Electronic Supplementary Materials

Freestanding 3D mesoporous graphene oxide for high performance energy storage applications

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1. Supplementary Information

Materials. Graphite powders (325 mesh, 99.995%) was purchased from Alfa Aesar. All other reagents were commercially available and analytic grade and were used directly without any purification. Double distilled water was used throughout the experiments.

Synthesis of graphene oxide (GO). GO was prepared from graphite powder (Aldrich, <20um) by the modified Hummers method. Briefly, graphite powder (5.0 g) and 130 mL of concentrated H_2SO_4 were added into a 1 L flask until the powder was completely dispersed. The flask was then cooled to 0^{o}C using a water-ice bath. A 15.0 g of $KMnO_4$ powder was added to the cold reaction mixture, which was allowed to warm to room temperature. The temperature was then raised to 35^{o}C and the mixture was stirred for 2 h. The reaction mixture was cooled with an ice bath again, which was then diluted with 230 mL of water. To the diluted mixture, about 10 mL of H_2O_2 was added until evolution of gas was ceased. The mixture is allowed to settle for about 24 h. After settling, the clear supernatant was decanted. The remaining mixture was centrifuged and washed with a diluted HCl solute (10 % v/v) and a mixed solution containing CH_3OH and water (50% v/v) several times. The resulting graphene oxide (GO) was freeze-drying under vacuum at room temperature for 24 h, yielding about 6.0 g of dark brown powders.

2. Supplementary Figures

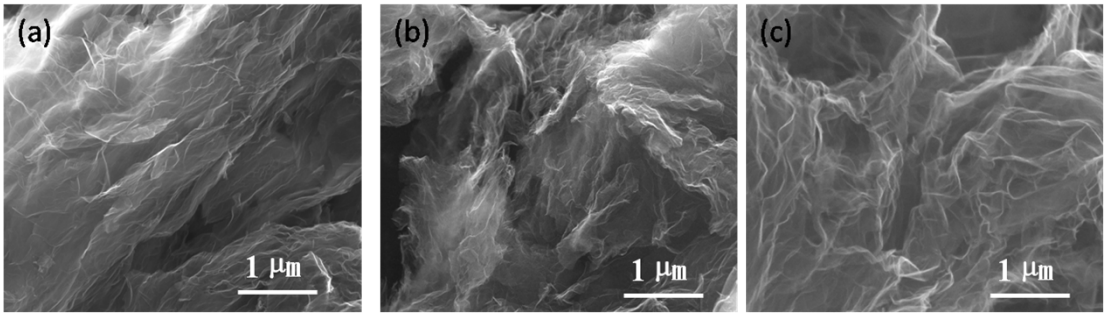

Fig.S1 SEM images of (a) CRGO-10, (b) CRGO-30, and (c) RGO.

Table S1 Comparison of capacitive performance based on graphene materials in the literatures.

Samples	Synthesis methods	Electrolyte	C_s (F g^{-1})	Ref.
3D a-MEGO	KOH activation	BMIMBF4/AN	165	[1]
3D-GFs	Soft template	1 M H_2SO_4	226	[2]
3D-graphene hydrogel	Hydrothermal reduction	H_2SO_4-PVA	186-196	[3]
3D HPG	Heating ion-exchanged resin	$TEMABF_4$/PC	178	[4]
3D macroporous graphene frameworks	Template by polystyrene spheres	1 M Na_2SO_4	202	[5]
Non-stacked RGO	Anti-solvent method	6 M KOH	236.8	[6]
Porous graphene	MgO template	6 M KOH	303	[7]
Curved graphene	Thermal reduction	$EMIMBM_4$	100	[8]
Functionalized graphene	$Mg(OH)_2$ template	6 M KOH	456	[9]
Porous graphene	CO_2-activated	1 M H_2SO_4	278.5	[10]
Restacking inhibited 3D RGO	Thermal reduction of melamine-mediated GO	$LiPF_6$	210	[11]
HPGN	Silica nanoparticles template	1 M H_2SO_4	492	[12]

Prous graphene	CVD and Far-infrared reduction	6 M KOH	320	[13]
Porous graphene	CO reduced, repaired, and activated	6 M KOH	291	This work

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