Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Cu-N_4 in Copper phthalocyanine@CFC catalyst for ammonia oxidation reaction catalysis

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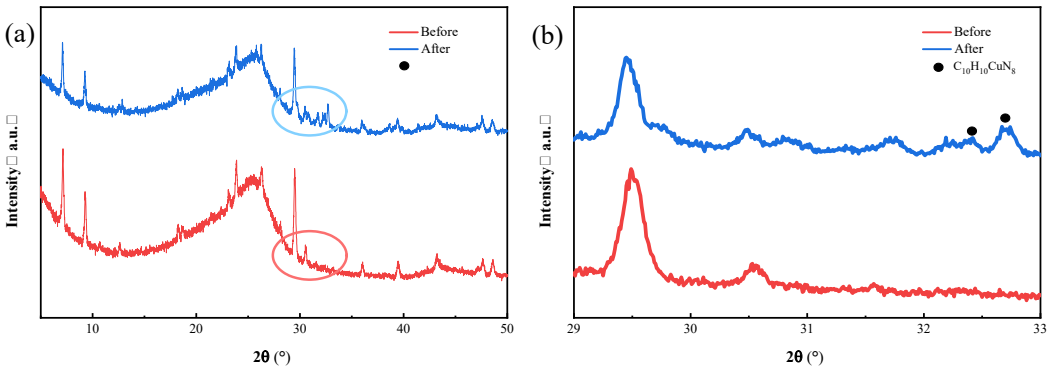

Fig.S1 XRD images of (a-b) before and after electrochemical comparison of CuPc-2.

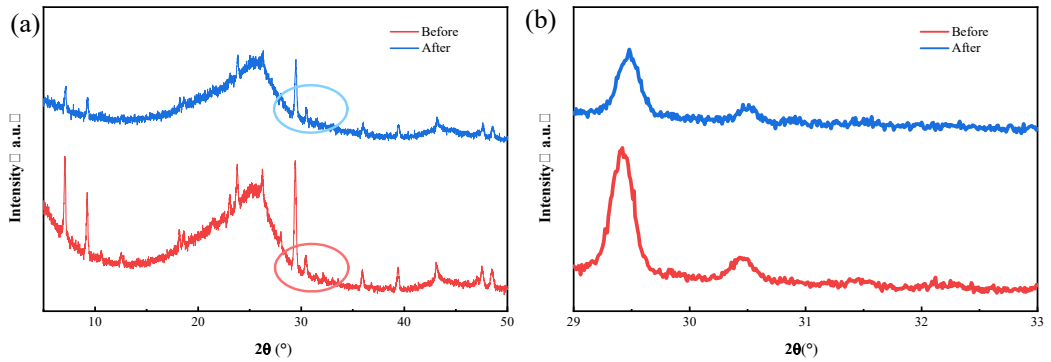

Fig.S2 XRD images of (a-b) before and after electrochemical comparison of CuPc-3.

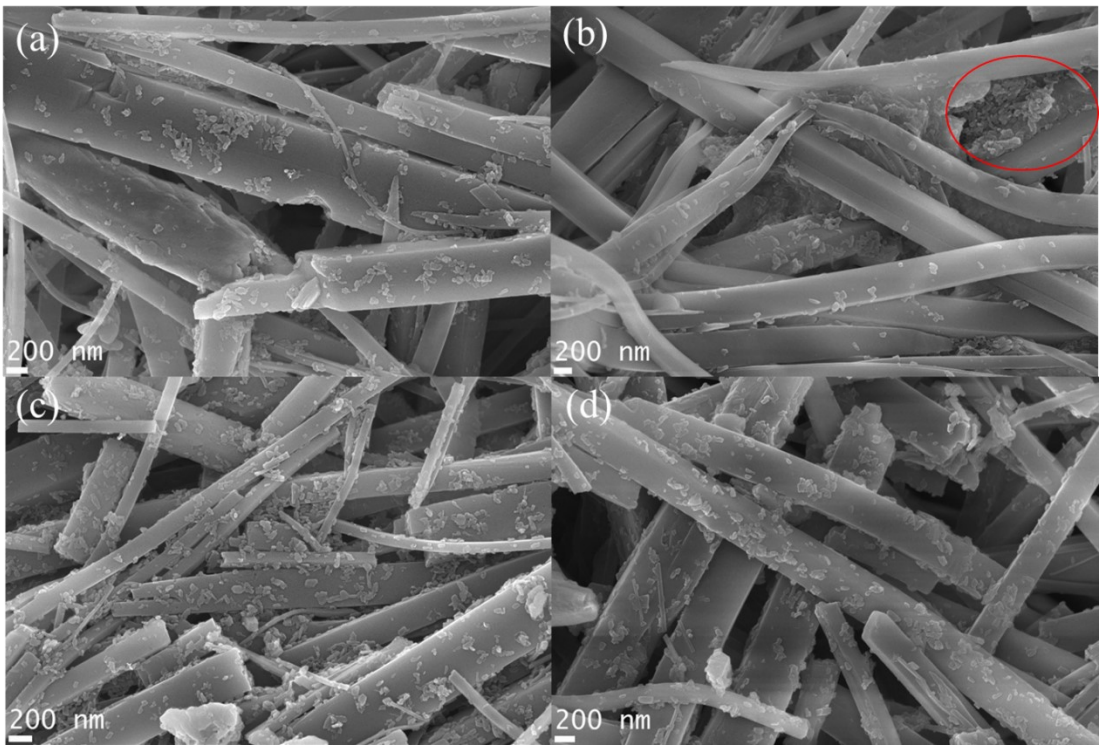

Fig.S3 (a) SEM image before CuPc-2 electrochemical test; (b) SEM image after CuPc-2 electrochemical test; (c) SEM image before CuPc-3 electrochemical test; (d) SEM image after CuPc-3 electrochemical test

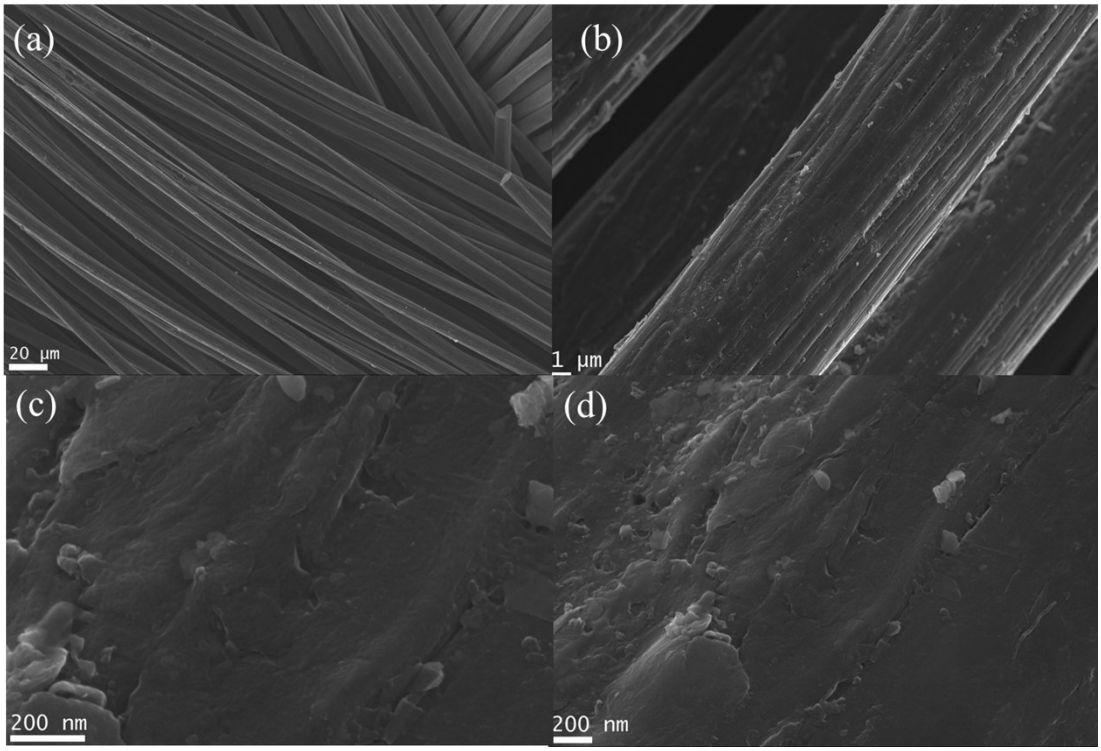

Fig.S4 SEM images of Backround

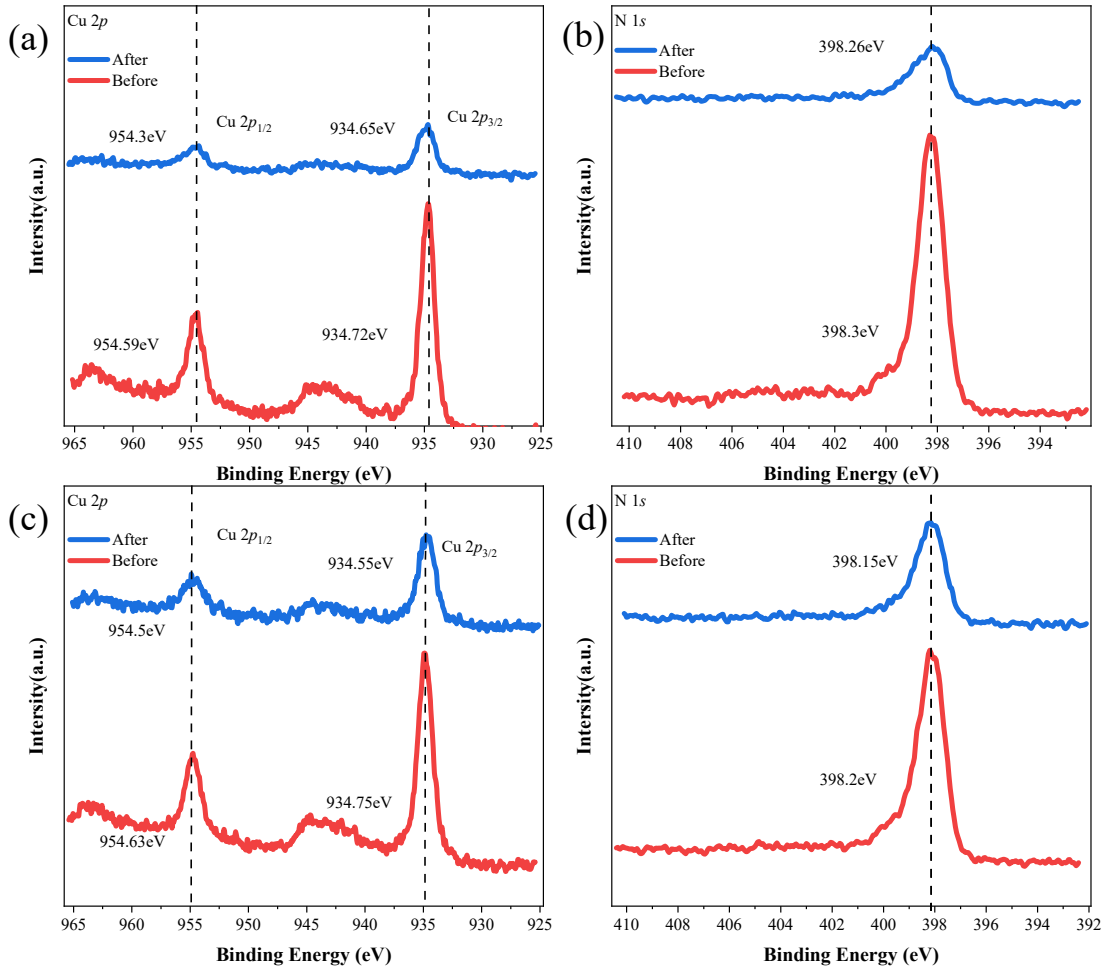

Fig.S5 (a-b) before and after electrochemical comparison of CuPc-2;(c-d) before and after electrochemical comparison of CuPc-3.

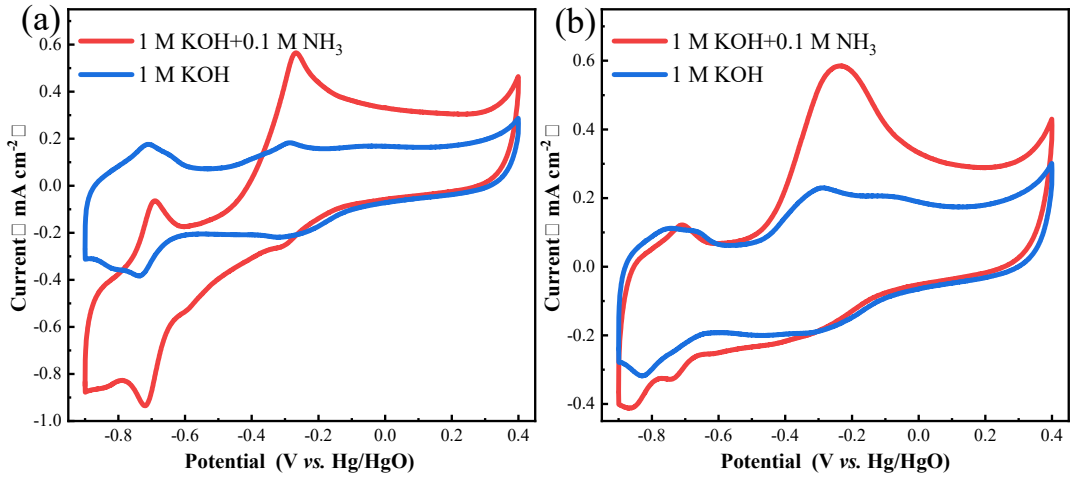

Fig.S6 (a) CV of CuPc-2 under different electrolytes; (b) cv of CuPc-3 under different electrolytes;

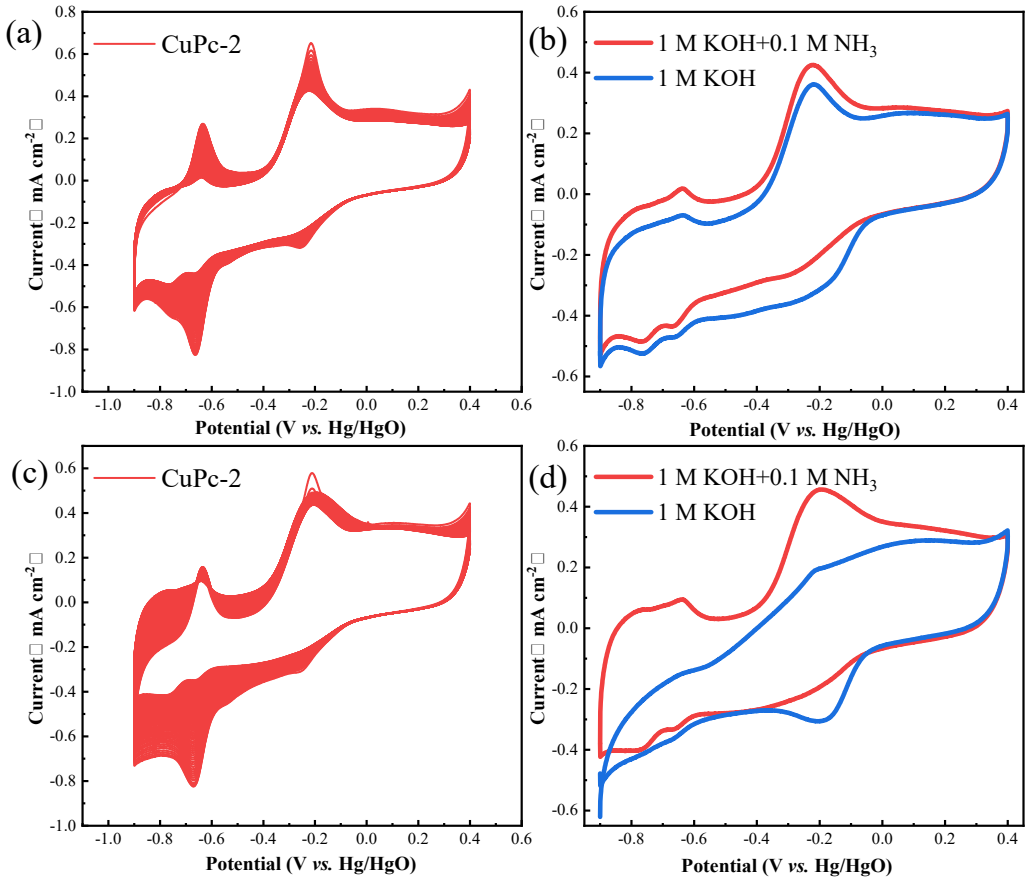

Fig.S7 (a) Stability test of CuPc-2 at 1 M KOH+ 0.1 M NH_3; (b) CV of CuPc-2 under different electrolytes after 100 cycles; (c) Stability test of CuPc-3 at 1 M KOH+ 0.1 M NH_3; (d) CV of CuPc-3 under different electrolytes after 100 cycles.

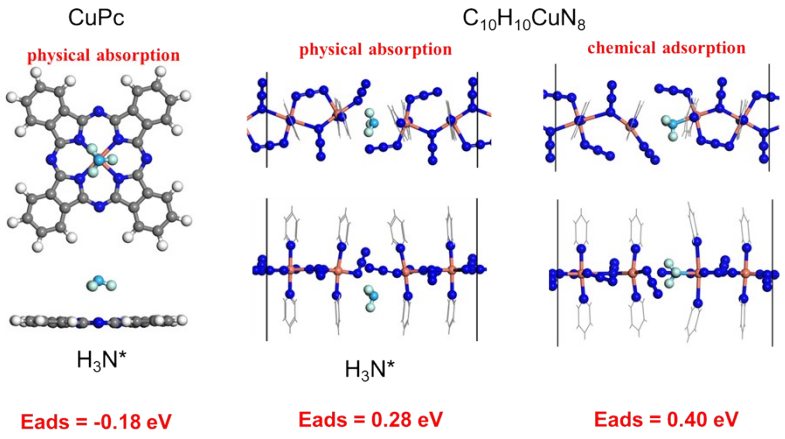

Fig.S8 H_3N* adsorption energy diagram of CuPc and $C_{10}H_{10}CuN_8$.

Table.S1 UPS result of CuPC-X(X=1,2,3)

Catalyst	Work function(eV)	Fermi Level(eV)	Cut-off energy(eV)
CuPc-1	4.17	0.65	17.7
CuPc-2	4.9	0.55	16.87
CuPc-3	4.68	0.49	17.03

Table. S2 Summary of some Pt-based catalysts.

Catalysts	Electrolyte (mol/L KOH+ mol/L NH3-H2O)	Peak current density (mA/cm2)	Peak potential (vs. RHE)/V	Documents
Pt	1+0.1	1.7	0.68	[1]
Pt/C	1+0.1	20	0.68	[1]
Pt/CNT	1+0.1	58	0.78	[1]
Pt-Zn	0.5+0.1	0.6	0.7	[2]
Pt-Ir	1+0.1	0.4	0.63	[3]

1. N. Hanada, Y. Kohase, K. Hori, H. Sugime and S. Noda, *Electrochimica Acta*, 2020, **341**, 136027.

2. J. Jiang, *Electrochemistry Communications*, 2017, **75**, 52-55.

3. S. Le Vot, L. Roué and D. Bélanger, *Journal of Power Sources*, 2013, **223**, 221-231.