Supporting Information (SI) for:

In Situ electrochemical formation of NiSe/NiO_x core/shell nano-electrocatalysts for superior oxygen evolution activity

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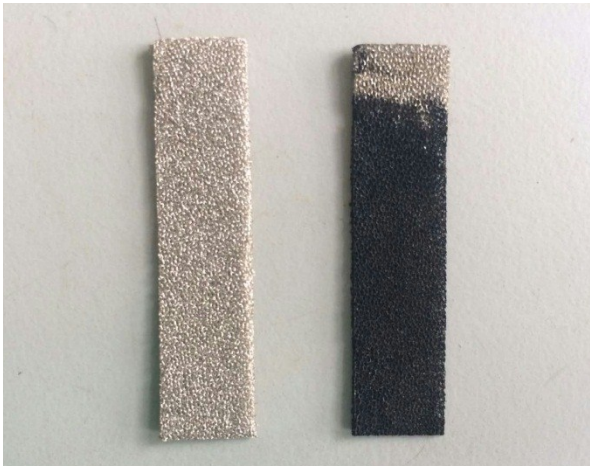

Figure S1. Photograph of NF (left) and NiSe/NF (right).

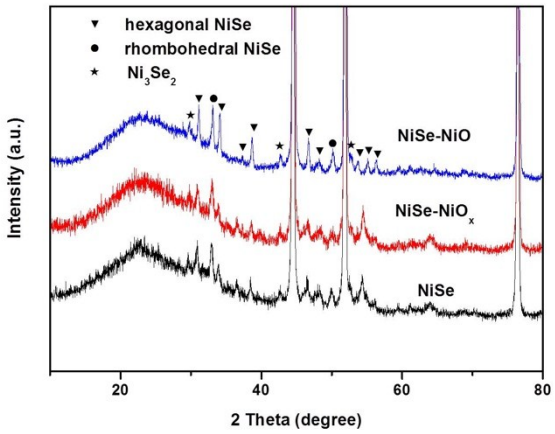

Figure S2. XRD patterns of the NiSe-NiO (blue), NiSe-NiO_x/NF (red) and NiSe/NF (black). ▾, ● and ⋆ represent NiSe in hexagonal phase (PDF#65-3425), in rhombohedral phase (PDF#18-0887) and Ni_3Se_2 (PDF#19-0841), respectively.

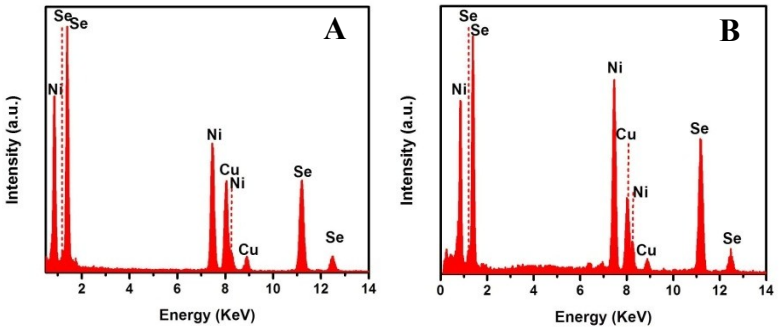

Figure S3. EDX spectrum of the NiSe nnaorod for NiSe/NF (The peak locating at 6.3KeV in figure B comes from background).

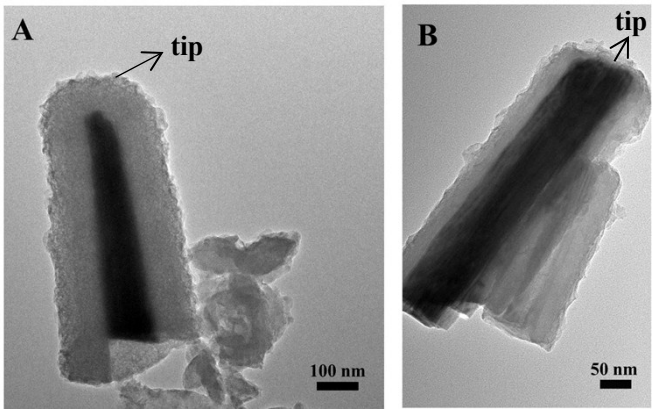

Figure S4 TEM images of NiSe-NiO_x. NiSe core is densely coated with NiO_x layer.

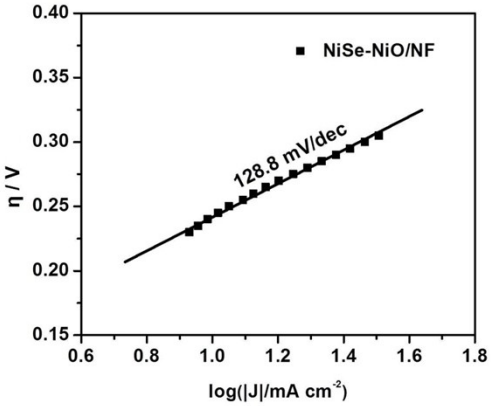

Figure S5. Tafel plots for OER over NiSe-NiO_x/NF.

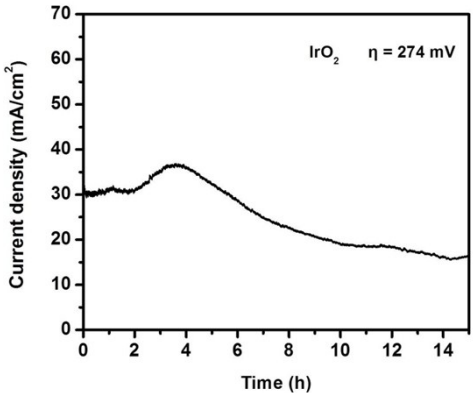

Figure S6 Constant potential electrolysis with IrO_2 at an overpotential of 274 mV in 1M KOH.

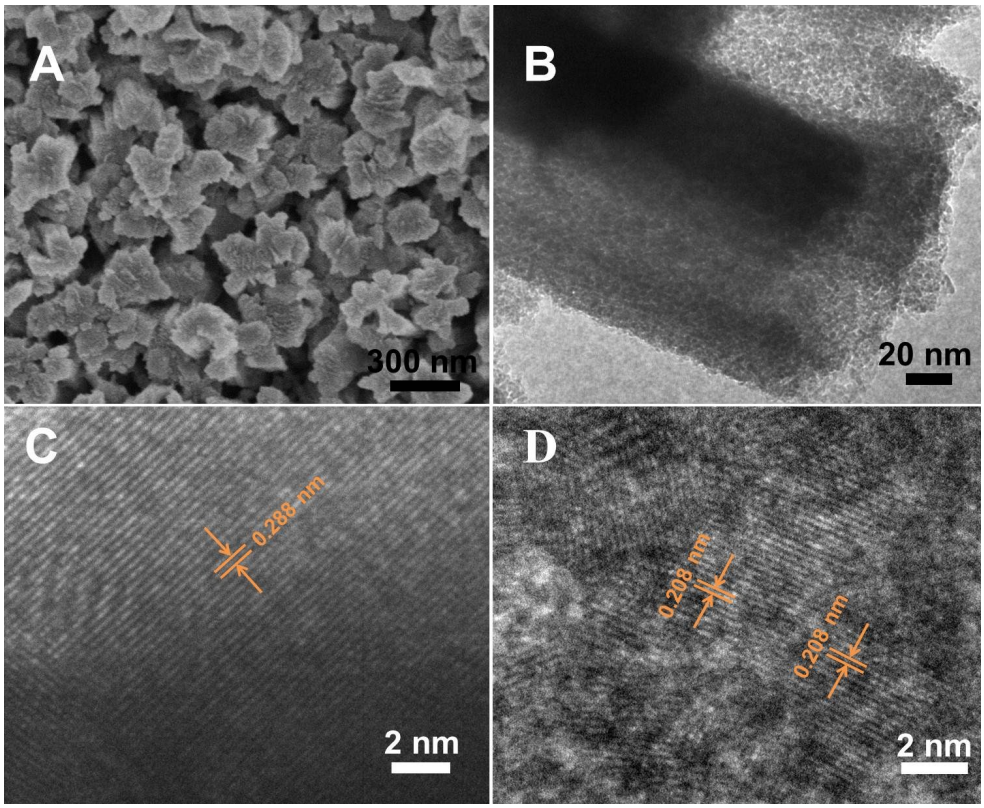

Figure S7. (A) SEM image of NiSe-NiO/NF, (B) TEM image of NiSe-NiO/NF, (C) HRTEM taken from the core of NiSe-NiO/NF, (D) HRTEM taken from the shell of NiSe-NiO/NF.

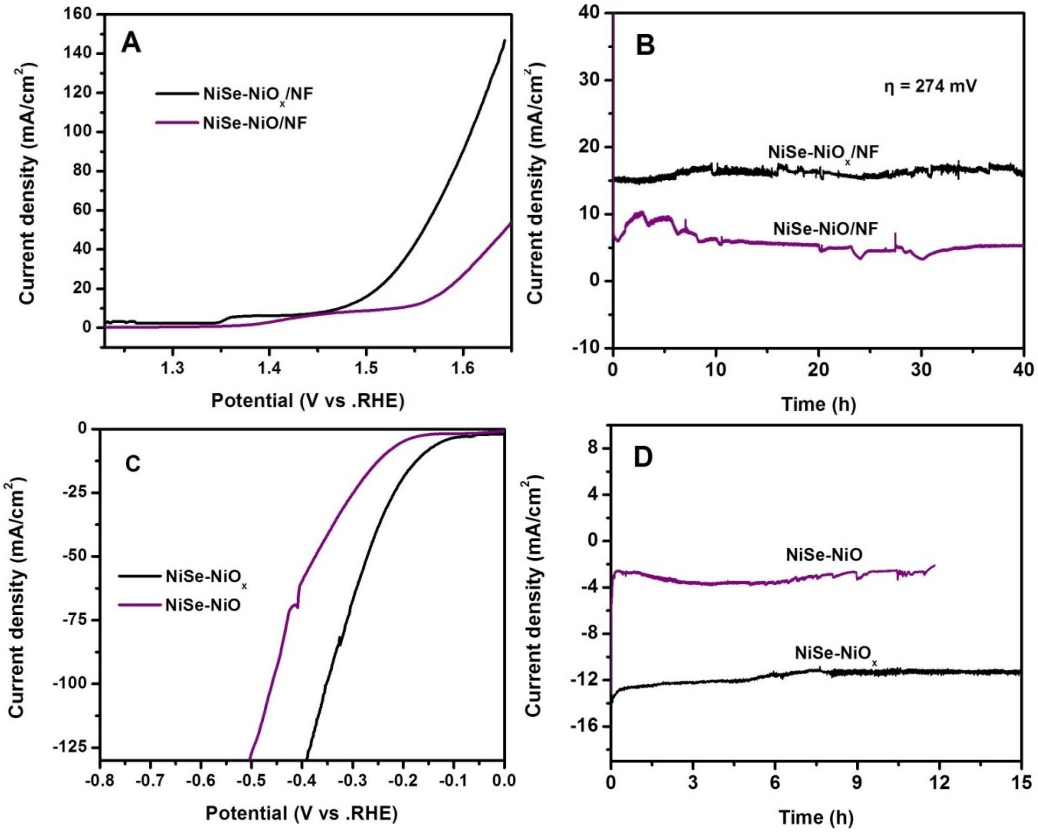

Figure S8. (A) Polarization curves of NiSe-NiO$_x$/NF and NiSe-NiO/NF for OER, (B) I-t curves of NiSe-NiO$_x$/NF and NiSe-NiO/NF at an overpotential of 274 mV, (C) Polarization curves of NiSe-NiO$_x$/NF and NiSe-NiO/NF for HER, (D) I-t curves of NiSe-NiO$_x$/NF and NiSe-NiO/NF at an overpotential of 150 mV. All the measurements were carried out in 1M KOH.

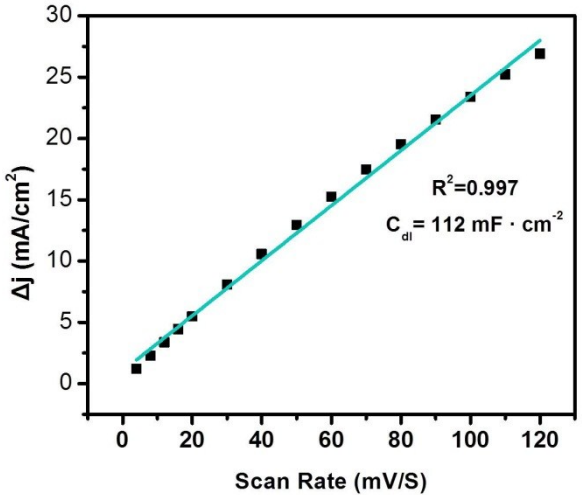

Figure S9 Plots showing the extraction of the double-layer capacitive (C_{dl}) for IrO_2.

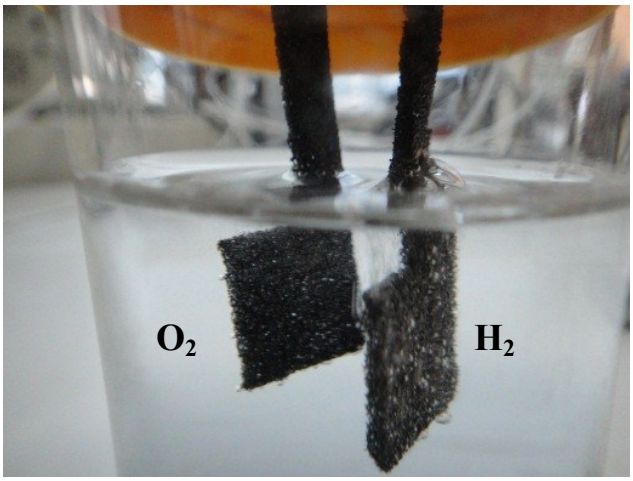

Figure S10. Photograph showing the generation of H_2 and O_2 bubbles on NiSe-NiO_x/NF electrodes.

Table S1. Comparison of the electrocatalytic activity of NiSe-NiO_x/NF reported here under alkaline medium via-a-via some good NiO-related OER catalysts that have been recently reported for alkaline solution.

Catalyst	Current density (mA/cm^2)	Overpotential (mV)	Reference
NiSe-NiO_x	**10**	**243**	**This work**
$NiFeO_x$/CFP	10	230	*Nat. Commun.* ***2015****, 6, 7261.*
Ni-NiO/N-rGo	10	240	*Adv. Funct. Mater.* ***2016****,25,5799*
$Fe_6Ni_{10}O_x$	10	286	*Angew. Chem. Int. Ed.* ***2014****,53,7547*
Ni_2P/NiO	10	290	*Energy Environ. Sci.* ***2015****, 8, 2347.*
$Ni_{0.71}Fe_{0.29}(OH)_x$	10	296	*Nanoscale,* ***2016****, 8, 5015.*
$Ni(OH)_2$	10	299	*Faraday Discuss.,* ***2014****, 176, 363.*
NiO/TiO_2	10	320	*J. Am. Chem. Soc.* ***2016****, 138, 6517.*
$NiCo_2O_4$	10	320	*Angew. Chem. Int. Ed.* ***2015****, 127, 7507*
Ni@C/NF	10	330	*J. Mater. Chem. A* ***2016****, 4, 7297.*
α-$Ni(OH)_2$	10	331	*J. Am. Chem. Soc.* ***2014****, 136, 7077.*
NiO/NF	10	345	*J. Mater. Chem. A* ***2016****, 4, 9797.*
Ni-NG	10	400	*Energy Environ. Sci.* ***2013****, 6, 3693.*
NiO_x/Ni	10	390	*Applied Surface Science,* ***2015****, 359, 172.*