

Supporting Information

Nickel-Cobalt Oxides Supported on Co/N Decorated Graphene as Excellent Bifunctional Oxygen Catalyst

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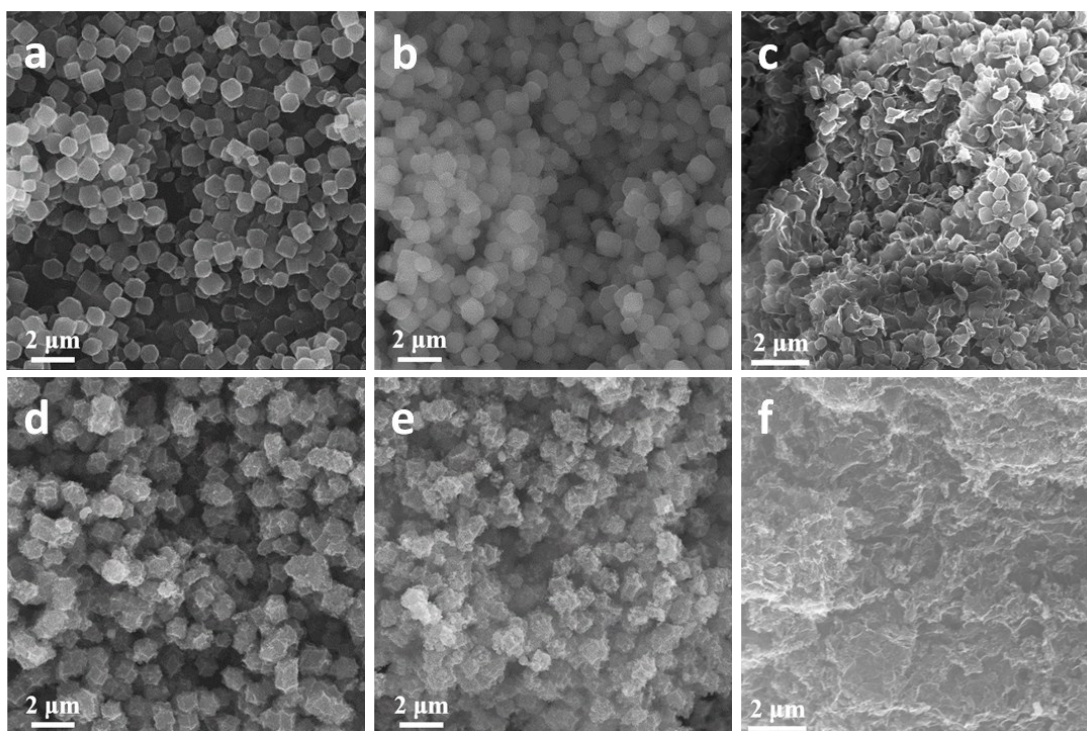


Fig. S1. The SEM images of ZIF-67 (a), ZIF-67-Ni (b), ZIF-67/GO (c) and the corresponding pyrolysis products Co₃O₄/Co-NC (d), Ni_xCo_yO₄/Co-NC (e), and Co₃O₄/Co-NG (f).

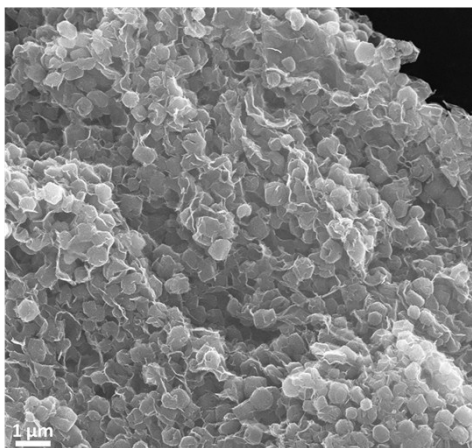


Fig. S2. The SEM image of ZIF-67-Ni/GO.

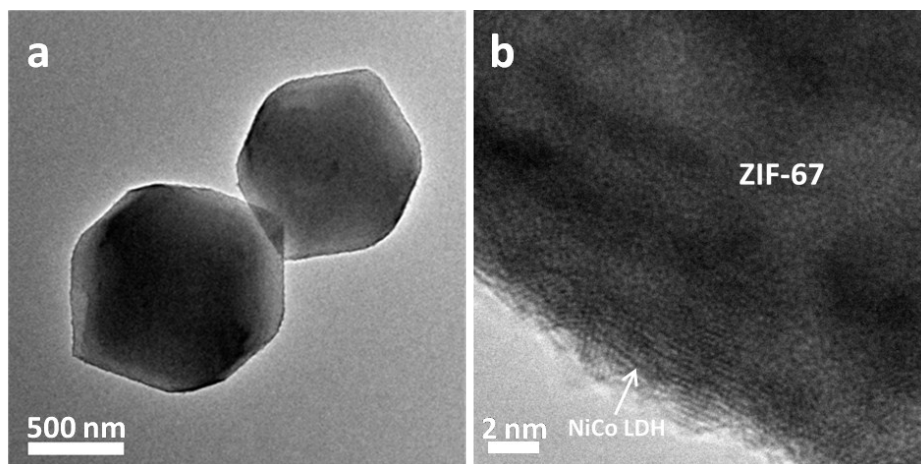


Fig. S3. TEM (a) and HRTEM (b) images of ZIF-67-Ni.

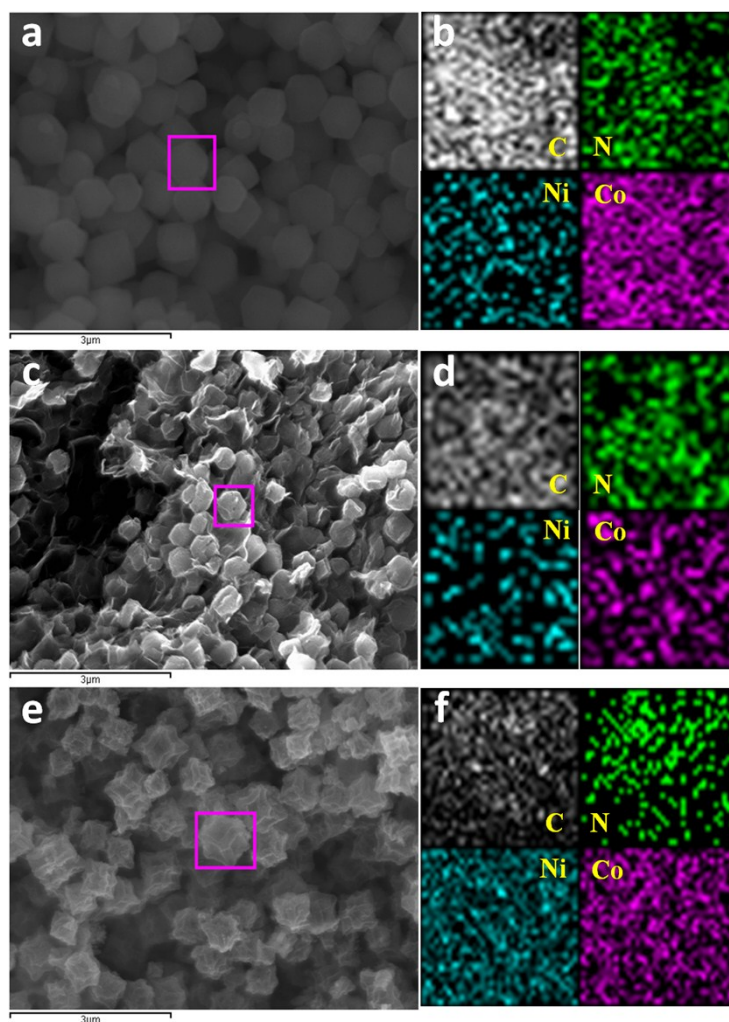


Fig. S4. The element mapping of ZIF-67-Ni (a, b), ZIF-67-Ni/GO (c, d), Ni_xCo_yO₄/Co-NC (e, f).

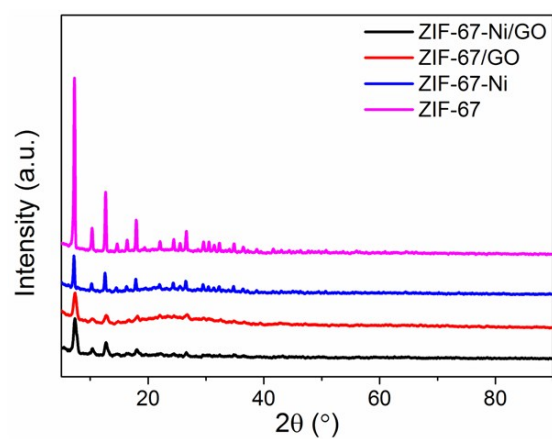


Fig. S5. XRD patterns of precursors.

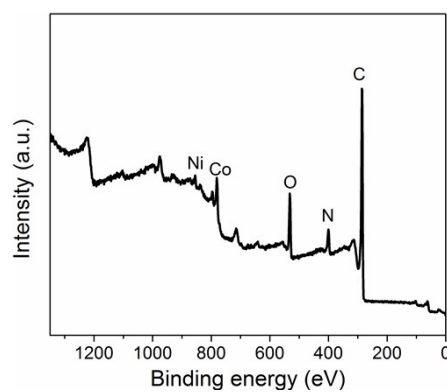


Fig. S6. The whole XPS spectra of $\text{Ni}_x\text{Co}_y\text{O}_4/\text{Co-NG}$.

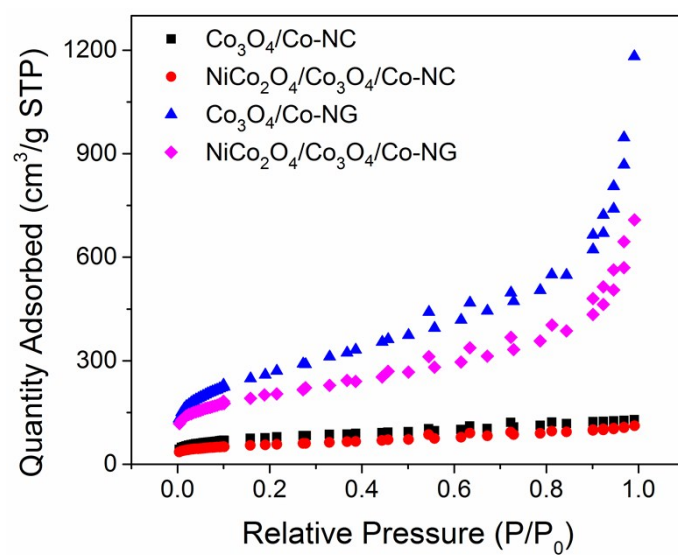


Fig. S7. The N_2 absorption/desorption curves of four samples.

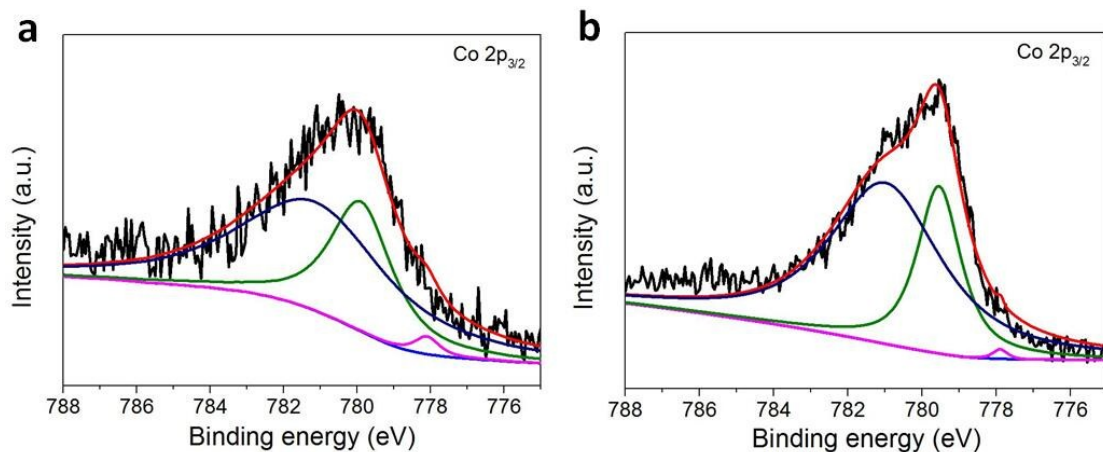


Fig. S8. The Co 2p XPS spectrum of Co₃O₄/Co-NC (a) and Co₃O₄/Co-NG (b).

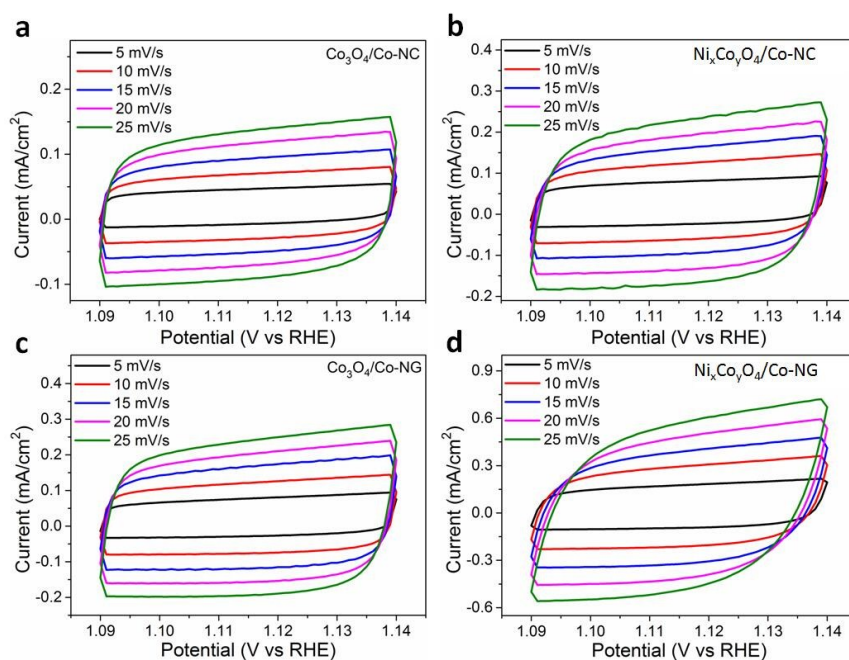


Fig. S9. The CV plots of four samples at different scan rates. (a) Co₃O₄/Co-NC, (b) Ni_xCo_yO₄/Co-NC, (c) Co₃O₄/Co-NG and (d) Ni_xCo_yO₄/Co-NG.

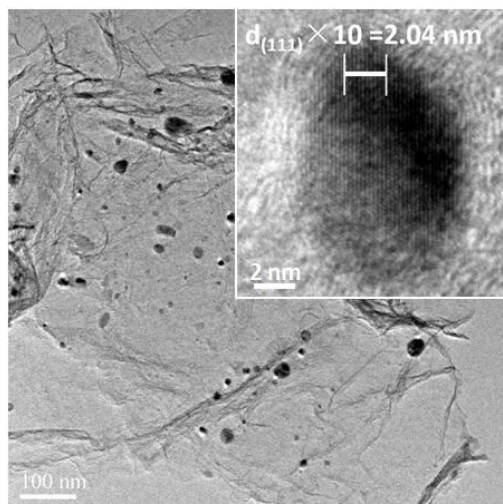


Fig. S10. The TEM image of Co-NG prepared by removing the metal oxides with acid treatment from $\text{Ni}_x\text{Co}_y\text{O}_4/\text{Co-NG}$.

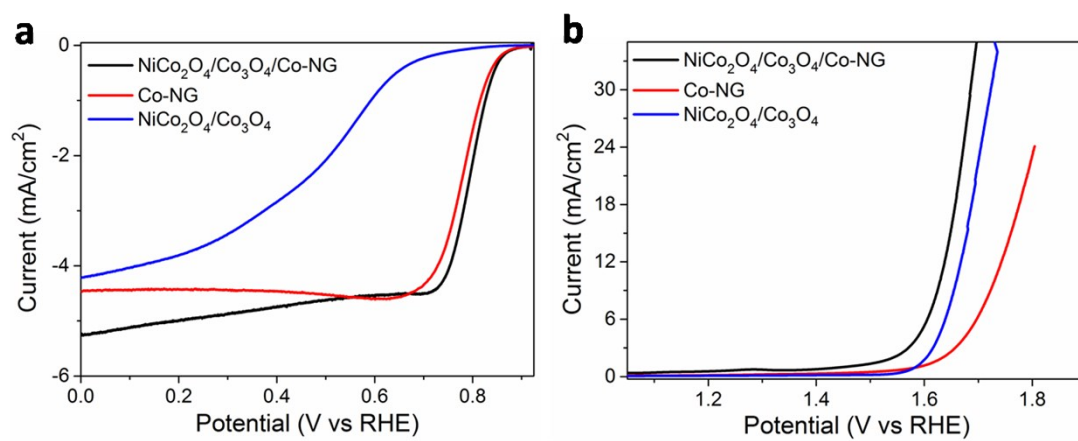


Fig. S11. The ORR (a) and OER (b) performance of $\text{Ni}_x\text{Co}_y\text{O}_4/\text{Co-NG}$, Co-NG and $\text{Ni}_x\text{Co}_y\text{O}_4$.