Supporting Information for

Electrocatalytic nitrate-to-ammonia conversion on CoO/CuO nanoarray through Zn-nitrate battery

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Figures and Table

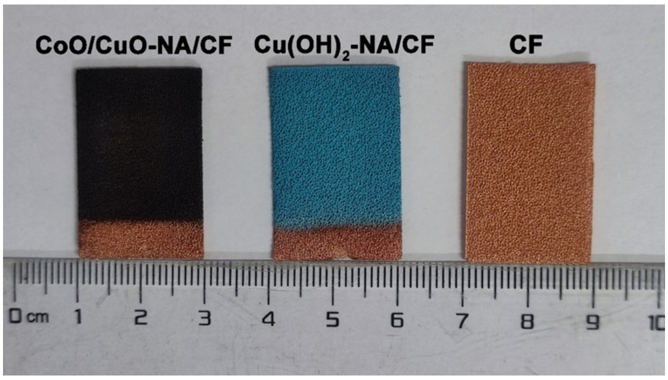

Fig. S1 Photograph of different samples.

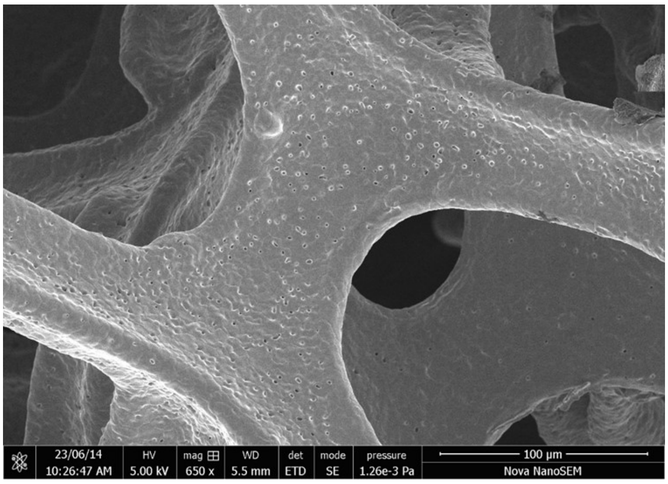

Fig. S2 SEM images of CF.

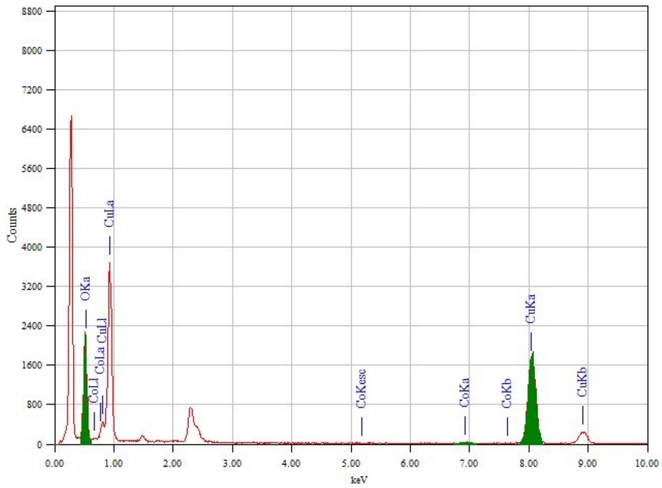

Fig. S3 EDX spectrum of CoO/CuO-NA/CF.

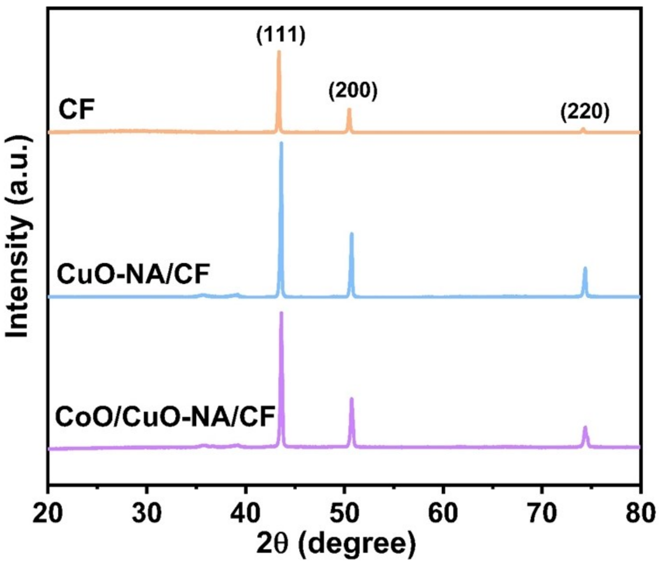

Fig. S4 XRD patterns of CF, CuO-NA/CF, and CoO/CuO-NA/CF.

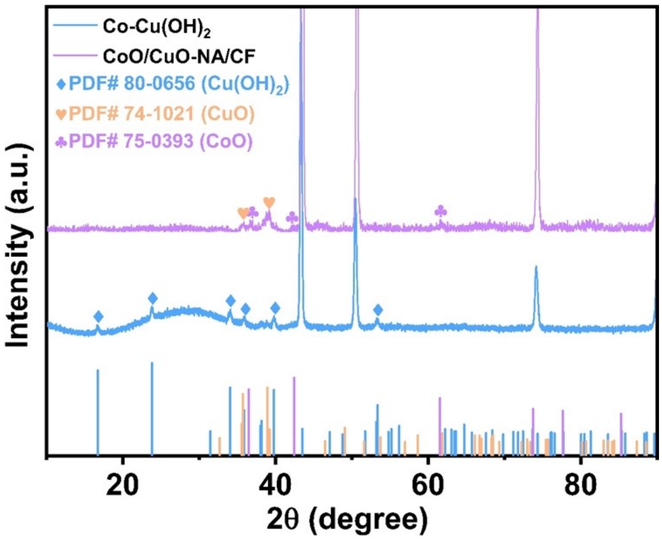

Fig. S5 XRD patterns of Co-$Cu(OH)_2$ and CoO/CuO-NA/CF.

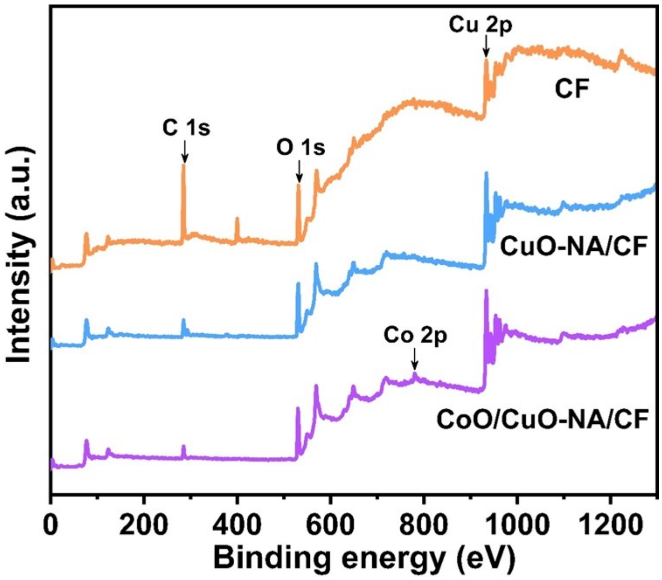

Fig. S6 XPS survey spectrum of CF, CuO-NA/CF, and CoO/CuO-NA/CF.

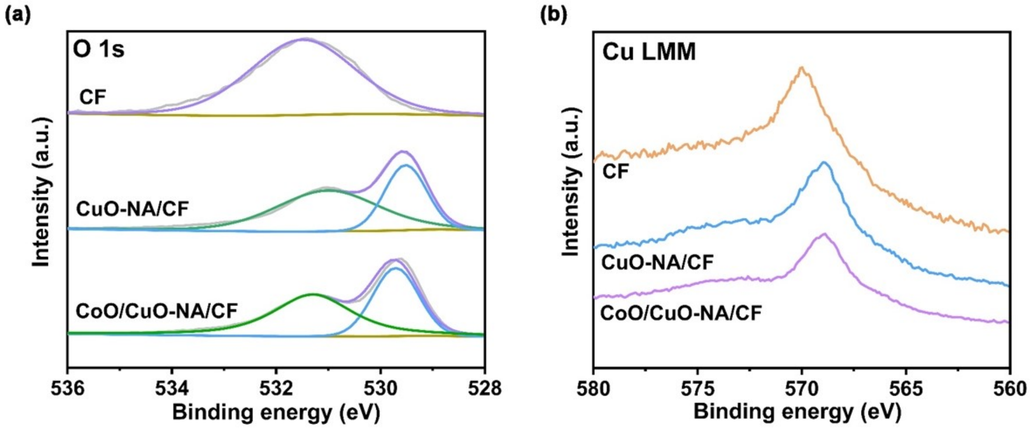

Fig. S7 (a) XPS spectra in O 1s region and (b) Cu LMM auger XPS spectra of CF, CuO-NA/CF, and CoO/CuO-NA/CF.

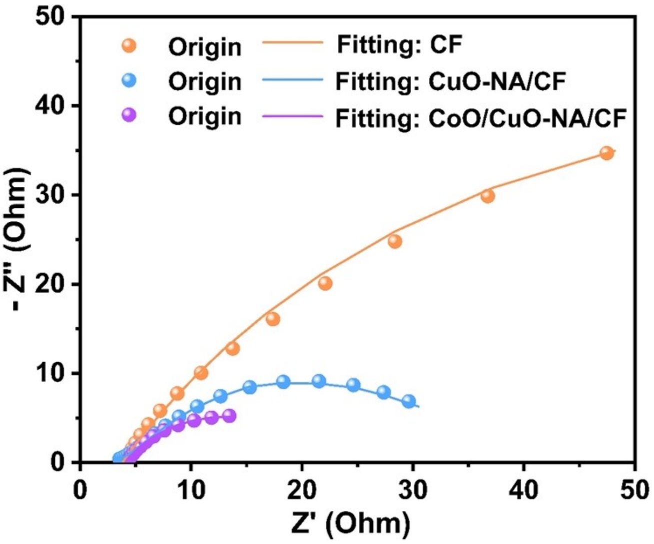

Fig. S8 EIS measurements of CF, CuO-NA/CF, and CoO/CuO-NA/CF.

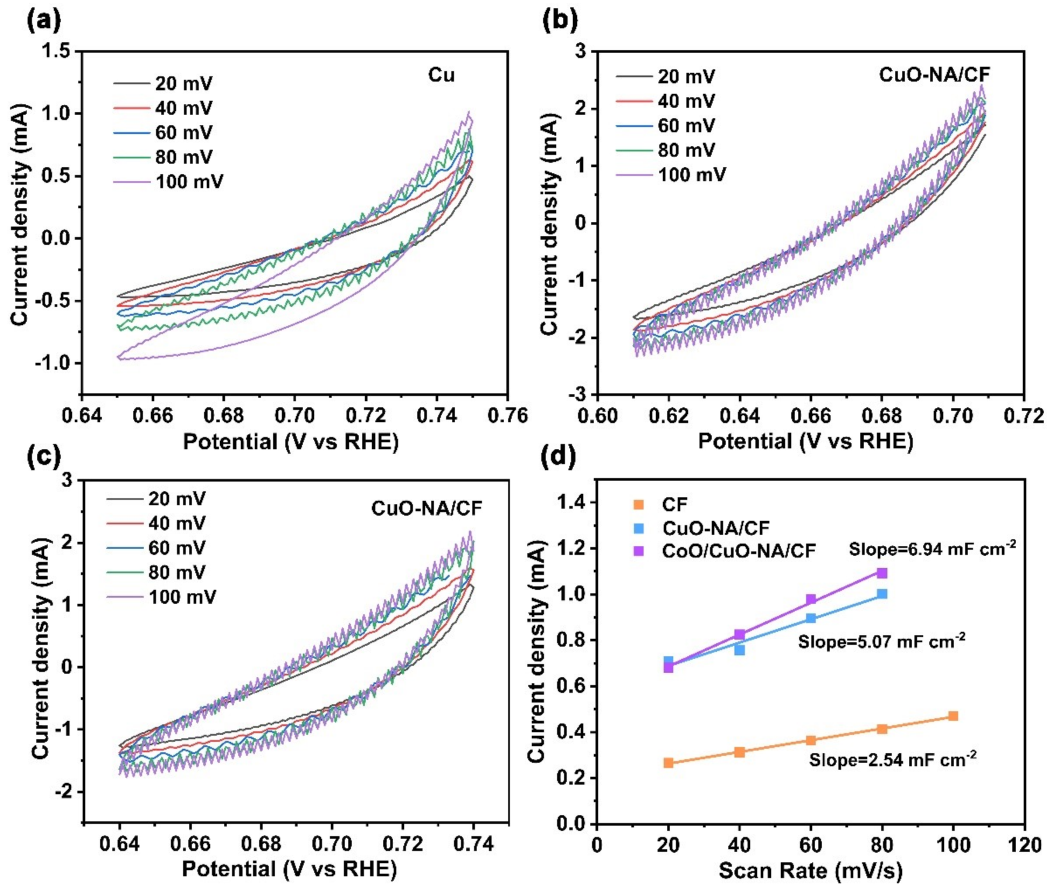

Fig. S9 ECSA measurements of CF, CuO-NA/CF, and CoO/CuO-NA/CF.

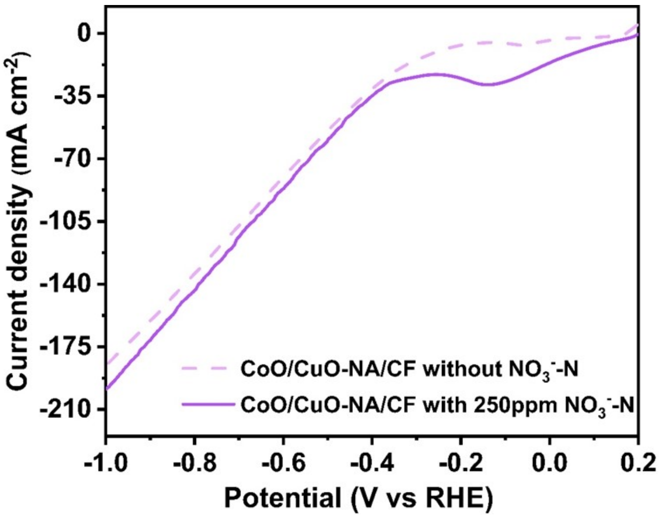

Fig. S10 LSV curves CoO/CuO-NA/CF in 0.5 M NaOH with and without 250 ppm NO_3^--N.

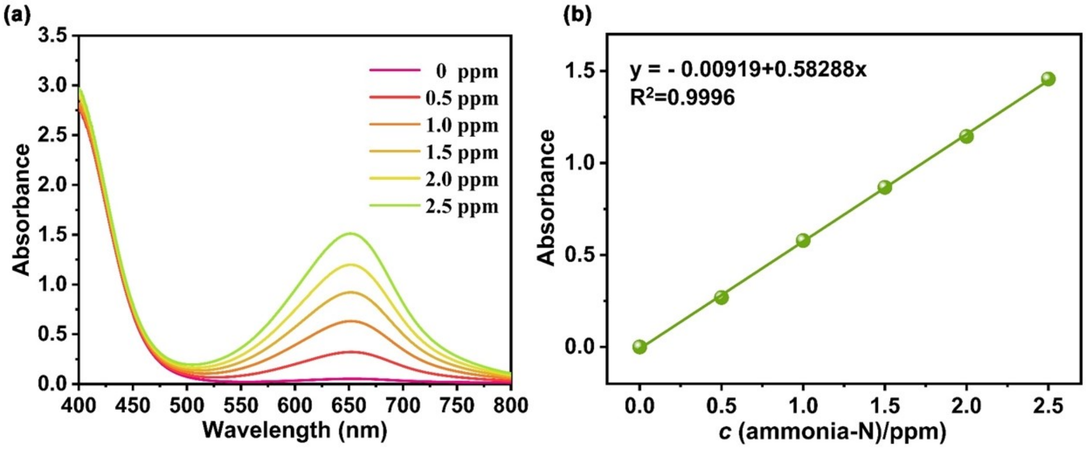

Fig. S11 (a) The concentration-absorbance calibration curves of NH_3. (b) The calibration curves show good linearity.

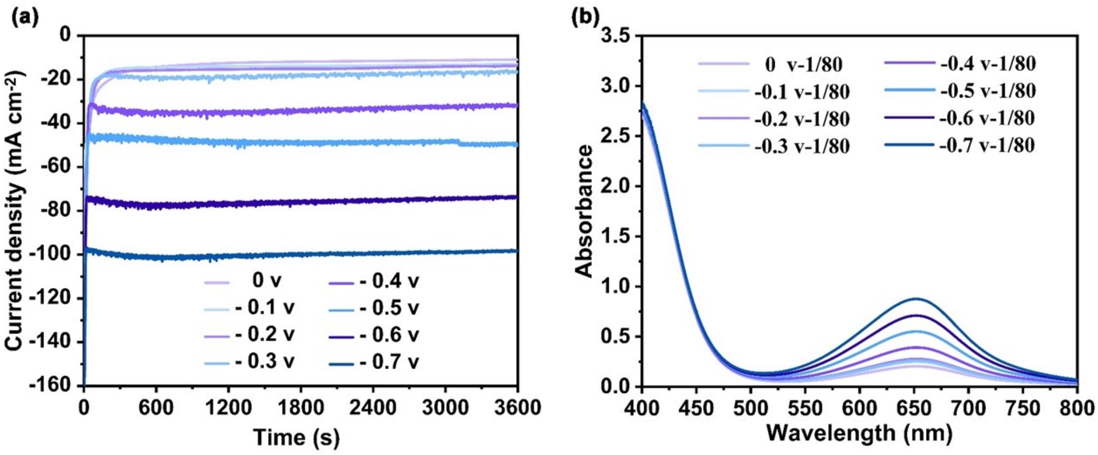

Fig. S12 Chronoamperometry curves for CoO/CuO-NA/CF in Ar-saturated 0.5 M NaOH electrolytes containing 250 ppm NO_3^--N.

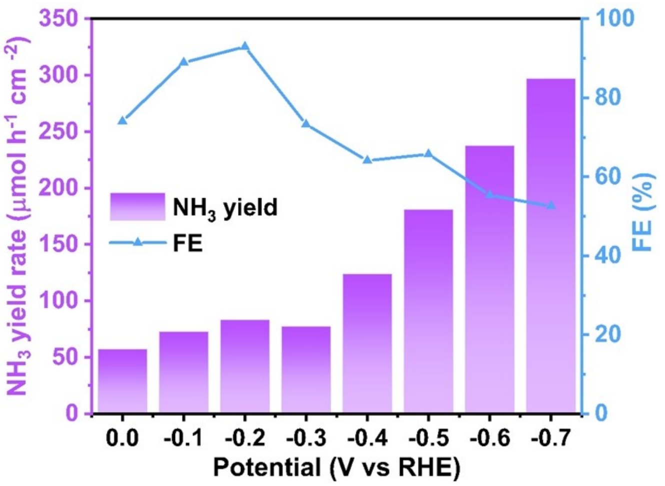

Fig. S13 NO_3^- to NH_3 conversion FE_{NH3} and NH_3 yield for CoO/CuO-NA/CF.

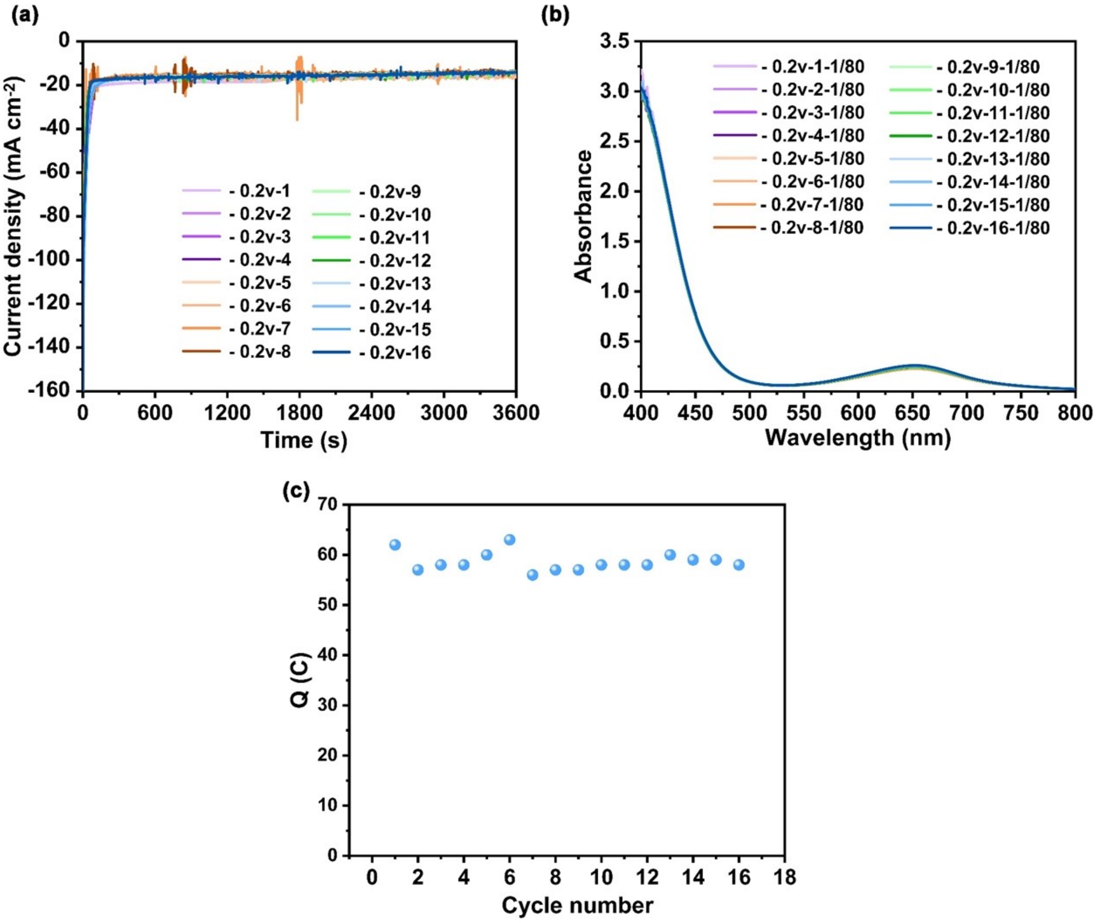

Fig. S14 (a) Chronoamperometry curves of CoO/CuO-NA/CF. (b) UV-Vis absorption spectra and (c) Q values for electrogenerated NH_3 during recycling tests at –0.2 V vs. RHE.

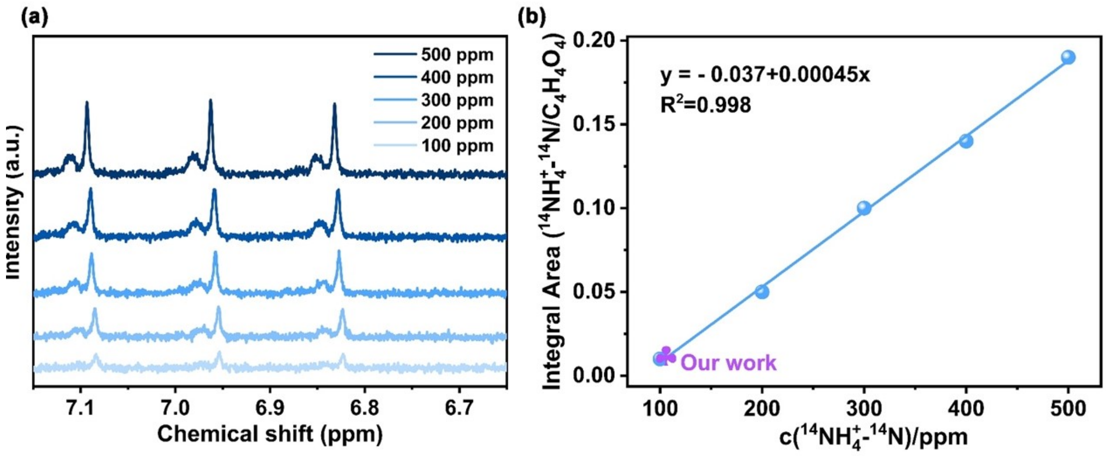

Fig. S15 ^{1}H NMR spectra $^{14}NH_4^+$-^{14}N with different concentrations.

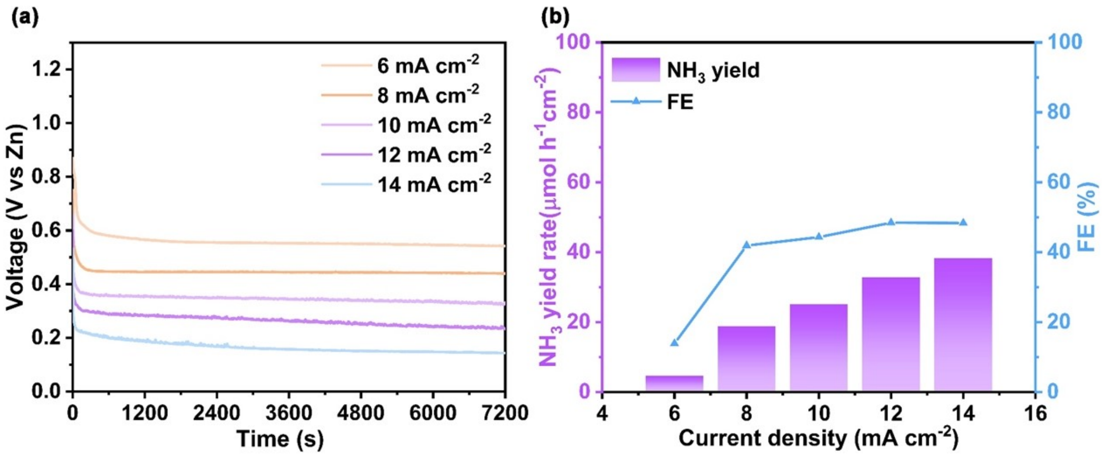

Fig. S16 Chronoamperometry curves (a) and FE_{NH3} and yield of NH_3 (b) for CuO-NA/CF-based Zn-NO_3^- battery at in Ar-saturated 0.5 M NaOH electrolytes containing 500 ppm NO_3^--N.

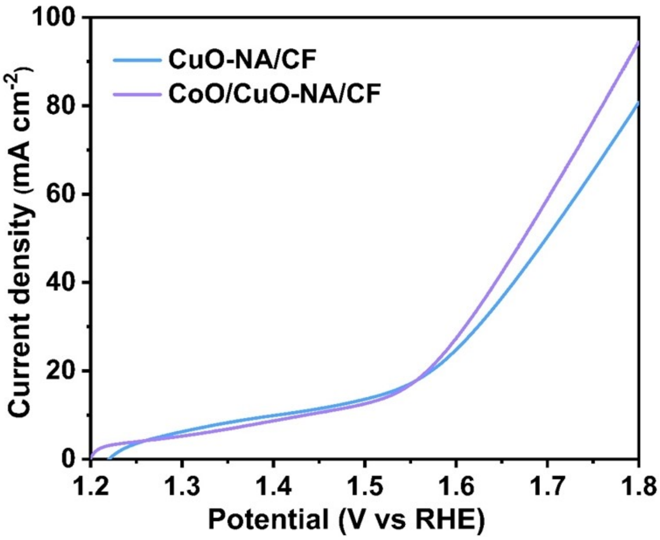

Fig. S17 LSV curves of OER for CuO-NA/CF and CoO/CuO-NA/CF.

Table S1 Comparison of NH_3 yield and power density of our battery with other Zn-NO_3^- battery systems.

Catalyst	Power density ($mW\ cm^{-2}$)	FE (%)	NH_3 yield	Rechargeability	Ref.
CoO/CuO-NA/CF	4.3	82.0	60.3 μmol h^{-1} cm^{-2}	Yes	This work
Pd/TiO_2	0.87	81.3	32 mmol h^{-1} cm^{-2}	No	[2]
$NiCo_2O_4$/CC	3.94	96.1	48.5 μmol h^{-1} cm^{-2}	No	[1]
$ZnCo_2O_4$ NSA/CC	4.62	90	91.75 μmol h^{-1} cm^{-2}	No	[3]
Co_2AlO_4/CC	3.43	95	750 μg h^{-1} cm^{-2}	No	[4]
CeO_{2-x}@NC/GP	3.44	96.09	145.08 μmol h^{-1} cm^{-2}	No	[5]
Fe/Ni_2P	3.25	85	22.6 μmol cm^{-2} h^{-1}	Yes	[6]
Co_2B@Co_3O_4/TM	3.21	97.2	0.74 mg h^{-1} cm^{-2}	No	[7]
MP-Cu	7.56	93	76 μmol cm^{-2} h^{-1}	No	[8]
NiCoBDC	3.66	99.4%	66.2 μmol h^{-1} cm^{-2}	No	[9]
CoNi-Vp-1.0	1.05	76.23 %	12.227 μmol h^{-1} cm^{-2}	No	[10]

References

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