Electronic Supplementary Information (ESI)

Size Fractionation of Graphene Oxide Sheets Assisted by Circular Flow and their Graphene Aerogels with Size-dependent Adsorption

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Table S1 Experimental parameters of size fractionation of CGO.

Fractionation tube (mm)	Silicon sheet (anode) (mm)	Cone groove (mm)	Needle tubing (cathode)(mm)
Φ10×600	8×35	Φ9×20	Φ1.2×32

| Electric current (mA)	C_H^+ (mol L^{-1})	C_{CGO} (mol L^{-1})	Fractionation time (h)
0.95±0.05	0.1-0.5	0.2-2	3.5-4.5
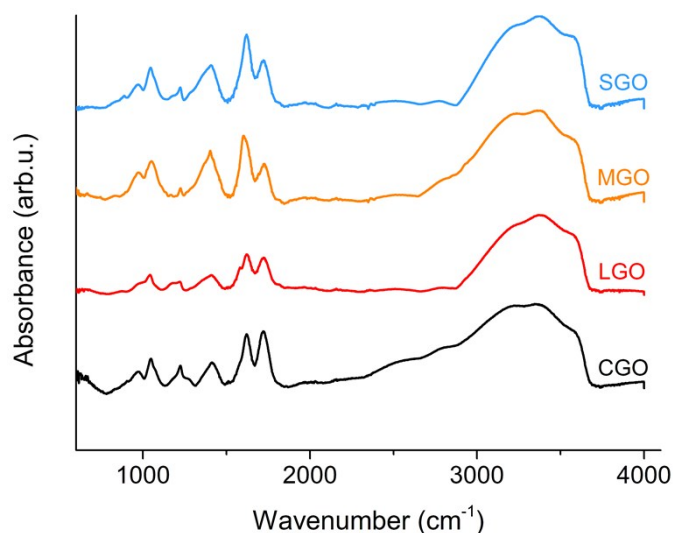
Fig. S1 FTIR spectra of CGO, LGO, MGO and SGO sheets. The following functional groups were identified in all GO specimens: O-H stretching vibrations (3420 cm^{-1}), C=O stretching vibration (1720-1740 cm^{-1}), C=C from aromatic sp^2 CC bonds (1590-1620 cm^{-1}), and C-O vibrations (1250 cm^{-1}).
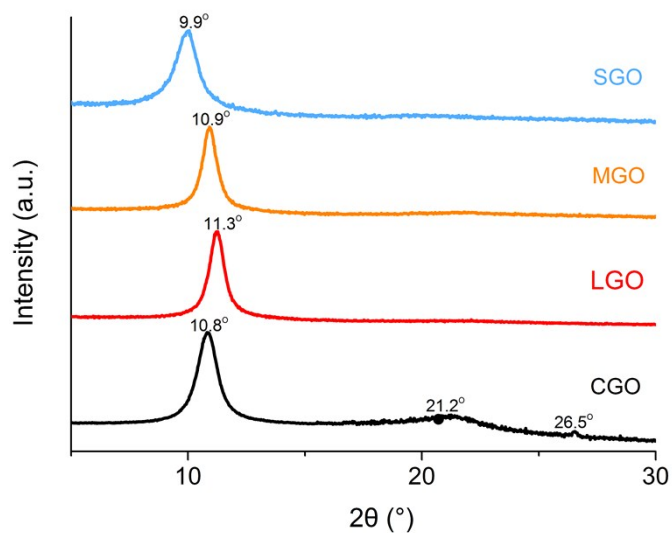

Fig. S2 XRD patterns of CGO, LGO, MGO and SGO specimens. There are four XRD diffraction peaks at 2θ =10.8^o, 11.3^o, 10.9^o and 9.9^o, corresponding to the WAXD patterns of CGO, LGO, MGO and SGO samples respectively.
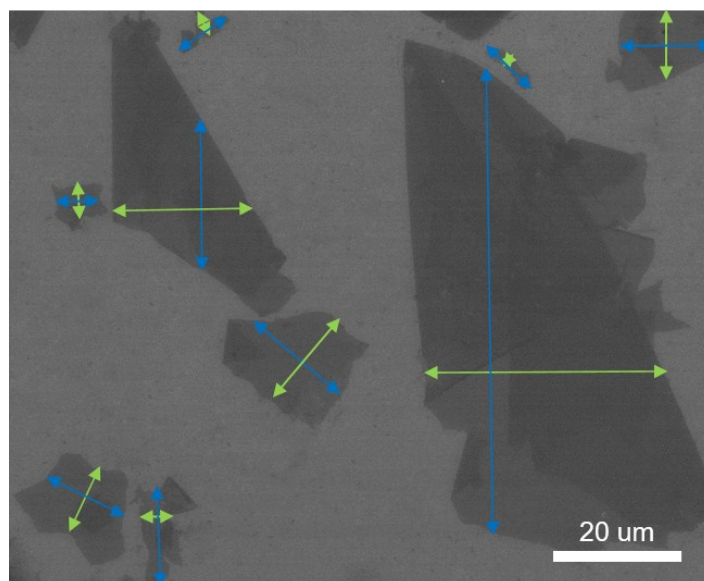
Fig. S3 Details for determination of the size of a GO sheet with irregular shape. The size of every sheet is defined as a square root of area value, which is obtained by largest (blue line) multiplying with the smallest (green line) transverse widths. According to the monolayer structure of graphene, the weight of a graphene sheet is directly proportional to its area value. Hence, the weight percentage of GO size distribution is relative to its area percentage.
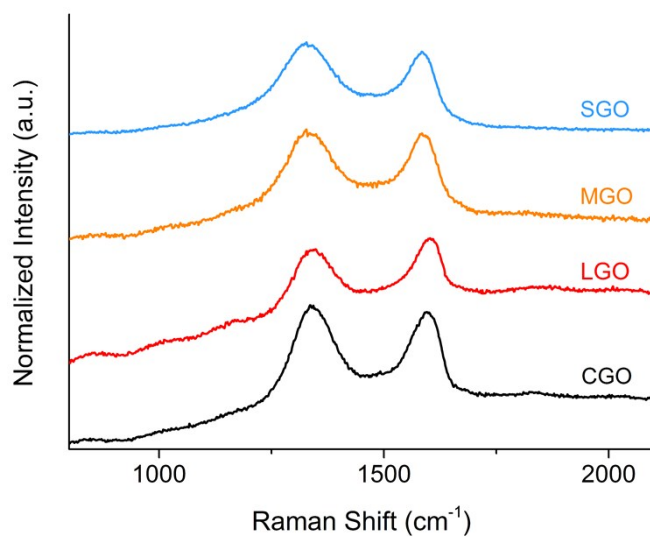
Fig. S4 Raman spectra of CGO, LGO, MGO and SGO sheets. Two usual bands were detected at GO sheets: the G-band near 1590 cm^{-1} corresponds to the Raman-active E_{2g} mode of graphite due to sp^2 hybridized carbons and the D-band around 1350 cm^{-1} is attributed to either sp^3 hybridized carbons or the structural defect sites of the sp^2 hybridized carbon network.
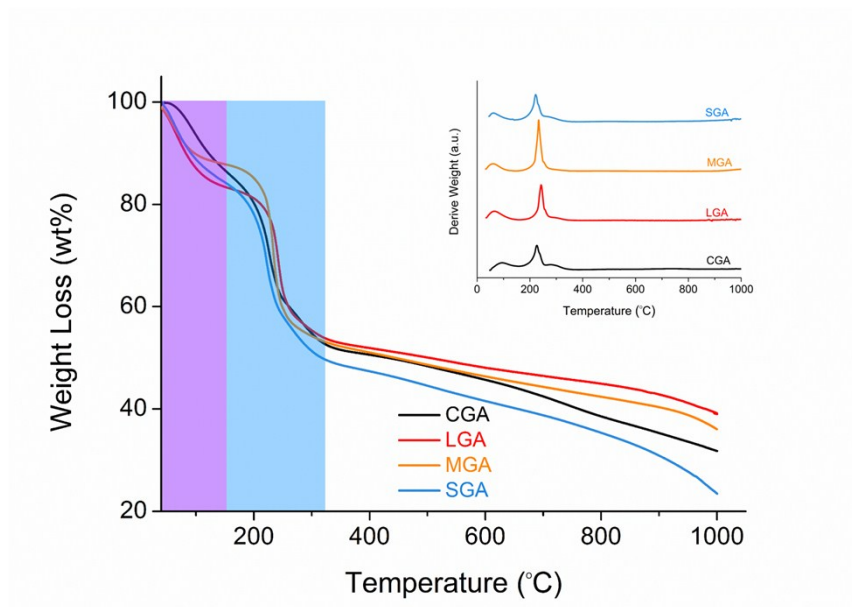
Fig. S5 TGA analysis of CGA, LGA, MGA and SGA, respectively. The inset is DTG analysis of these different aerogels.
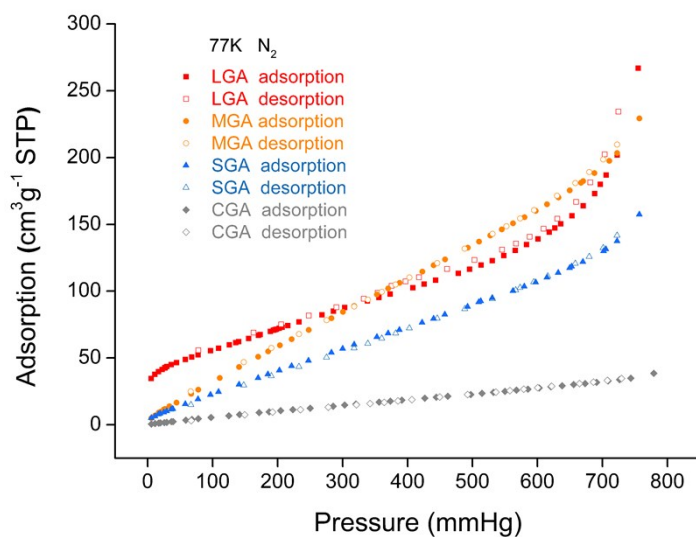
Fig. S6 Nitrogen adsorption–desorption isotherms of CGA, LGA, MGA and SGA, respectively. The BET surface areas ($m^2 g^{-1}$) of different graphene aerogels decreases in the following sequence: LGA (86.4) > MGA (84.3) > SGA (56.3) > CGA (2.4).