Dendrite-free Zn Anodes Enabled by Functional Nitrogen-Doped Carbon Protective Layers for Aqueous Zinc-Ion Batteries

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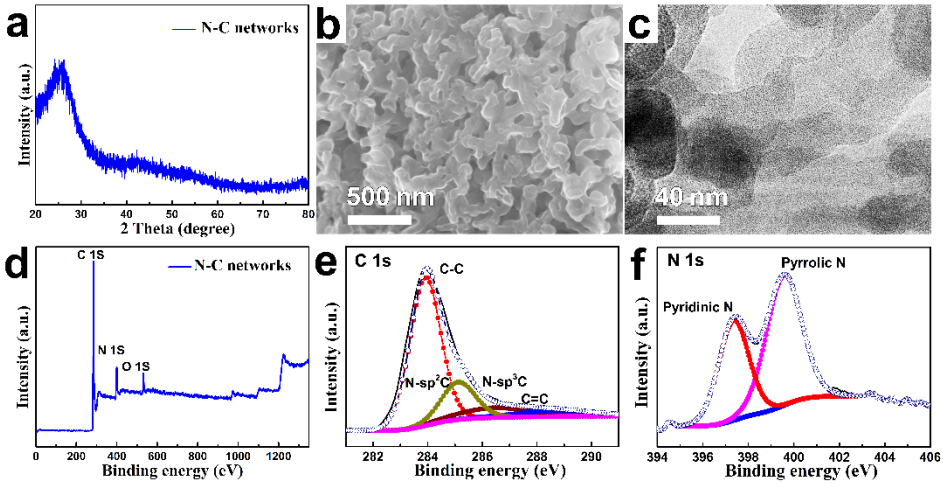

Fig.S1 (a) XRD patterns. (b and c) SEM and HRTEM images of the N-C networks materials. (d) XPS survey spectra of the N-C networks. High-resolution (e) C 1S and (f) N 1s spectra of N-C networks.

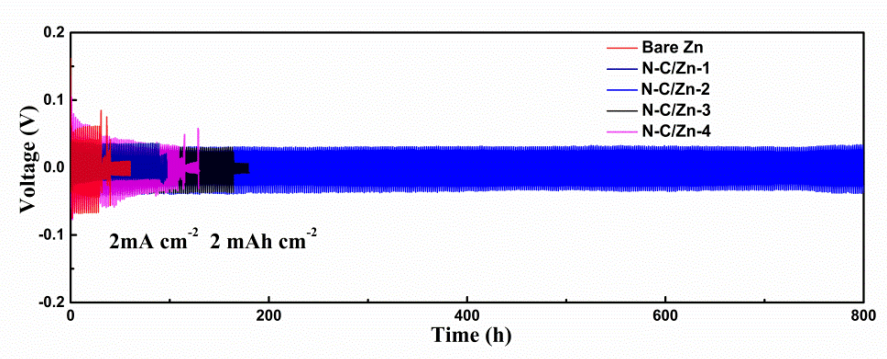

Fig. S2 Voltage-time profiles of the N-C/Zn anodes with different coating amount at a current density of 2 mA cm^{-2} with a fixed capacity of 2 mAh cm^{-2}.

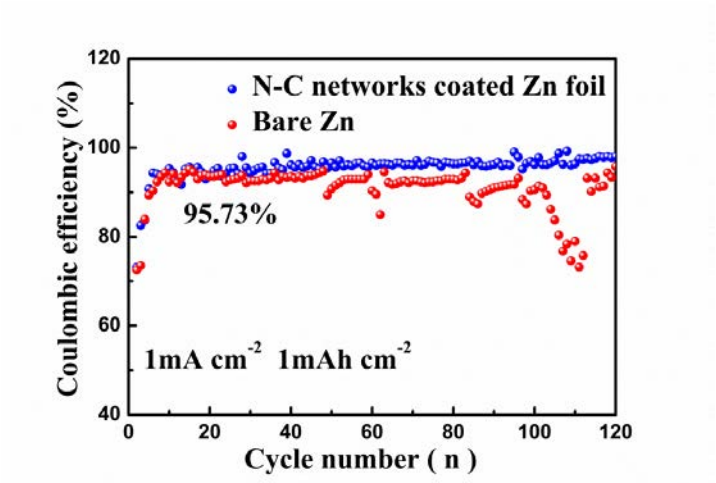

Fig. S3 Coulombic efficiencies of Zn plating/stripping on Cu foil with/without N-C coating at 1 mA cm^{-2}.

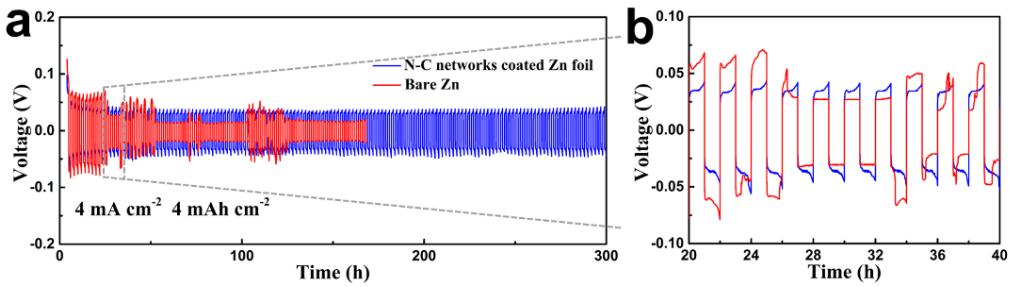

Fig. S4 Voltage-time profiles (a and b) at a current density of 4 mA cm^{-2} with a fixed capacity of 4 mAh cm^{-2}.

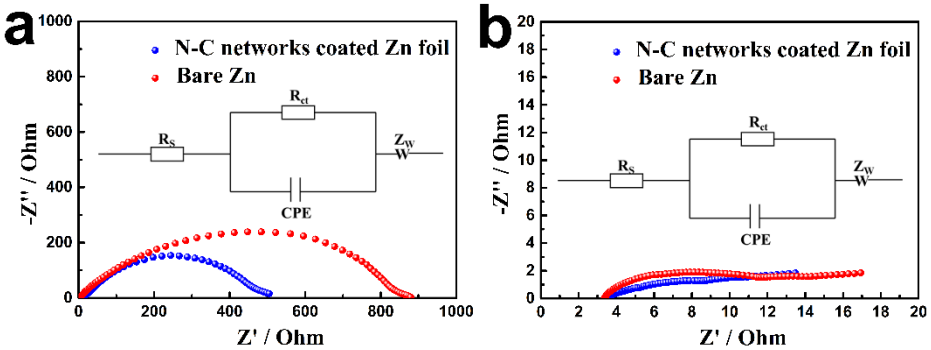

Fig. S5 (a and b) Nyquist plots of the N-C networks coated Zn electrode before cycling and after 60 h at 1 mA cm^{-2}. (the inset is the relevant equivalent circuit)

Table S1 The simulated impendence results of the N-C networks coated Zn foil and bare Zn electrodes before and after 60 h at 1 mA cm^{-2}.

Sample	N-C networks coated Zn foil	Bare Zn
R_{ct} (ohm) (Before cycle)	451.7	846
Rct (ohm) (60th cycle)	7.797	10.16

Table S2 Comparison of the cycling performances of different coated-Zn anodes

Coating Materials	Current Densities	Capacity	Cycle life	Ref.
3D CNTs	2 mA cm^{-2}	2 mAh cm^{-2}	200h	[1]
Al_2O_3 coating	1 mA cm^{-2}	1 mAh cm^{-2}	500h	[2]
TiO_2 layer	1 mA cm^{-2}	1 mAh cm^{-2}	150h	[3]
Porous kaolin coating	4.4 mA cm^{-2}	1.1 mA h cm^{-2}	800 h	[4]
Nanoporous $CaCO_3$	0.25 mA cm^{-2}	0.05 mA h cm^{-2}	836 h	[5]
Reduced graphene oxide	2 mA cm^{-2}	2 mA h cm^{-2}	200 h	[6]
Nitrogen-Doped Carbon Protective Layers	2 mA cm^{-2}	2 mAh cm^{-2}	800 h	This work

References

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