Supporting information

Regulating the Layered Structure of 2D $FePS_3$ to Achieve High-performance Electrocatalytic Urea Degradation

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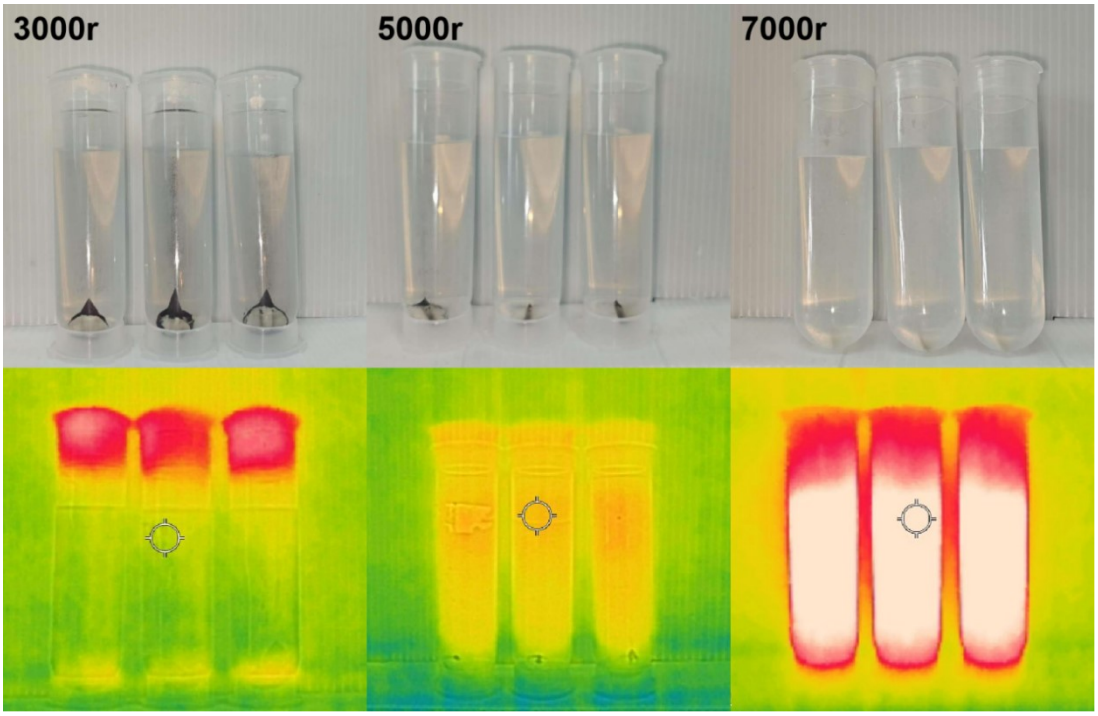

Figure. S1 Digital and thermal infrared images of the fractions obtained by differential centrifugation.

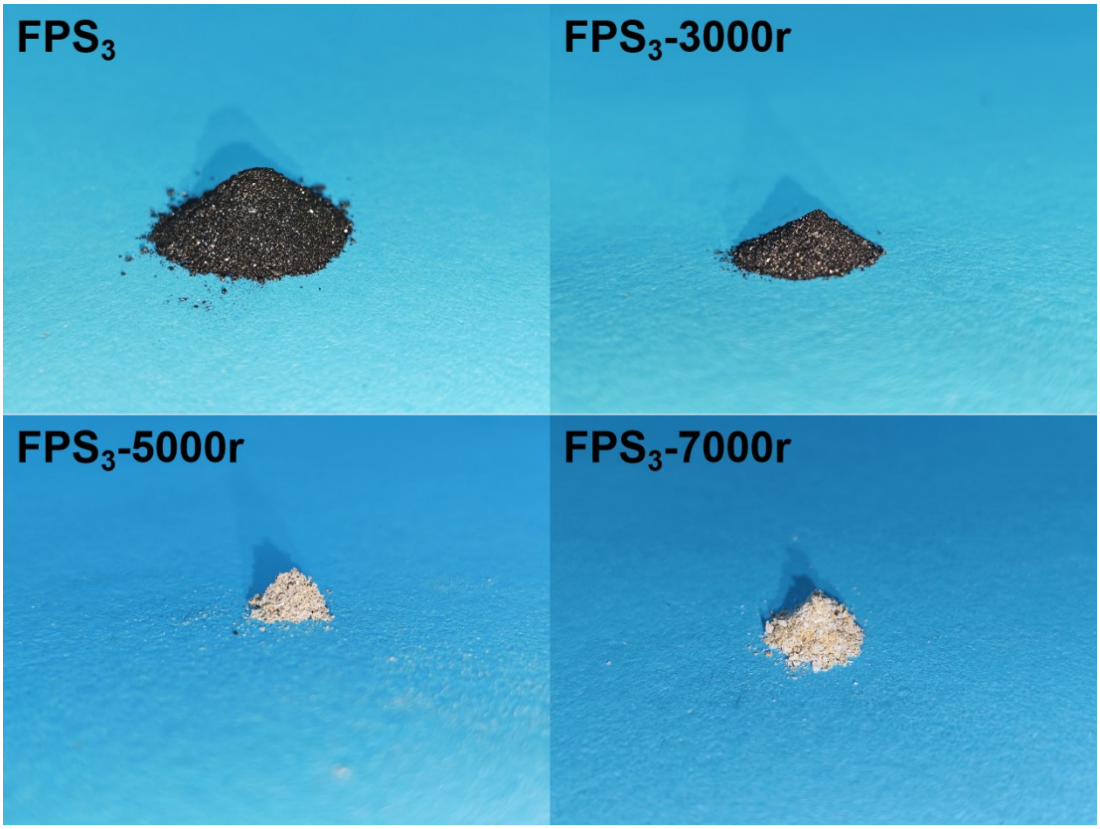

Figure. S2 Digital photograph of the FPS_3, FPS_3-3000r, FPS_3-5000r, and FPS_3-7000r catalyst powders.

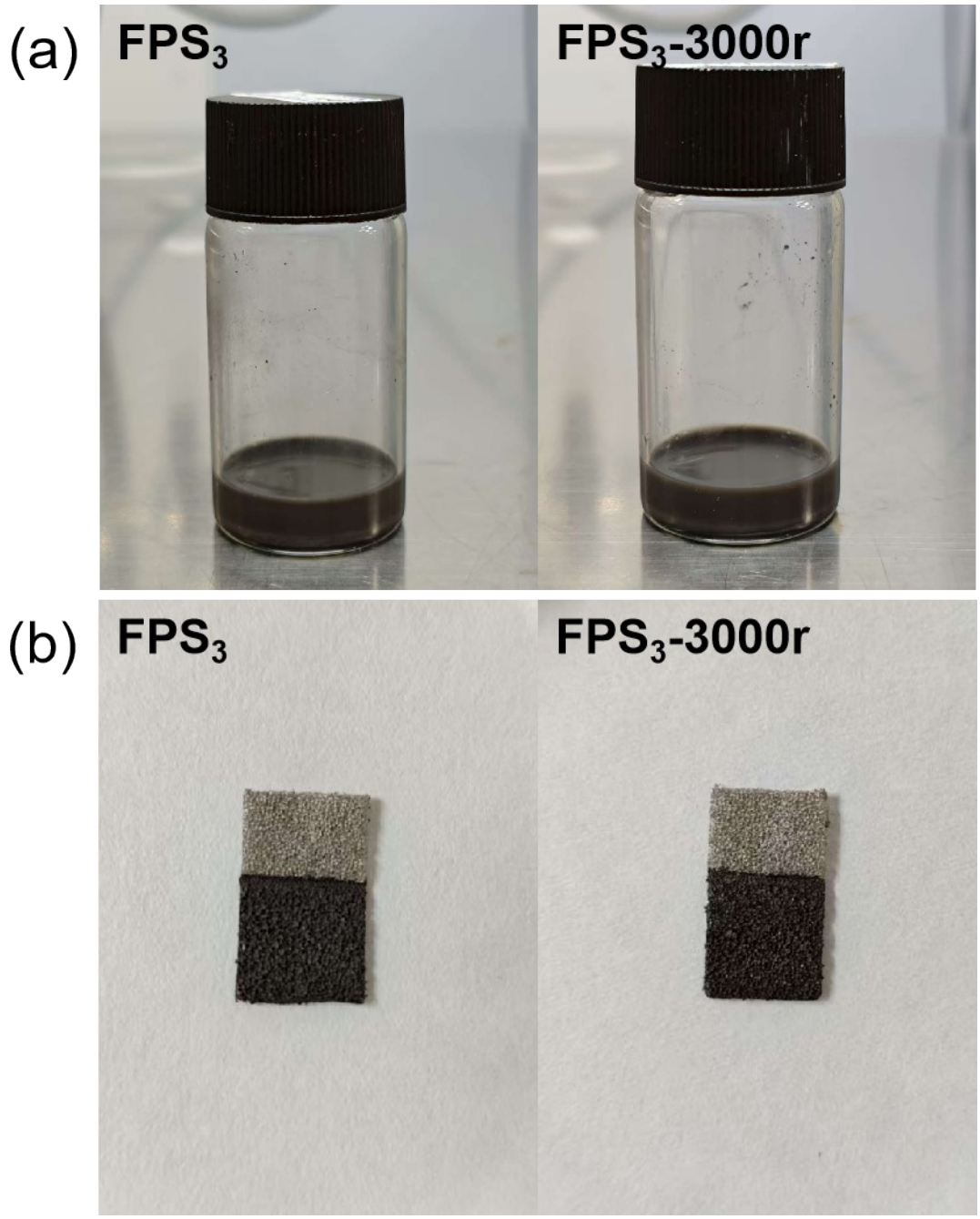

Figure. S3 Digital photographs of (a) FPS_3 and FPS_3-3000r catalyst ink, (b) FPS_3 and FPS_3-3000r catalytic electrodes.

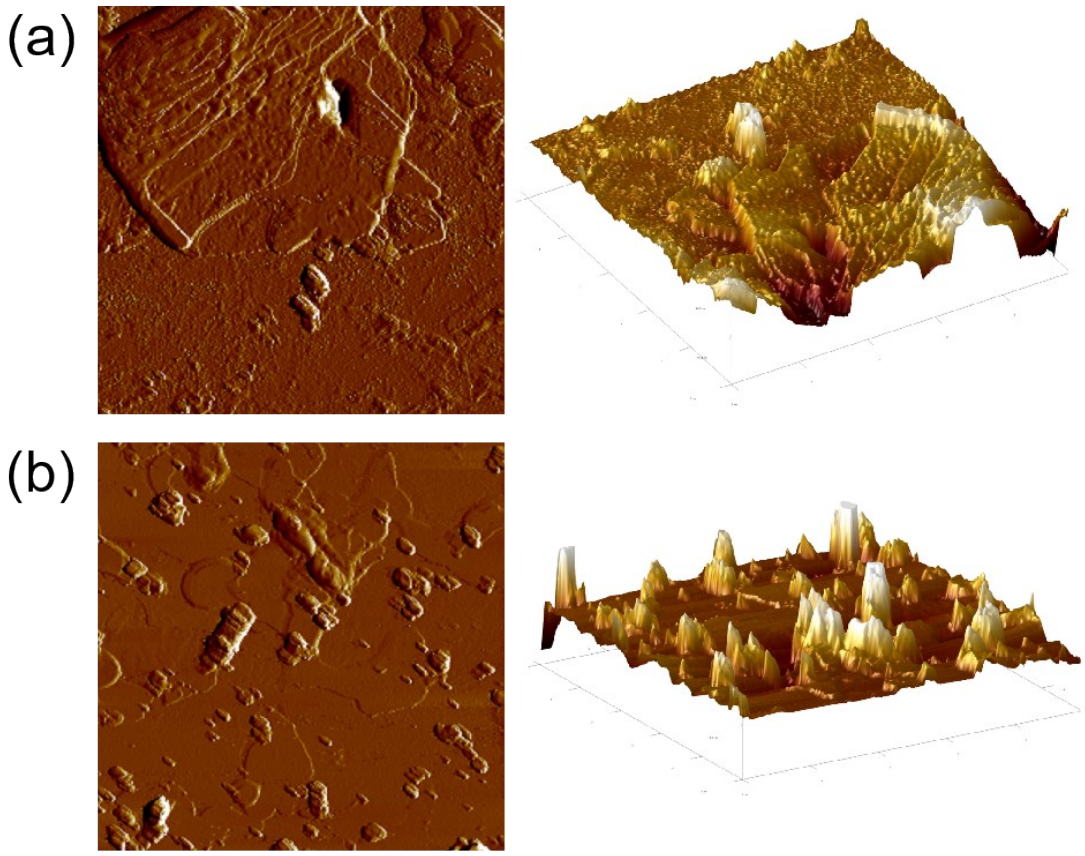

Figure. S4 AFM images: (a) 2D planar view and 3D topography of FPS_3, (b) 2D planar view and 3D topography of FPS_3-3000r.

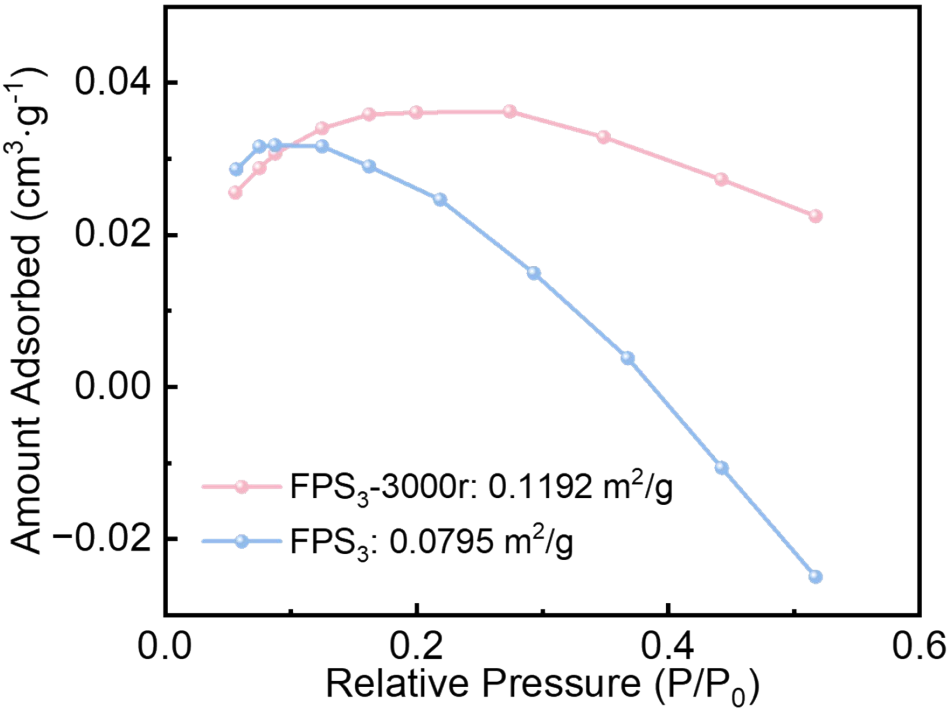

Figure. S5 Adsorption isotherms and specific surface areas of FPS_3 and FPS_3-3000r catalysts.

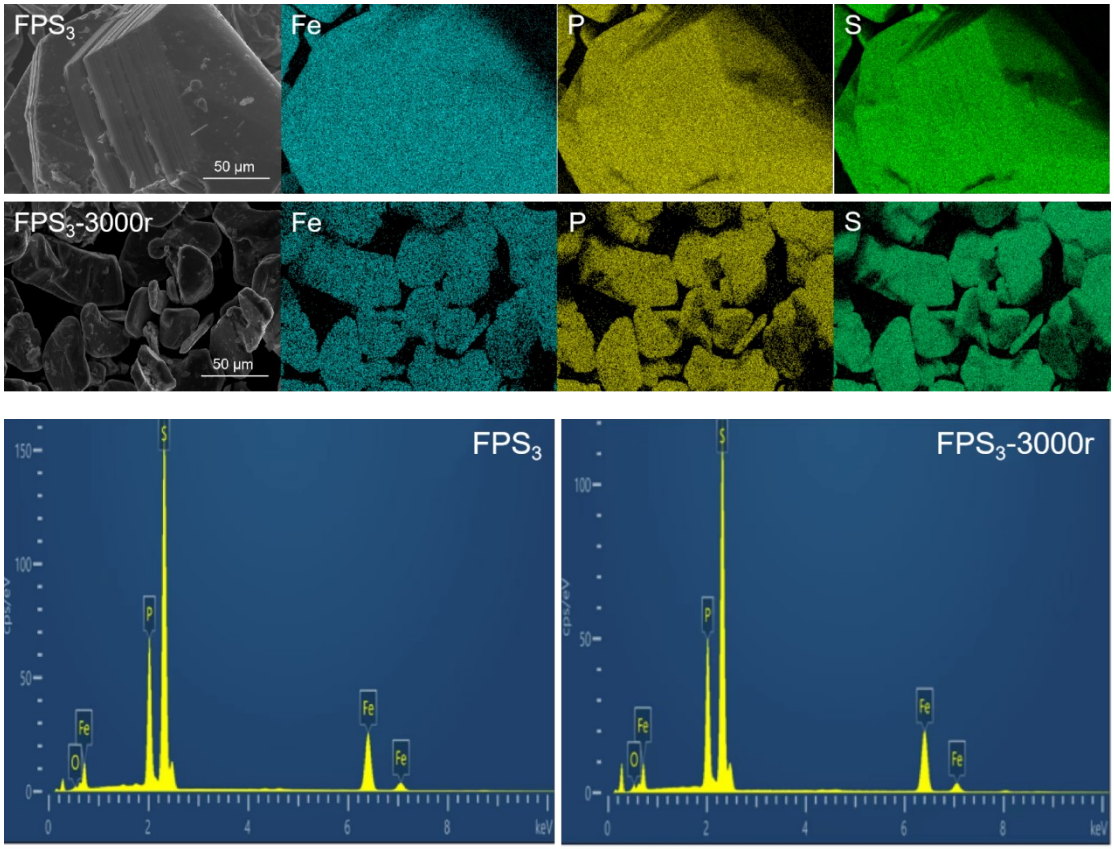

Figure. S6 EDS element mapping and element distribution maps of FPS_3 and FPS_3-3000r.

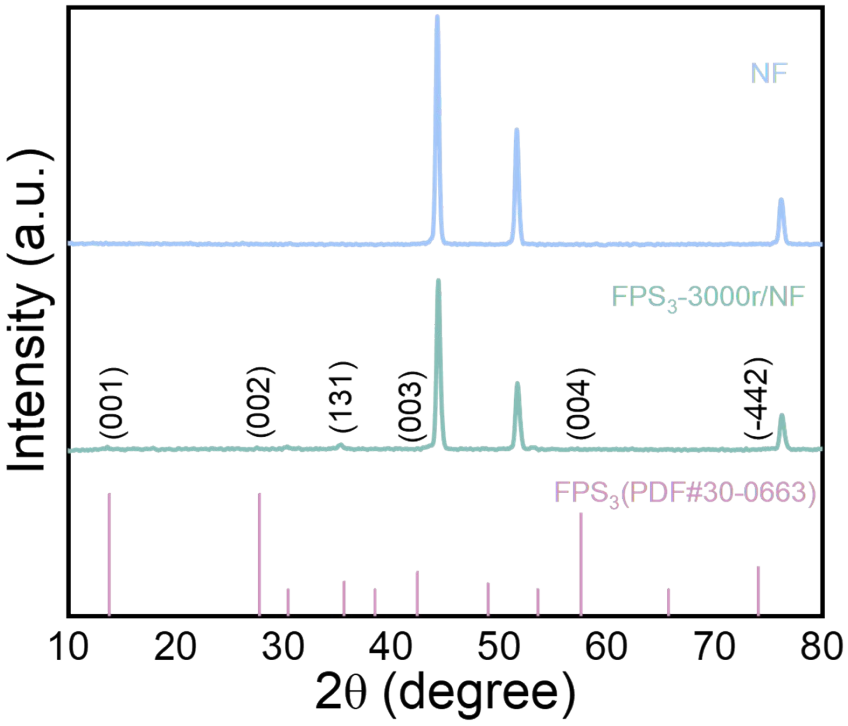

Figure. S7 XRD patterns of the NF and FPS_3-3000r/NF catalyst electrodes.

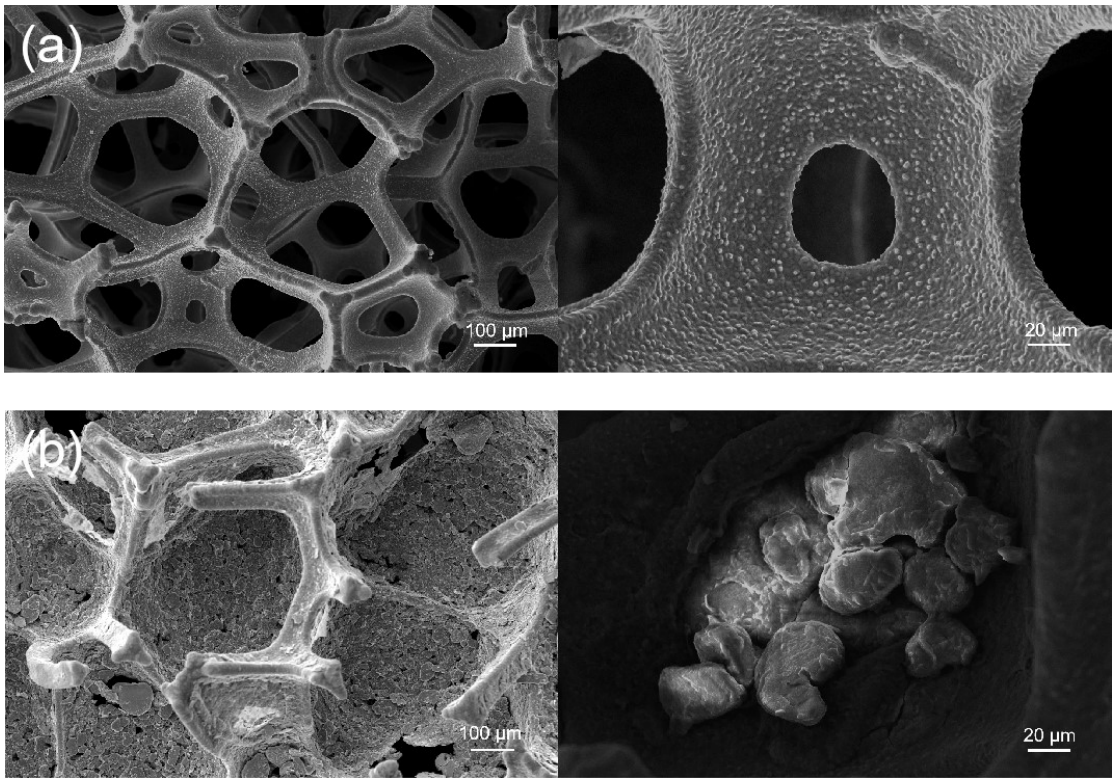

Figure. S8 SEM image of (a) NF, (b) FPS_3-3000r/NF.

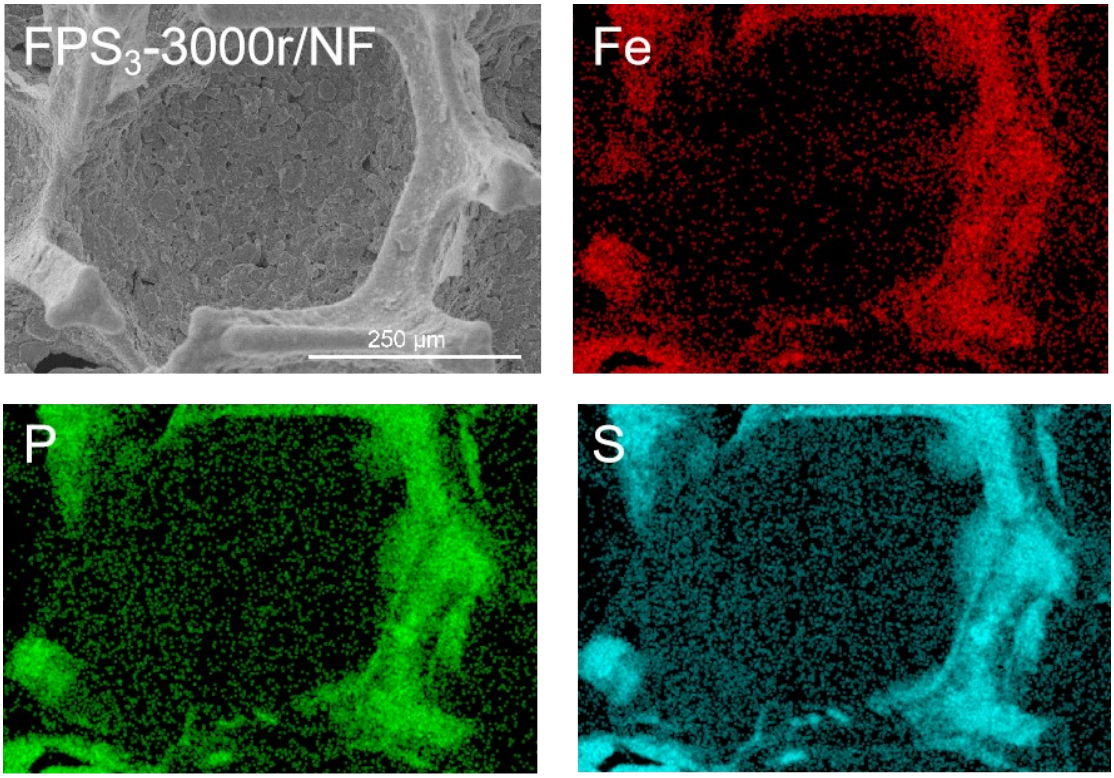

Figure. S9 EDS elemental mapping of FPS_3-3000r/NF.

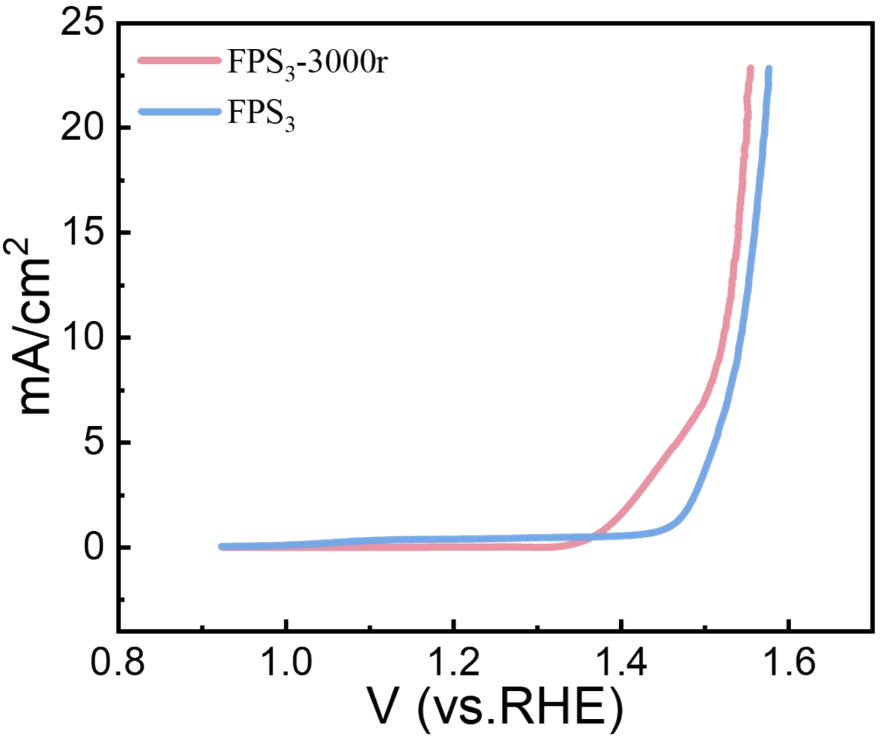

Figure. S10 LSV curves normalized to the electrochemically active surface area (ECSA).

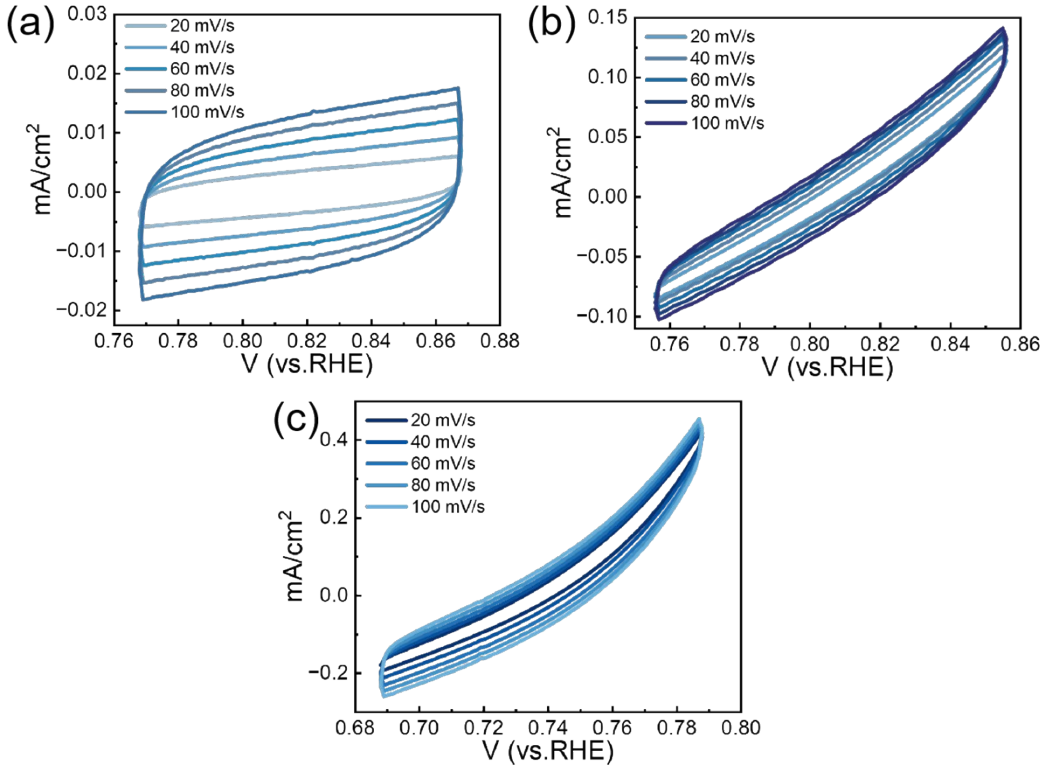

Figure. S11 CV curves measured at different scan rates within the non-Faradaic region are presented: (a) NF, (b) FPS_3/NF, and (c) FPS_3-3000r/NF.

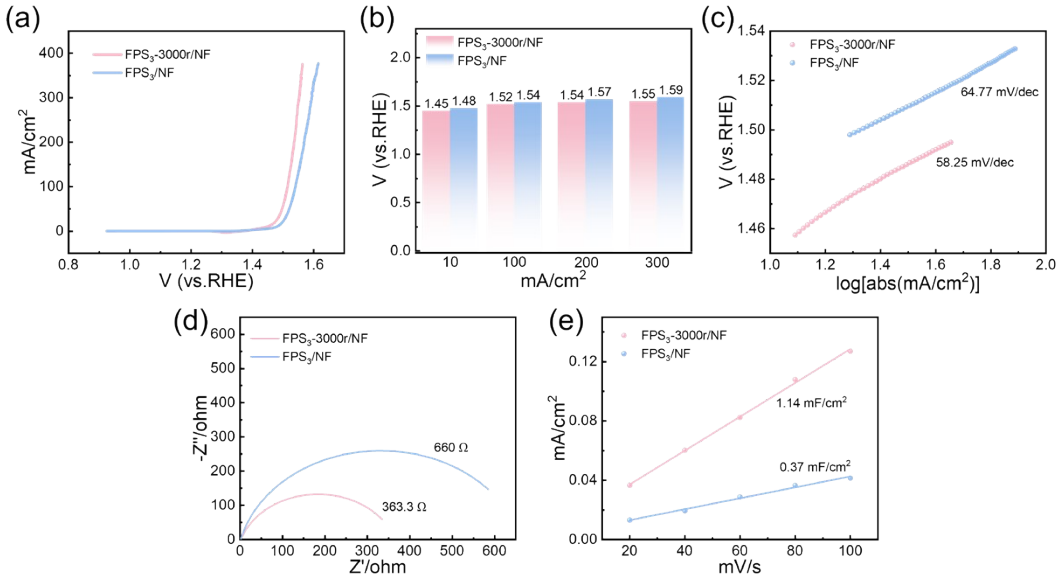

Figure. S12 OER electrochemical performance of FPS_3-3000r/NF and FPS_3/NF: (a) LSV curves, (b) Current density-potential plot, (c) Tafel slopes, (d) EIS fitting curves under open circuit potential, (e) C_{dl} determination.

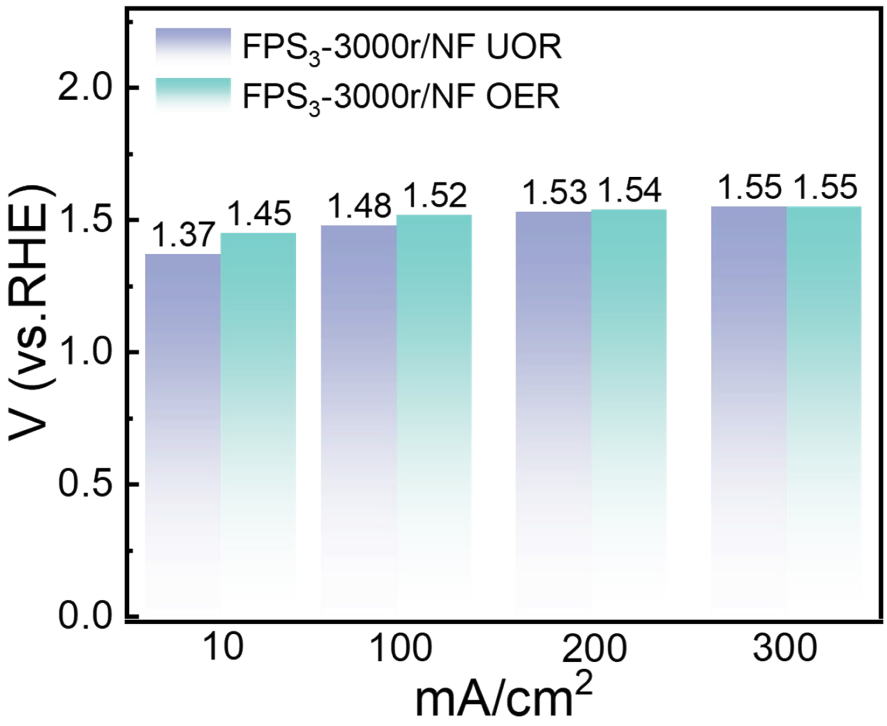

Figure. S13 Comparison of OER and UOR performance of FPS_3-3000r/NF electrode under different current densities.

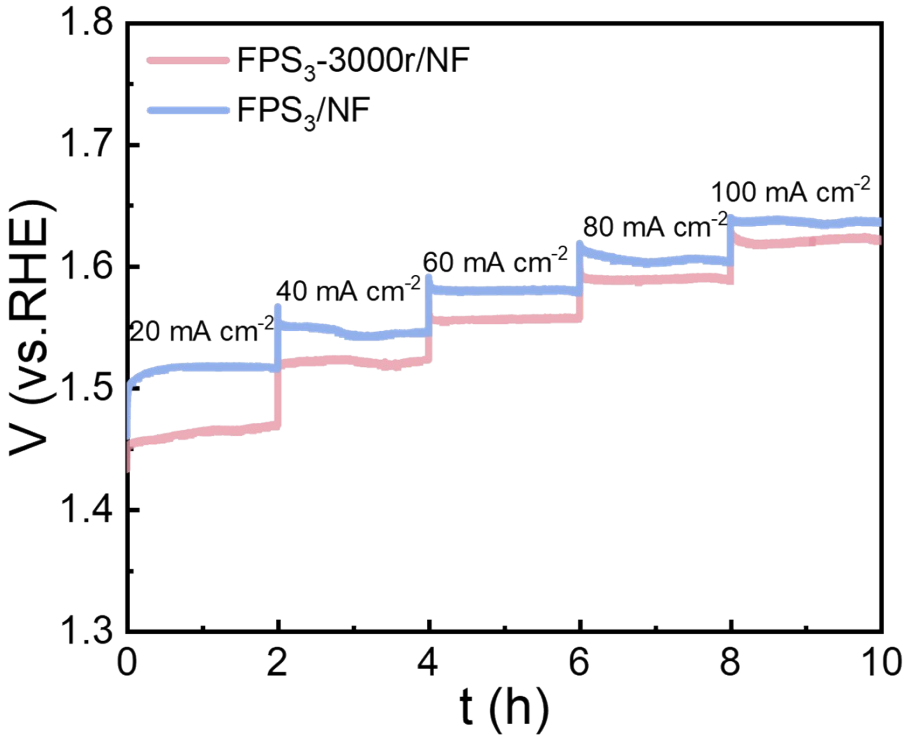

Figure. S14 Stepped chronopotentiometry test of FPS_3/NF and FPS_3-3000r/NF.

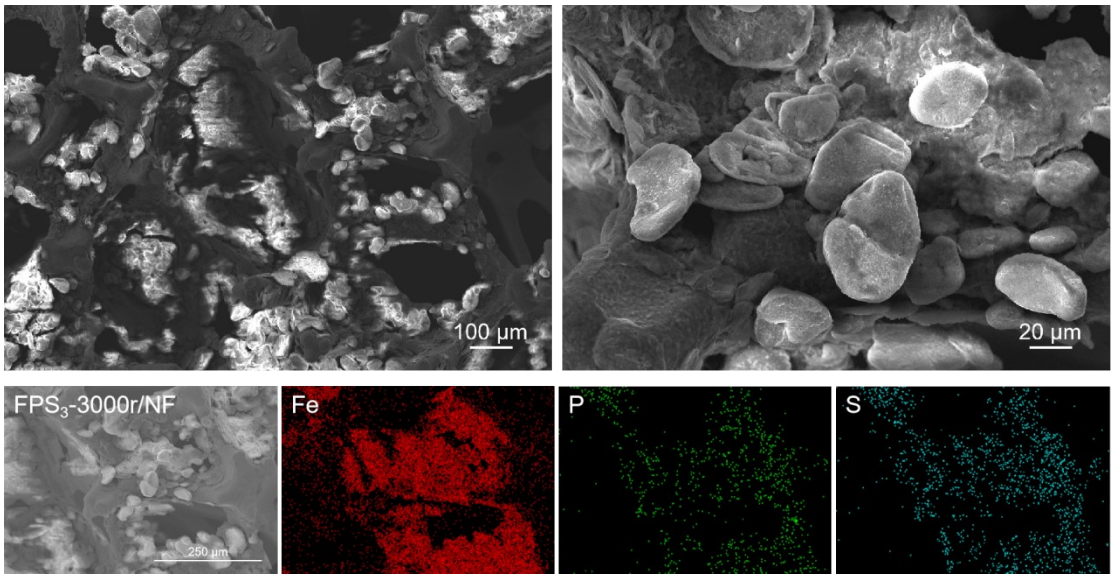

Figure. S15 Post-reaction of FPS_3-3000r/NF: SEM image and corresponding EDS elemental mapping.

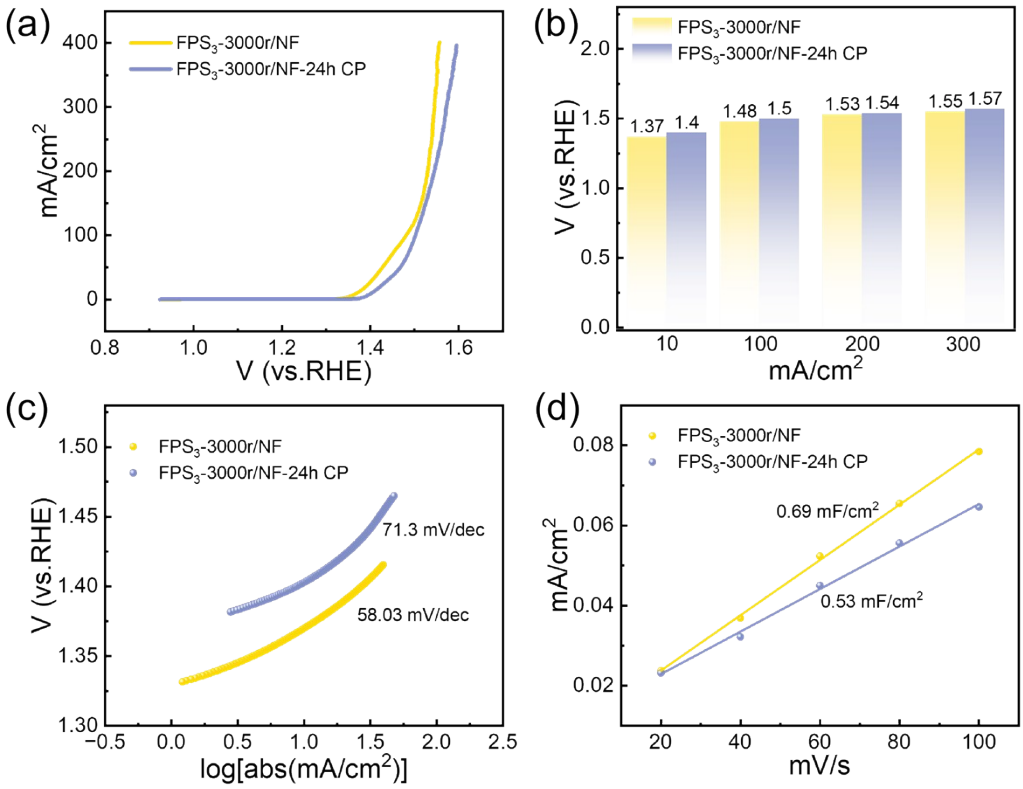

Figure. S16 Comparison of the electrochemical performance before and after stability testing: (a) LSV curves, (b) Current density-potential plot, (c) Tafel slopes, (d) C_{dl} determination

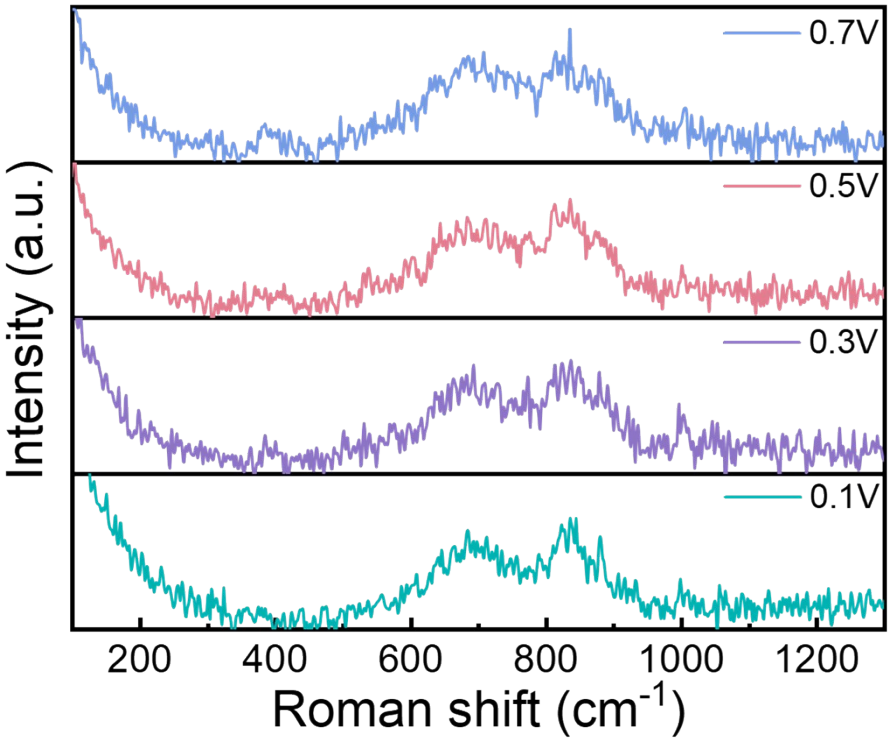

Figure. S17 In situ Raman spectra of the FPS_3-3000r/NF electrode.

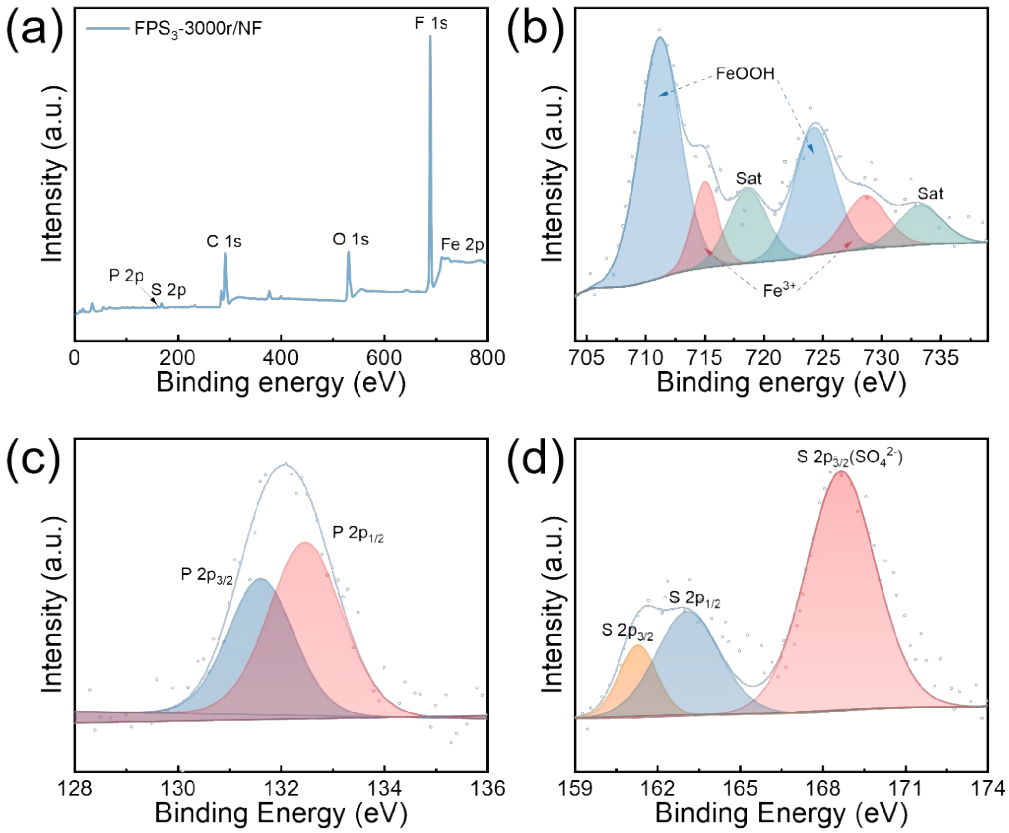

Figure. S18 post-reaction XPS spectra of the FPS_3-3000r/NF: (a) Full spectra, (b) Fe, (c) P, and (d) S.

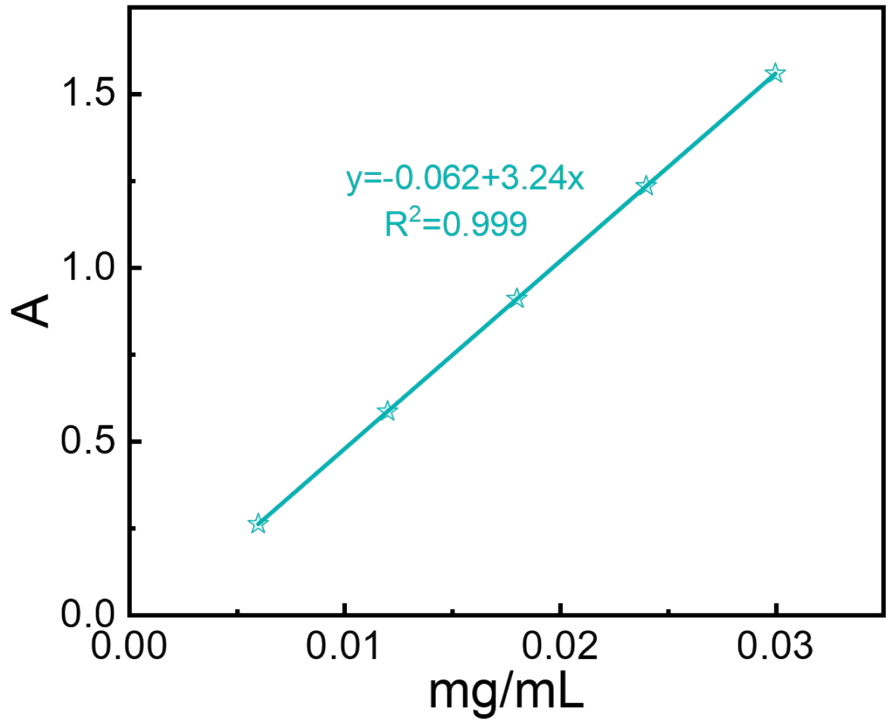

Figure. S19 Calibration curve for urea quantification.

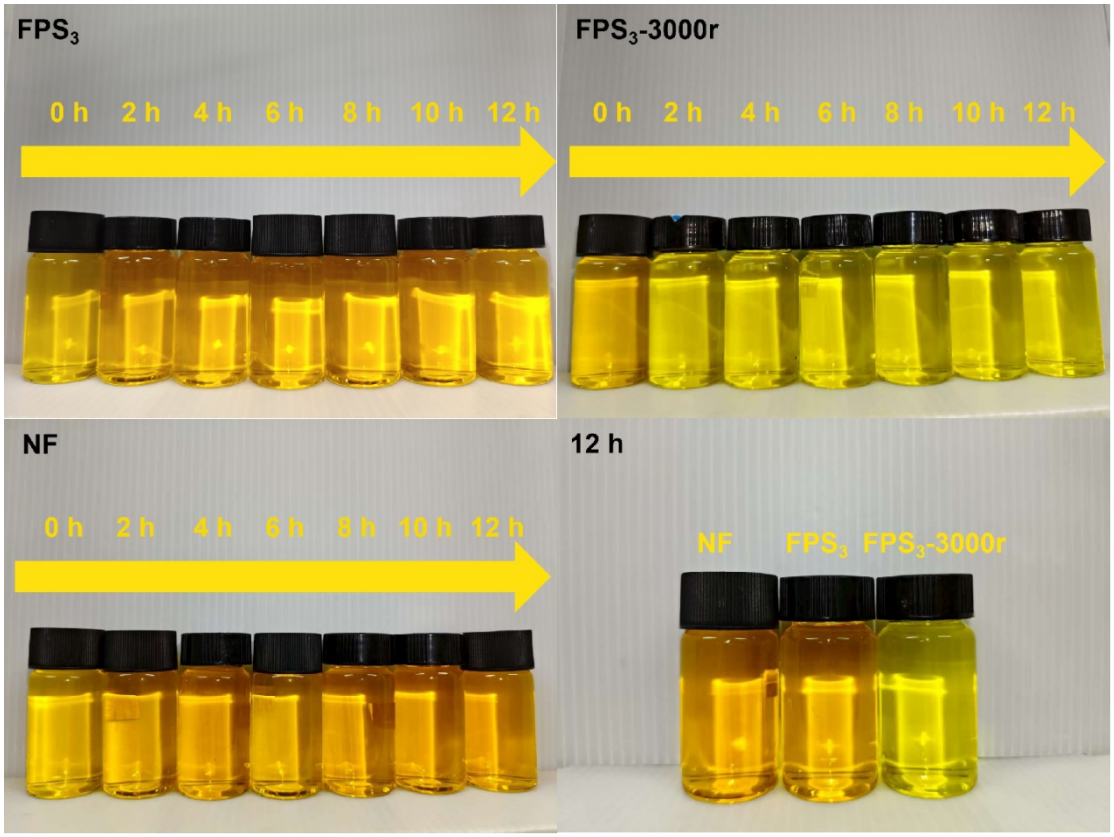

Figure. S20 Digital photograph of time-tracked color evolution of the electrolyte.

Table. S1 Elemental content of the FPS_3 and FPS_3-3000r catalyst powders.

FPS_3			FPS_3-3000r		
element	Wt%	At%	element	Wt%	At%
O	1.34	3.04	O	2.81	6.31
P	16.44	19.30	P	16.07	18.64
S	49.84	56.56	S	47.89	53.67
Fe	32.38	21.09	Fe	33.23	21.38
gross	100.00	100.00	gross	100.00	100.00

Table. S2 UOR activity parameter for various electrocatalysts.

catalyst	electrolyte	Current density (mA/cm^2)	Cell voltage V (vs. RHE)	Ref
$Ni_9S_8/CuS/Cu_2O$	1.0 M KOH + 0.33 M urea	10	1.47	1
Mo-Co-S-Se/CC	1.0 M KOH + 0.33 M urea	10	1.4	2
V-$FeNi_3N/Ni_3N$	1.0 M KOH + 0.33 M urea	10	1.46	3
$CuCo_2O_4$	1.0 M KOH + 0.33 M urea	10	1.45	4
$NiCo_2S_4$/CC	1.0 M KOH + 0.33 M urea	10	1.45	5
N-NiS/NiS_2	1.0 M KOH + 0.33 M urea	10	1.62	6
$NiSe_2$-NiO 350	1.0 M KOH + 0.33 M urea	10	1.39	7
Ni_3N NA/CC	1.0 M KOH + 0.33 M urea	10	1.44	8
N_2P-NF	1.0 M KOH + 0.33 M urea	10	1.47	9
O−NFF	1.0 M KOH + 0.33 M urea	10	1.38	10
NiO_x/CN_x	1.0 M KOH + 0.33 M urea	10	1.38	11
$Ni(OH)_2$ NS@NW/Ni	1.0 M KOH + 0.33 M urea	5	1.58	12
$FePS_3$-3000r/NF	1.0 M KOH + 0.33 M urea	10	1.37	This work
$FePS_3$/NF	1.0 M KOH + 0.33 M urea	10	1.477	This work

References

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