

Supporting Information

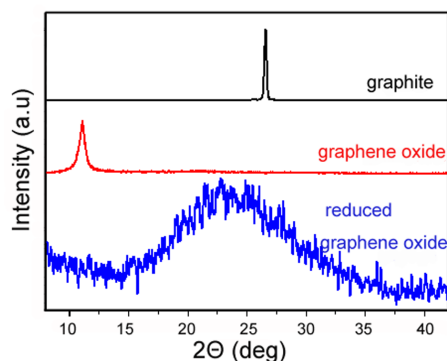


Figure S1. X-ray powder diffraction patterns of pristine graphite, graphene oxide before and after reduction with L-AA for 48 hours.

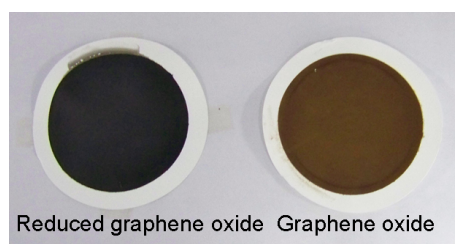


Figure S2. Optical images of the reduced graphene oxide and graphene oxide thin papers used for electrical conductivity measurement.

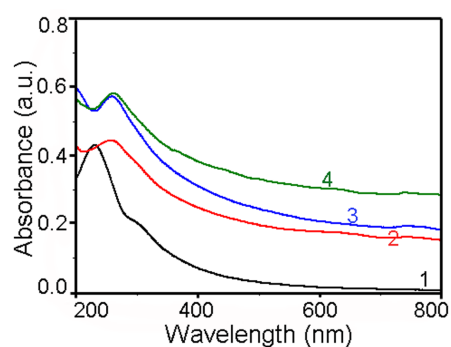


Figure S3. UV-vis absorption spectra of GO aqueous dispersions before (1) and after being reduced via L-AA for 12 hours with different GO to L-AA ratios of 1:2 (2), 1:10(3), and 1:20(4).

Experimental section

1. Preparation of the graphene oxide (GO)

Graphene oxide was prepared using natural graphite powder through a modified Hummers method. In a typical experiment, graphite (2 g, 500 mesh) and sodium nitrate (1 g) were put into a 250 ml flask at 0 °C. Subsequently, concentrated H₂SO₄ (50 mL) was added slowly in the flask under stirring, and the temperature of mixture was kept at 5 °C. The mixture was stirred continuously for 2 hours, and meanwhile 7.3 g of KMnO₄ was added in small portions to prevent the rapid temperature rise (the temperature was kept at ~10 °C). Then, the temperature of the reaction mixture was lifted to 35 °C and was stirred for 2 hours. After completion of the reaction, 90 ml of water was poured slowly into the solution under vigorous stirring, and dark brown suspension was obtained. The suspension was treated further by adding the mixture of H₂O₂ (7 mL, 30%) and water (55 mL) to convert the residual permanganate and MnO₂ into soluble MnSO₄. The resulting suspension has bright yellow color. The graphite oxide was separated from the reaction mixture by filtration. The yellow-brown graphite oxide powders were washed for three times with warm (~ 40 °C) diluted HCl (3 %, 150 ml), and were dried finally at 40 °C for 24 hours under vacuum.

The graphite oxide was exfoliated into graphene oxide (GO) sheets by ultrasonication (200 w) at room temperature for one hour. The as-obtained yellow-brown aqueous suspension of GO was stored at room temperature on lab bench, and used for further characterizations and the chemical reduction.

2. Characterization

FT-IR spectra: The FT-IR spectra were obtained on a Fourier Transform Infrared spectrometer (EQUINOX 55, Bruker, Germany). The samples for FT-IR measurement were prepared by grinding the dried powder of reduced graphene oxide or graphene

oxide with KBr together, and then compressed into thin pellets.

Raman spectra: Raman measurements were performed on an Invia/Reflrx Laser Micro-Raman spectroscope (Renishaw, England) with excitation laser beam wavelength of 514 nm. The powders of reduced graphene oxide or graphene oxide (~ 0.5 mg/mL) were placed on a clean SiO₂/Si substrate that was used for the Raman measurement.,.

UV-vis spectra: Absorption spectra were recorded on a UV-2550 UV-vis spectrometer (SHIMADZU, Japan). The aqueous suspensions of graphene oxide or reduced graphene oxide were used as the UV-vis samples, and the pure water was used as reference.

TEM: Transmission Electron Microscopy (TEM) images (including high resolution images) and selected area electron diffraction (SAED) patterns were acquired using a JEM-2010 transmission electron microscope (JEOL Ltd., Japan) operated at 200 kV. The specimens of TEM were prepared by placing the aqueous suspension (~ 0.02 mg/mL) of graphene oxide or reduced graphene oxide on the carbon-coated copper grids, and blotted after 30 s.

AFM: Atomic Force Microscopic images of graphene oxide and graphene were taken on a MultiMode Nanoscope V scanning probe microscopy (SPM) system (Veeco, USA). The commercially available AFM cantilever tips with a force constant of ~ 48 N/m and resonance vibration frequency of ~ 330 kHz were used. The scanning rate was set usually at 0.7-1 Hz. The samples for AFM were prepared by dropping aqueous suspension (~ 0.02 mg/mL) of the reduced graphene oxide or graphene oxide on freshly cleaved mica surface and dried under vacuum at 80 °C.

Electrical conductivity measurement: The electrical conductivity of reduced GO was measured using a SZ-82 digital four-point probe system (Suzhou, P. R. China).

The thin circle “papers” (1 cm in diameter, 0.3 mm in thickness) of reduced GO, prepared by filtration and were dried under vacuum at 80 °C for 12 hours, were used as samples for the electrical conductivity measurement. To get the reliable electrical conductivity data, the four-point probe system was carefully placed on the reduced GO “papers”, and three different sites of each sample were chosen to measure.

X-Ray powder diffraction (XRD) : the X-ray powder diffraction patterns were recorded on a BRUKER-AXS diffractometer (Bruker, Germany) using Cu K α radiation ($\lambda = 0.154$ nm).

XPS: The XPS measurements were performed on a X-ray photoelectron spectroscopy (Axis Ultra DLD, Kratos Analytical, UK) using monochromated Al K α (1486.6 eV) source at 15 kV.