

Electronic Supplementary Material

Mn, N co-doped Co nanoparticles/porous carbon as air cathode for highly efficient rechargeable Zn-air batteries

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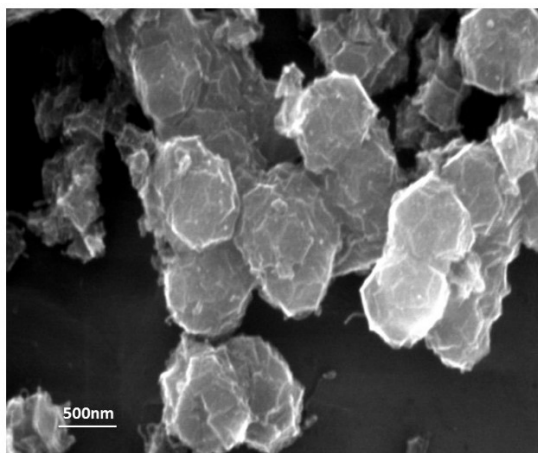


Figure S1. SEM of the Mn-Co_x/N-PC electrocatalyst.

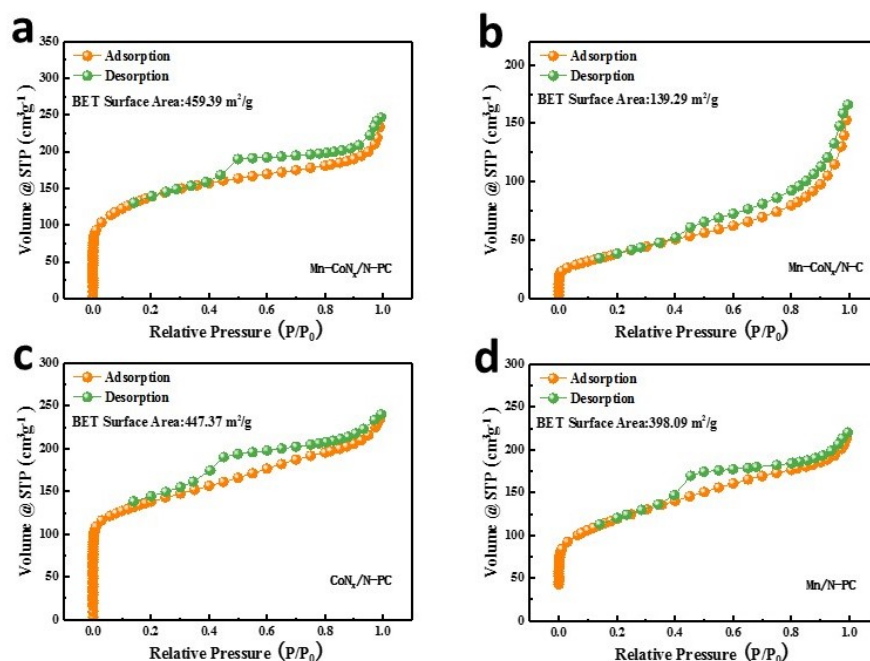


Figure S2. a), b), c) and (d) N_2 adsorption/desorption isotherm of the Mn-CoN_x/N-PC, Mn-CoN_x/N-C, CoN_x/N-PC and Mn/N-PC electrocatalyst.

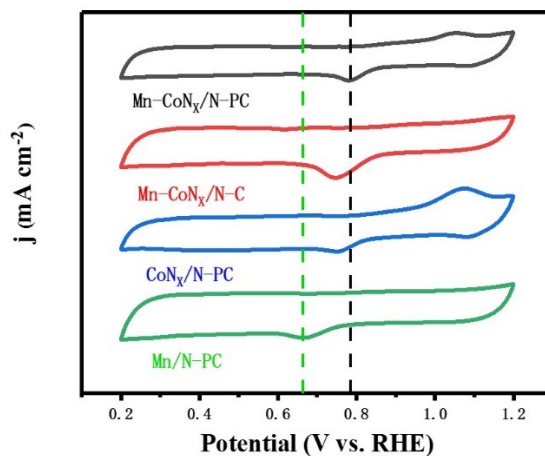


Figure S3. CV curves of the Mn-CoN_x/N-PC, Mn-CoN_x/N-C, CoN_x/N-PC and Mn/N-PC electrocatalyst.

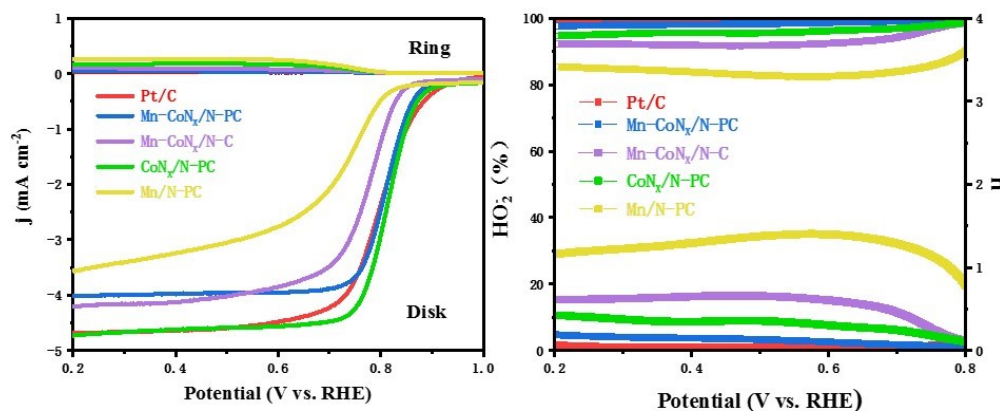


Figure S4. a) ORR polarization curves. b) ORR electron transfer number (n) and peroxide percentage (HO_2^-) of the Mn-CoN_x/N-PC, Mn-CoN_x/N-C, CoN_x/N-PC, Mn/N-PC and Pt/C electrocatalyst.

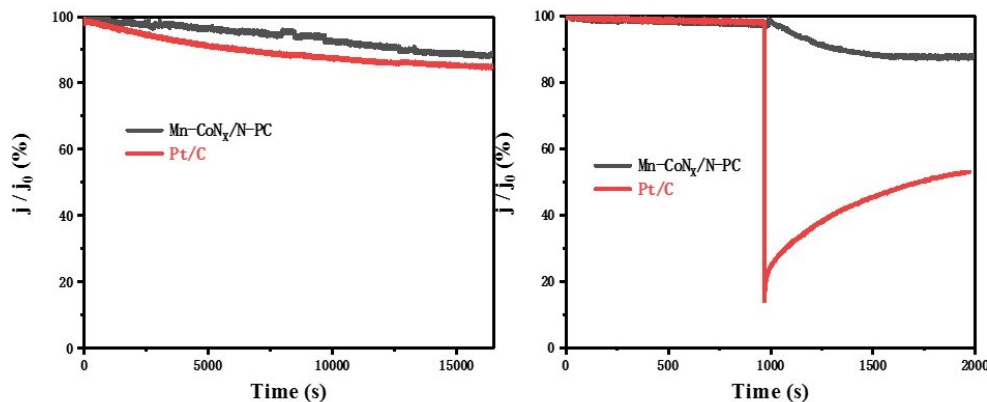


Figure S5. a) Chronoamperometric response of the Mn-CoN_x/N-PC and Pt/C, b) Chronoamperometric response of the Mn-CoN_x/N-PC and Pt/C after the introduction of 3 M CH₃OH into 0.1 M KOH solution.

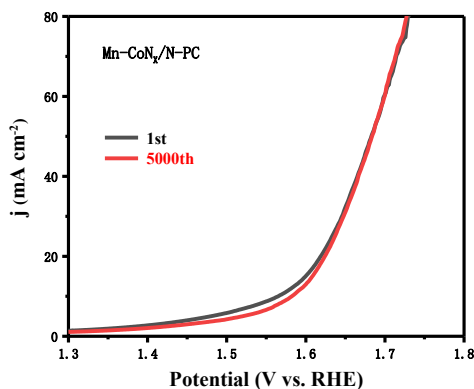


Figure S6. polarization curves of the Mn-CoN_x/N-PC electrocatalysts before and after 5000 potential sweeps for OER test.

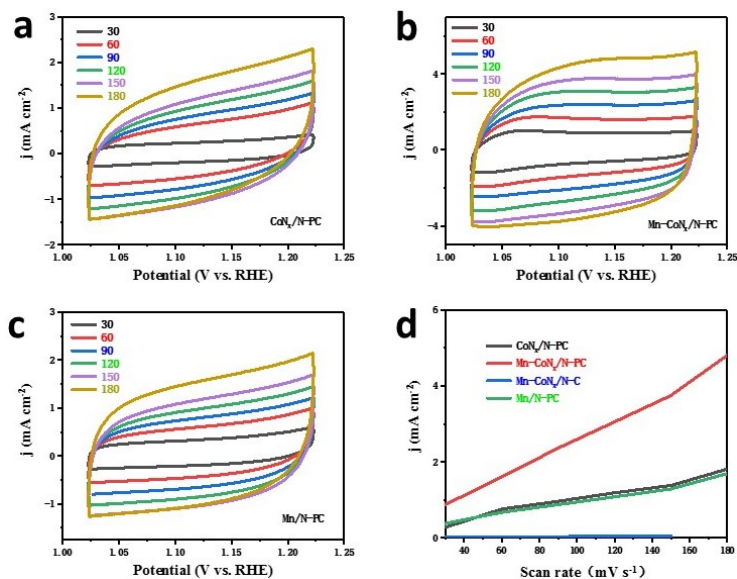


Figure S7. a), b) and c) The CVs of CoN_x/N-PC, Mn-CoN_x/N-PC and Mn/N-PC electrocatalyst at different scan rate from 30-180 mV s⁻¹, d) the corresponding double-layer capacitance (C_{dl}) test.

Table S1. Comparative ORR/OER performance between Mn-CoN_x/N-PC and many catalyst in previous reports.

Catalyst	$E_{1/2}/V$	$E_{j=10}/V$	$\Delta E/V$	Reference
Mn-CoN_x/N-PC	0.85	1.56	0.71	This work
Co ₃ O ₄ /MnO ₂ /PQ-7	0.89	1.79	0.9	8
MnO@Co-N/C	0.83	1.76	0.93	17
Co-CNT/PC	0.83	1.55	0.72	19
Mn/Co-N-C	0.8	1.66	0.86	21
Co ₄ N/CNW/CC	0.8	1.54	0.74	24
Fe@C-NG/NCNTs	0.84	1.68	0.84	28