

Supporting Information

Dual-modification Engineering of CoNi alloy Realizing Robust Performance for Electrocatalytic hydrogen production

Yutong Ye⁺, Guorong Zhou⁺, Kaixun Li⁺ and Yun Tong^{}*

School of Chemistry and Chemical Engineering, Key Laboratory of Surface & Interface Science of Polymer Materials of Zhejiang Province, Zhejiang Sci-Tech University, Hangzhou 310018, Zhejiang, China

Correspondence and requests for materials should be addressed to Y. Tong (E-mail: tongyun@mail.ustc.edu.cn)

Table of contents

Figure S1. The XRD pattern of S-CoNi/CP sample.....	3
Figure S2. The XRD pattern of S, Pt-CoNi/CP sample.	3
Figure S3. (a-d) The SEM images of S-Co/NF sample.....	4
Figure S4. (a-d) The SEM images of S-Ni/NF sample.	5
Figure S5. (a, b) The SEM images of S-CoNi/NF sample.....	6
Figure S6. (a, b) The SEM images of S, Pt-CoNi/NF sample.....	6
Figure S7. (a, b) The TEM images of S-CoNi/NF sample.....	7
Figure S8. The XPS survey spectrum of S-CoNi/NF sample.	7
Figure S9. The XPS survey spectrum of S, Pt-CoNi/NF sample.	8
Figure S10. (a) The polarization curves and (b) Tafel slopes of NF, Pt-NF, S, Pt-NF and S, Pt-CoNi/NF samples.	9
Figure S11. (a) The polarization curves and (b) Tafel slopes of Pt-CoNi/NF and S, Pt-CoNi/NF samples.	9
Figure S12. The mass activity of Pt/C and S, Pt-CoNi/NF samples for HER in 1 M KOH.	10
Figure S13. Polarization curves before and after 3000 cycles of S, Pt-CoNi/NF for HER in 1 M KOH.	10
Figure S14. The cyclic voltammetry curves of (a) S-Co/NF, (b) S-Ni/NF, (c) S-CoNi/NF and (d) S, Pt-CoNi/NF electrodes in 1.0 M KOH recorded at different scan rates from 20 to 100 mV s ⁻¹	11
Figure S15. The XRD pattern of S, Pt-CoNi/CP sample after HER test.	12
Figure S16. (a-d) The SEM images of S, Pt-CoNi/NF sample after HER test.	12
Figure S17. High-resolution XPS spectra of (a) Co 2p, (b) Ni 2p, (c) Pt 4f and (d) S 2p for S, Pt-CoNi/NF after HER test.	13
Table S1. The summary of synthesis conditions for the samples.....	14

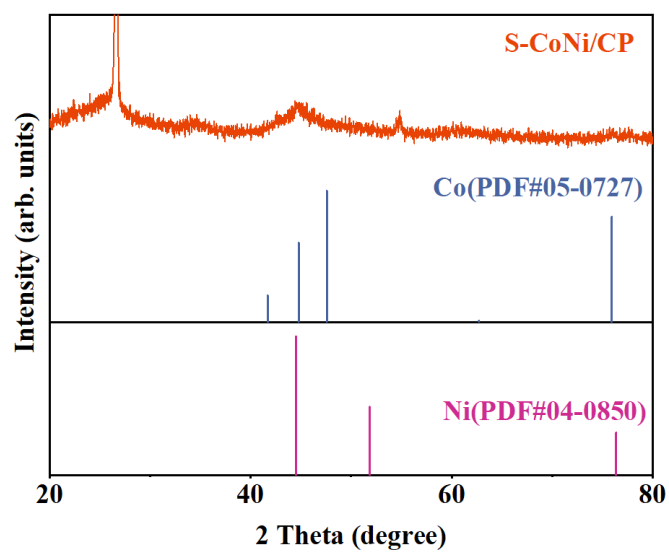


Figure S1. The XRD pattern of S-CoNi/CP sample.

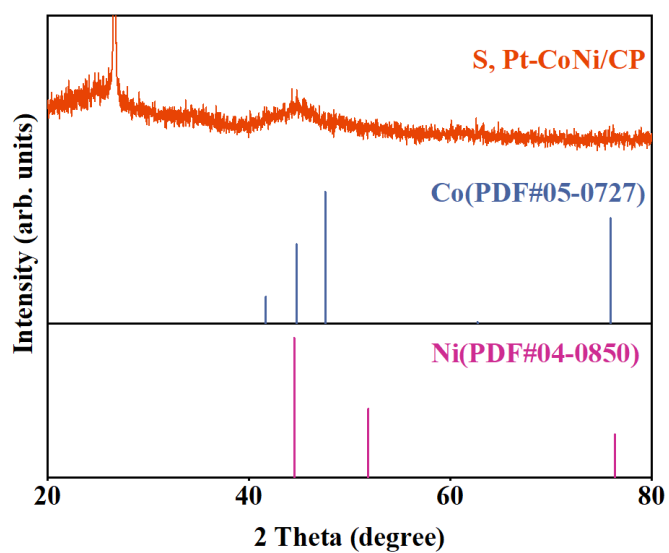


Figure S2. The XRD pattern of S, Pt-CoNi/CP sample.

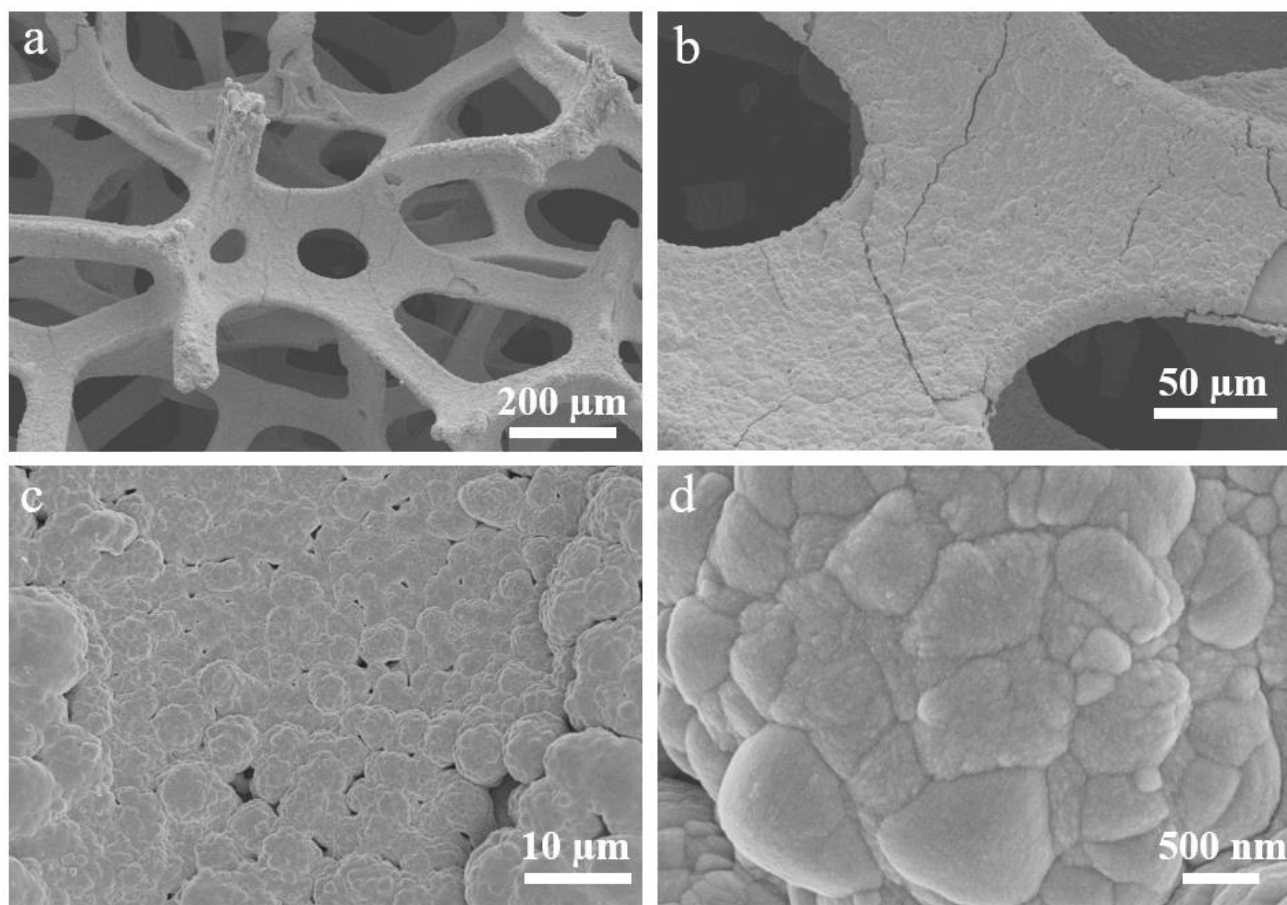


Figure S3. (a-d) The SEM images of S-Co/NF sample.

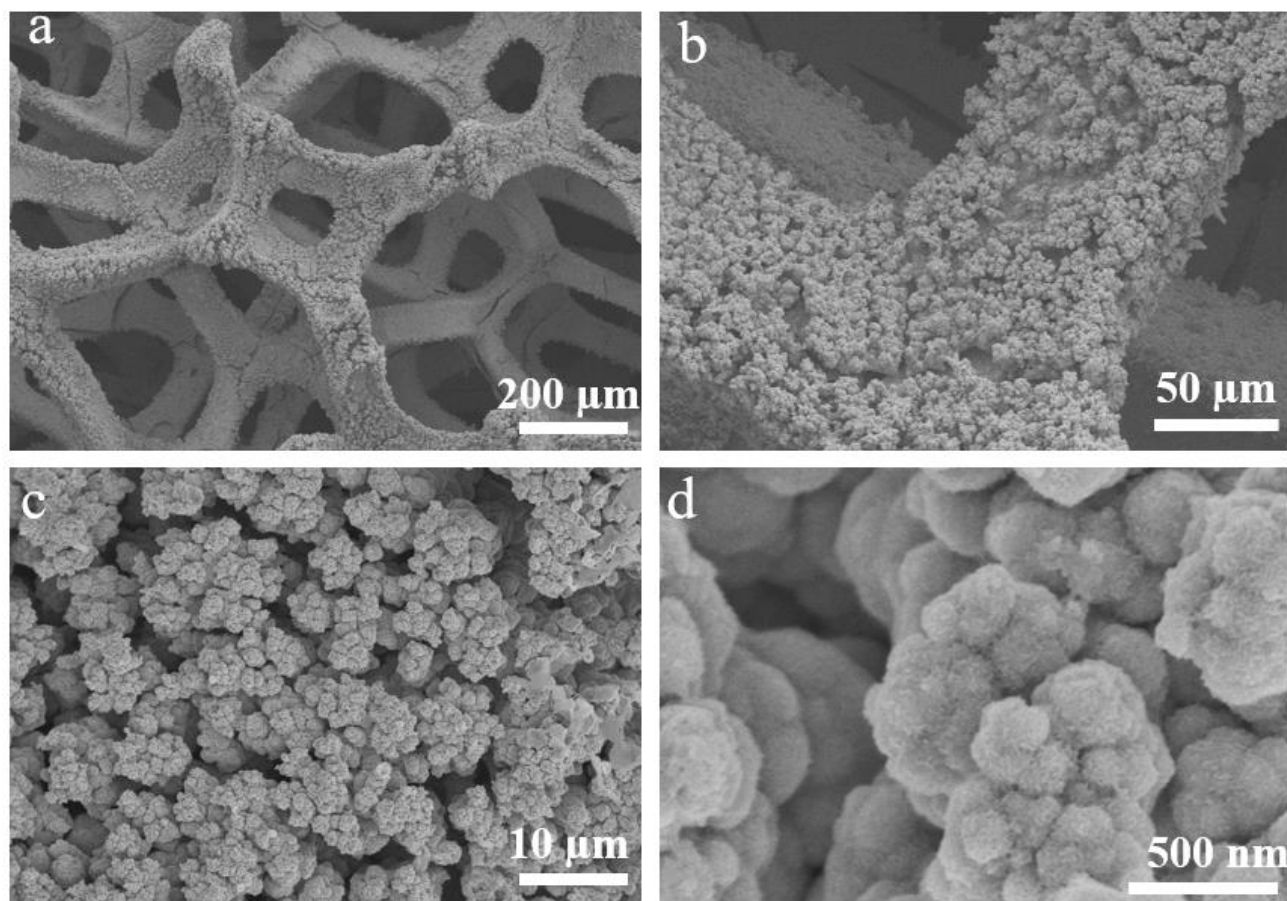


Figure S4. (a-d) The SEM images of S-Ni/NF sample.

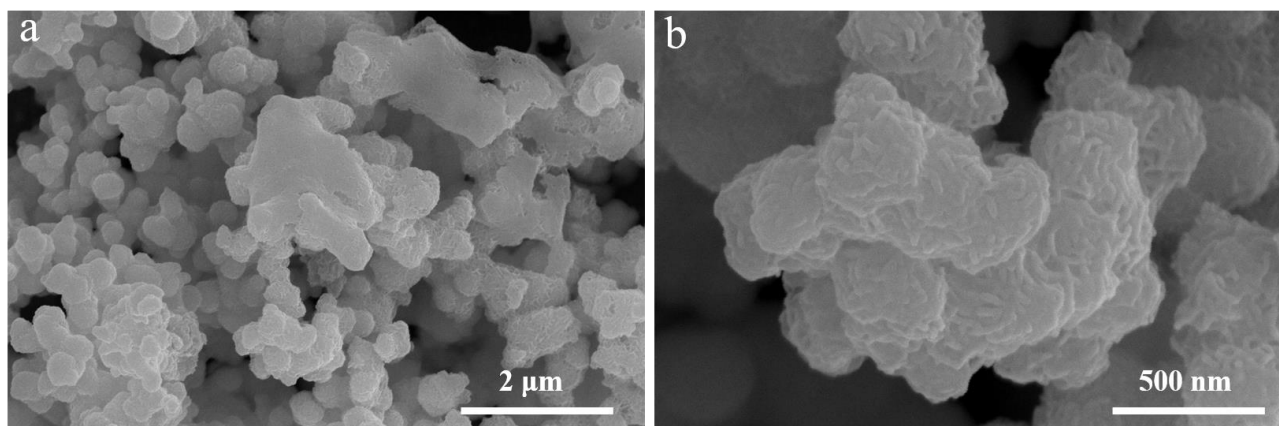


Figure S5. (a, b) The SEM images of S-CoNi/NF sample.

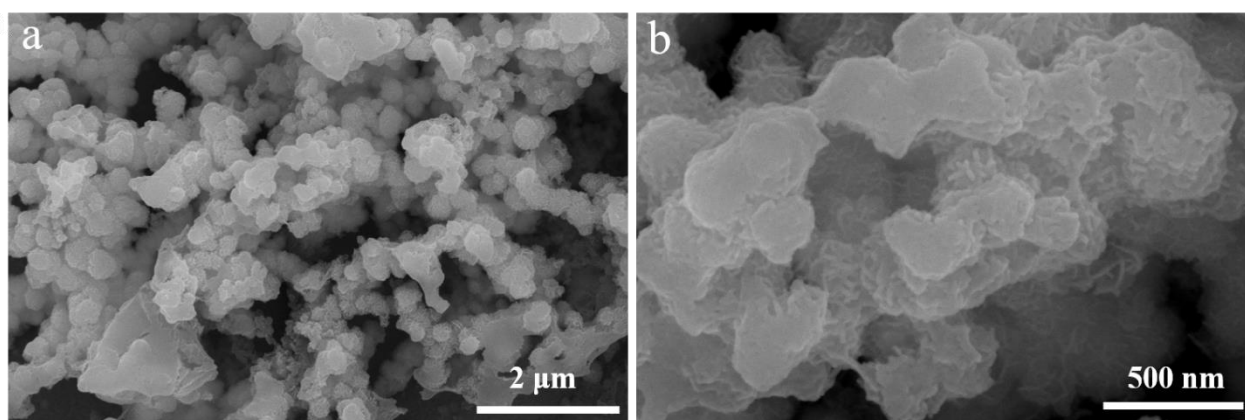


Figure S6. (a, b) The SEM images of S, Pt-CoNi/NF sample.

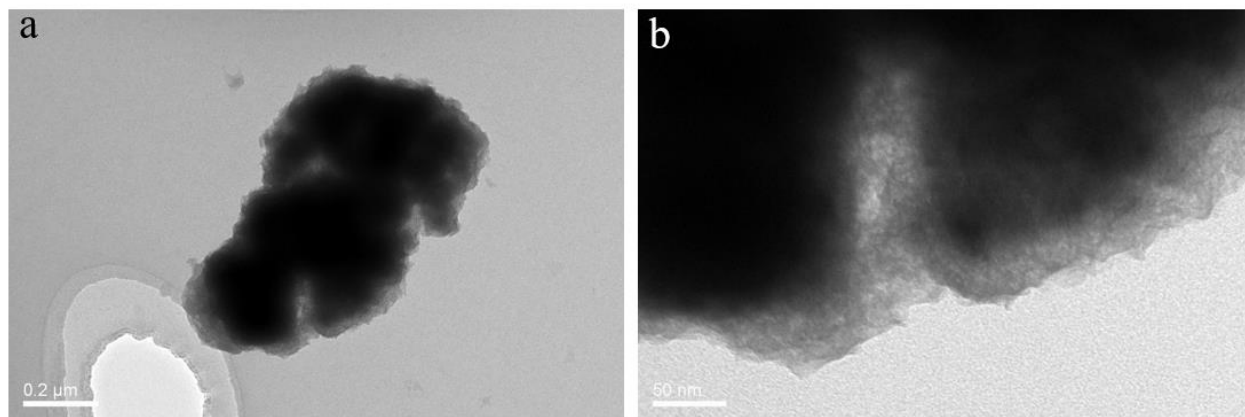


Figure S7. (a, b) The TEM images of S-CoNi/NF sample.

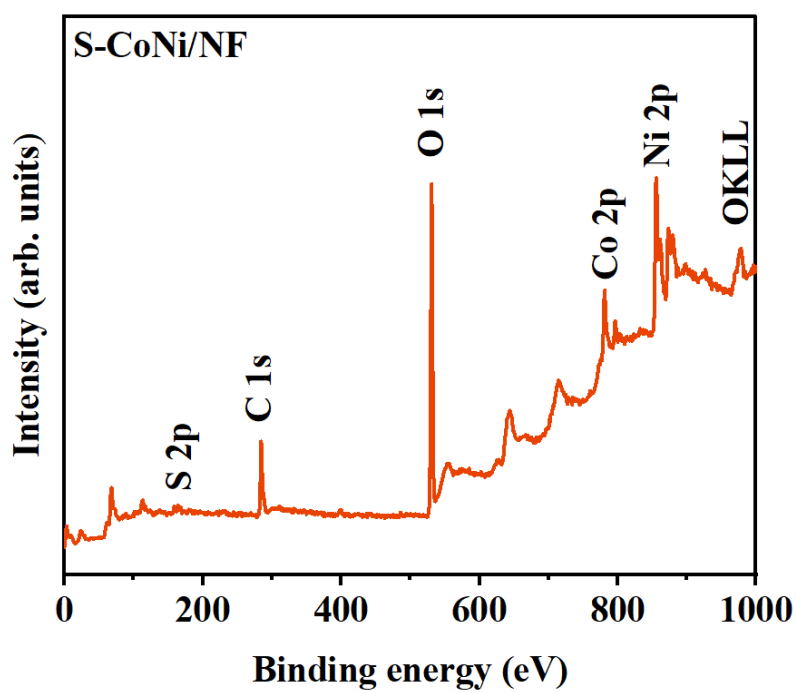


Figure S8. The XPS survey spectrum of S-CoNi/NF sample.

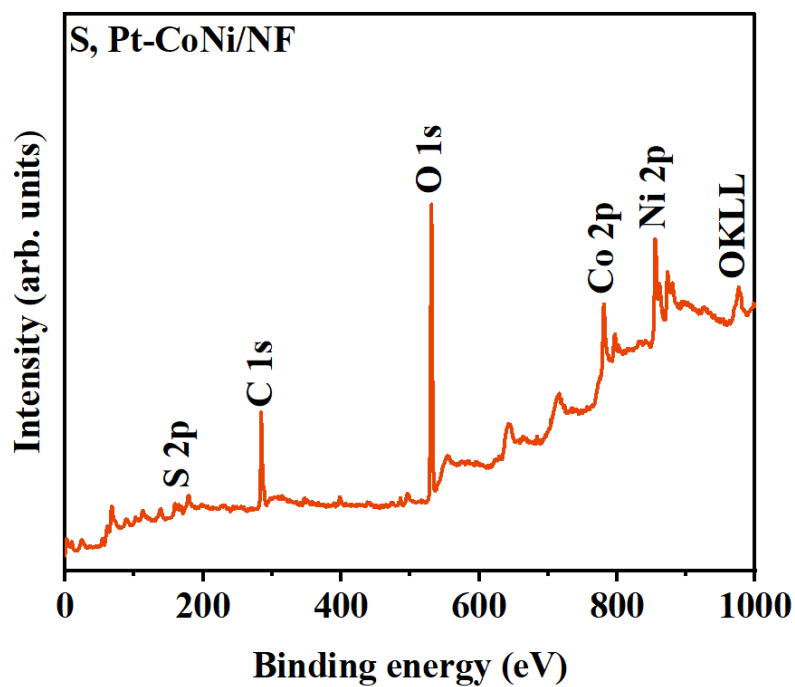


Figure S9. The XPS survey spectrum of S, Pt-CoNi/NF sample.

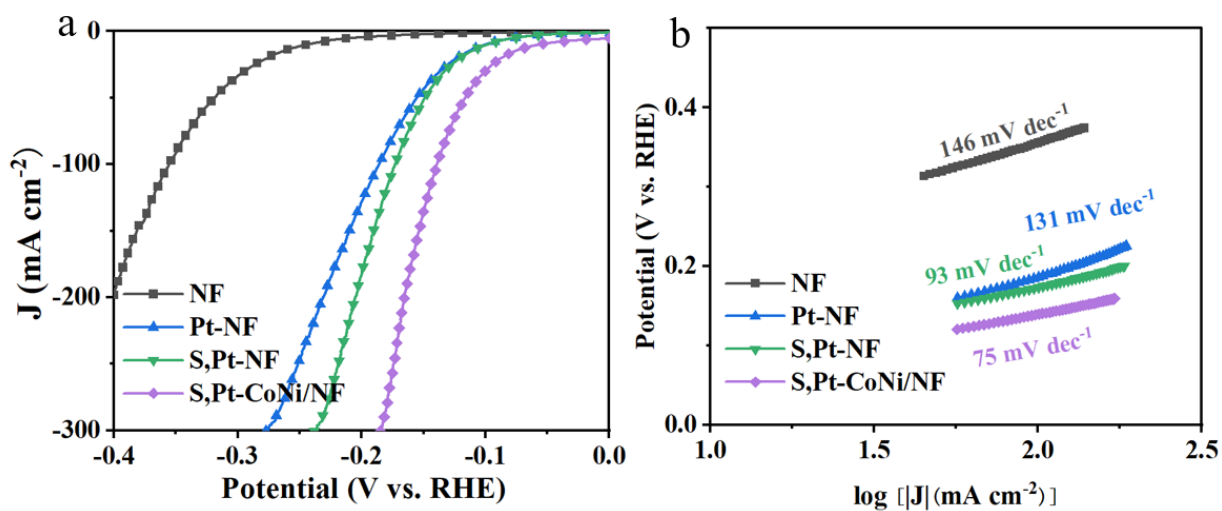


Figure S10. (a) The polarization curves and (b) Tafel slopes of NF, Pt-NF, S, Pt-NF and S, Pt-CoNi/NF samples.

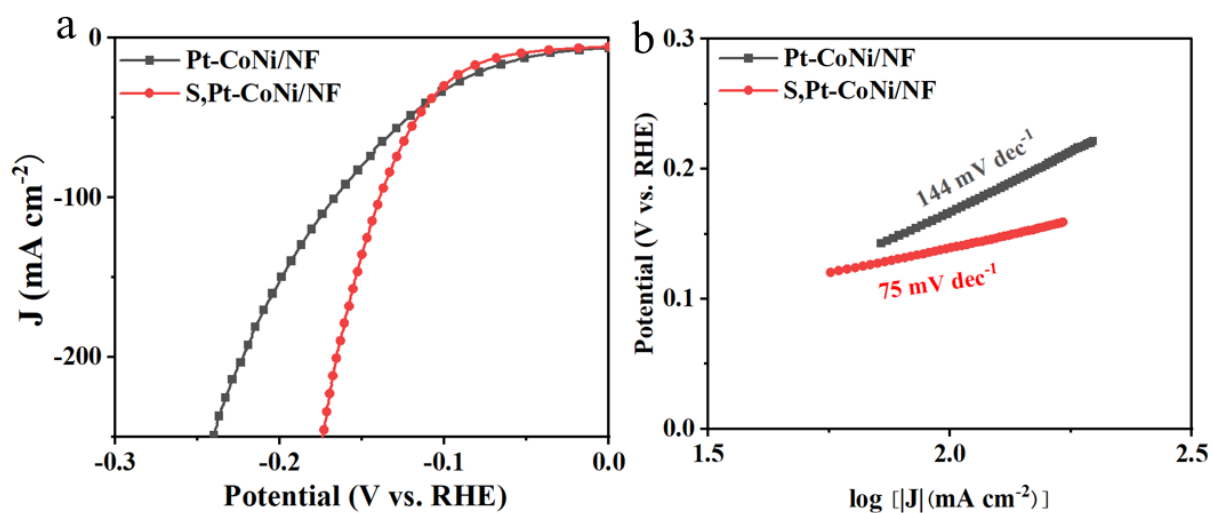


Figure S11. (a) The polarization curves and (b) Tafel slopes of Pt-CoNi/NF and S, Pt-CoNi/NF samples.

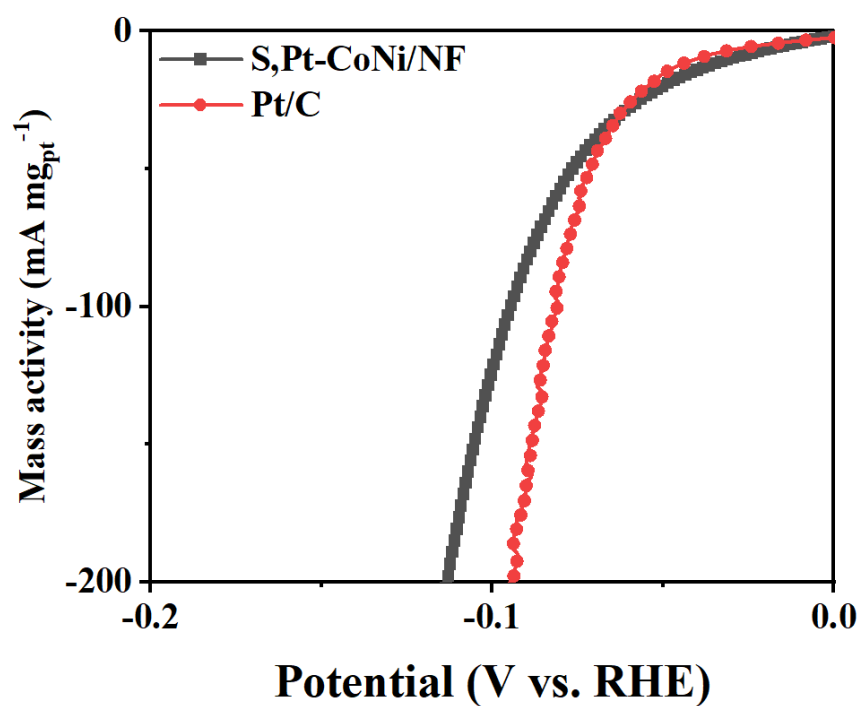


Figure S12. The mass activity of Pt/C and S, Pt-CoNi/NF samples for HER in 1 M KOH.

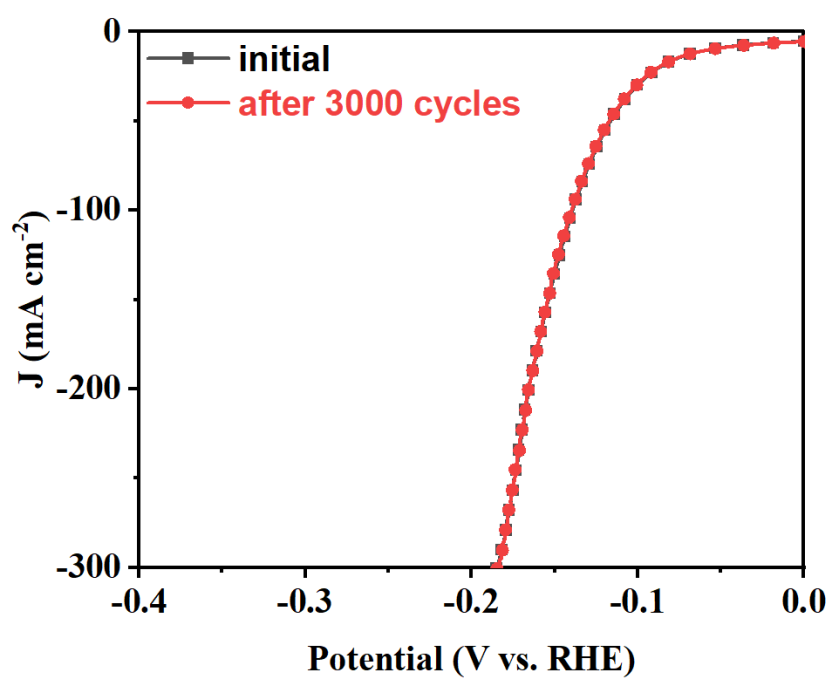


Figure S13. Polarization curves before and after 3000 cycles of S, Pt-CoNi/NF for HER in 1 M KOH.

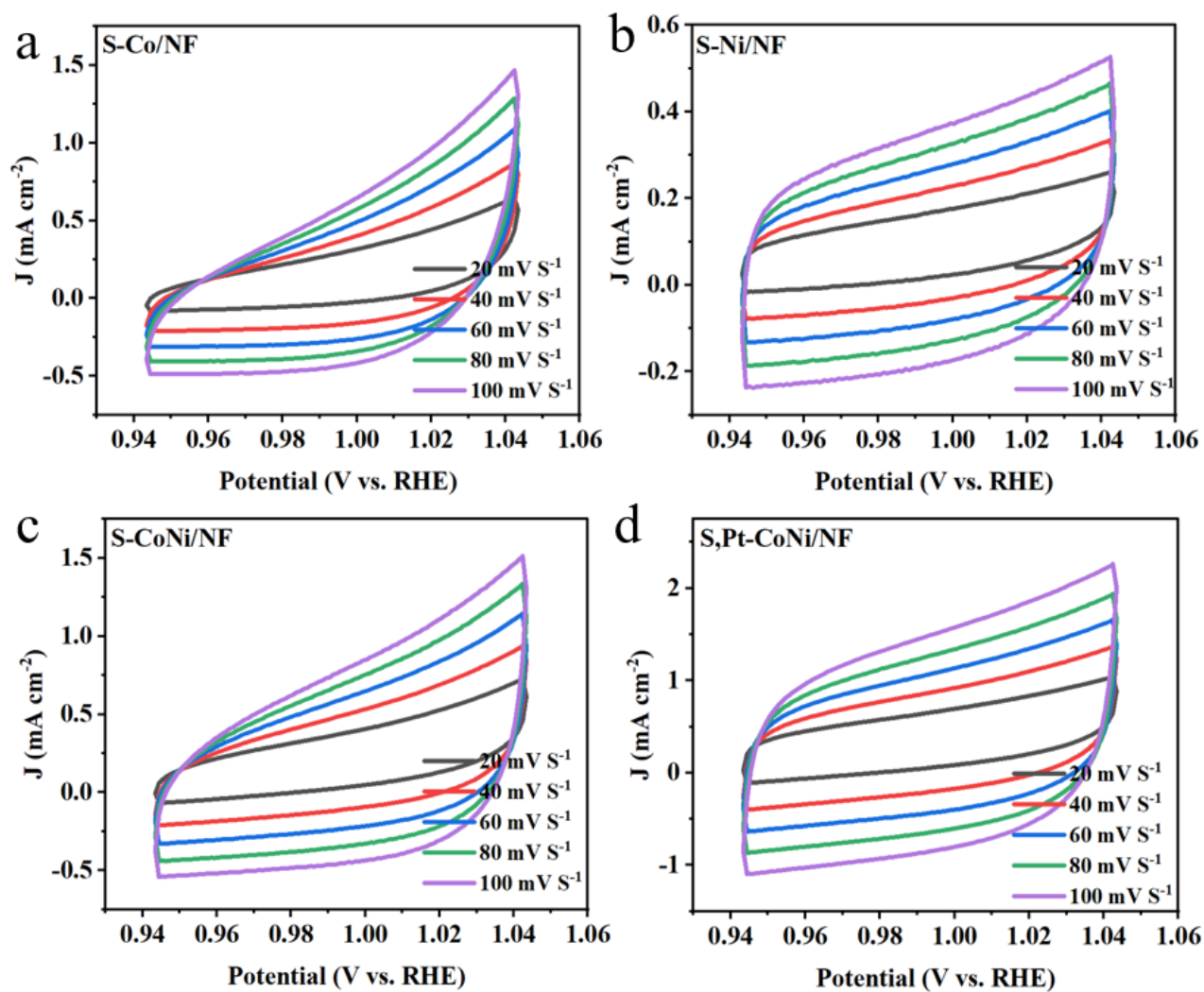


Figure S14. The cyclic voltammetry curves of (a) S-Co/NF, (b) S-Ni/NF, (c) S-CoNi/NF and (d) S, Pt-CoNi/NF electrodes in 1.0 M KOH recorded at different scan rates from 20 to 100 mV s⁻¹.

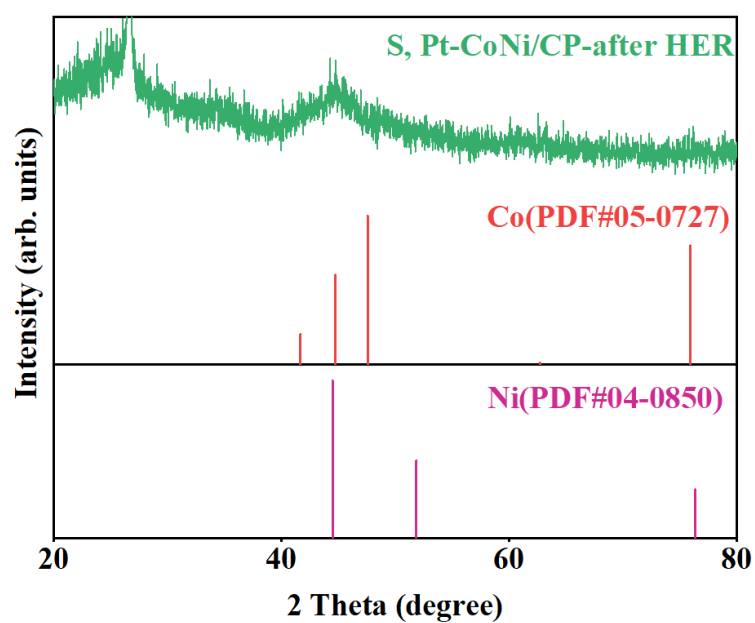


Figure S15. The XRD pattern of S, Pt-CoNi/CP sample after HER test.

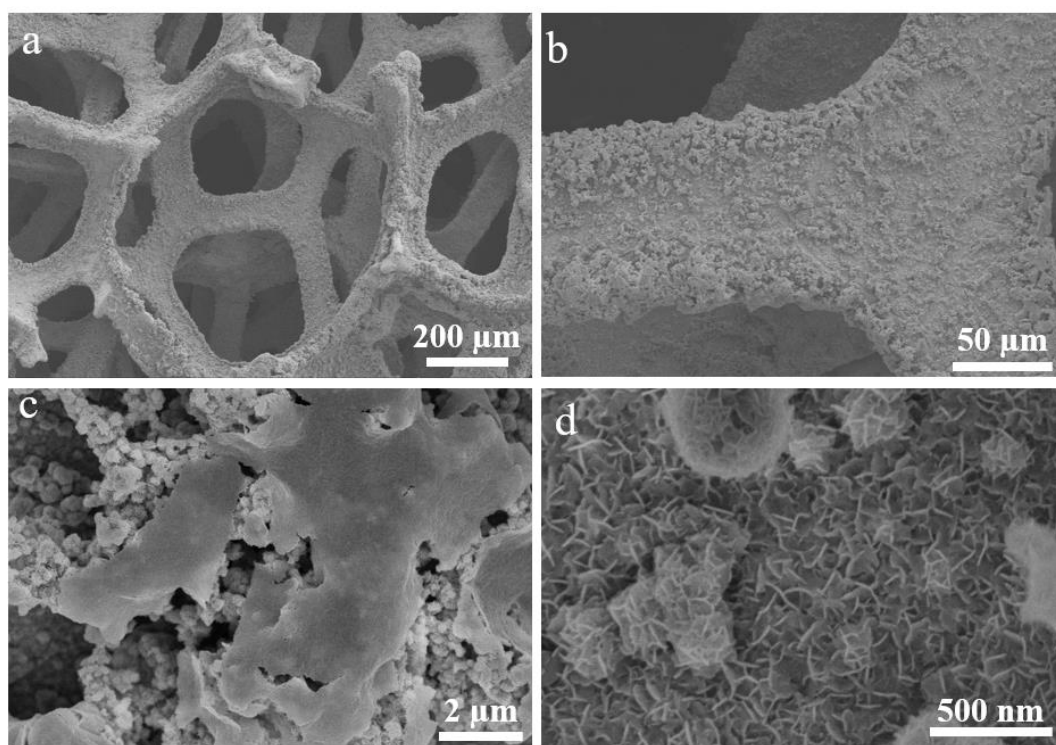


Figure S16. (a-d) The SEM images of S, Pt-CoNi/NF sample after HER test.

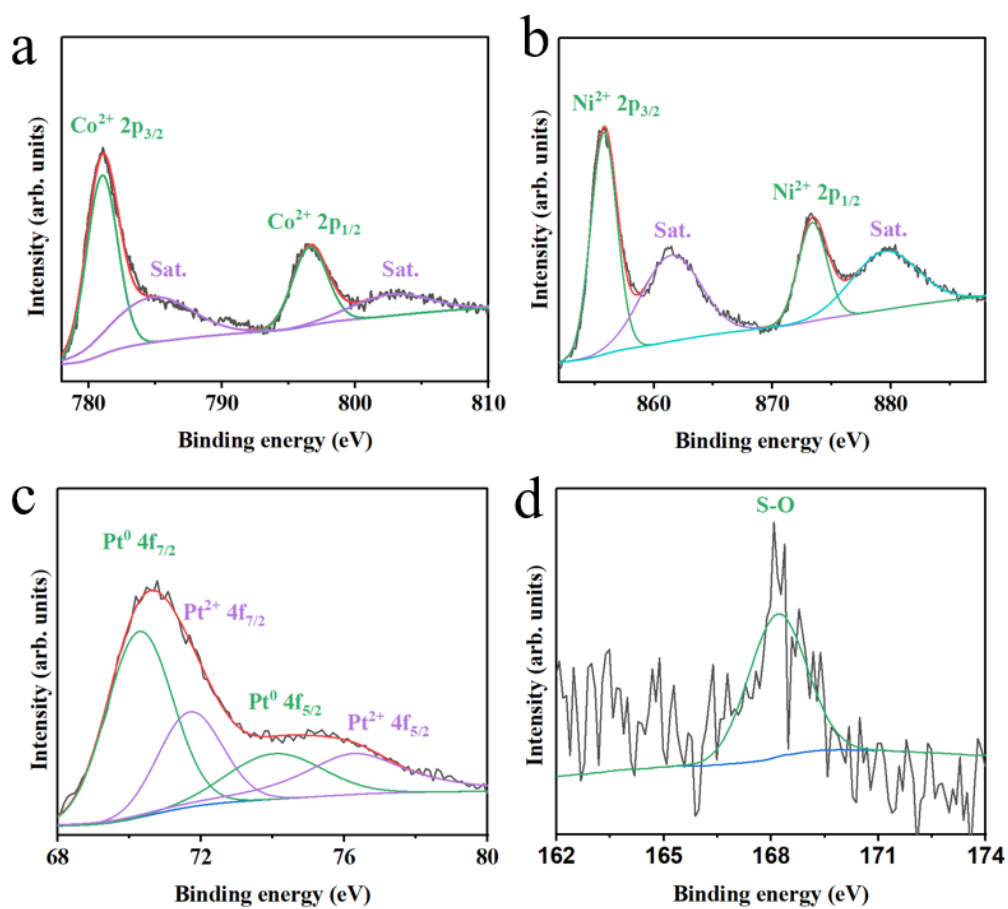


Figure S17. High-resolution XPS spectra of (a) Co 2p, (b) Ni 2p, (c) Pt 4f and (d) S 2p for S, Pt-CoNi/NF after HER test.

Table S1. The summary of synthesis conditions for the samples.

Catalyst	Loading mass (mg cm ⁻²)	Electrodeposition voltage (V)	Electrodeposition time (s)
S-Co/NF	6.2	-2	400
S-Ni/NF	5.3	-2	400
S-CoNi/NF	6.1	-2	400
S, Pt-CoNi	4.2	-2	400
Pt/C	5.0	-2	400