# Electronic Supplementary Information (ESI) for

# Fabrication of Novel Cubic-$Fe_3O_4$@rGO Composite via Colloid Electrostatic Self-assembly Process for Supercapacitors

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## Experimental section

*Synthesis of graphene oxide.* Graphene oxide (GO) was synthesized using the following modified Hummer's method.[S1] Graphite (2 g) was mixed with concentrated $H_2SO_4$ (69 mL) and the mixture was stirred for 30 min within an ice bath. $KMnO_4$ (8 g) was added very slowly into the dark suspension and the reaction mixture was stirred and sonicated for another 15 min under a reaction temperature of 20 °C. Then the ice bath was removed, and the mixture was stirred at 35 °C overnight. Distilled water was added to the pasty solution under magnetic stirring and the color of the solution turned to yellowish brown. After another 2 h of vigorous stirring, $H_2O_2$ (30*wt* %, 25 mL) was added and the color turned golden yellow immediately. The mixture was washed with HCl (5 %) for several times and then deionized water until the solution became acid free. The reaction mixture was filtered and dried under vacuum at 65 °C. The GO was obtained as a gray powder and used for the further experimental.

$Fe(OH)_3$ colloid solution was prepared using the method reported previously[S2]. 200mL of deionized water was boiled for 2 min, and then 40mL of $FeCl_3$ solution (10%

wt) was added dropwisely into the boiling water. After that, it needs to be heated for another 2 min to obtain the $Fe(OH)_3$ colloid solution. The $Fe(OH)_3$ colloid solution was cooled to room temperature for the further experiments.

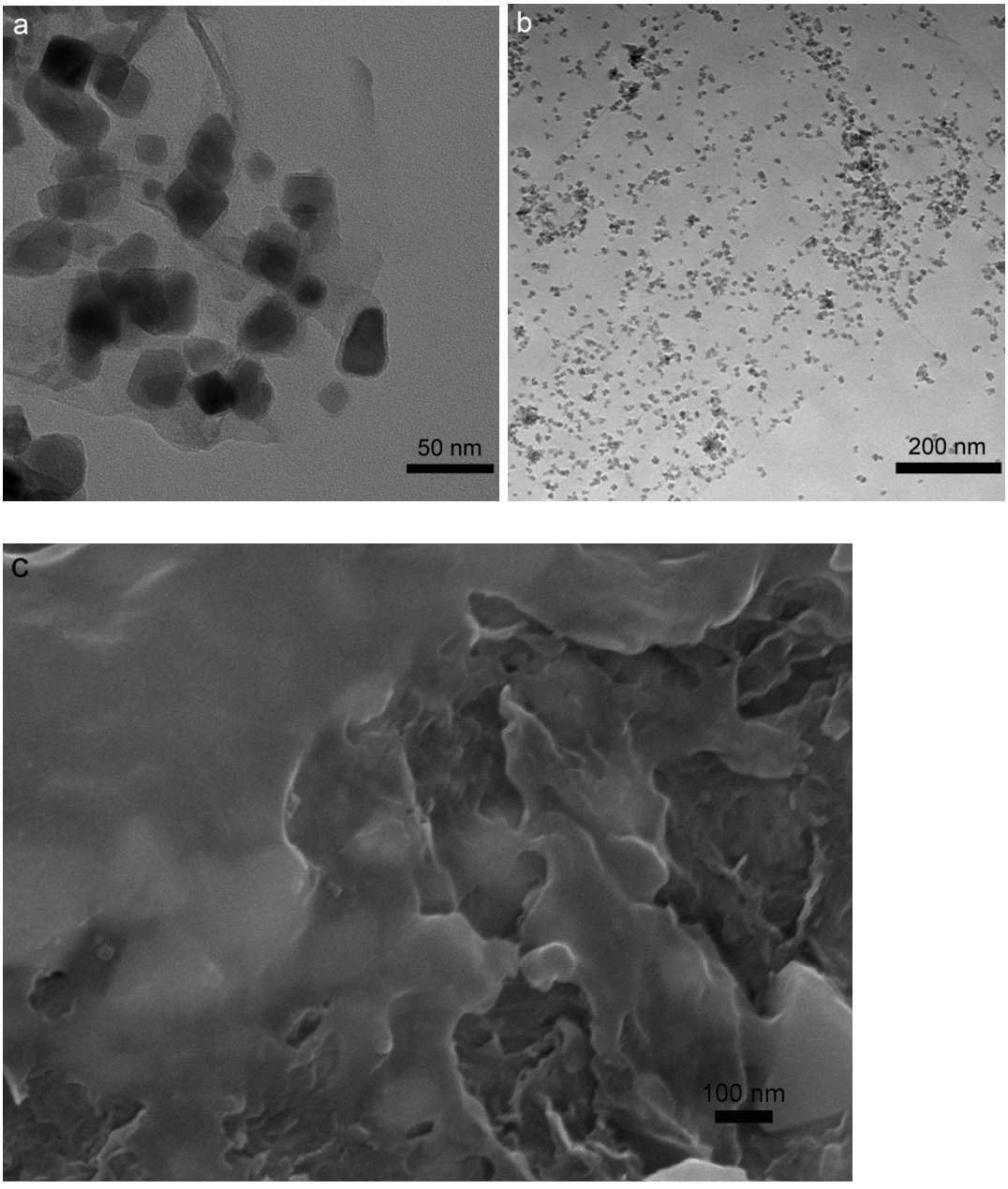



**Fig. S1** (a) TEM images of CFGC nanocomposite; (b)TEM images of $Fe(OH)_3$/graphene oxide nanocomposite; (c) SEM images of CFGC nanocomposite.

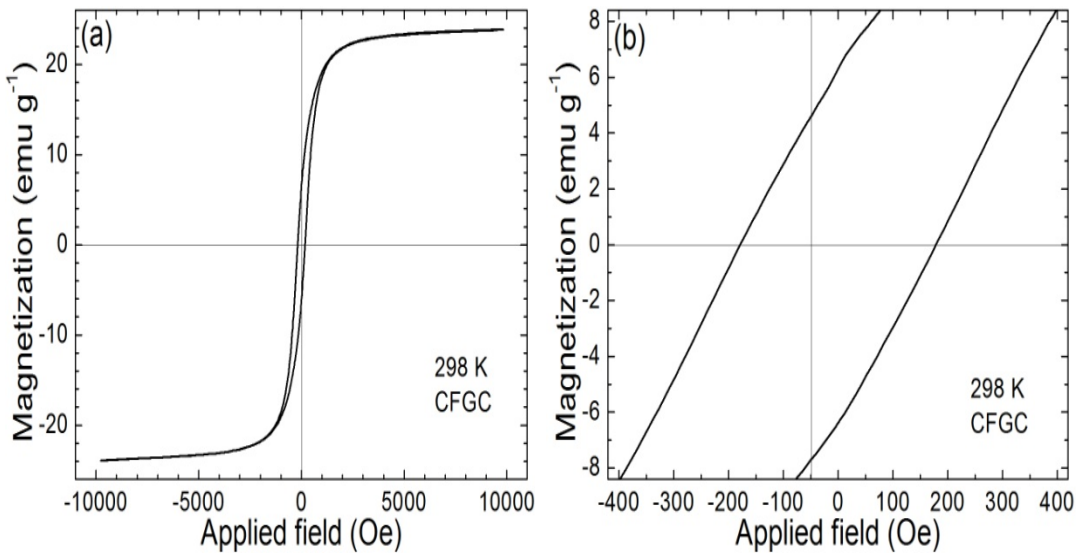
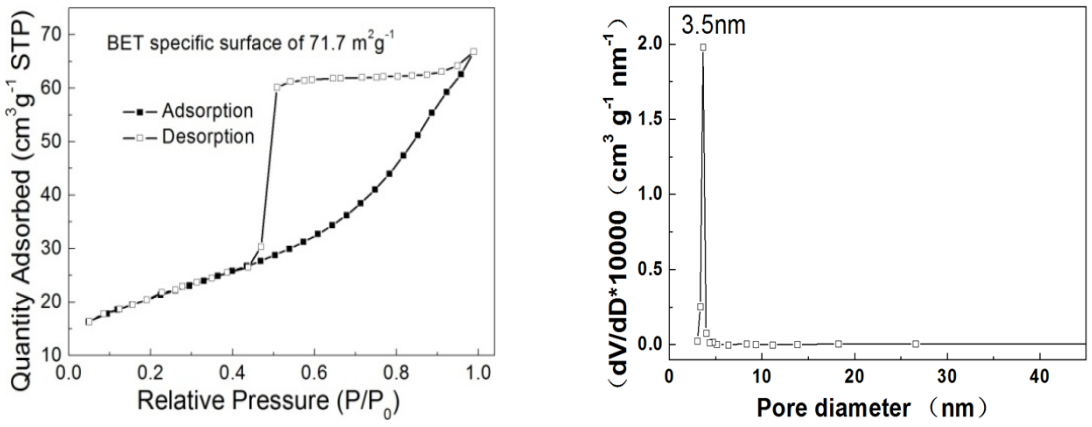
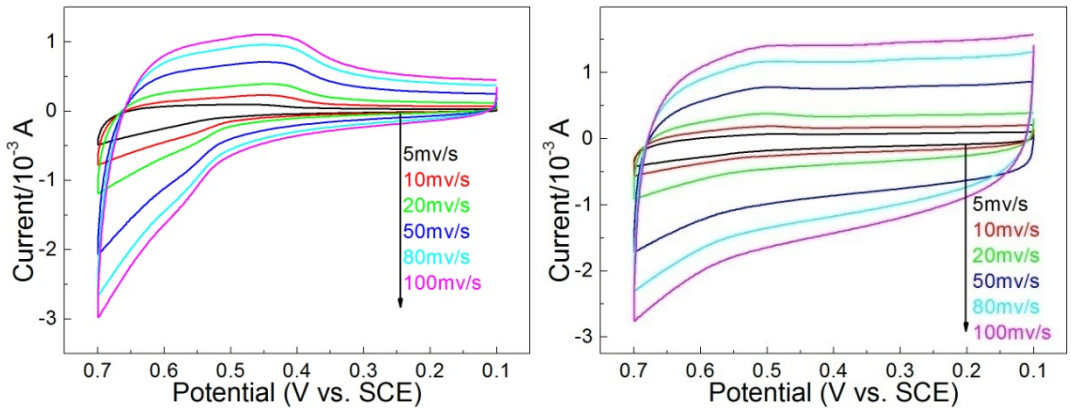



**Figure S2.** Magnetization curves for the CFGC.

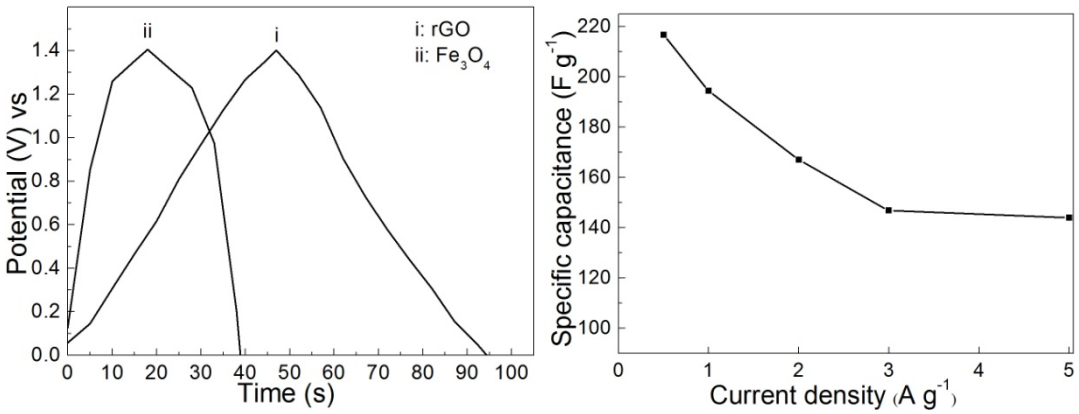



（a） （b）

**Figure S3.** （a）Nitrogen adsorption desorption isotherms at 77K. and （b） pore width distribution of CFGC.



a b




c d

**Figure S4.** (a) The cyclic voltammogram (CV) curves of $Fe_3O_4$ under the different scan rates of 5, 10, 20, 50, 80, and 100 mV $s^{-1}$; (b) The cyclic voltammogram (CV) curves of rGO under the different scan rates of 5, 10, 20, 50, 80, and 100 mV $s^{-1}$; (c) (i) rGO and (ii) $Fe_3O_4$ GCD curves at current density of 500 mA $g^{-1}$; (d) Specific capacitance of CFGC at different current densities.

**References**

[S1] W. S. Hummers and R. E. Offeman, *J. Am. Chem. Soc.*, 1958, **80**, 1339–1339.

[S2] Y. T. Chen, G. Fei, Y. Qiu, H. Hu, I. Kulaots, E. Walsh and R. H. Hurt, *ACS Nano*，2013, **7**, 3744-3753.