Supplementary Information

Nitrogen and Sulfur Co-doping of Partially Exfoliated MWCNTs as Three Dimensional Structured Electrocatalyst for the Oxygen

Reduction Reaction

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Figure S1. Photographic images of MWCNT with different exfoliation degree before and after 1 min sonication and then standing for 15 min and 30 min.



Figure S2. FT-IR spectrum of MWCNTs with different exfoliation degrees.



Figure S3 (a) Nitrogen sorption isotherms at 77.3 K and (b) pore distribution of NSCNT-0, NSCNT-3 and NSCNT-6 catalysts.



Figure S4. Thermo gravimetric analysis (TGA) of thiourea tested in N₂ atmosphere.



Figure S5. CV comparison of different NSCNT samples at a scan rate of 50 mV s⁻¹ in N_{2} - and O_{2} - saturated 0.1 M KOH solution.



Figure S6. (a) ORR Polarization curves of NSCNT-4 at various rotation rates (sweep rate 5 mV s⁻¹) in O₂-saturated 0.1 M KOH solution; (b) The corresponding Koutecky-Levich plots (j^{-1} vs. $\omega^{-1/2}$) at different electrode potentials.



Figure S7. (a) RRDE measurement on Pt/C at a scan rate of 5 mV s⁻¹ with a rotation rate of 1600 rpm; (b) The electron-transfer number n and H₂O₂ yield on Pt/C.



Figure S8. Cyclic voltammetry curves of NSCNT-3 and Pt/C in O_2 -saturated 0.1 M KOH solution and the presence of 1 M methanol.