

Supporting information

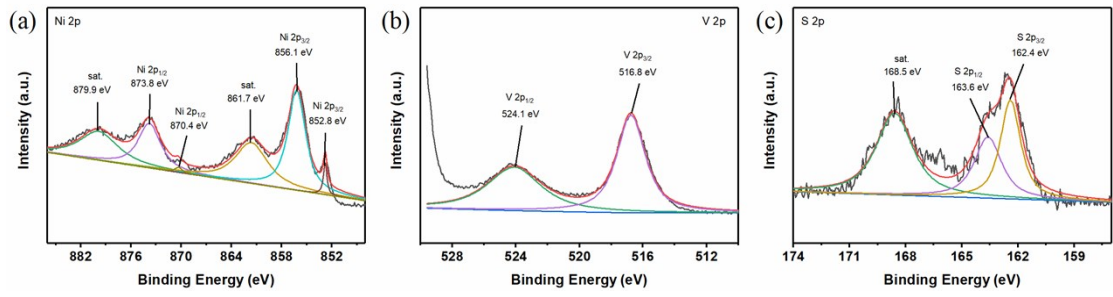


Figure S1. High-resolution XPS spectra of VS/Ni₃S₂/NF.

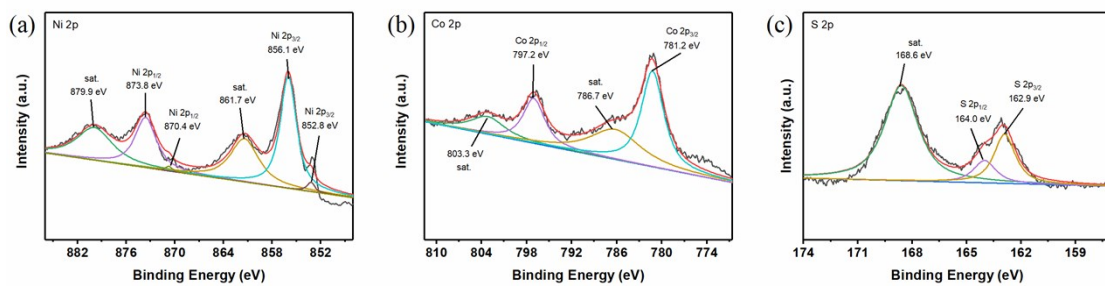


Figure S2. High-resolution XPS spectra of NiCo₂S₄/NF.

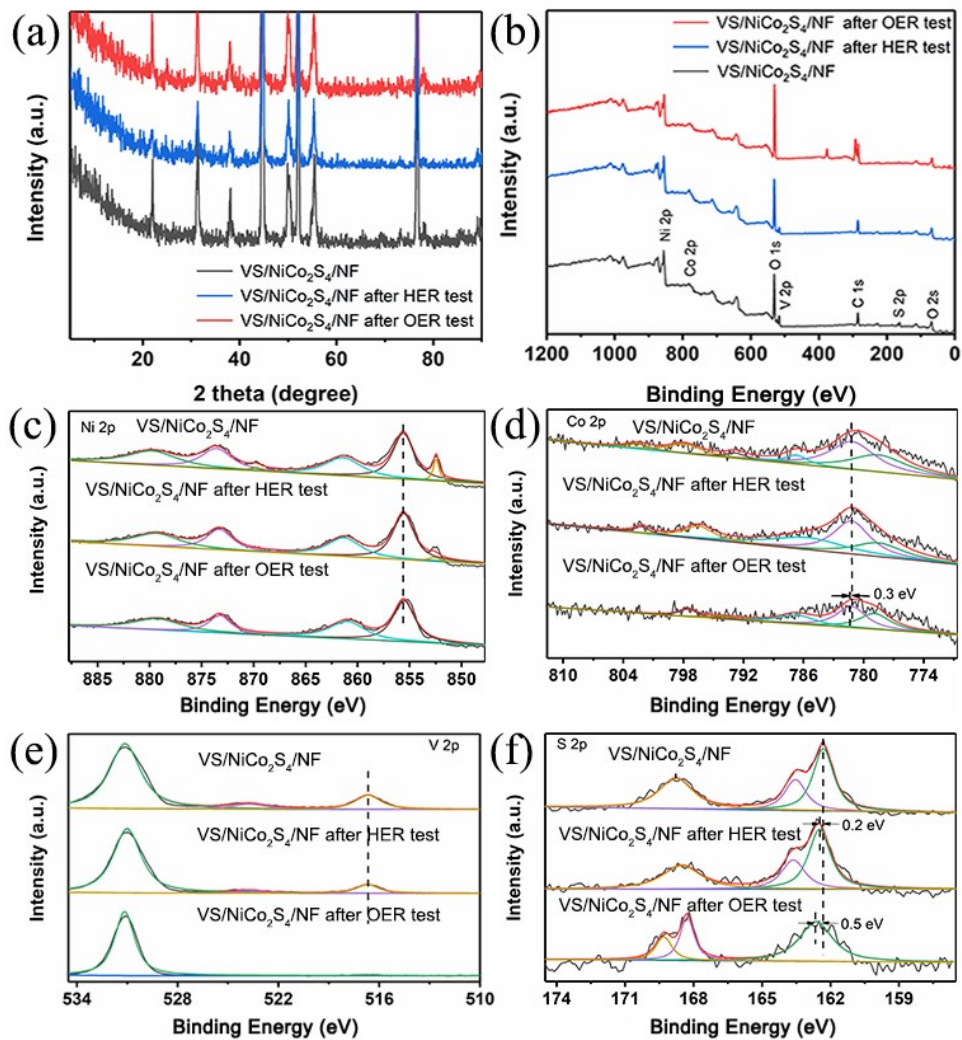


Figure S3. XRD patterns (a) and XPS spectra(b-f) of VS/NiCo₂S₄/NF after HER and OER long-term stability test.

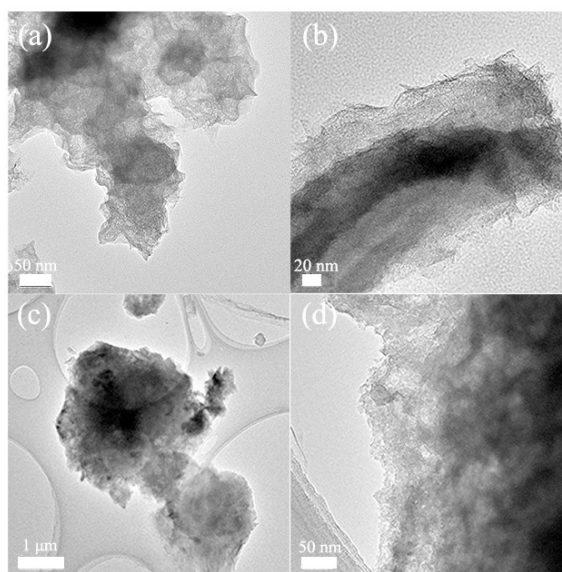


Figure S4. TEM images of VS/NiCo₂S₄/NF after HER (a, b) and OER (c, d) long-term stability test.

Table S1. Comparison of the OER activity over VS/NiCo₂S₄/NF with several Ni/Co-based electrocatalysts in alkaline media.

Samples	OER Overpotential / current density (mV/mA · cm ⁻²)	ref
VS/NiCo ₂ S ₄ /NF	332/50	This work
NiS/NF	335/50	1
Ni ₃ S ₂ /FeS	295/30	2
NiS/Ni	301/10	3
NiCo ₂ S ₄ NA/CC	336/20	4
Ni _x Co _{3-x} O ₄	337/10	5
NiCo ₂ O ₄ NRAs	320/10	6
Co ₉ S ₈ @MoS ₂ /CNFs	361/10	7
CoMoS ₃	320/10	8
CoS	310/10	9

Table S2. Comparison of the HER activity over VS/NiCo₂S₄/NF with several Ni/Co-based electrocatalysts in alkaline media.

Samples	HER Overpotential/ current density (mV/mA·cm ⁻²)	ref
VS/NiCo ₂ S ₄ /NF	184/10	This work
NiCo ₂ S ₄ nanotube	200/10	10
CoS _x /Ni ₃ S ₂	204/10	11
NiS/Ni	161/10	3
Co ₉ S ₈ @NiCo LDH/NF	168/10	12
Ni _x Co _{3-x} O ₄	155/10	5
NiCo ₂ O ₄ NRAs	156/10	6
FeS/NiS/NF	144/10	13
NiS/VS	158/10	14
Ni ₃ S ₂	300/10	15

Reference

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