Supporting Information for

Microwave-assisted solvothermal preparation of nitrogen and sulfur co-doped reduced graphene oxide and graphene quantum dots hybrids for highly efficient oxygen reduction

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**Fig. S1** XPS survey for N, S-GQDs (A) and high resolution C1s (B), N1s (C), S2p (D) XPS spectra of N, S-GQDs.

**Fig. S2** ORR measurements of GCE modified with RGO (red) or RGO/N, S-GQDs (blue) in N$_2$-saturated 0.1 M KOH solution, O$_2$-saturated 0.1 M KOH solution.
**Fig. S3** (A) Linear sweep voltammetry curves for N, S-RGO/GQDs hybrids in N$_2$-saturated (black) and O$_2$-saturated (red) 0.1 M KOH solutions at the rotary speed of 1200 rpm. (B) Linear sweep voltammetry curves for N, S-RGO/GQDs hybrids in O$_2$-saturated 0.1 M KOH solution with different speeds. Scan rate is 5 mV s$^{-1}$.

**Fig. S4** TEM (A) and HRTEM (B) images of N, S-RGO/GQDs hybrids after 1000 cycles of CVs.
Fig. S5 CVs of GCE modified with N, S-RGO/GQD hybrids after being annealed at 800 °C for 2 h in the Ar in N₂-saturated 0.1 M KOH solution (a), O₂-saturated 0.1 M KOH solution (b). Scan rate is 5 mV s⁻¹.

Fig. S6 (A) Rotating disk electrode (RDE) curves for GCE modified with N, S-RGO/GQDs hybrids after being annealed at 800 °C for 2 h in the Ar in O₂-saturated 0.1 M KOH solution with different rotating speeds at the scan rate of 5 mV s⁻¹. (B) Koutecky–Levich plots derived from the RDE measurements.
Fig. S7 XPS survey (A) and high resolution N1s (B), S2p (C), C1s (D) XPS spectra of N, S-RGO/GQDs hybrids after being annealed at 800 °C for 2 h in the Ar.

Table S1 Comparison of ORR catalytic performances between N, S-RGO/GQDs hybrids and other doped carbon materials in literatures.

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<th>Catalyst</th>
<th>Onset potential</th>
<th>Electron transfer number</th>
<th>Reference</th>
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<td>NCM_{58}</td>
<td>-0.13 V</td>
<td>3.4 (at -0.9 V)</td>
<td>[1]</td>
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<tr>
<td>NG</td>
<td>-0.183 V</td>
<td>1.7-2.0 (at -0.4~0.7 V)</td>
<td>[2]</td>
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<tr>
<td>SGnP</td>
<td>-0.18 V</td>
<td>3.3 (at -0.6 V)</td>
<td>[3]</td>
</tr>
<tr>
<td>NG</td>
<td>-0.10 V</td>
<td>3.6 (at -1.0 V)</td>
<td>[4]</td>
</tr>
<tr>
<td>GN12</td>
<td>-0.30 V</td>
<td>2.0 (at -0.4~0.6 V)</td>
<td>[5]</td>
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<tr>
<td>N, S-RGO/GQDs</td>
<td>-0.10 V</td>
<td>3.6-4.0 (at -0.45~0.60 V)</td>
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