Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting information

Boosting the Bifunctional Electrocatalytic Oxygen Activities of CoO_x Nanoarrays with Porous N-doped Carbon Coating and the Application in Zn-Air Batteries

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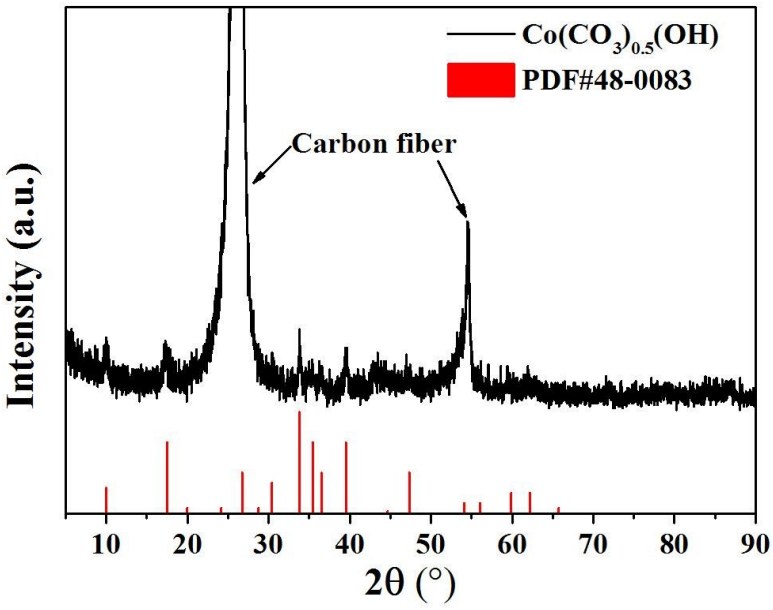

Fig. S1 XRD pattern of $Co(CO_3)_{0.5}(OH)$ on carbon fiber paper.

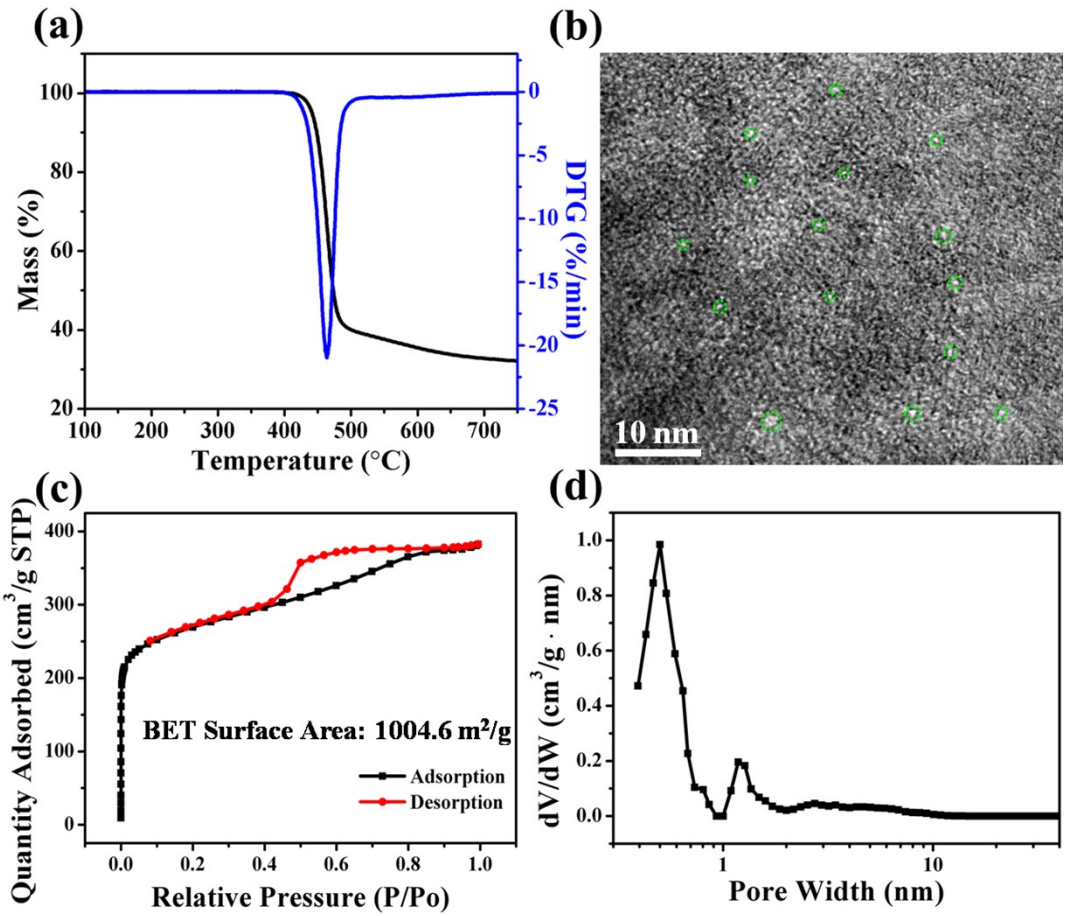

Fig. S2 (a) Thermogravimetric analysis of PVDF. (b-d) TEM image (b), N_2 adsorption-desorption isotherms (c), and pore size distribution curve (d) of PVDF derived carbon.

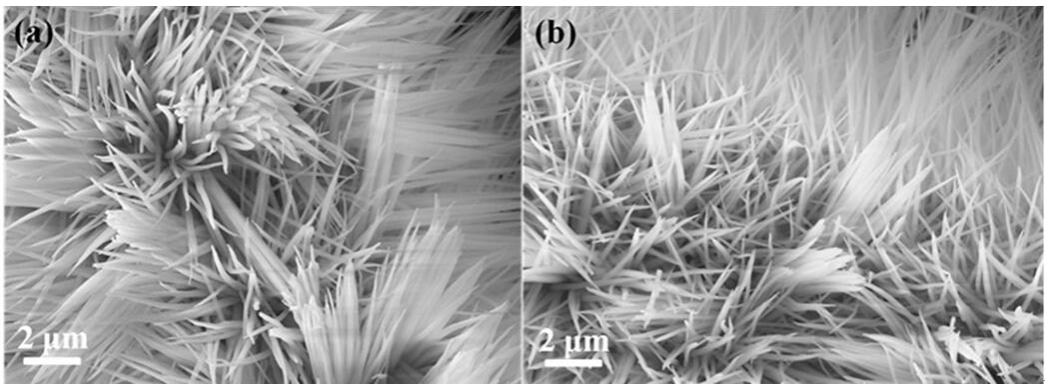

Fig. S3 SEM images of CoO_x (a) and CoO_x@C (b) nanoarray.

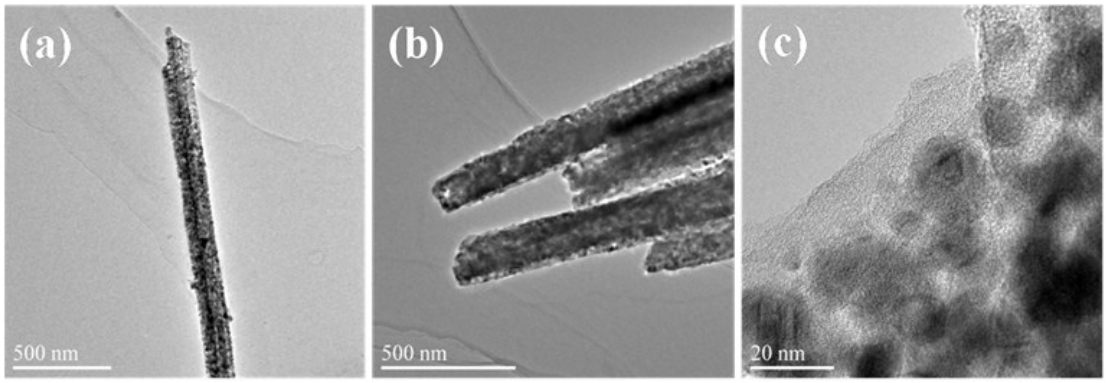

Fig. S4 TEM images of CoO_x (a) and CoO_x@C (b) nanoarray. HRTEM image of CoO_x@C nanoarray (c).

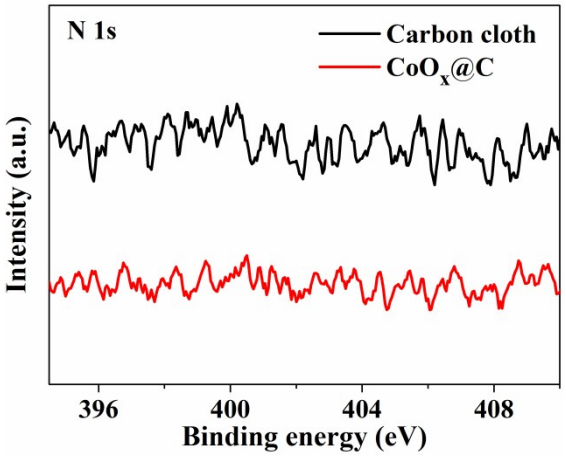

Fig. S5 The N 1s scan XPS patterns of CoO_x@C and carbon cloth.

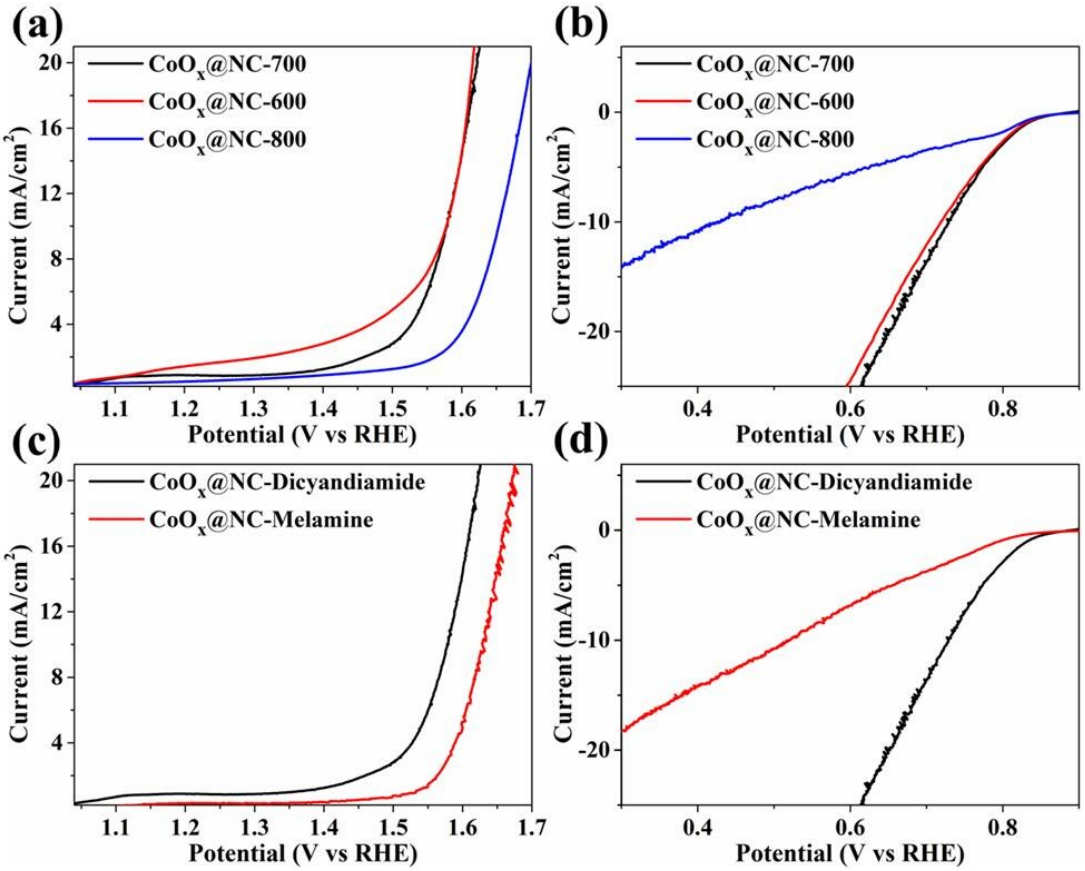

Fig. S6 The OER (a, c) and ORR (b, d) performance CoO_x@NC with different calcination temperature (a, b) and nitrogen source (c, d) in 0.1 M KOH solution.

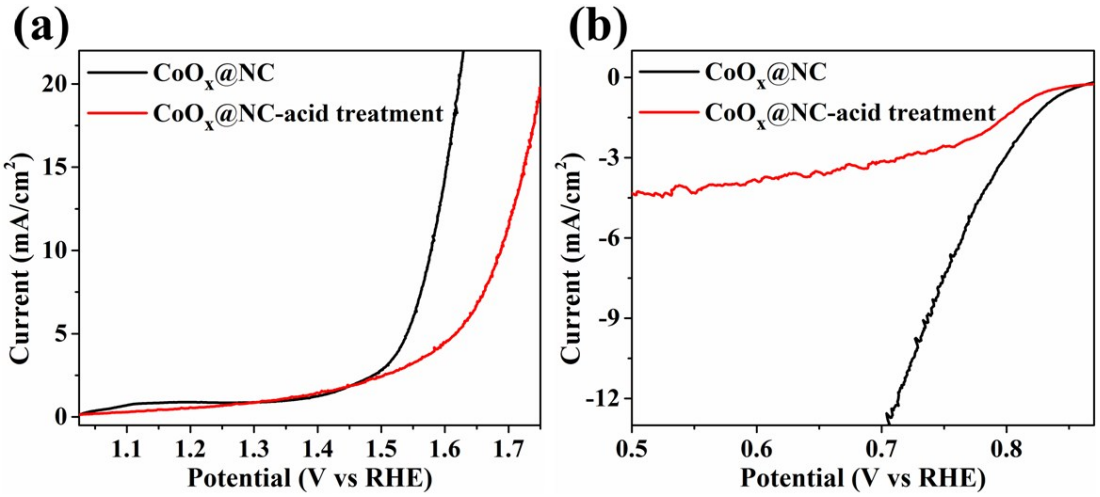

Fig. S7 OER (a) and ORR (b) performance of CoO_x@NC and its acid treated electrode in 0.1 M KOH solution.

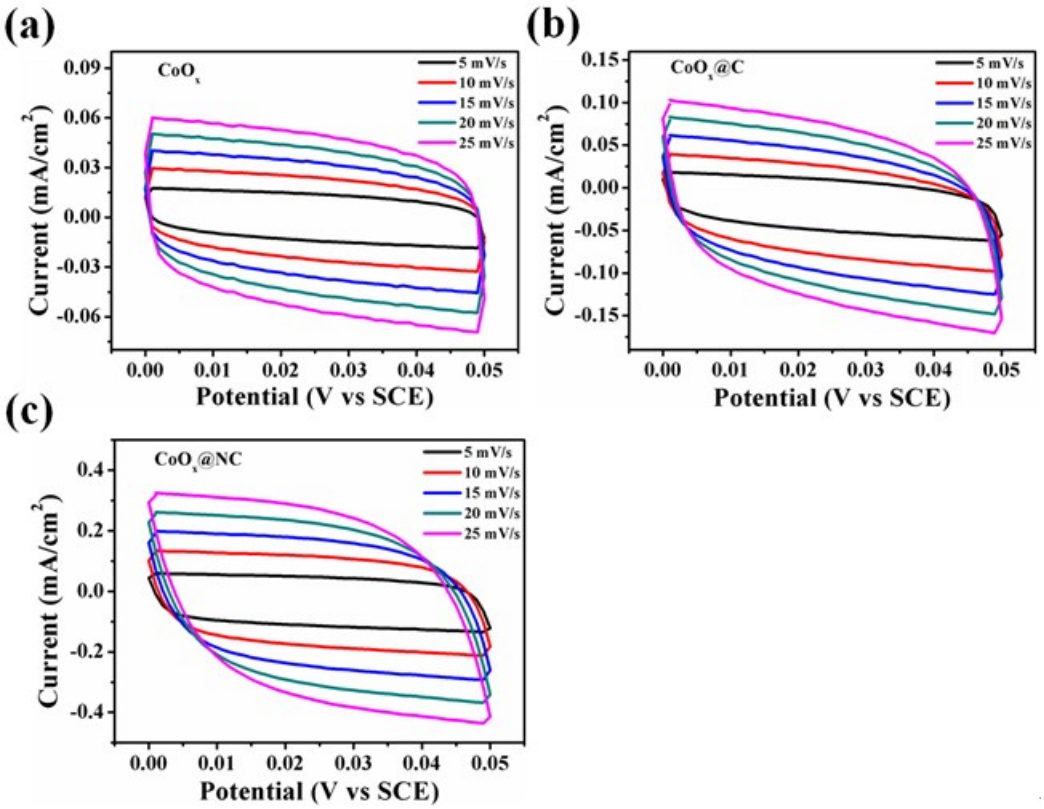

Fig. S8 CV plots of CoO_x, CoO_x@C, and CoO_x@NC under different scan rate in 0.1 M KOH solution.

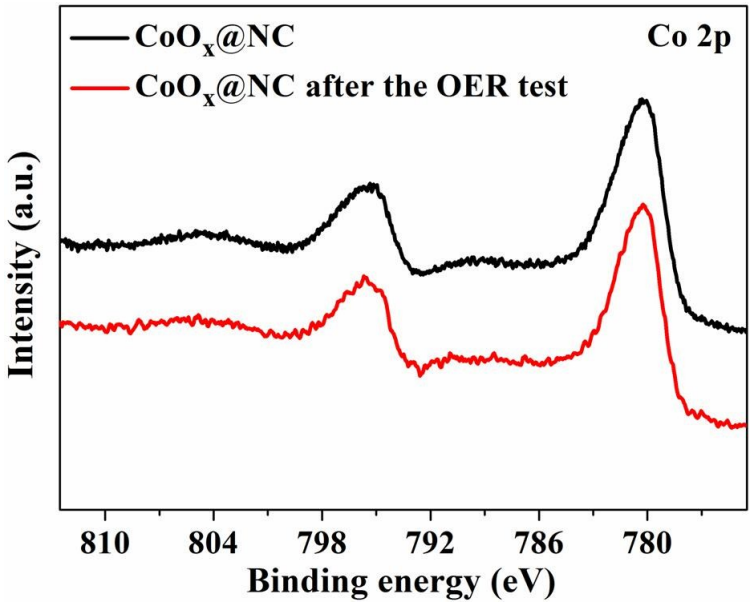

Fig. S9 Co 2p XPS spectrum of CoOx@NC nanoarray after 12 h stability test in 0.1 M KOH solution.

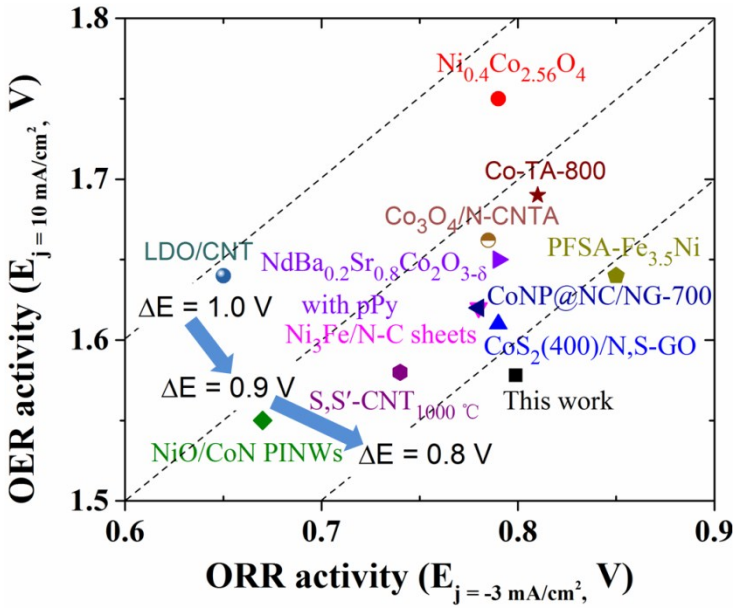

Fig. S10 Comparison of OER and ORR bifunctional activities of samples in this work with some representative electrocatalysts in recent references (from 2015 to now). The dash lines show the ΔE at constant values.

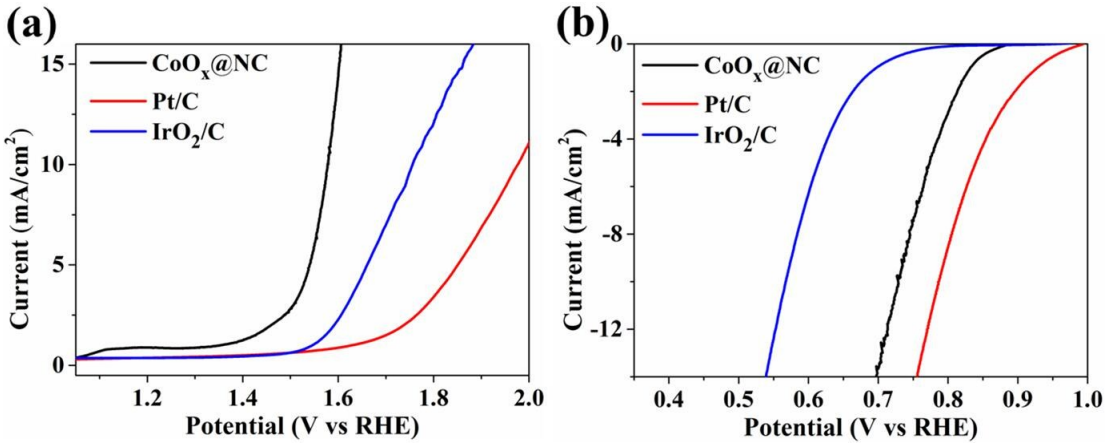

Fig. S11 OER (a) and ORR (b) performance of CoO_x@NC nanoarray, Pt/C and IrO_2/C in 0.1 M KOH solution.

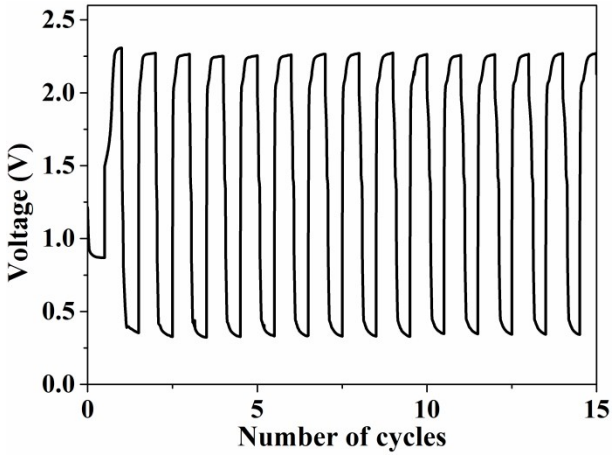

Fig. S12 Galvanostatic cycling discharge and charge curves of carbon cloth.

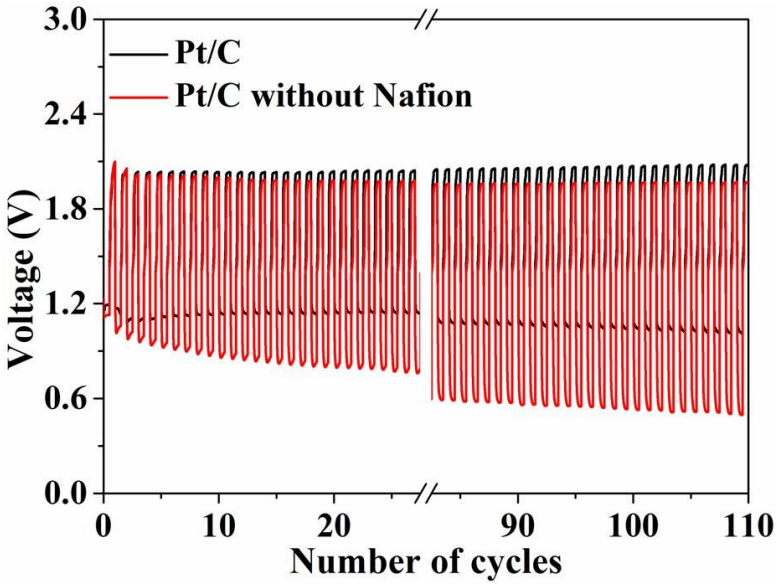

Fig. S13 Galvanostatic cycling discharge and charge curves obtained using air under ambient conditions of Pt/C without Nafion.