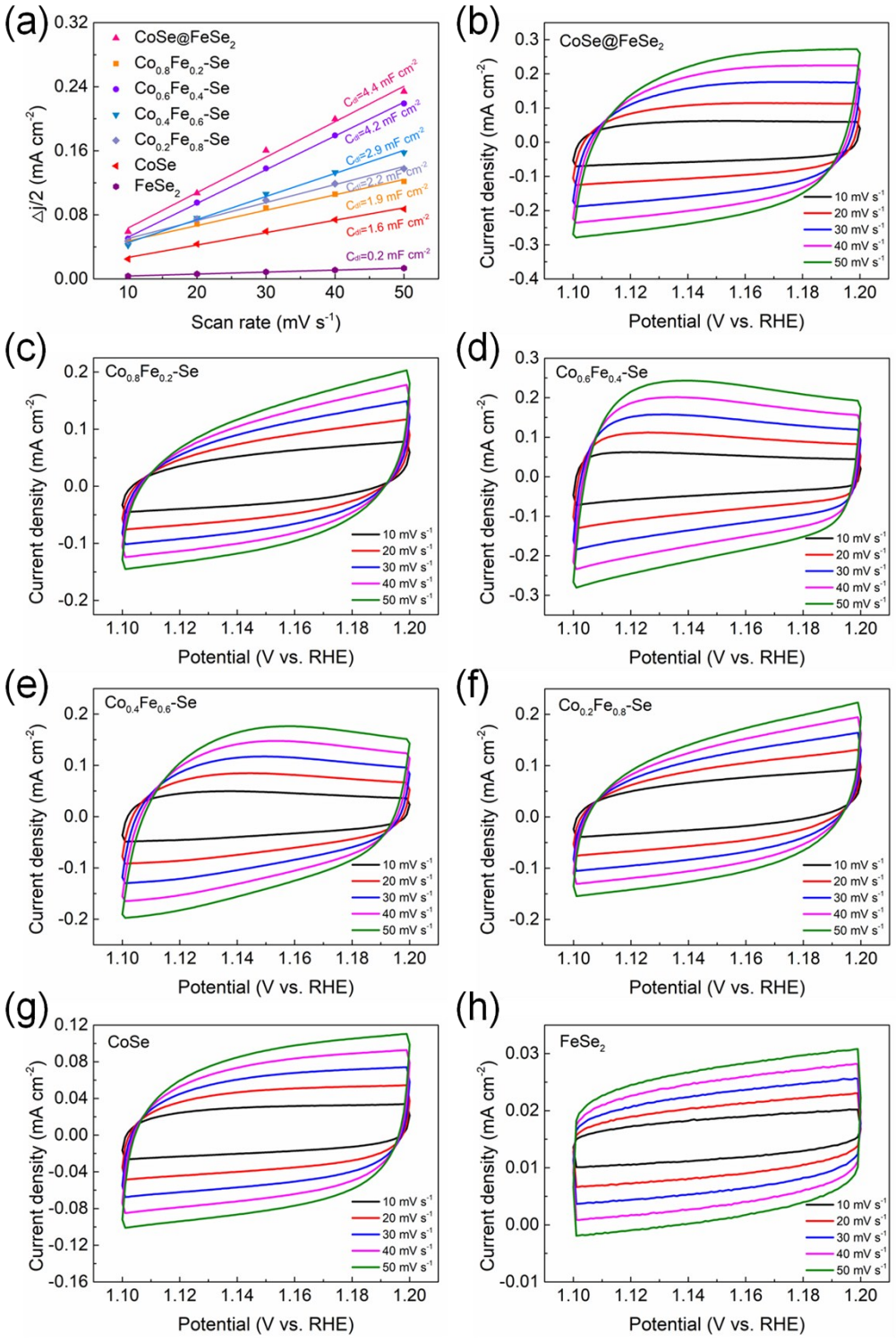

Fig. S6 (a) Plots of current density *vs.* scan rate (at 1.15 V). (b-h) CV curves of Co-Fe selenides with different metal atomic ratios (1:1, 4:1, 3:2, 2:3, 1:4, 1:0 and 0:1) in the potential range of 1.1-1.2 V vs. RHE.

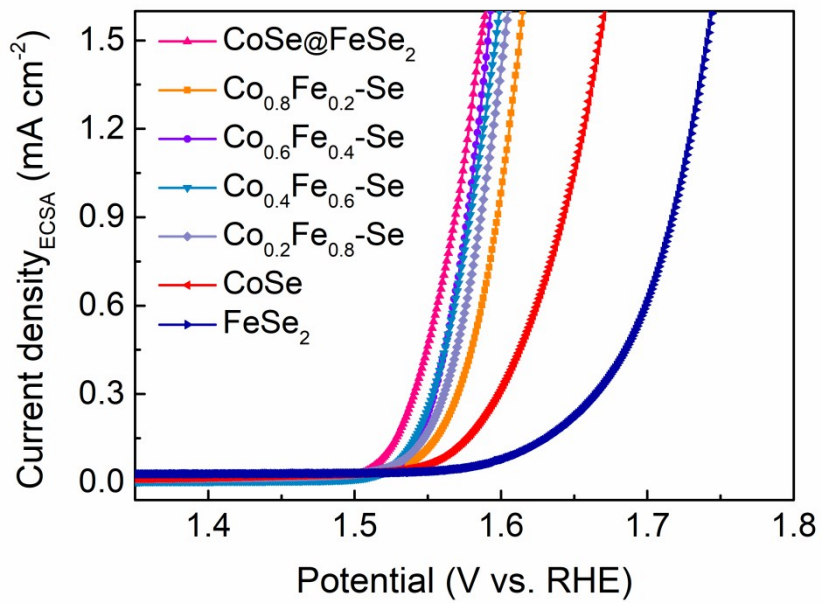

Fig. S7 The OER polarization curves normalized to the ECSA.

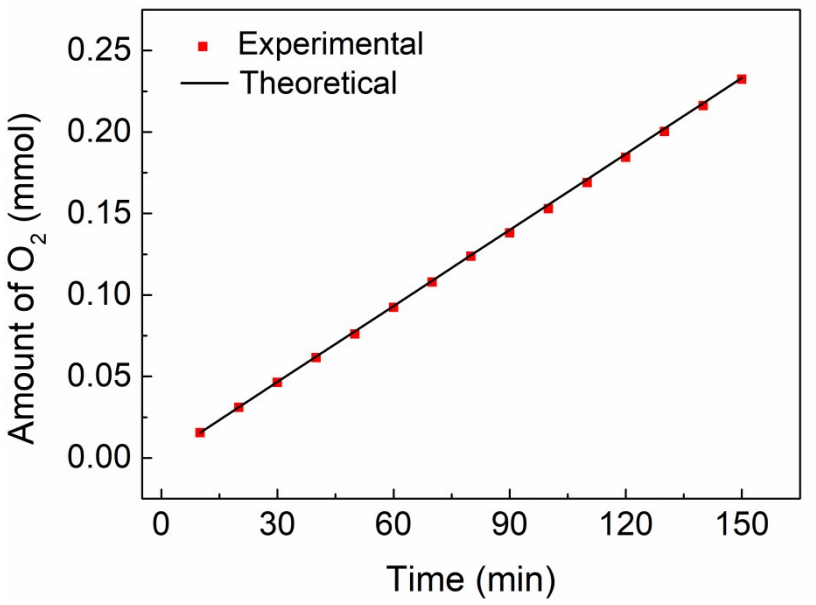

Fig. S8 The amount of generated O_2 gas for CoSe@$FeSe_2$ in 150 min.

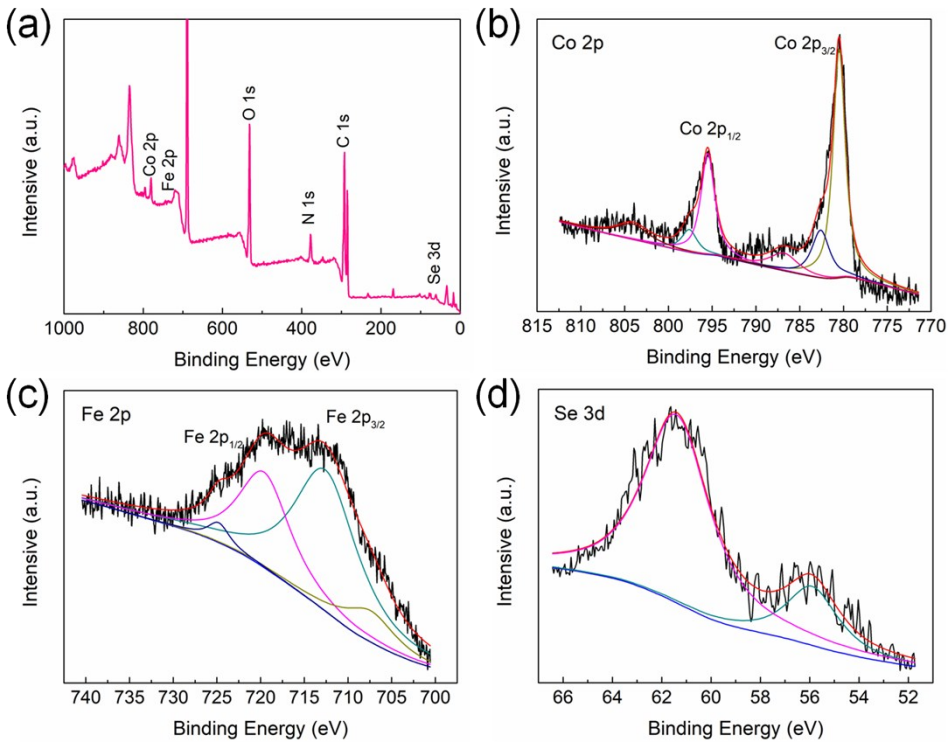

Fig. S9 XPS spectra of CoSe@$FeSe_2$ after 12h durability test towards OER: (a) survey scan, (b) Co 2p, (c) Fe 2p and (d) Se 3d.

Table S1 The ICP-AES results and the Co/Fe atomic ratios of the prepared samples.

Sample	Co (mg g^{-1})	Fe (mg g^{-1})	Se (mg g^{-1})	Co/Fe feed atomic ratio	Co/Fe real atomic ratio
$Co_{0.8}Fe_{0.2}$-Se	276.07	59.29	458.11	4:1	4.41:1
$Co_{0.6}Fe_{0.4}$-Se	216.02	132.06	408.27	3:2	3.10:2
$Co_{0.5}Fe_{0.5}$-Se	192.78	179.15	455.49	1:1	1.01:1
$Co_{0.4}Fe_{0.6}$-Se	147.33	196.33	448.43	2:3	2.13:3
$Co_{0.2}Fe_{0.8}$-Se	82.99	296.05	473.62	1:4	1.06:4