

Electronic supplementary information

Nitrogen-doped mesoporous reduced graphene oxide for high performance supercapacitors

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1. Graphene oxide synthesis

A small amount of expandable graphite was charged into a 1 L beaker and heated for 10 s in a microwave oven. The graphite expanded to about 150 times its original volume. Graphene oxide was synthesized from the expanded graphite according to a modified Hummers method.^{S1} Typically, 1 kg of concentrated H₂SO₄ (95 wt%) was charged into a 2 L beaker equipped with a mechanical stirrer (Teflon impeller). The beaker was then placed into an ice bath and chilled to 0 °C. Seven grams of expanded graphite were gradually added under stirring to make a suspension. Next, 45 g of KMnO₄ was slowly added so that the temperature did not exceed 20 °C. The temperature was then raised to 35 °C and the suspension was stirred for 2 h. The beaker was subsequently chilled again in an ice bath and 1.5 L of deionized water was slowly added so as to maintain a temperature below 70 °C. The mixture was stirred for 1 h and then diluted with 10 L of deionized water. Fifty milliliters of H₂O₂ (30 wt%) was slowly added, and vigorous bubbles appeared as the color of the suspension changed from dark brown to yellow. The suspension was centrifuged and washed four times with a 1 M HCl solution, followed by centrifuging at 10,000 rpm and washing with deionized water to completely remove the acid until the pH of the GO dispersion reached 6. In its as-synthesized form, the GO dispersion was a paste. After drying the GO dispersion at 80 °C under vacuum for 24 h, the concentration of GO was determined to be approximately 1.0 wt%.

2. PMMA latex synthesis

Positively charged PMMA latex was prepared by surfactant-free emulsion polymerization. Typically, 875 mL of deionized water and 100 g of MMA were charged into a 2 L flask. The mixture was stirred at 350 rpm and bubbled with nitrogen for 30 min. The temperature was increased to 70 °C, followed by the addition of 0.15 g of 2,2'-Azobis (2-methylpropionamide) dihydrochloride dissolved in 25 mL of deionized water. Polymerization was carried out under stirring for 6 h. The PMMA latex had a concentration of 10 wt%.

3. Morphology of PMMA-GO and PMMA-RGO

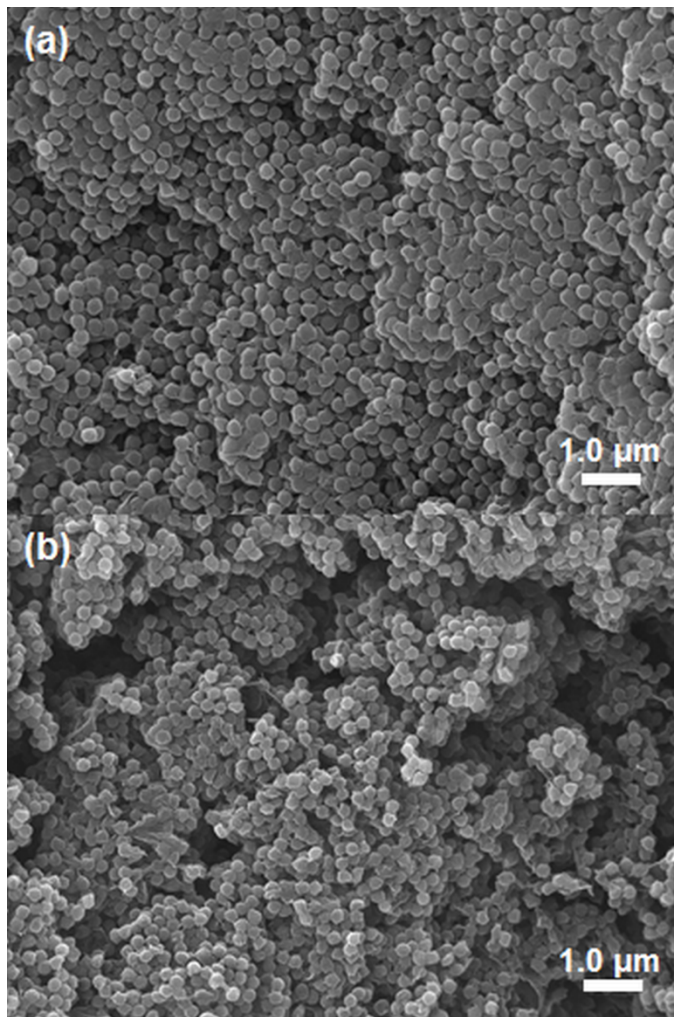


Fig. S1 SEM images of (a) PMMA-GO and (b) PMMA-RGO

4. Elemental composition

Table S1. Elemental composition of TRGO and CRGO determined by XPS

	C (at.%)	O (at.%)	N (at.%)	C/O	C/N
GO	66.9	30.4	-	2.2	-
TRGO	87.7	6.3	5.17	13.9	17.0
CRGO	93.4	4.3	2.26	21.7	41.3

5. Thermogravimetric analysis

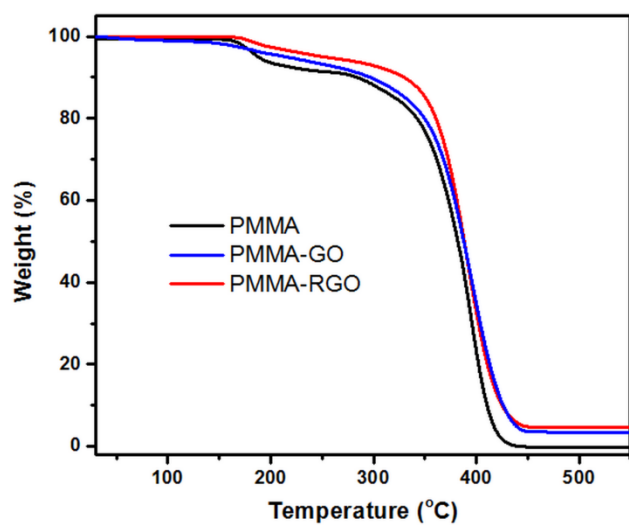


Fig. S2 TGA curves of PMMA, PMMA-GO and PMMA-RGO

6. CV of TRGO and CRGO

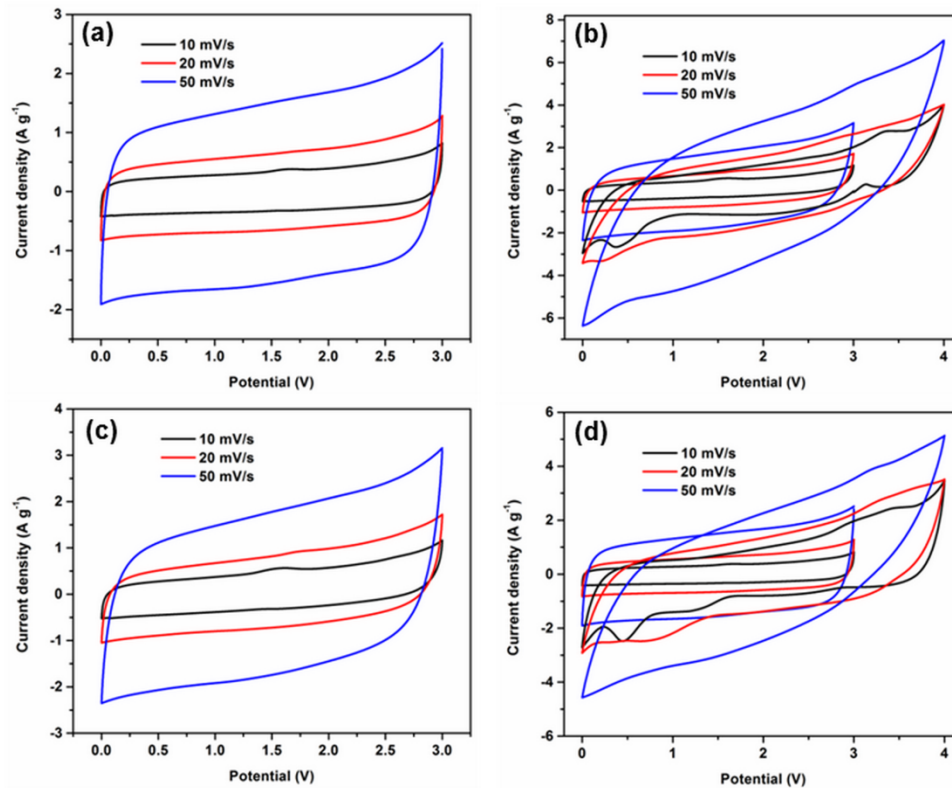


Fig. S2: CVs of TRGO (a) and CRGO (c) in potential window of 0-3.0 V; CVs of TRGO (b) and CRGO (d) in both potential window of 0-3.0 V and 0-4.0 V