Supporting Information

In-situ growth of $NiSe_2$ nanocrystalline array on graphene for efficient hydrogen evolution reaction

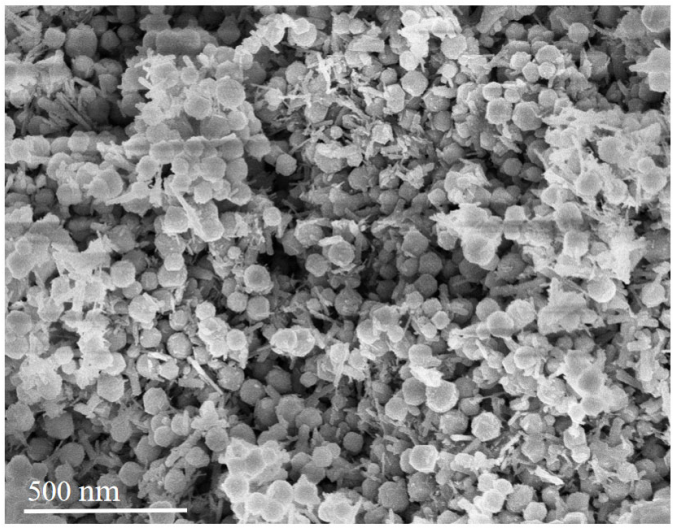

Fig. S1 SEM image of $NiSe_2$ nanoparticles.

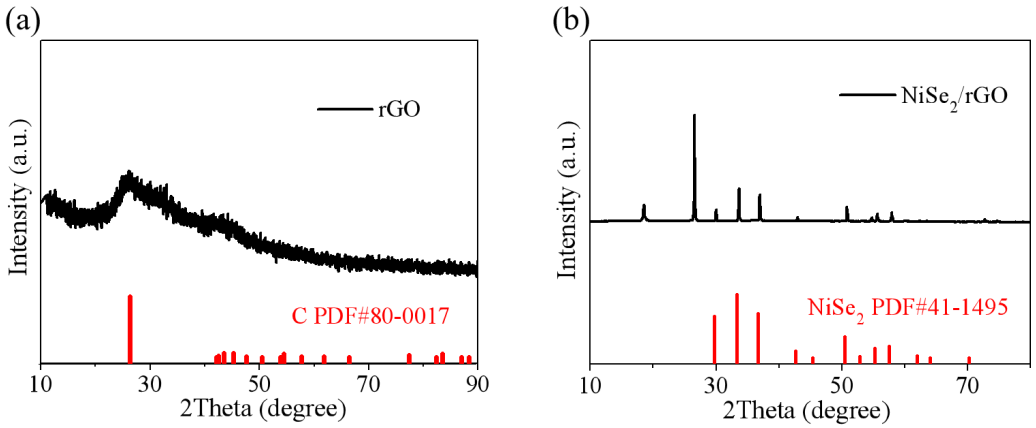

Fig. S2 XRD patterns of the materials. (a) XRD pattern of rGO; (b) XRD pattern of $NiSe_2$/rGO catalyst.

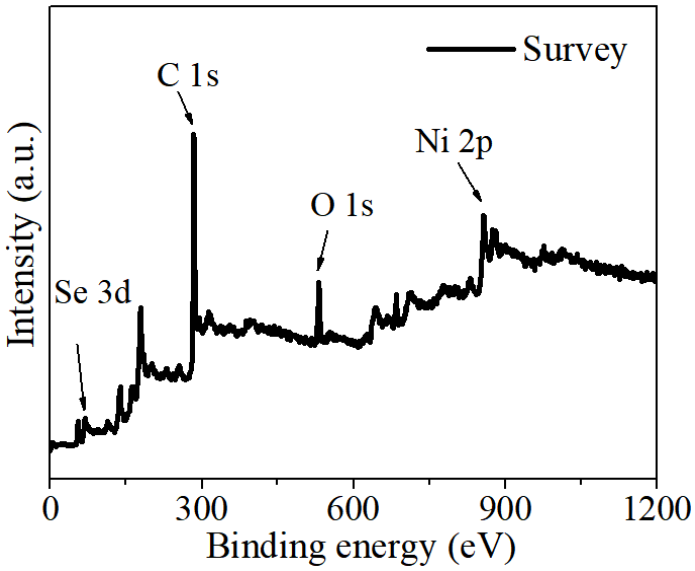

Fig. S3 Full XPS spectra of $NiSe_2$/rGO.

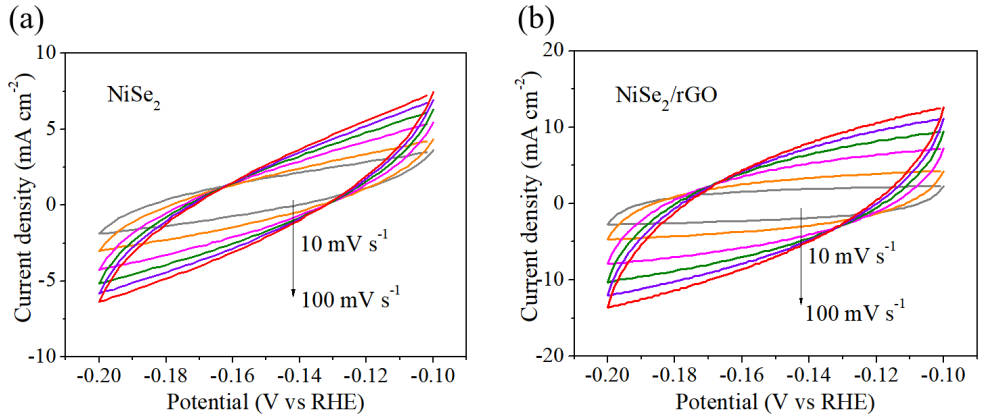

Fig. S4 CV curves at a different scan rate of 10, 20, 40, 60, 80, and 100 mV/s. (a) $NiSe_2$; (b) $NiSe_2$/rGO.

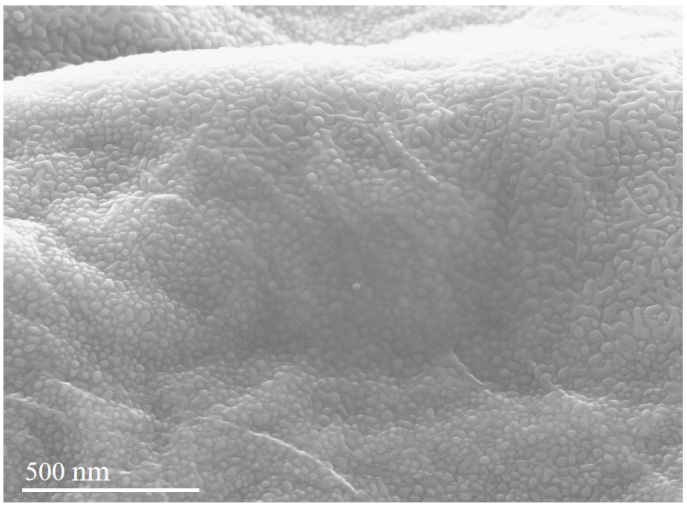

Fig. S5 SEM image of $NiSe_2$/rGO after 100 h chronoamperometry testing.

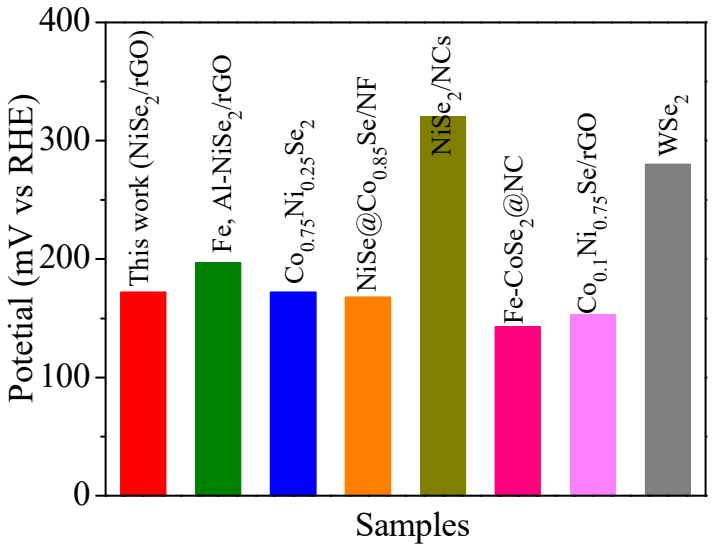

Fig. S6 Comparison of HER performance with reported materials (Data from Refs. [1–7]).

1. Chen L, Jang H, Kim M, et al. Fe, Al-co-doped $NiSe_2$ nanoparticles on reduced graphene oxide as an efficient bifunctional electrocatalyst for overall water splitting. Nanoscale, 2020, 12(25): 13680–13687

2. Fang X, Ren L, Li F, et al. Modulating electronic structure of $CoSe_2$ by Ni doping for efficient electrocatalyst for hydrogen evolution reaction. Rare Metals, 2021, 3: 1–10

3. Ding W, Cao Y, Liu H, et al. In situ growth of NiSe@$Co_{0.85}Se$ heterointerface structure with electronic modulation on nickel foam for overall water splitting. Rare Metals, 2021, 40(7): 1373–1382

4. Kwak I, Im H, Jang D, et al. $CoSe_2$ and $NiSe_2$ nanocrystals as superior bifunctional catalysts for electrochemical and photoelectrochemical water splitting. ACS Applied Materials and Interfaces, 2016, 8(8): 5327–5334

5. Wu X, Han S, He D, et al. Metal organic framework derived Fe-doped $CoSe_2$ incorporated in nitrogen-doped carbon hybrid for efficient hydrogen evolution. ACS Applied Materials and Interfaces, 2018, 6(7): 8672–8678

6. Zhao W, Wang S, Feng C, et al. Novel cobalt-doped $Ni_{0.85}Se$ chalcogenides ($Co_xNi_{0.85-x}Se$) as high active and stable electrocatalysts for hydrogen evolution reaction in electrolysis water splitting. ACS Applied Materials and Interfaces, 2018, 10(47): 40491–40499

7. Wang Z, Wu H, Li Q, et al. Reversing interfacial catalysis of ambipolar WSe_2 single crystal. Advanced Science, 2020, 7(3): 1901382