

Supplementary Material

Synergistic Effect of Nitrogen Doping and MWCNT Intercalation for the Graphene Hybrid Support for Pt Nanoparticles with Exemplary Oxygen Reduction Reaction Performance

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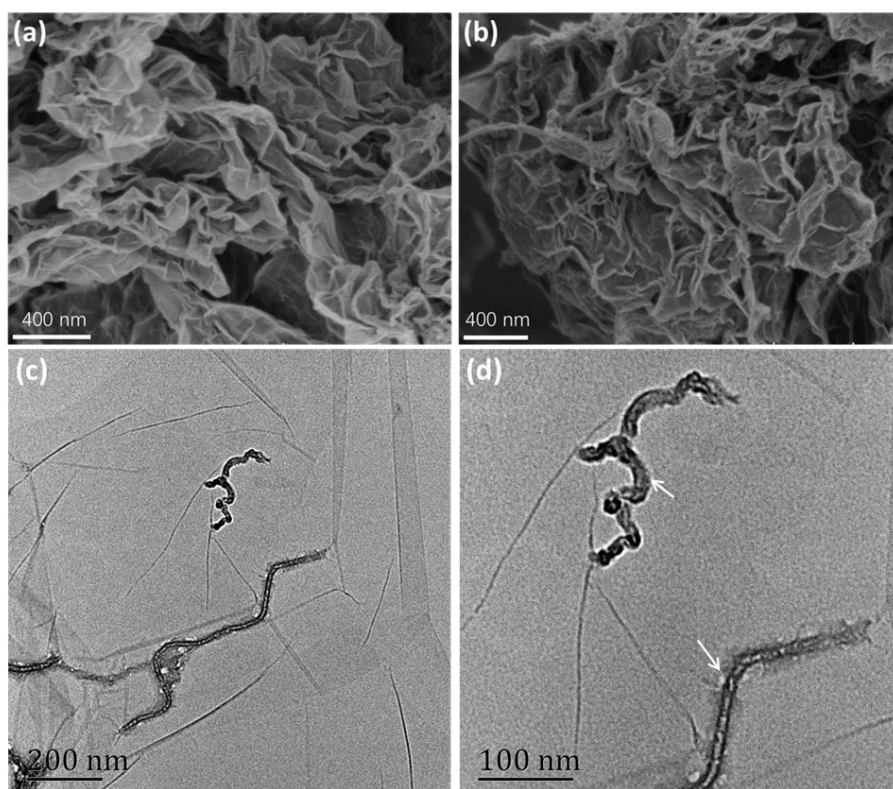


Figure S1. SEM images (a,b) and TEM images (c,d) of GO-MWCNT.

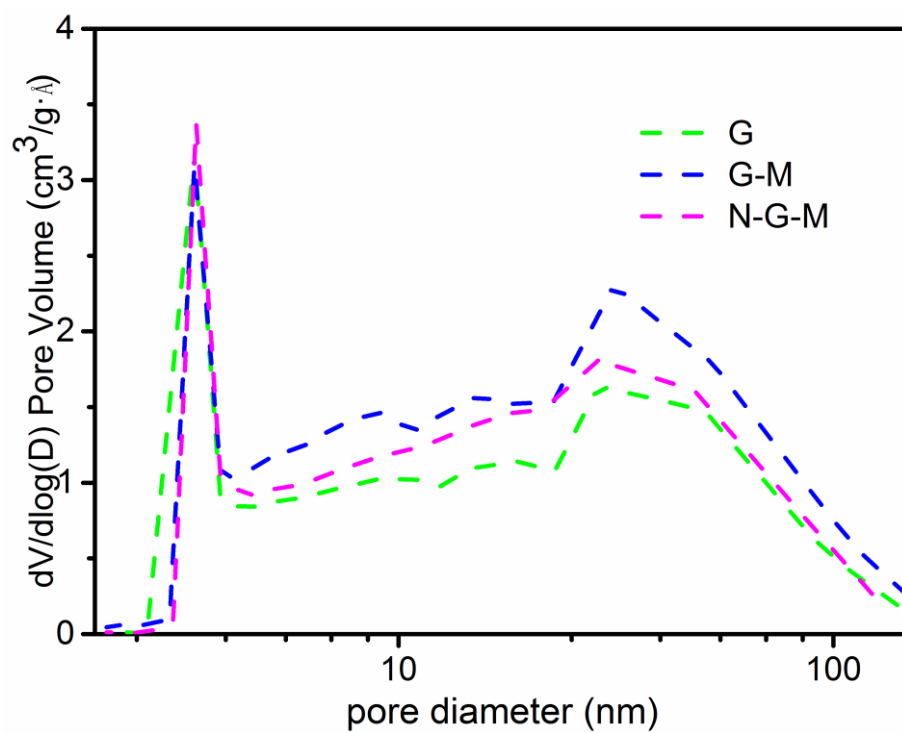


Figure S2. The pore size distributions of G, G-M, and N-G-M supports.

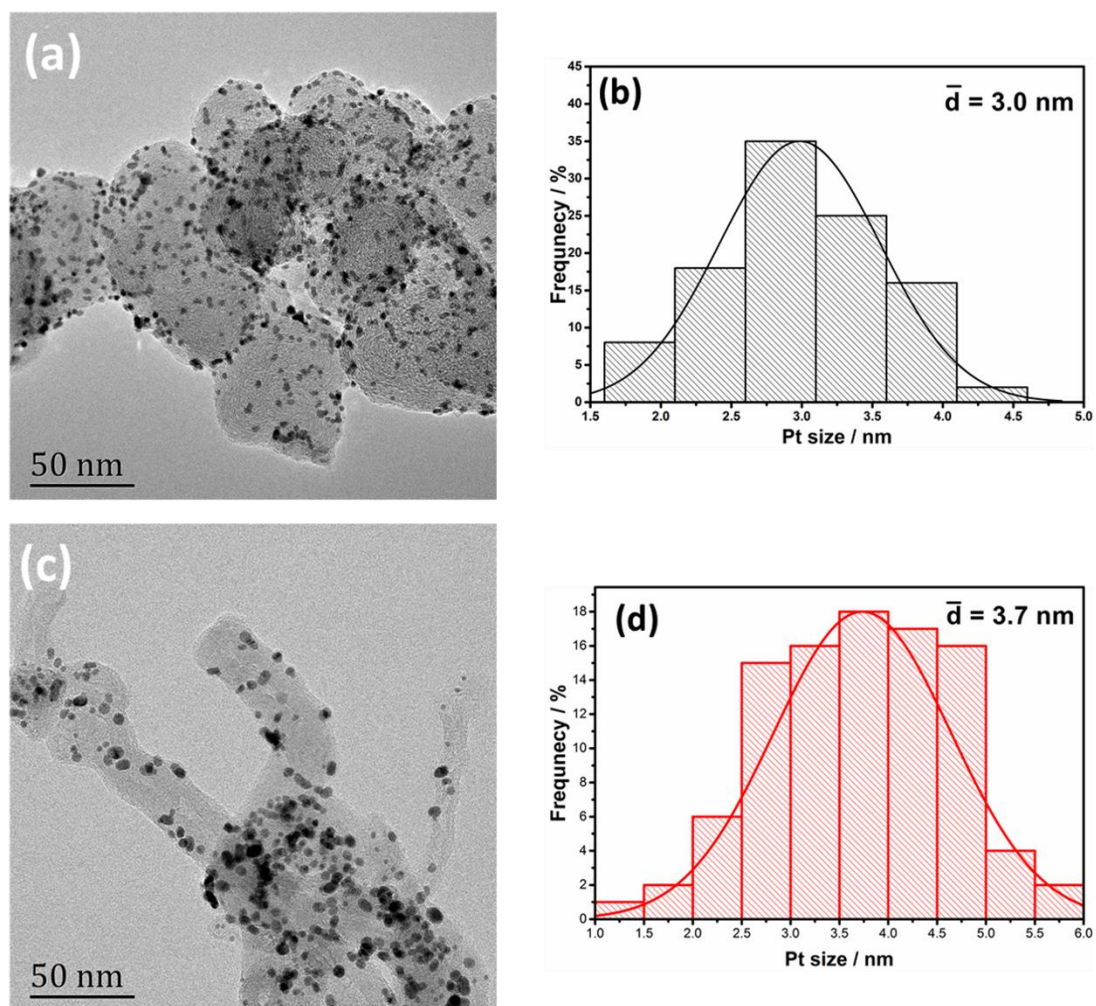


Figure S3. TEM images for (a) JM20 and (c) Pt/M catalysts. The corresponding particle size distribution curves for (b) JM20 and (d) Pt/M catalysts.

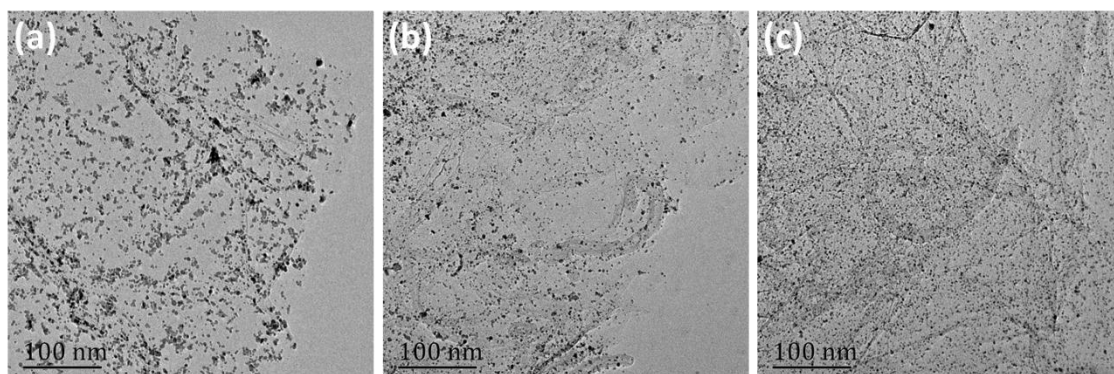


Figure S4. Low magnification TEM images for (a) Pt/G, (b) Pt/G-M, and (c) Pt/N-G-M catalysts.

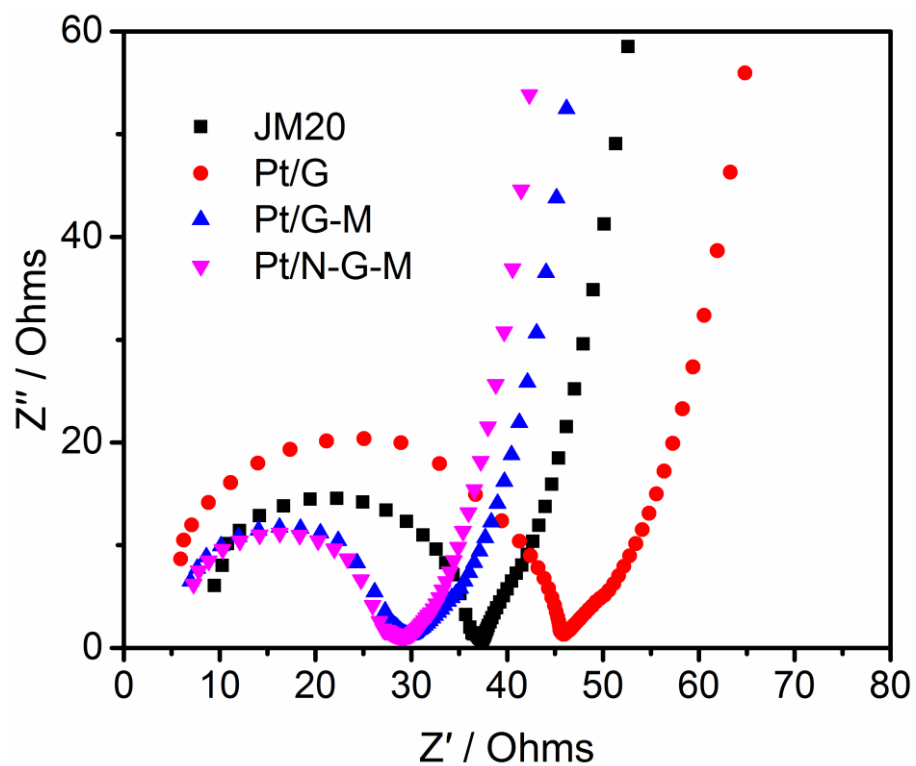


Figure S5. Nyquist plots of EIS for JM20, Pt/G, Pt/G-M and Pt/N-G-M recorded in 0.1 M HClO₄.

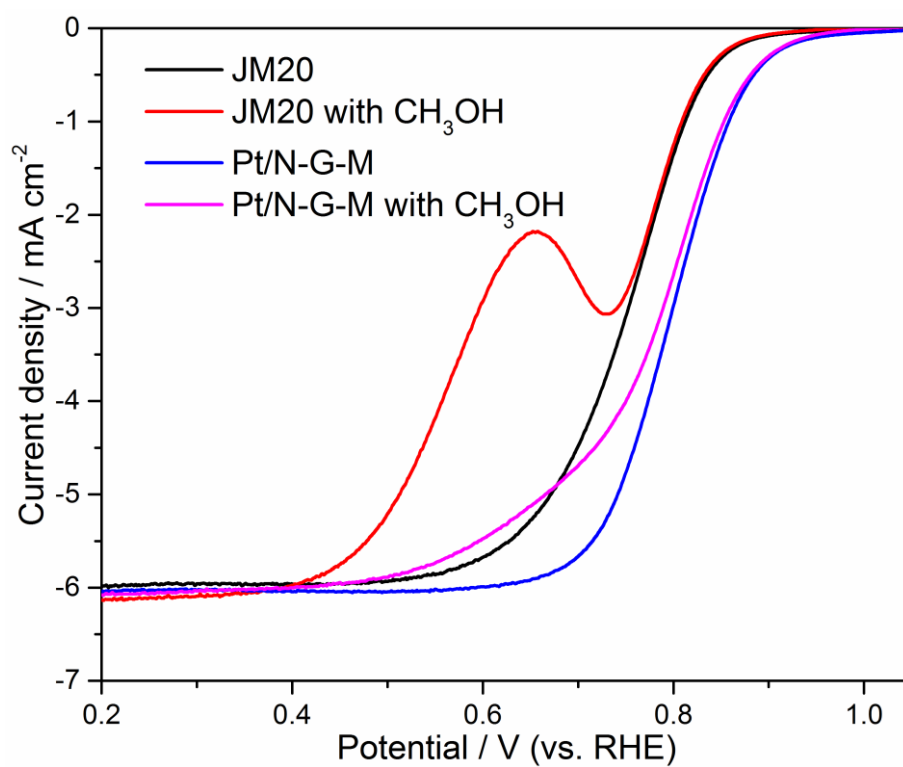


Figure S6. ORR polarization curves for JM20 and Pt/N-G-M catalysts in 0.1 M HClO₄ + 0.1 M CH₃OH with a potential scan rate of 5 mV·s⁻¹.

Table S1. Results of the fits of Pt 4f spectra, values given in percentage of total intensity.

Catalyst	Pt Species		
	Pt ⁰	Pt ²⁺	Pt ⁴⁺
Pt/G	51.1	32.6	16.3
Pt/G-M	57.2	32.1	10.7
Pt/N-G-M	59.6	30.2	10.2