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Electronic Supporting Information (ESI)

Preparation of graphene-based composite aerogel and the effects of carbon nanotubes on preserving porous structure of aerogel and improving its capacitor performance

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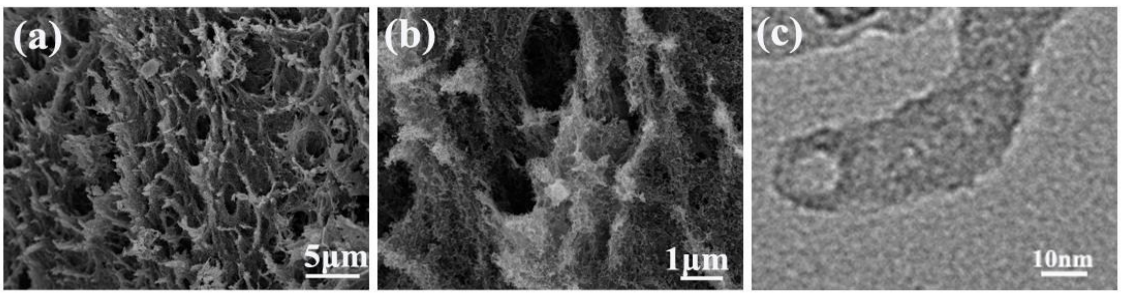

Fig.S1 SEM images of GCA/CNT (a, b); TEM image of GCA/CNT (c)

We prepared more control samples with different ratio of graphene and CNT by varying amount of ethanol and the as-obtained samples were denoted GCA/CNT-S and GCA/CNT-L, with an ethanol feeding speed of 0.2 mL/min and 1.0 mL/min for 45 mins, respectively.

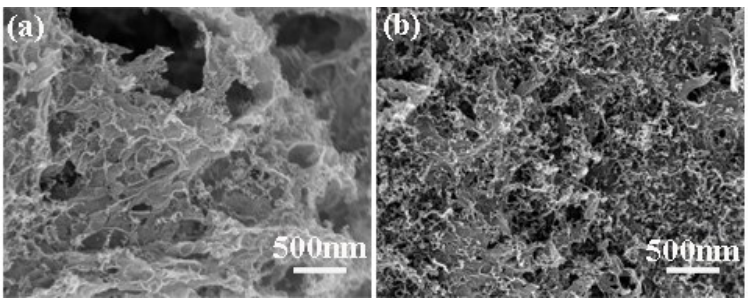

Fig.S2 SEM image of GCA/CNT-S (a) and GCA/CNT-L (b).

The SEM images of GCA/CNT-S and GCA/CNT-L were shown in Fig.S2. It is observed that the deposited amount of CNT can be easily changed by varying the amount of ethanol. However, GCA/CNT-L performs some agglomeration of the CNTs, when the total amount of ethanol increases to 45mL.

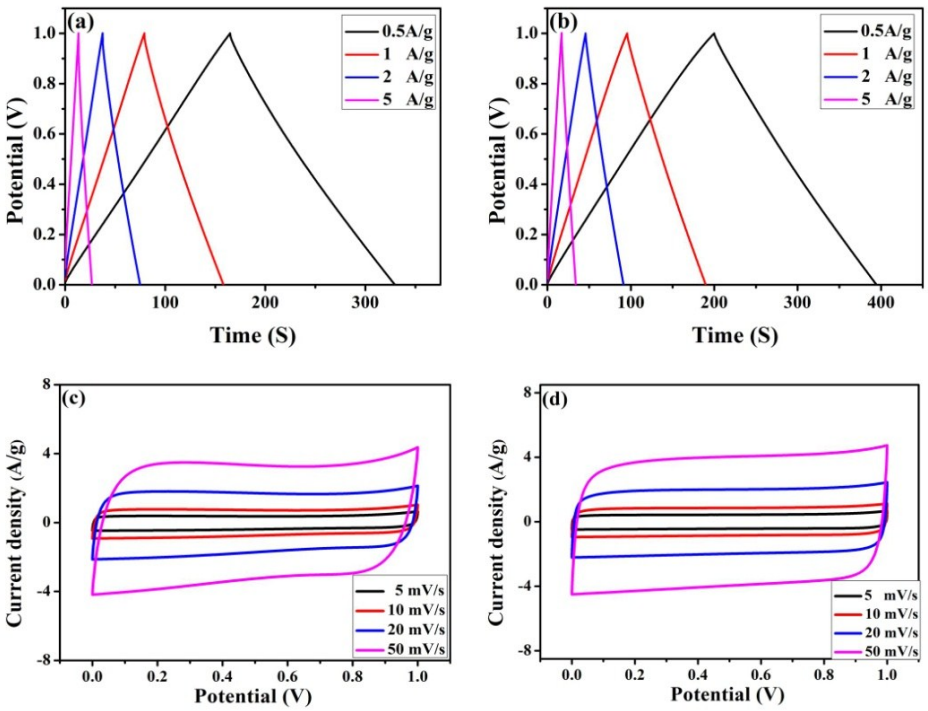

Fig.S3 Galvanostatic charge-discharge curves of GCA/CNT-S (a) and GCA/CNT-L (b) measured at different current density; Cyclic voltammetry curves measured at different scan rate of GCA/CNT-S (c) and GCA/CNT-L (d).

In addition, we have also performed the CV and galvanostatic charge-discharge tests of these samples and the results are provided in Fig.S3. The specific capacitances of GCA/CNT-S and GCA/CNT-L, based on the galvanostatic discharge curves, are calculated to be 159.5 and 198.2 F/g at a current density of 0.5 A/g, respectively. It is found that, the specific capacitance increases with higher CNTs amount, comparing GCA, GCA/CNT-S and GCA/CNT. That is attributed to the effect of carbon nanotubes on improving electrical conductivity and preserving more porous structure during the pressure treatment. Nevertheless, GCA/CNT-L exhibites a little lower capacitance than that of GCA/CNT, which is due to high weight ratio of CNTs in the composites and its lower SSA of CNT, which contributes relatively lower specific capacitance.