Supplementary Information

Three-dimensional MOF-derived Co and N co-doped porous carbon bifunctional catalyst for Zn-air battery
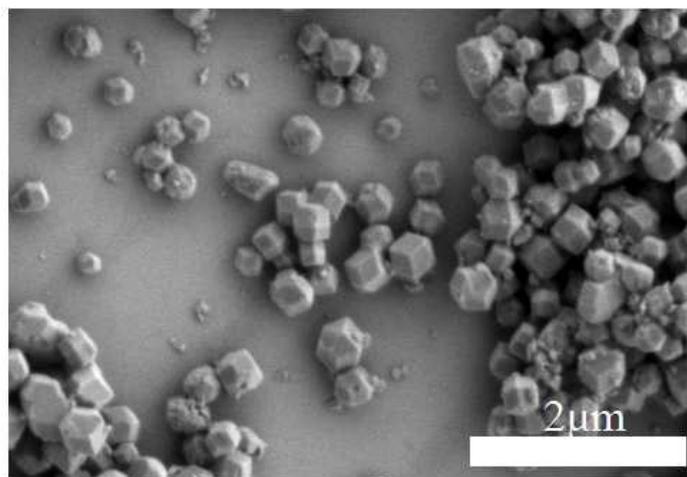
Figure S1. SEM image of ZnCo-ZIF.
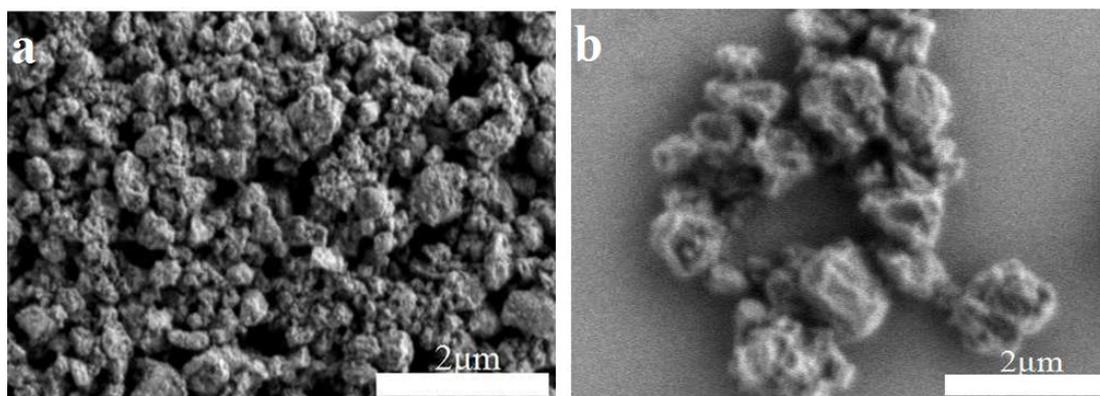
Figure S2. a) SEM image of Co-N-PC-0.5. b) SEM image of Co-N-PC-2.
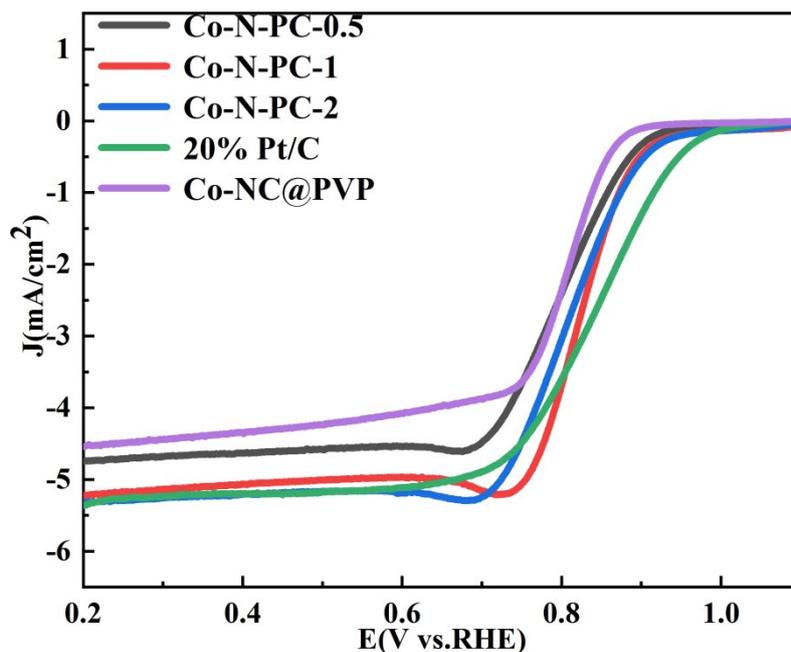
Figure S3. The ORR polarization curves of Co-NC@PVP and Co-N-PC-800 catalysts with different Zn/Co ratio in 0.1 M KOH at 1600 rpm.
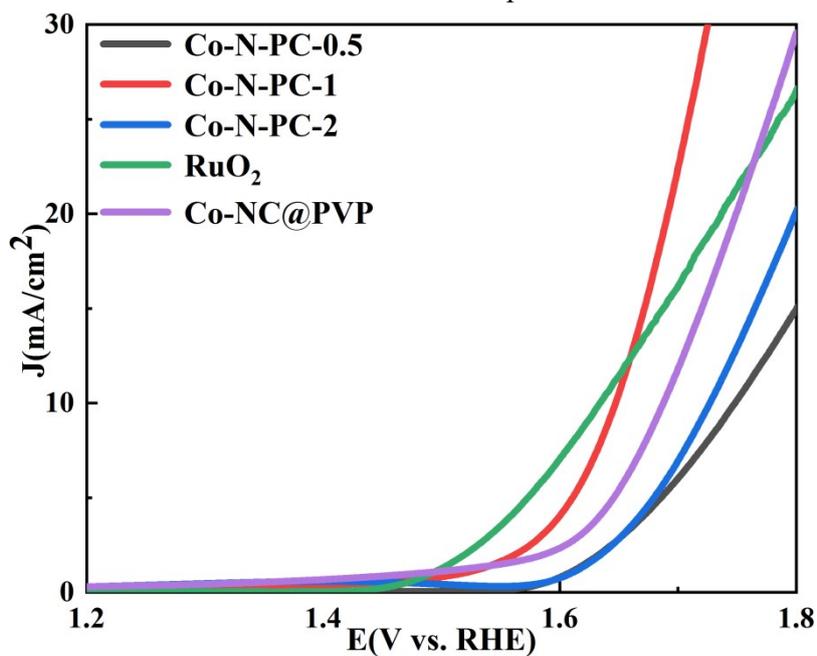
Figure S4. The OER polarization curves of Co-NC@PVP and Co-N-PC-800 catalysts with different Zn/Co ratio in 0.1 M KOH at 1600 rpm.
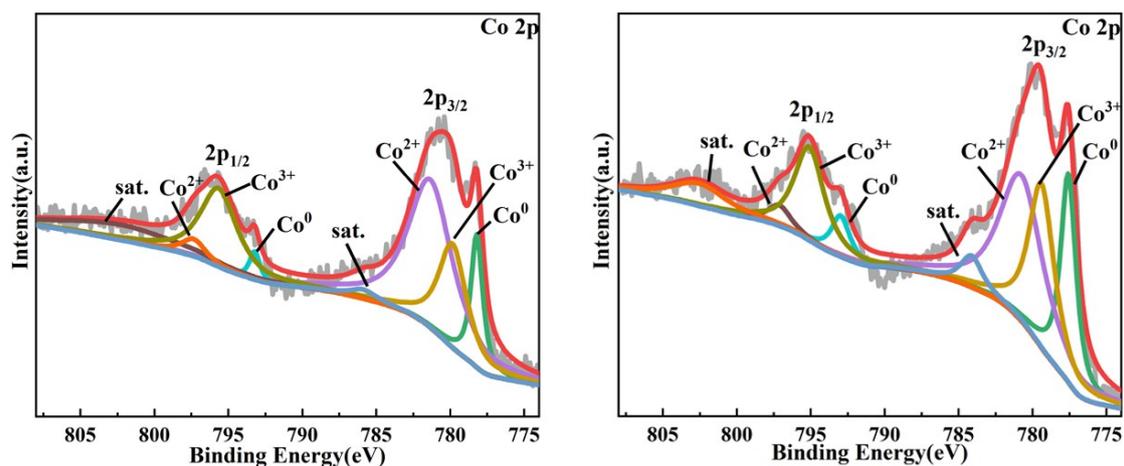
Figure S5. Co 2p XPS high-resolution spectra of Co-N-PC-700 a) and Co-N-PC-900 b).
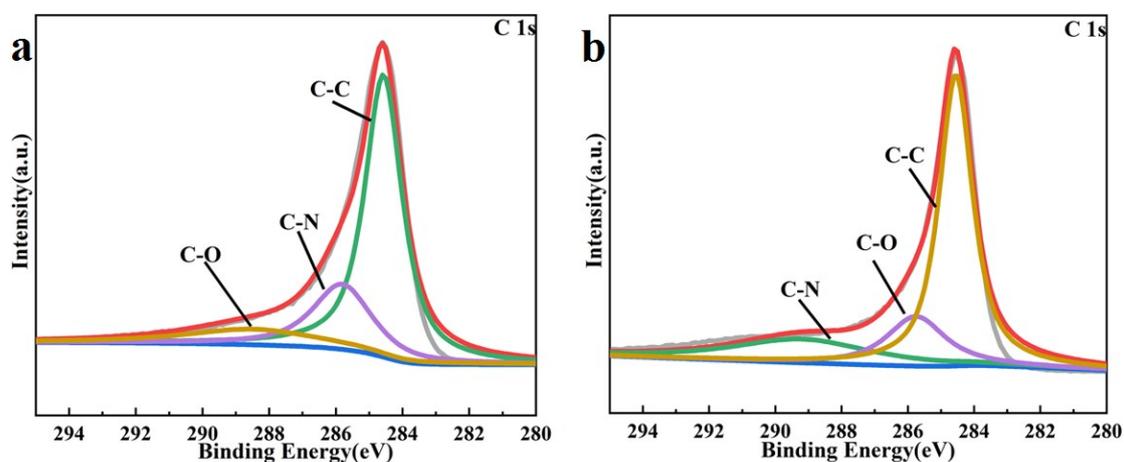
Figure S6. C 1s XPS high-resolution spectra of Co-N-PC-700 a) and Co-N-PC-900 b).
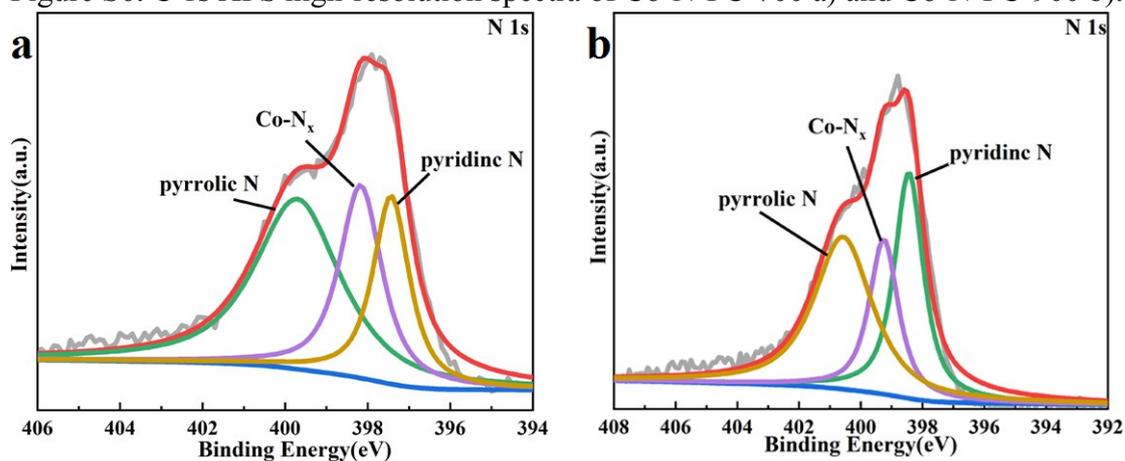
Figure S7. N 1s XPS high-resolution spectra of Co-N-PC-700 a) and Co-N-PC-900 b).
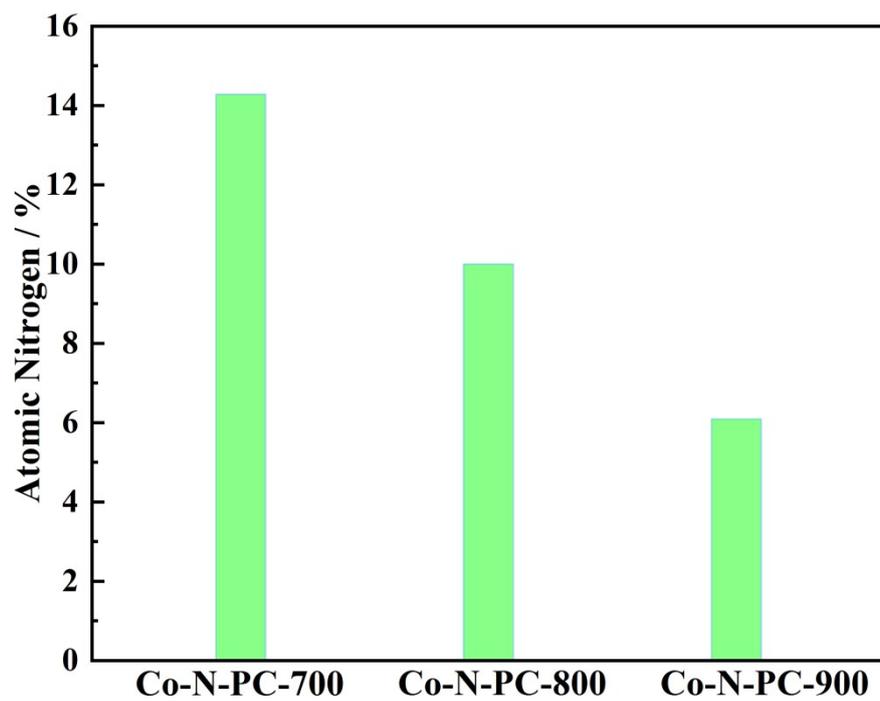
Figure S8. Atomic nitrogen-content of Co-N-PC-700, Co-N-PC-800 and Co-N-PC-900.
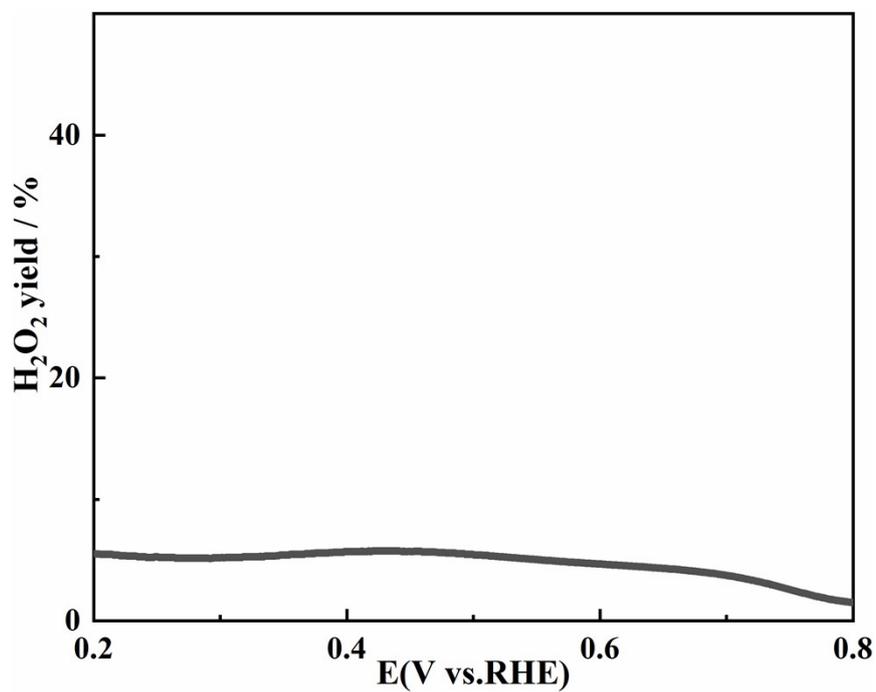
Figure S9. Commercial 20% Pt/C catalyst the yield of H_2O_2.
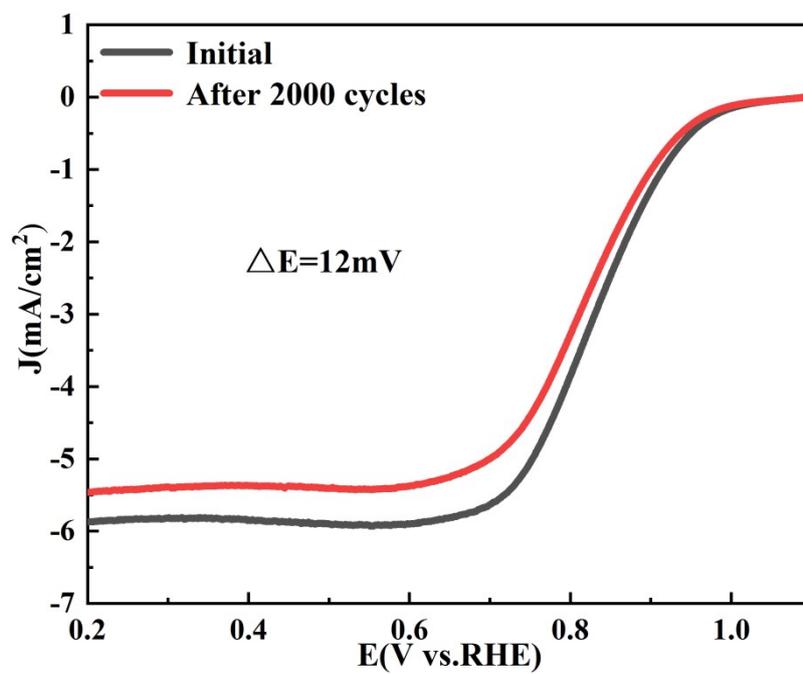
Figure S10. Commercial 20% Pt/C catalyst for initial cycle and after 2000 cycles.
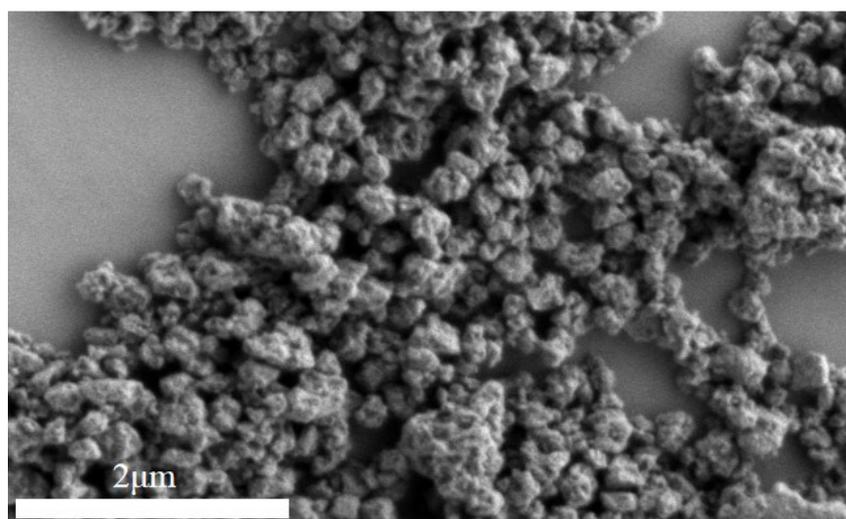
Figure S11. SEM image of Co-N-PC-800 assembled battery after cycling test.

Table S1 XPS $2P_{3/2}$ spectra information for each Co-N-PC-T samples of Co ions.

Sample / Ion	Co-N-PC-700	Co-N-PC-800	Co-N-PC-900
Co	14.12%	20.04%	22.57%
Co^{2+}	57.79%	30.39%	43.75%
Co^{3+}	25.96%	40.71%	28.96%

Table S2 EDS of the ZnCo-MOF@PVP and Co-N-PC-800 catalyst.

Sample / Element (weight%)	ZnCo-MOF@PVP	Co-N-PC-800
C	44.45%	56.31%
N	37.70%	32.87%
Co	7.79%	10.15%
Zn	10.07%	0.66%