Supporting Information

High Catalytic Activity of Co_3O_4 Nanoparticles Encapsulated in the Graphene Supported Carbon Matrix for Oxygen Reduction Reaction

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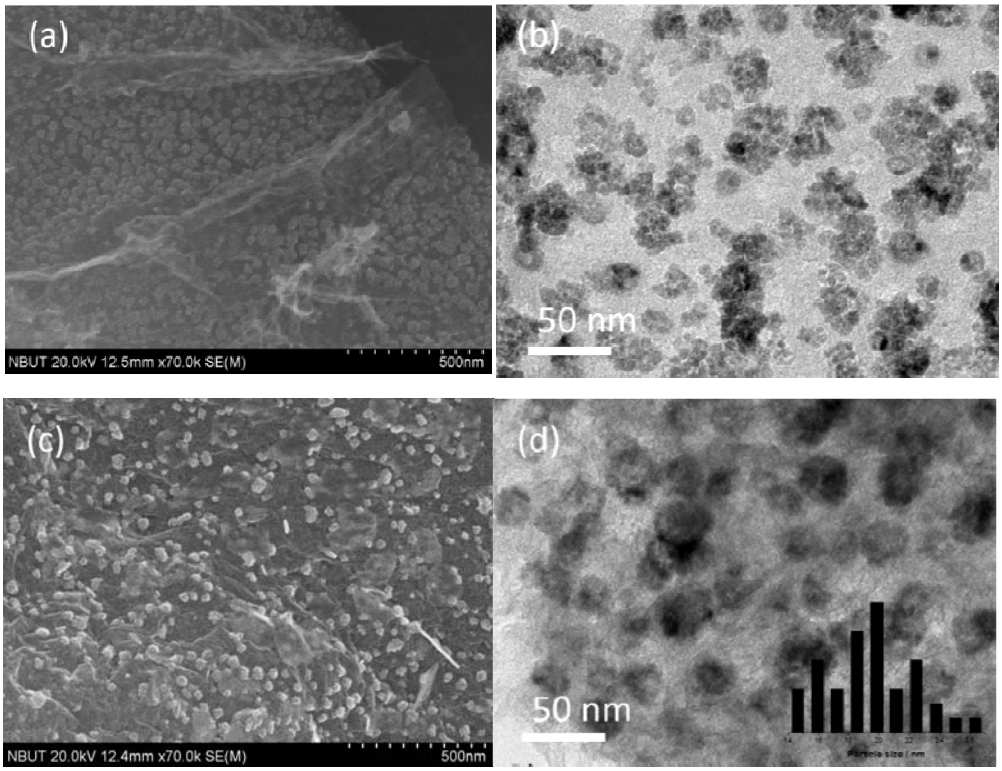


Figure S1. SEM images of (a) the CoMG and (c) the CoPG and TEM images of (b) the CoMG and (d) the CoPG. The insets in Figure S1d show the histogram of the Co_3O_4 particle sizes.

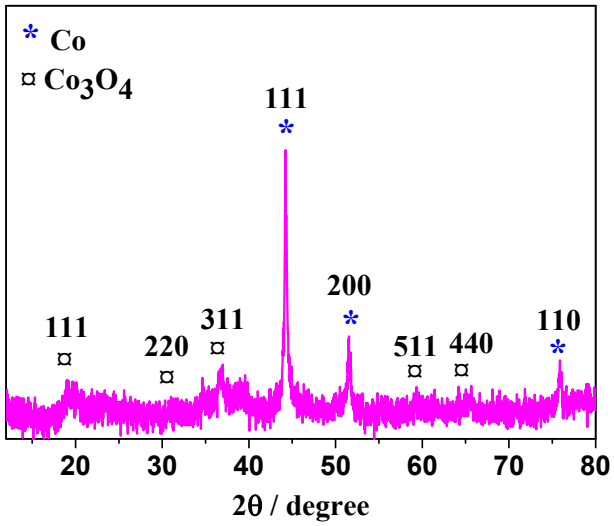


Figure S2. XRD patterns of the CoPM. The reflection peaks corresponding to the Co and Co_3O_4 phases are indicated in the figure.

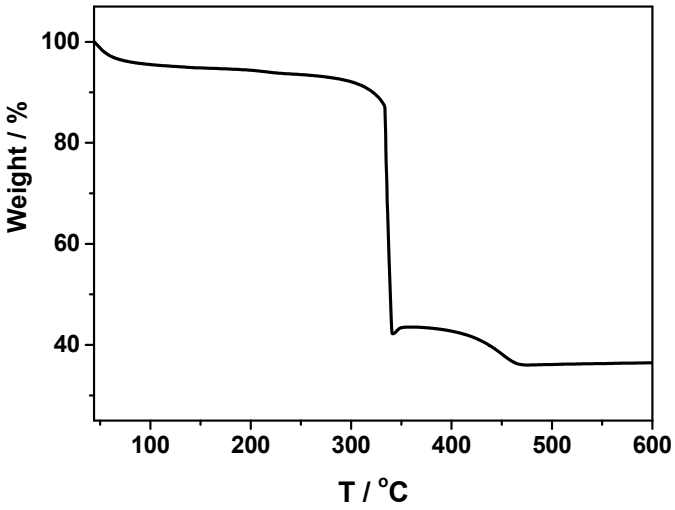


Figure S3. TGA curve of the CoPMG.

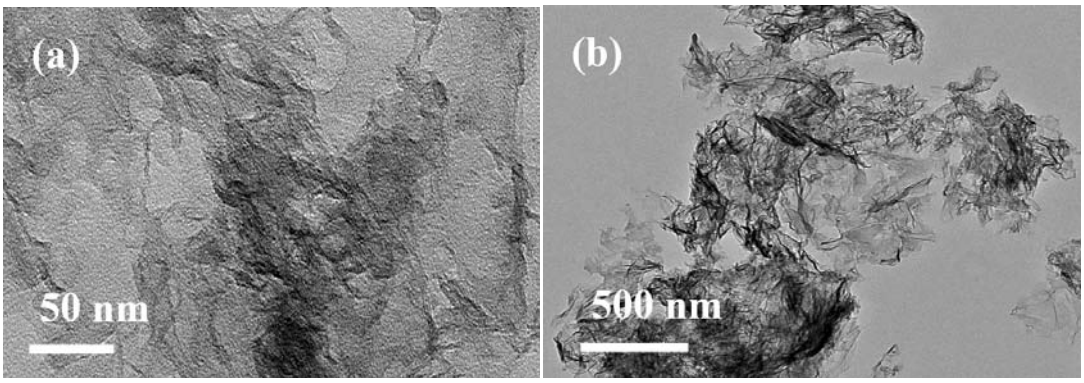
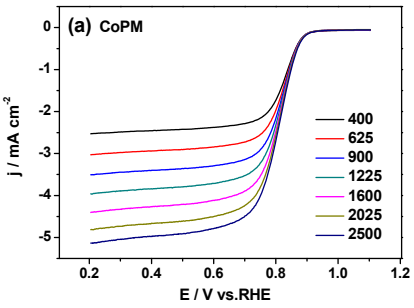
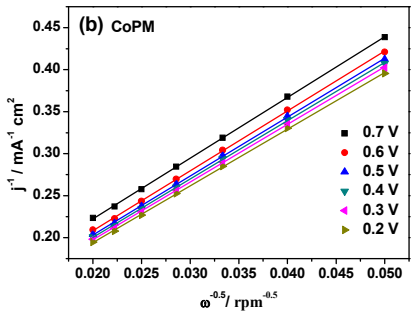
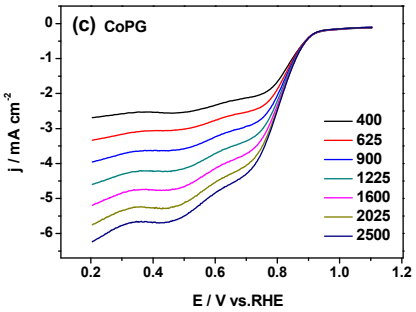
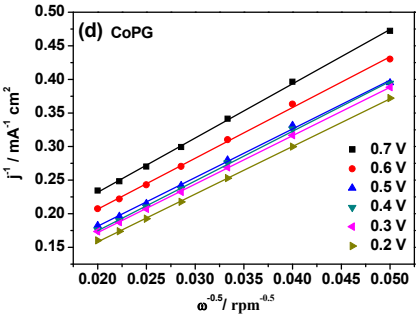


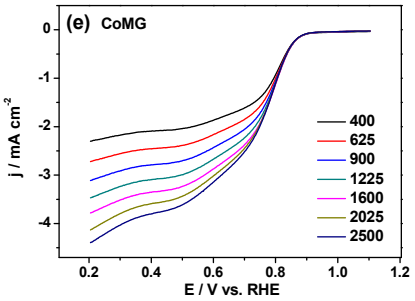
Figure S4. TEM images of the PMG synthesized through the acid etching of the CoPMG at (a) high and (b) low magnification.

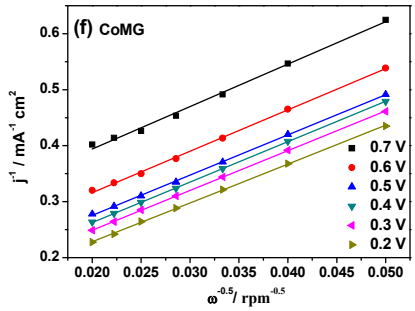

(a) CoPM
j / mA cm-2
E / V vs.RHE
400
625
900
1225
1600
2025
2500

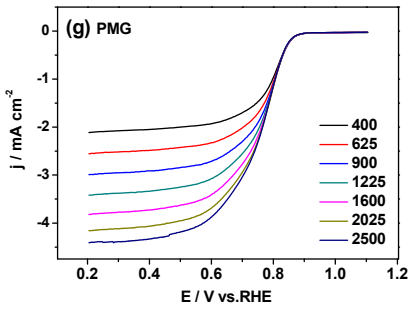

(b) CoPM
j-1 / mA-1 cm2
ω-0.5/ rpm-0.5
0.7 V
0.6 V
0.5 V
0.4 V
0.3 V
0.2 V

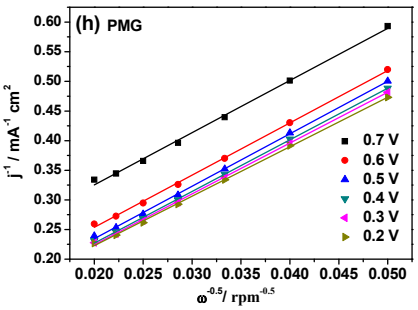

(c) CoPG
j / mA cm-2
E / V vs.RHE
400
625
900
1225
1600
2025
2500


(d) CoPG
j-1 / mA-1 cm2
ω-0.5/ rpm-0.5
0.7 V
0.6 V
0.5 V
0.4 V
0.3 V
0.2 V


(e) CoMG
j / mA cm-2
E / V vs. RHE
400
625
900
1225
1600
2025
2500


(f) CoMG
j-1 / mA-1 cm2
ω-0.5/ rpm-0.5
0.7 V
0.6 V
0.5 V
0.4 V
0.3 V
0.2 V


(g) PMG
j / mA cm-2
E / V vs.RHE
400
625
900
1225
1600
2025
2500


(h) PMG
j-1 / mA-1 cm2
ω-0.5/ rpm-0.5
0.7 V
0.6 V
0.5 V
0.4 V
0.3 V
0.2 V

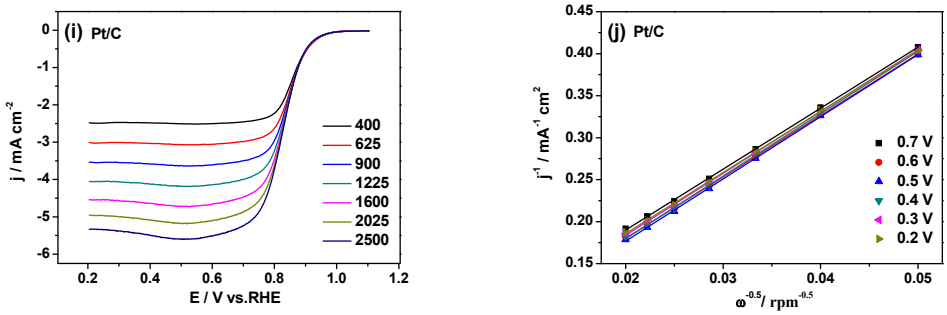


Figure S5. LSV curves at various different rotation rates for the ORR and corresponding K-L plots for (a, b) the CoPM, (c, d) the CoPG, (e, f) the CoMG, (g, h) the PMG, (i, j) the Pt/C 20 wt. %, in the O_2-saturated 0.1 M KOH solution. The dots are the experimental results and the straight lines are their corresponding fittings using Equation 1.