

Electronic Supplementary Material for New Journal of Chemistry

## **CoFeP/NC@CoP/Ni<sub>2</sub>P Heterostructure for Efficient Overall Water**

### **Splitting**

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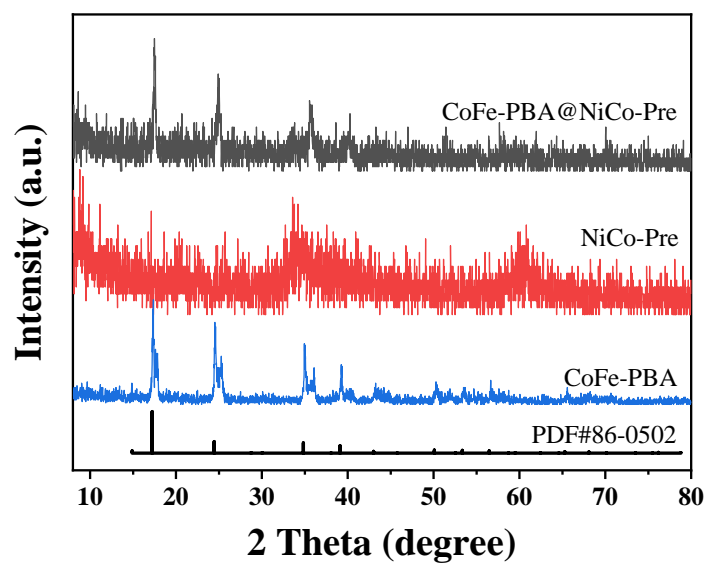


Fig. S1. XRD patterns of the CoFe-PBA, NiCo-Pre, Co-Fe PBA@NiCo-Pre

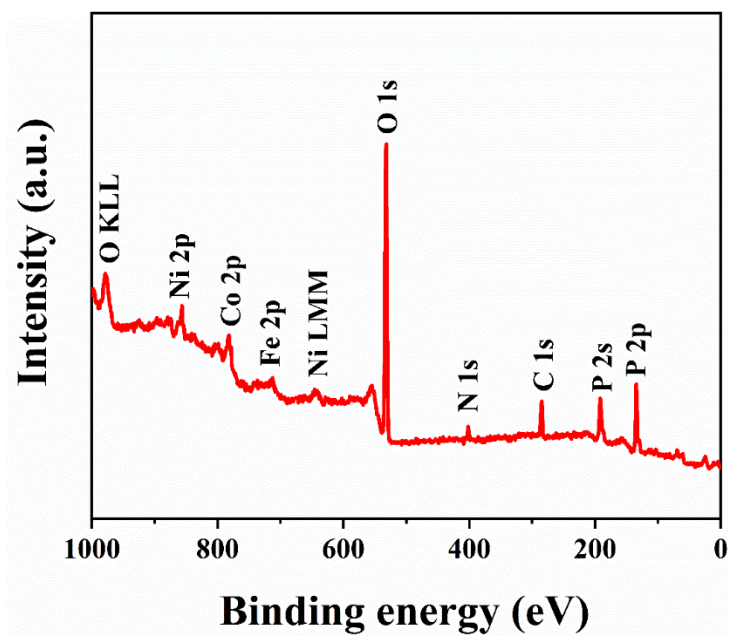


Fig. S2. The XPS survey spectrum of the CoFeP/NC@CoP/Ni<sub>2</sub>P

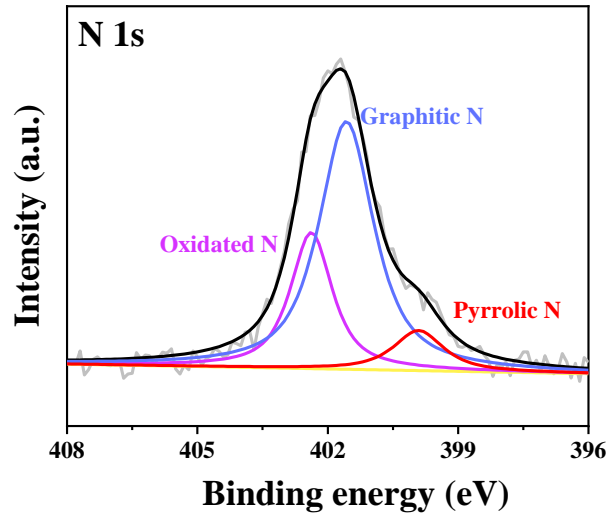


Fig. S3. N 1s spectrum of CoFeP/NC@CoP/Ni<sub>2</sub>P

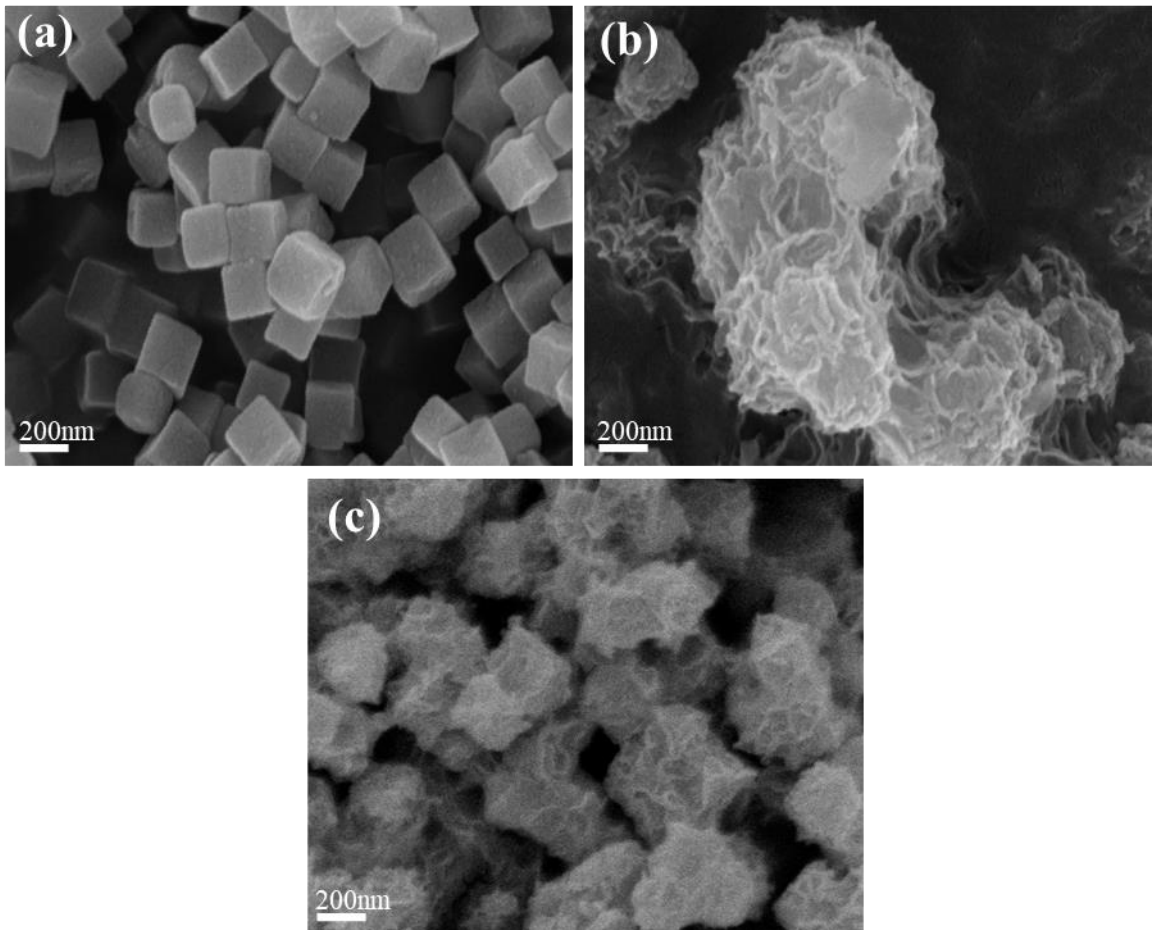


Fig. S4. SEM images of the CoFe-PBA (a), NiCo-Pre (b), Co-Fe PBA@NiCo-Pre (c)

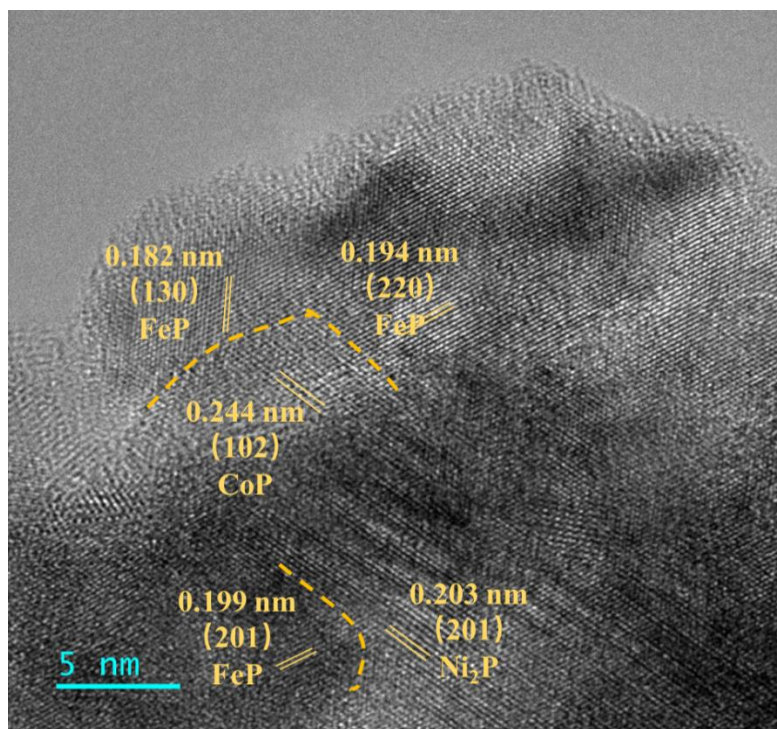


Fig. S5. TEM image of CoFeP/NC@CoP/Ni<sub>2</sub>P

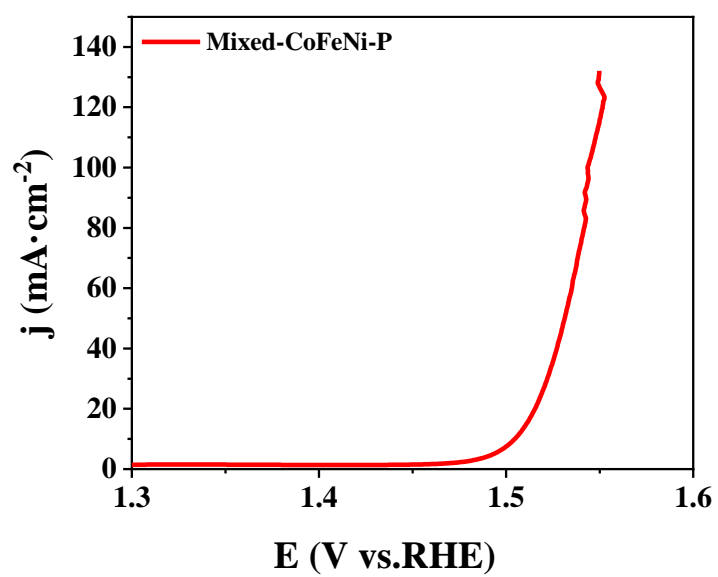


Fig. S6. OER polarization curve of Mixed-CoFeNi-P

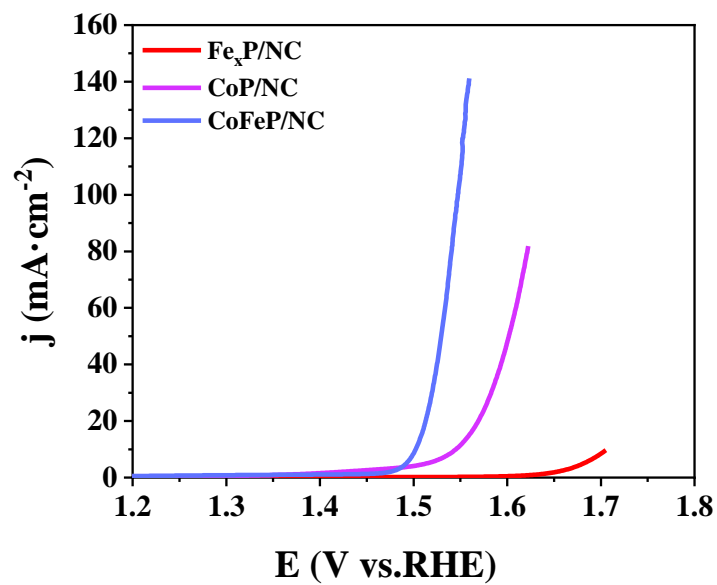


Fig. S7. OER polarization curves for different samples

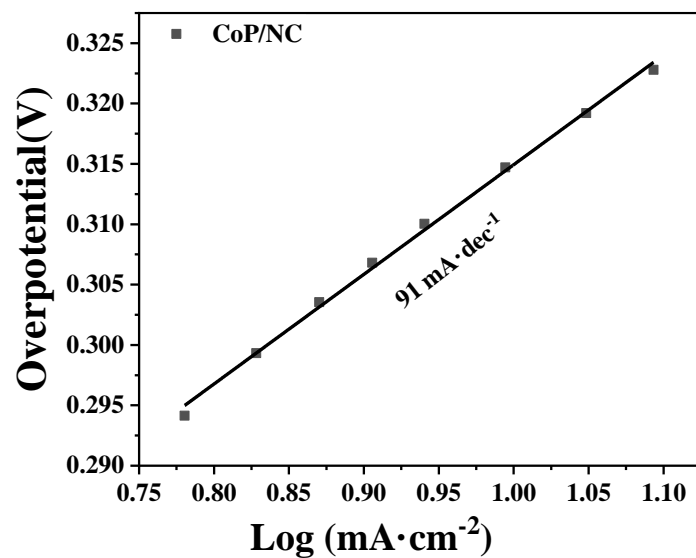


Fig. S8. Tafel slopes of CoP/NC extracted from the corresponding LSV polarization curves for OER

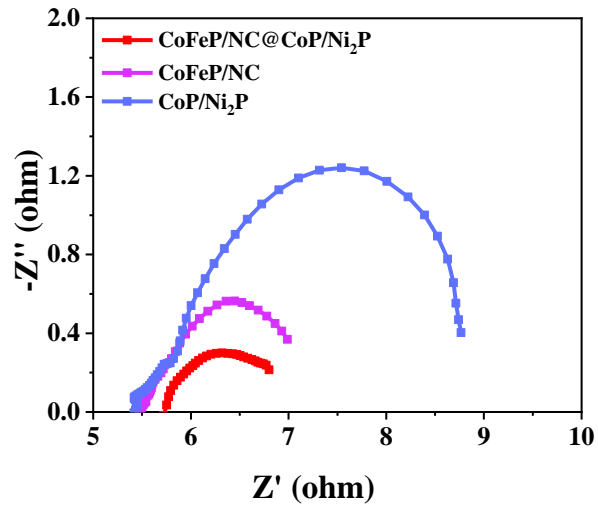


Fig. S9. Electrochemical impedance spectra of CoFeP/NC@CoP/Ni<sub>2</sub>P, CoFeP/NC and CoP/Ni<sub>2</sub>P (d) for OER

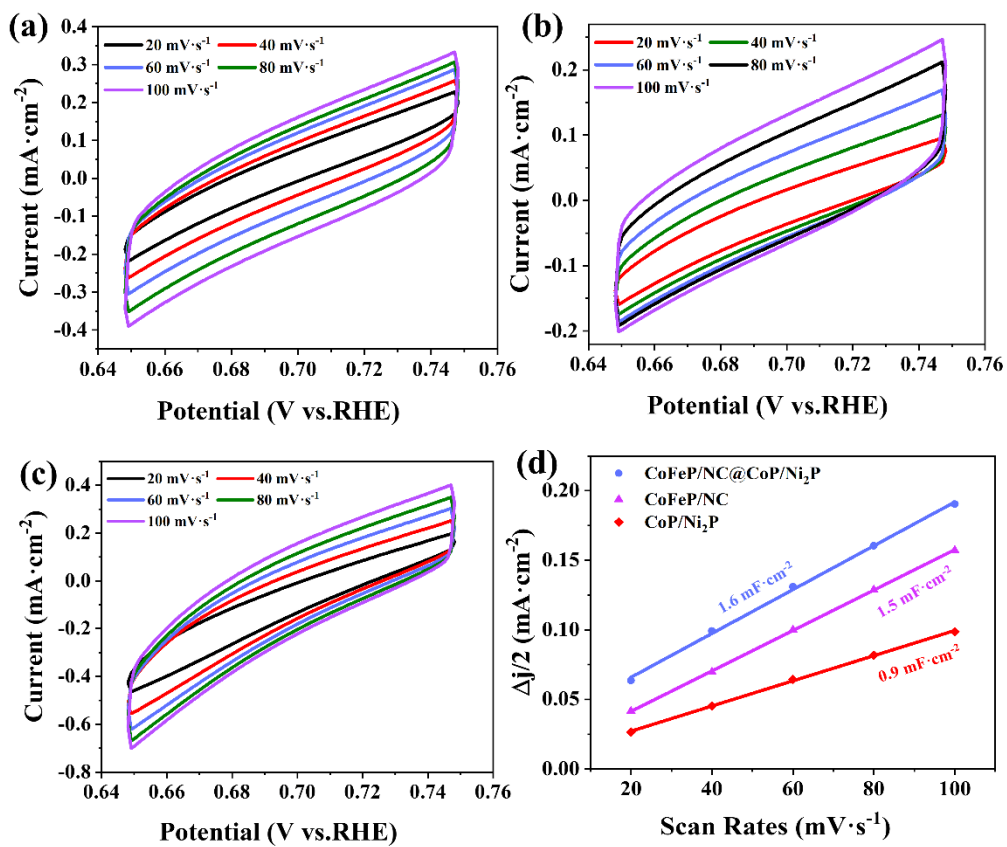


Fig. S10. CVs measurement with various scan rates for CoFeP/NC (a), CoP/Ni<sub>2</sub>P (b), CoFeP/NC@CoP/Ni<sub>2</sub>P (c) in 1 M KOH and Double-layer capacitance ( $C_{dl}$ ) of CoFeP/NC@CoP/Ni<sub>2</sub>P, CoFeP/NC, CoP/Ni<sub>2</sub>P (d).

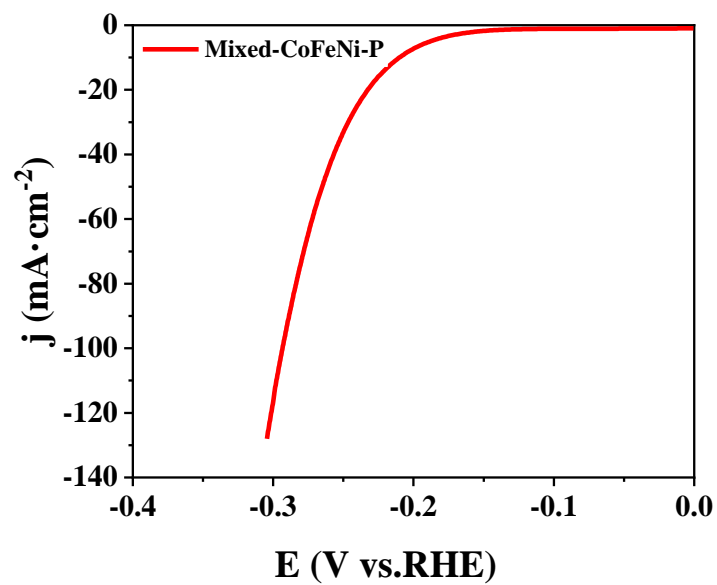


Fig. S11. HER polarization curve of Mixed-CoFeNi-P

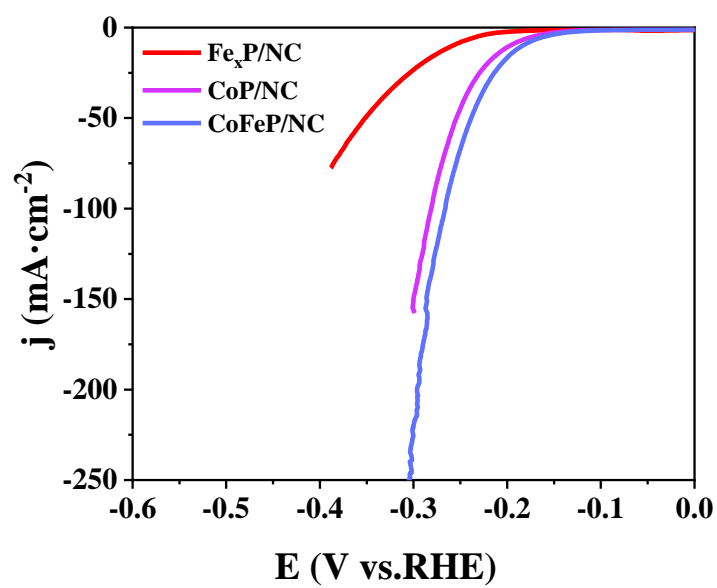


Fig. S12. HER polarization curves for different samples

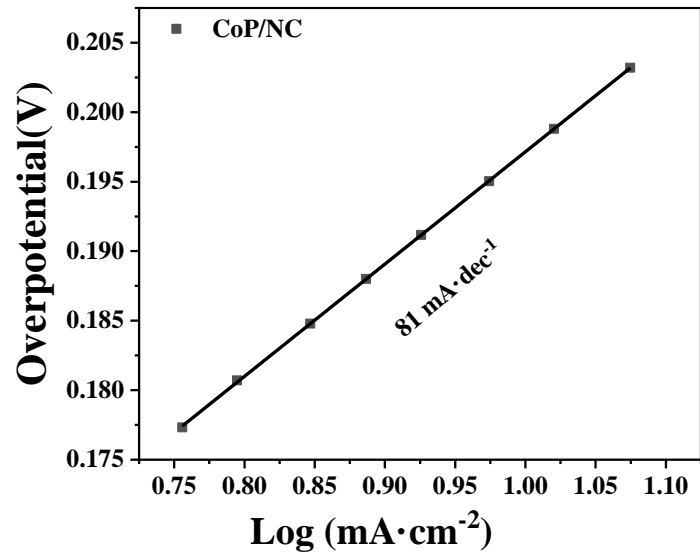


Fig. S13. Tafel slopes of CoP/NC extracted from the corresponding LSV polarization curves for HER

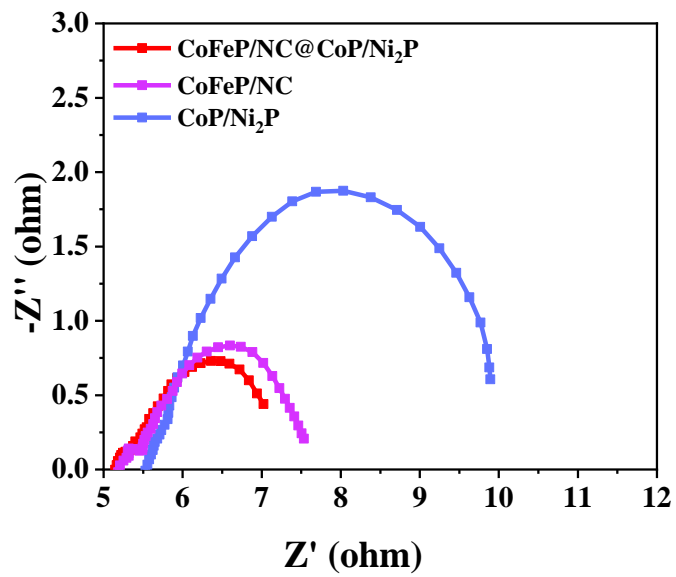


Fig. S14. Electrochemical impedance spectra of CoFeP/NC@CoP/Ni<sub>2</sub>P, CoFeP/NC and CoP/Ni<sub>2</sub>P (d) for HER



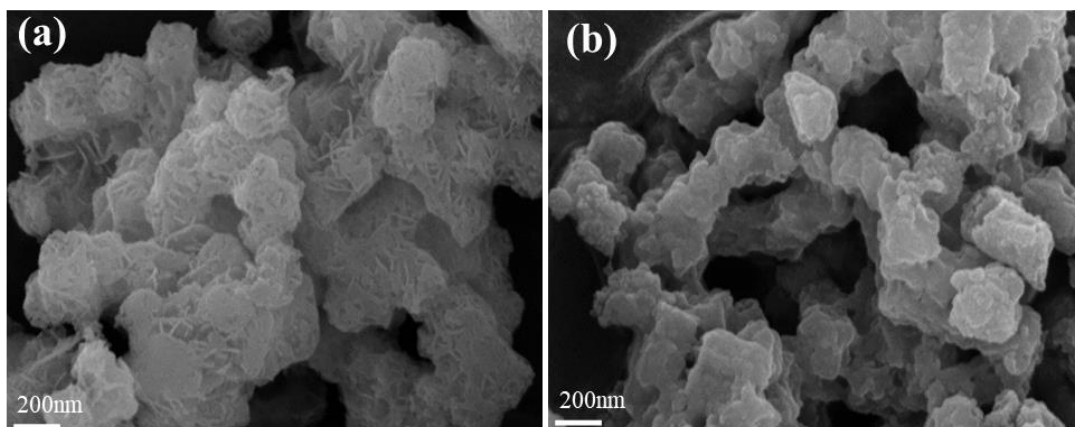


Fig. S15. SEM images of post-HER (a) and post-OER (b) CoFeP/NC@CoP/Ni<sub>2</sub>P

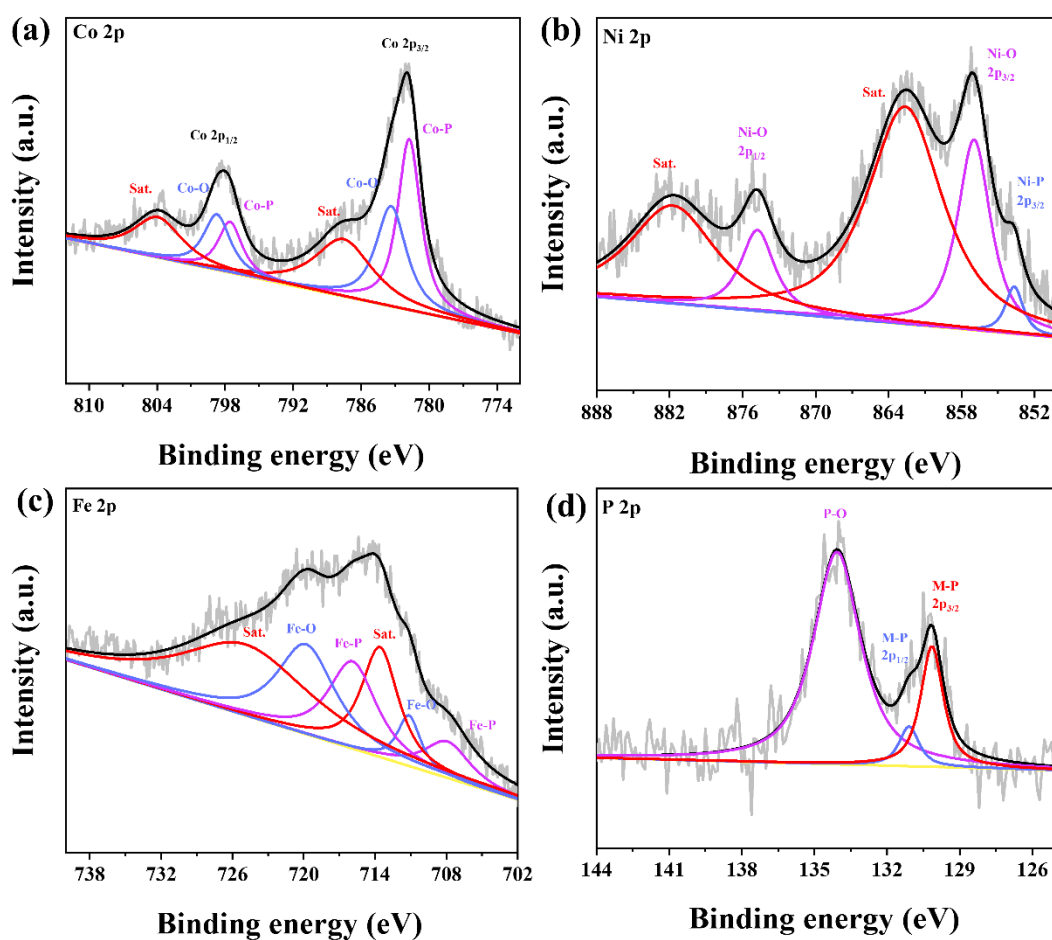


Fig. S16. High-resolution Co 2p (a), Ni 2p (b), Fe 2p (c), P 2p (d) XPS spectra of the post-HER CoFeP/NC@CoP/Ni<sub>2</sub>P

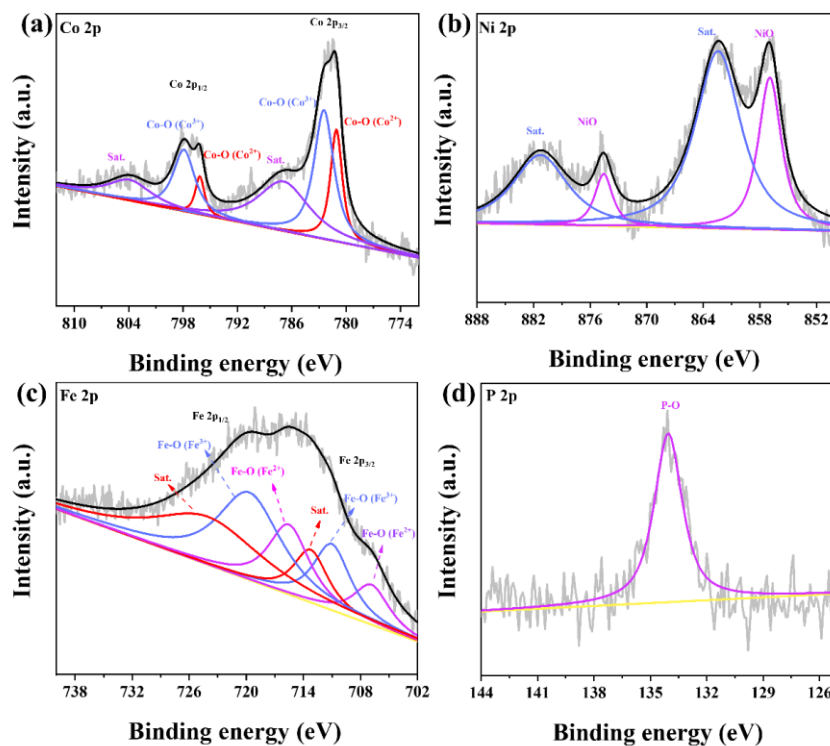


Fig. S17. High-resolution Co 2p (a), Ni 2p (b), Fe 2p (c), P 2p (d) XPS spectra of the post-OER CoFeP/NC@CoP/Ni<sub>2</sub>P

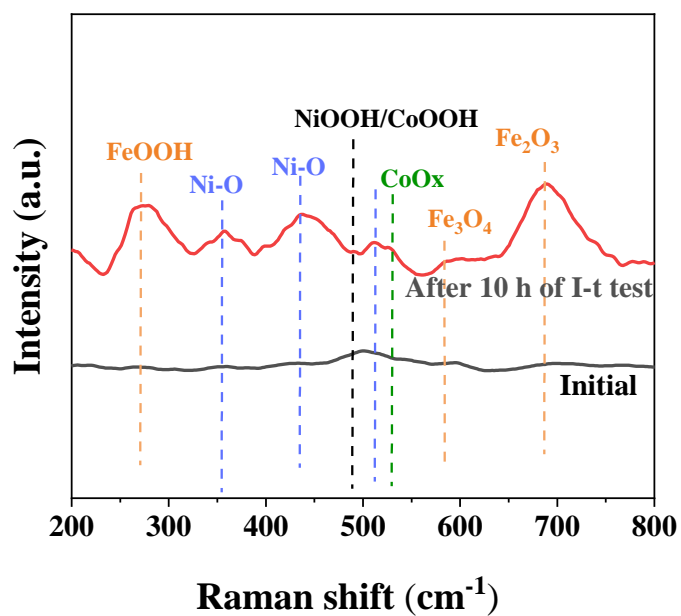


Fig. S18. Raman spectra of the CoFeP/NC@CoP/Ni<sub>2</sub>P before and after the long-term stability test for 10 h