Electronic Supplementary Information

Preparation of reduced graphene oxide/cationic polyacrylamide composite via flocculation and its electrochemical properties

Experiment details

GO was prepared by oxidizing natural graphite powder based on the modified Hummers method. The as-obtained GO (120mg) was ultrasonically dispersed in deionized water (120ml), then certain amounts of CPAM (Mn=$6x10^6$) aqueous solution (0.3mg/ml) was added. The mixture was stirred for 30min, followed by slow addition of sodium borohydride (1.2g).Finally, the solution was kept at 80°C for 2h with agitation. After that, the obtained RGO/CPAM composite solution was centrifuged and washed with deionized water until the pH was 7. The product was dried at 45°C for 24h under vacuum, then ground into powder and sealed storage. Composites were named RGO/CPAM1 and RGO/CPAM2 respectively according to the amount (40ml and 80ml) of the CPAM solution added. For comparison, reduced graphene oxide (RGO) was also prepared through the same way without the addition of CPAM.

The working electrodes were prepared by mixing the obtained powders with 5wt% acetylene black and 5wt% polytetrafluoroethylene (PTFE).Then it was made to be a homogeneous paste by the addition of a small amount of deionized water. About 10mg of the mixture pressed onto nickel foam current-collectors (1.0cm×1.0cm) to prepare electrodes. Electrochemical measurements were carried out at room temperature in an electrolyte of 6 M KOH solutions. Platinum foil and a mercury/oxide mercury electrode were used as the counter and reference electrodes respectively.

Characterization

Fourier transform infrared (FT-IR) spectra of KBr tablet were measured on a Thermo Nicolet 8700 infrared spectrometer. Raman spectra was recorded using a Renishaw Raman spectroscope, with He-Ne laser excitation at 633nm. X-ray diffraction (XRD) analysis was performed on a Rotation Anode High Power X-ray diffractormeter. Morphologies of products were observed on a scanning electron microscope (SEM, JSM 5610LV). Transmission electron microscopy (TEM) images was obtained with a JEM2100F operated at 200kV.The electrical properties of the composite electrodes were tested on a CHI 660B electrochemical workstation (Shanghai CH Instrument Company, China).

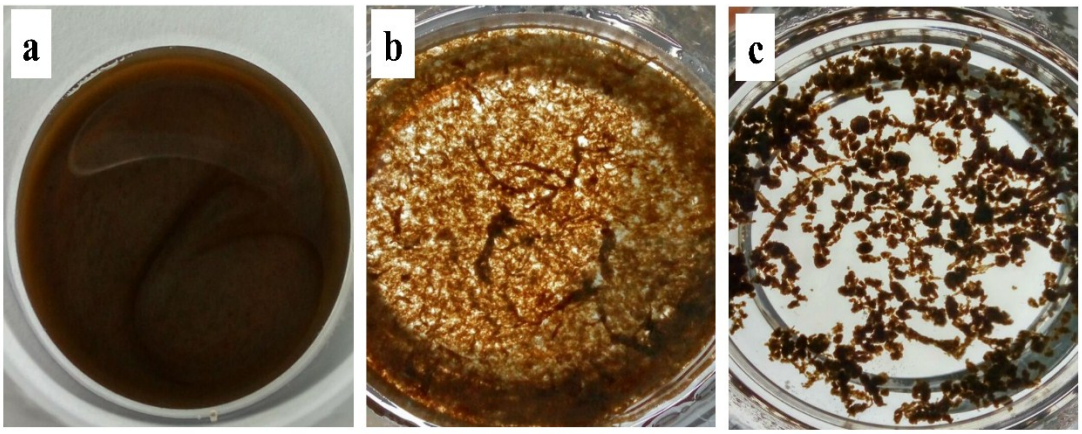

Fig. S1 10ml (1mg/ml) GO aqueous solution (a); 3ml (0.3mg/ml) CPAM solution was added into

the GO (b); 7ml (0.3mg/ml) CPAM solution was added (c).

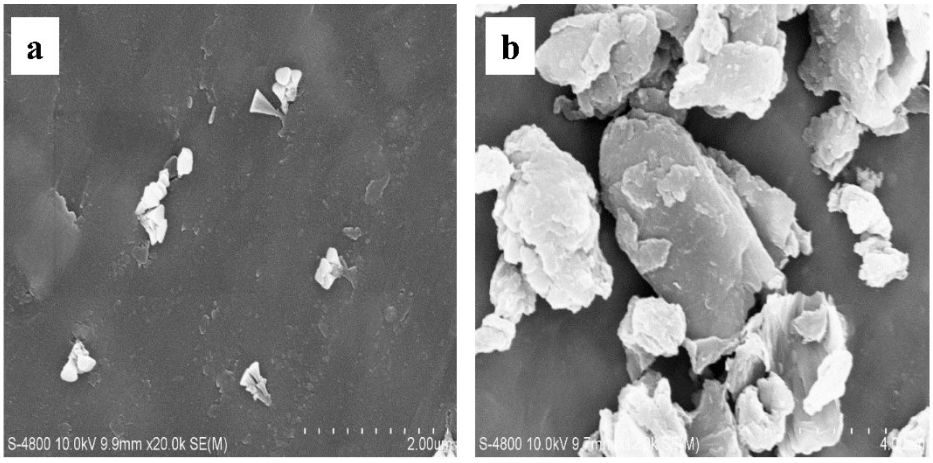

Fig. S2 SEM images of RGO (a) and RGO/CPAM2 composite (b)

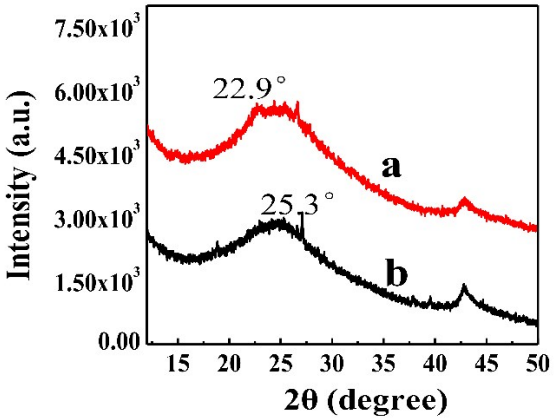

Fig. S3 X-ray diffraction patterns of RGO/CPAM2 composite (a) and RGO (b).