

## Supporting information

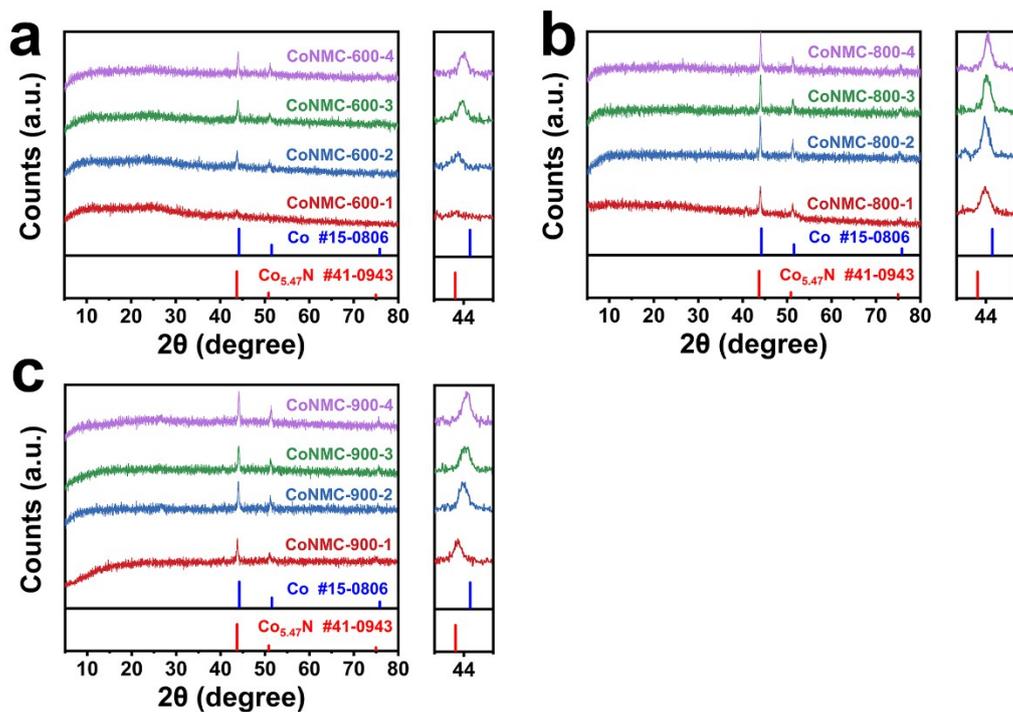
### **Co<sub>5.47</sub>N loaded N-doped carbon as an efficient bifunctional oxygen electrocatalyst for Zn-air battery**

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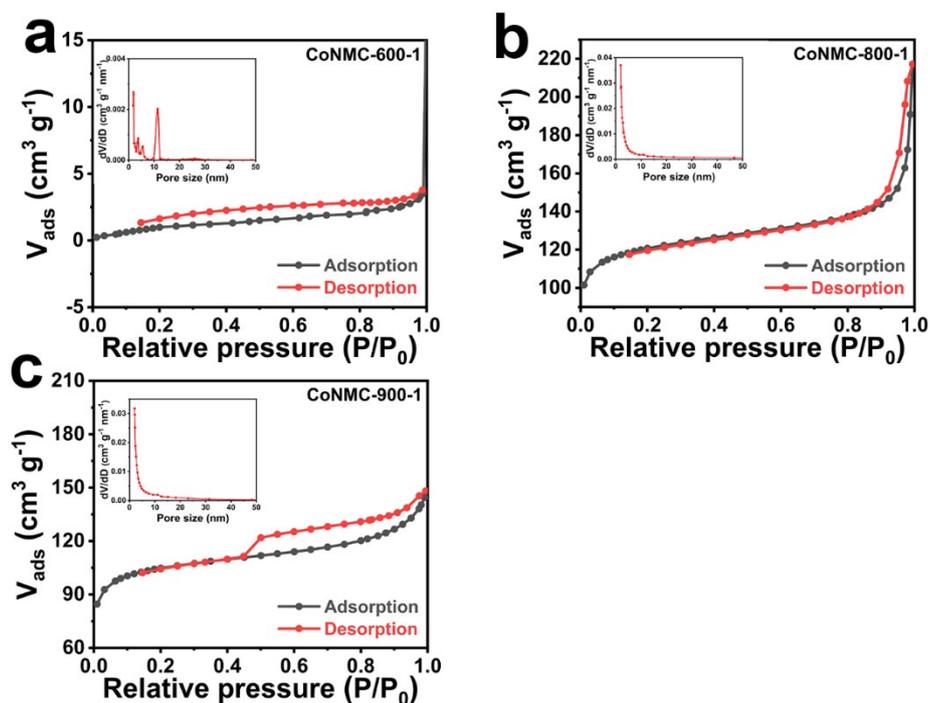
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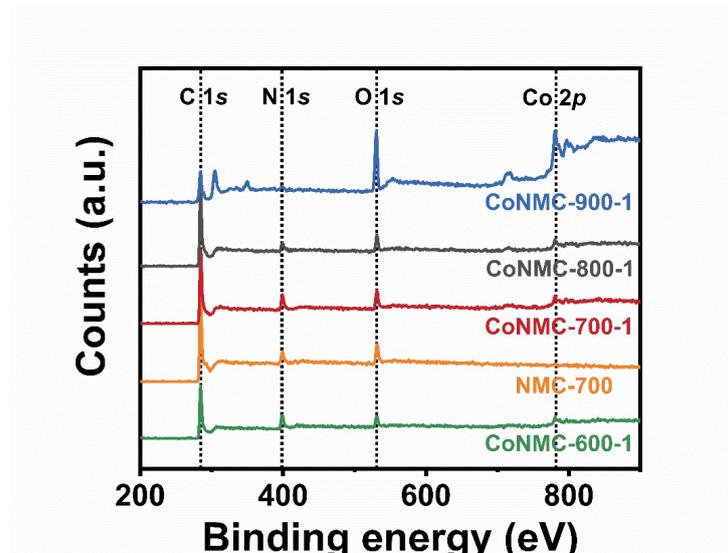
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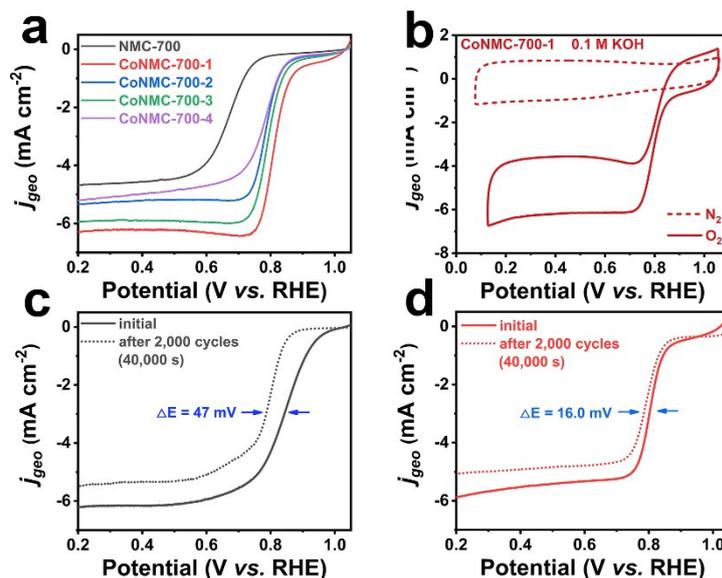
**Figure S1.** XRD patterns of (a) CoNMC-600-1, (b) CoNMC-800-1 and (c) CoNMC-900-1.



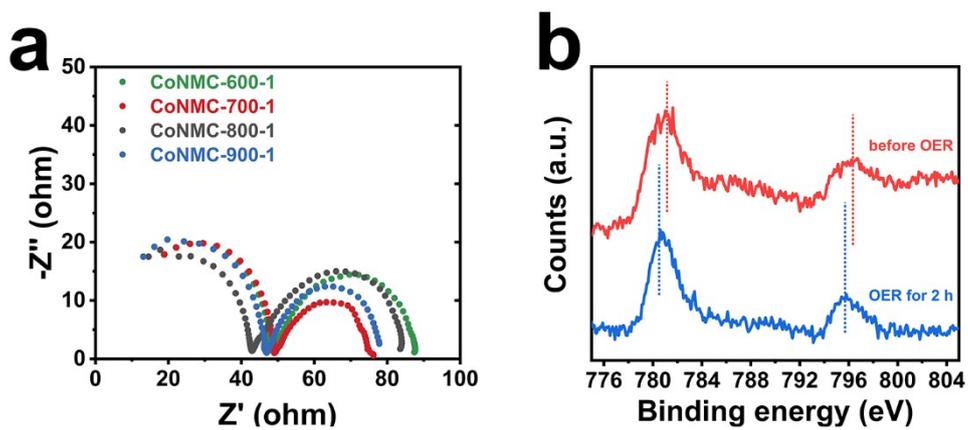
**Figure S2.** N<sub>2</sub> adsorption isotherm and pore distribution calculated from the desorption branch of (a) CoNMC-600-1, (b) CoNMC-800-1 and (c) CoNMC-900-1.



**Figure S3.** XPS survey spectra of CoNMC600-1, NMC-700, CoNMC-700-1, CoNMC-800-1 and CoNMC-900-1.



**Figure S4.** (a) LSV curves of CoNMC-700 in  $O_2$ -saturated 0.1 M KOH. (b) CV curves of CoNMC-700-1 in  $N_2$  or  $O_2$ -saturated 0.1 M KOH. (c) Polarization curve of Pt/C before and after long-term cyclic measurements. (d) Polarization curve of CoNMC-700-1 before and after long-term cyclic measurements (graphite plate as counter electrode).



**Figure S5.** (a) Nyquist plots of CoNMC-600-1, CoNMC-700-1, CoNMC-800-1 and CoNMC-900-1.

(b) XPS spectra of CoNMC-700-1 before and after 2 h OER.



**Figure S6.** Photograph of the Pt/C-RuO<sub>2</sub> based Zn-air battery exhibiting an open circuit voltage of 1.497 V measured with a voltmeter.