

## Electronic Supplementary Material

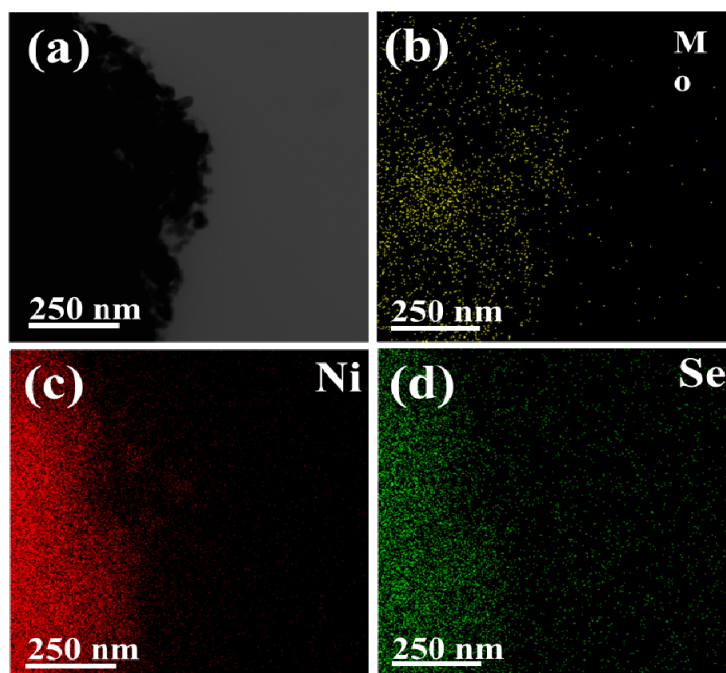


Fig. S1. EDS spectra of synthetic material.

(a) Corresponding TEM image; (b) Mo; (c) Ni; (d) Se

The EDS in Fig. S1 reveals the even distribution of Mo, Ni, and Se on the surface of  $\text{MoSe}_2\text{-Ni}_3\text{Se}_2/\text{NF}$ . The content of Mo, Ni, and Se are 6.48%, 75.29%, and 18.23% respectively.

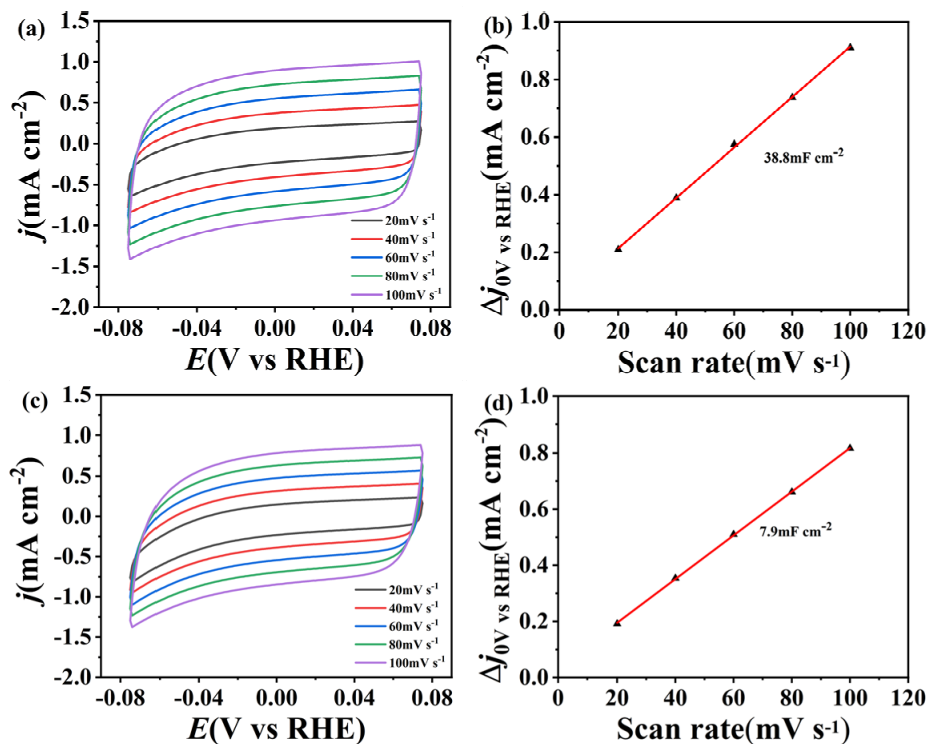


Fig. S2. Electrochemical characterization of different samples.

(a) Cyclic voltammogram of  $\text{MoSe}_2\text{-Ni}_3\text{Se}_2/\text{NF}$ ; (b) estimation of  $C_{dl}$  value of

MoSe<sub>2</sub>-Ni<sub>3</sub>Se<sub>2</sub>/NF; (c) cyclic voltammogram of Ni<sub>3</sub>Se<sub>2</sub>/NF; (d) estimation of C<sub>dl</sub> value of Ni<sub>3</sub>Se<sub>2</sub>/NF.

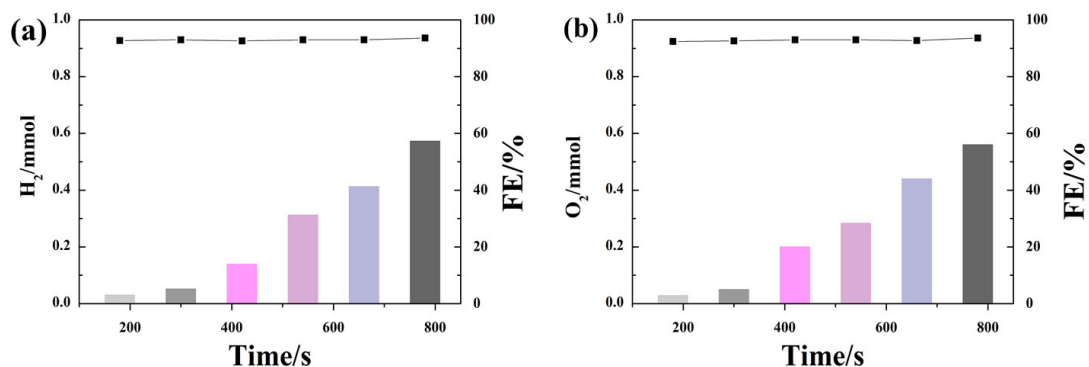


Fig. S3. Faraday efficiency of different electrocatalytic processes.

(a) HER; (b) OER.

Through testing and calculation, the Faraday efficiency of the HER and OER of the electrocatalyst is provided. The Faraday efficiency of both HER and OER remain around 93%.

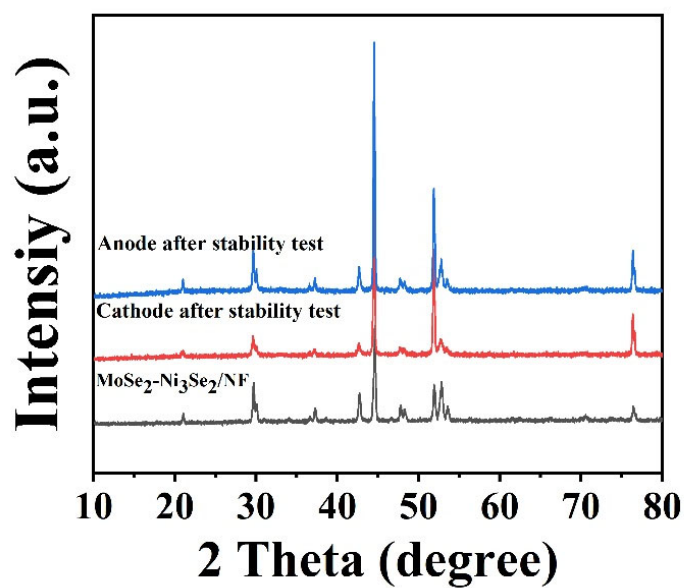


Fig. S4. XRD patterns of the sample after HER and OER durability test.

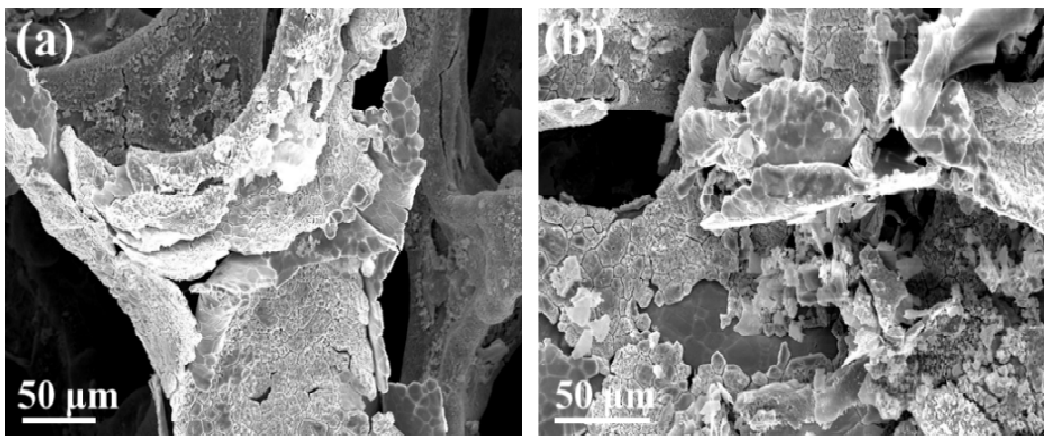


Fig. S5 SEM images of MoSe<sub>2</sub>-Ni<sub>3</sub>Se<sub>2</sub>/NF after the stability test of total water decomposition.

(a) After the cathode HER stability test; (b) after the anode OER stability test.

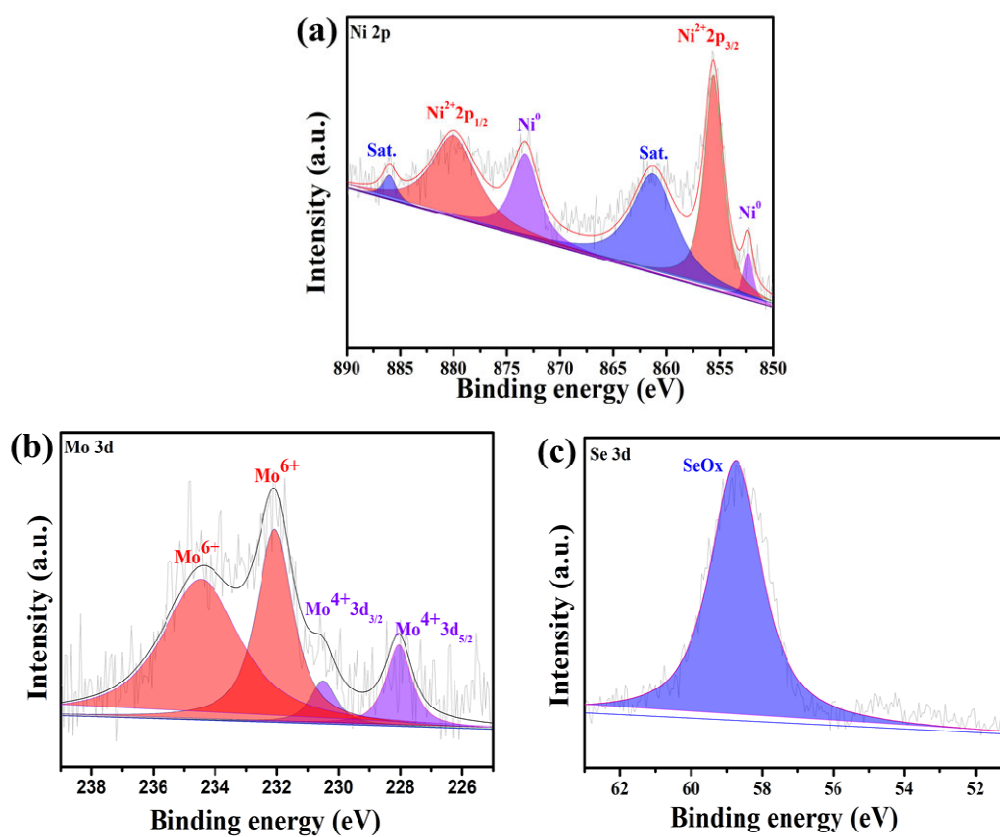


Fig. S6 XPS spectra after durability test.

(a) Ni 2p; (b) Mo 3d; (c) Se 3d.

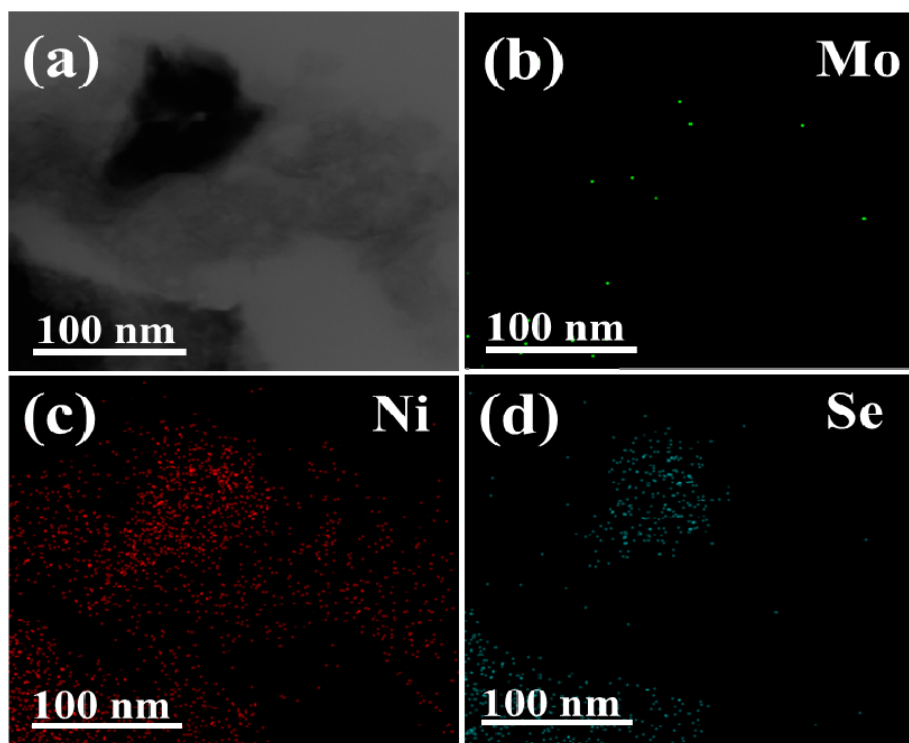


Fig. S7 EDS image after durability test.  
(a) Corresponding TEM image; (b) Mo; (c) Ni; (d) Se.