Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supplementary Information

Supercritical Fluid Processing for the Synthesis of NiS_2 Nanostructures as Efficient Electrocatalyst for Electrochemical Oxygen Evolution Reaction

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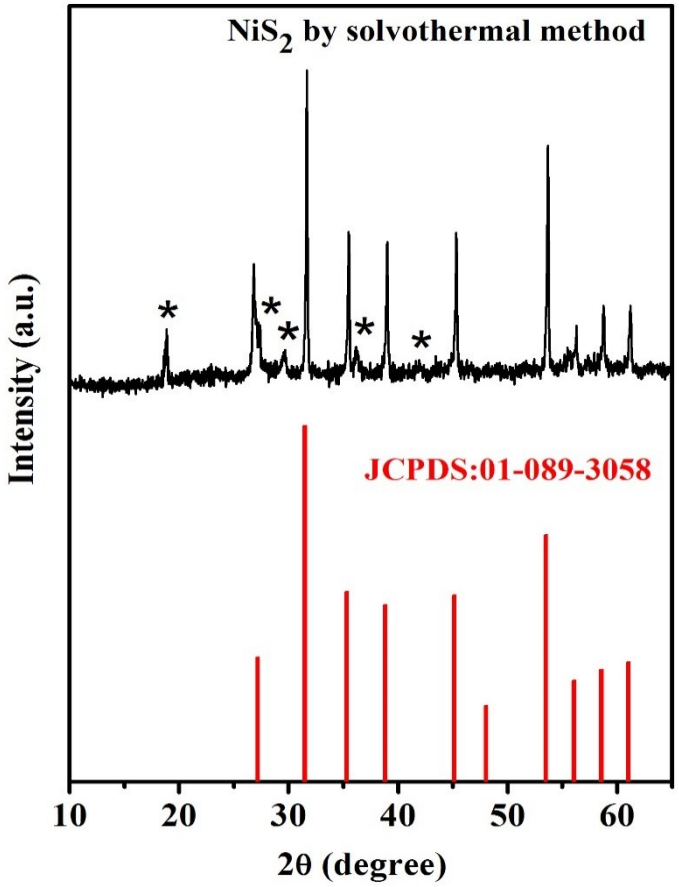

Fig. S1 XRD pattern of NiS_2 Sol nanostructures and the standard reference pattern of cubic NiS_2 (* symbol denotes the diffraction lines of $NiSO_4.H_2O$).

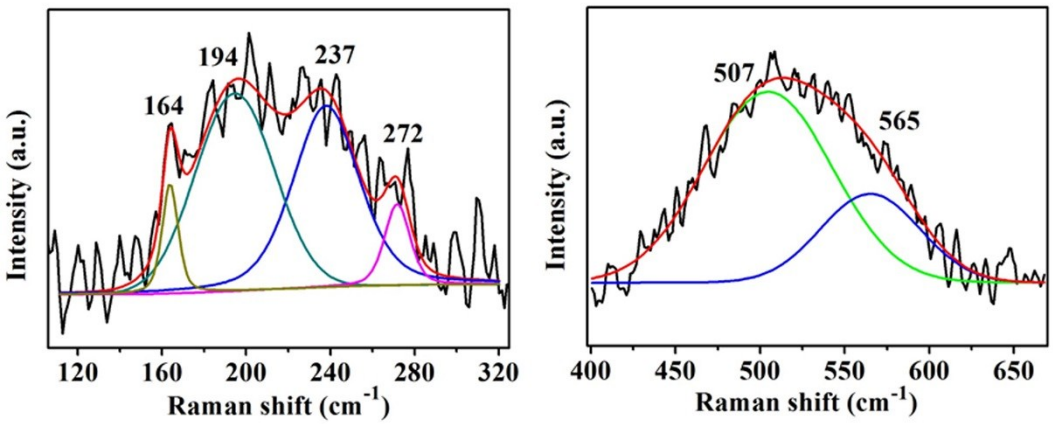

Fig. S2 Deconvoluted Raman spectra of as synthesized NiS_2 SCF nanostructures.

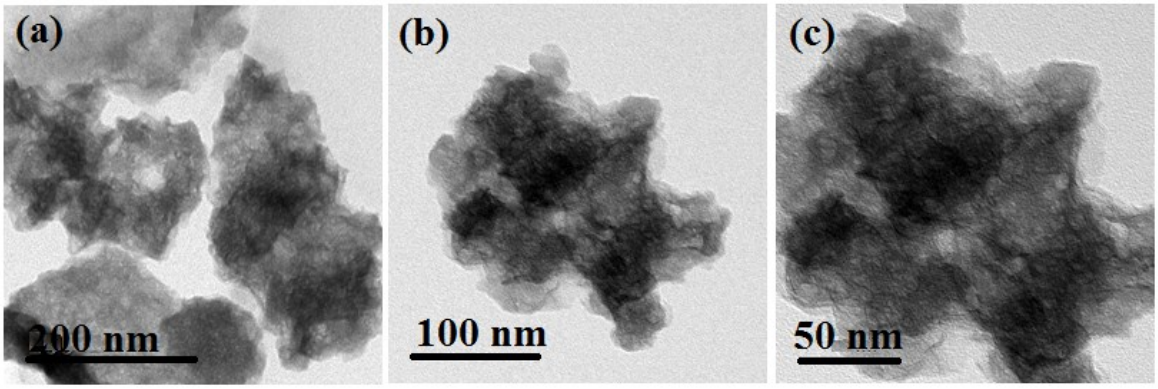

Fig. S3 (a-c) HR-TEM images of the as-synthesized NiS_2 SCF nanostructures.

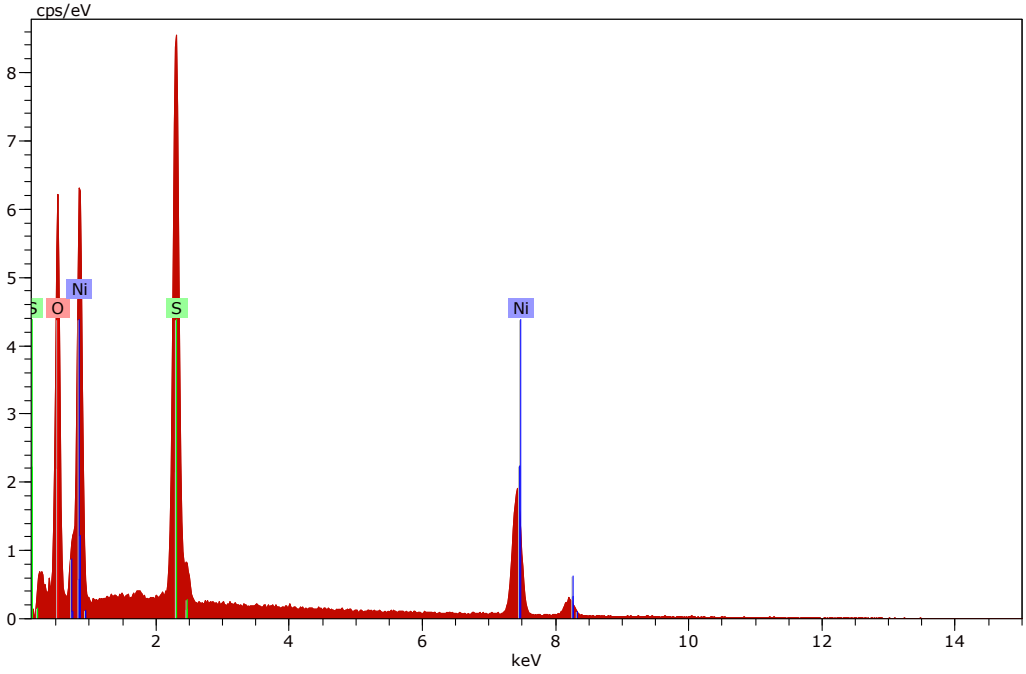

Fig. S4 SEM-EDX analysis of the as synthesized NiS_2 SCF nanostructures.

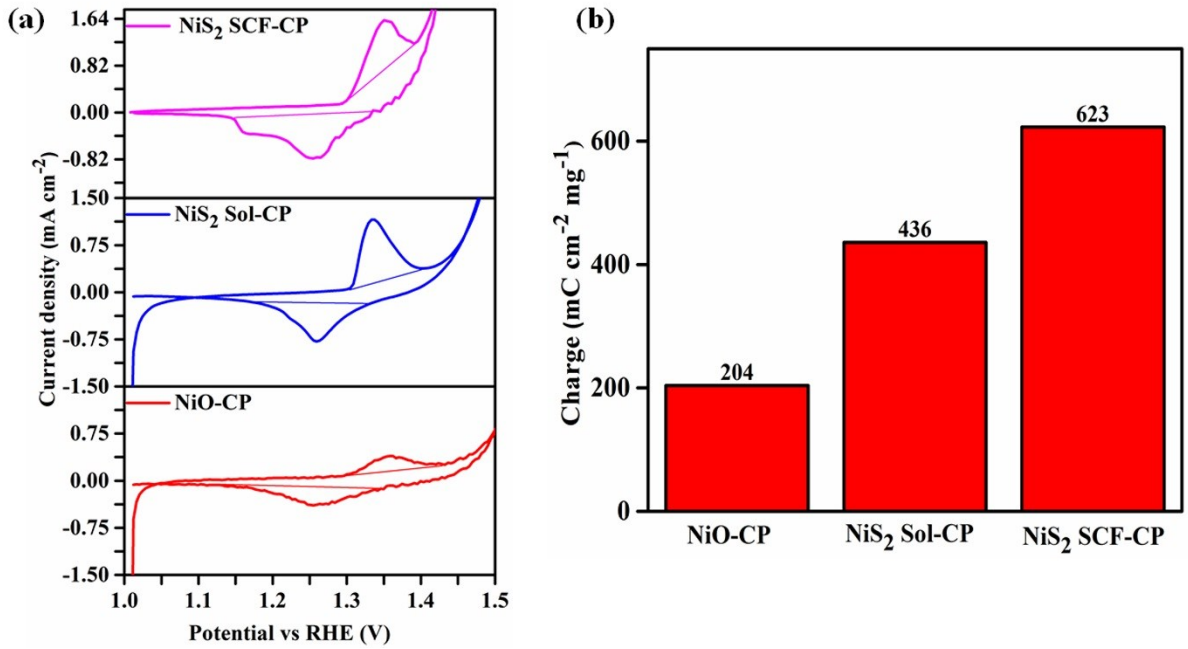

Fig. S5 (a) Cyclic voltammetric curve of different electrocatalysts measured at 2 mV s^{-1} and (b) estimated voltammetric charge (q*) under the redox peak of the corresponding electrocatalysts.

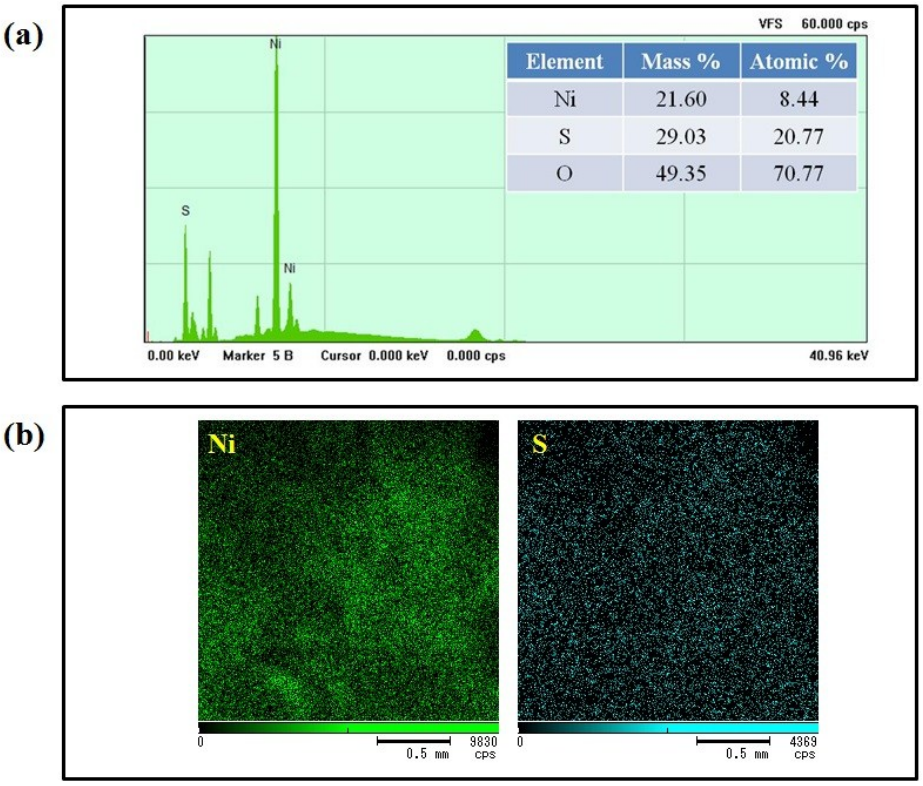

Fig. S6 (a) EDAX spectrum (inset elemental composition) and (b) XRF elemental mapping of NiS_2 SCF-CP before OER.

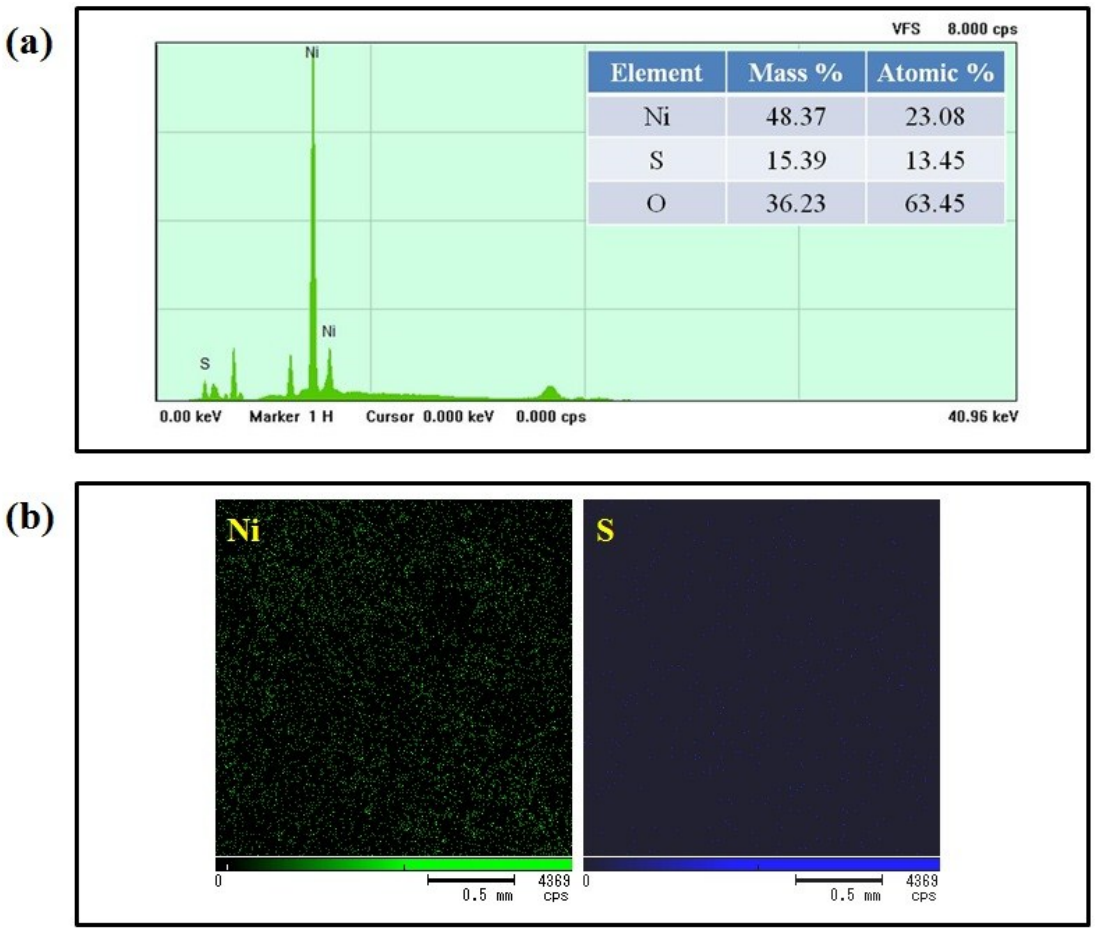

Fig. S7 (a) EDAX spectrum (inset elemental composition) and (b) XRF elemental mapping of NiS_2 SCF-CP after 500 cycles of OER at a scan rate of 30 mV s^{-1} in 1 M KOH.

Table S1 Comparison of OER catalytic activity with the recent studies.

Material	Synthesis Method	Substrate	η at 10 mA cm^{-2} mV *vs.* RHE	Tafel slope (mV dec^{-1})	References
Ni_3S_2	Hydrothermal	Ni foam / 1 M NaOH	260	-	J. Am. Chem. Soc. 2015, **137**, 14023−14026.
Ni_3Se_2	Electrodeposition	Glassy carbon / 0.3 M KOH	290	97	Energy Environ. Sci., 2016, **9**, 1771-1782
NiS	Hydrothermal	Stainless steel / 0.1 M KOH	297 at 11 mA cm^{-2}	47	ACS Appl. Mater. Interfaces, 2016, **8,** 5509−5516
$CoSe_2$/CFC	-	Carbon fabric collector / 1 M KOH	356	88	ACS Appl. Mater. Interfaces, 2016, **8**, 26902−26907.
Ni_3S_2-NL@NF-1	Hydrothermal	Ni foam / 1 M KOH	340	89	J. Mater. Chem. A, 2016, **4**, 13916–13922.
Ni_3S_2-NN@NF-1	Hydrothermal	Ni foam / 1 M KOH	370	96	J. Mater. Chem. A, 2016, **4**, 13916–13922.
Ni_3S_2/AT-Ni	Hydrothermal	Ni foam / 0.1 M KOH	217	163 mV	Electrochimica Acta, 2015, **174**, 297–301.
NiS_2	Vapor-Phase Atomic Layer Deposition	Glassy carbon / 1 M KOH	408	56	Chem. Mater, 2016, **28**, 1155−1164.
$Ni_xFe_{1-x}Se_2$	Hydrothermal followed by solvothermal selenization treatment	Ni Foam/1 M KOH	195	28	Nature communication, 7:12324, DOI: 10.1038/ncomms12324.
NiS	MOF assisted	N/S co-doped carbon substrate/1 M KOH	310	48	Electrochimica Acta, **191**, 2016, 813–820
NiS	Hydrothermal followed by Ar atmosphere calcination	Glassy carbon/1 M KOH	320	59	ACS Appl. Mater. Interfaces, 2017, **9**, 2500–2508
NiS_2	Supercritical fluid processing	Carbon paper/1 M KOH	264	105	This work
IrO_2	Purchased from Sigma-Aldrich	Carbon paper / 1 M KOH	260	95	This work