Electronic Supplementary Information for

All-solid-state asymmetric supercapacitor based on reduced graphene oxide/carbon nanotube and carbon fiber paper/polypyrrole electrodes

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Experimental section

Methylene blue technique for specific surface area measurement

Methylene blue (MB) is a common dye probe used to evaluate the specific surface area (SSA). The specific surface area was measured using MB adsorption method by UV-vis spectroscopy.[1-4] The test was taken by first adding a known mass of sample into a known volume MB solution of standard concentration. The mixed suspension was then sonicated for 2 h and stirred continuously for 24 h to reach the adsorption-desorption equilibrium of MB. The mixture was further centrifuged to remove any suspended material. The MB concentration was subsequently determined by analyzing the supernatant through UV-vis spectroscopy at a wavelength of 665 nm compared with the initial standard concentration. The value of specific surface area can be calculated from the amount of adsorbed MB according to the following equation:

$$SSA = \frac{N_A A_{MB}}{M_{MB}} \frac{(C_0 - C_e)V}{m_S}$$

where N_A is Avogadro number (6.02×10^{23}/mol), A_{MB} is the covered area of per MB molecule (typically assumed to be 1.35 nm^2), C_0 and C_e are the initial and equilibrium concentrations of MB, respectively, V is the volume of MB solution, M_{MB} is the relative molecular mass of MB, and m_S is the mass of the sample.
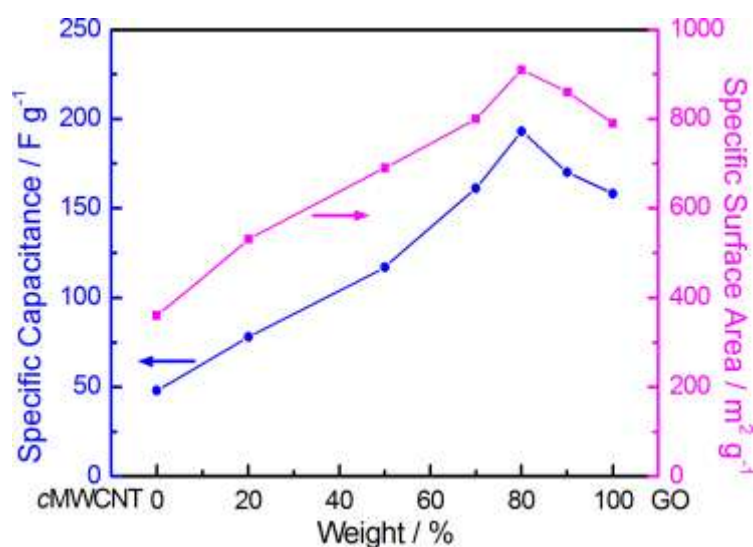
Results and discussion

Fig. S1 Influence of GO/cMWCNT weight ratio on the specific capacitance and the specific surface area of RGO/cMWCNT.
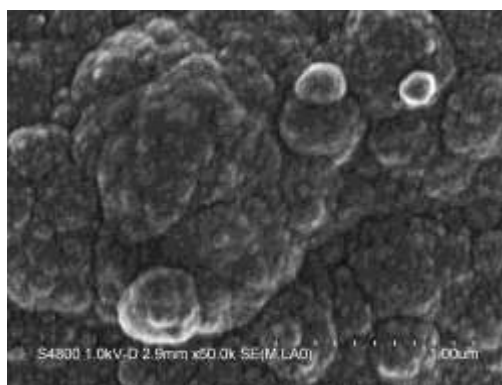

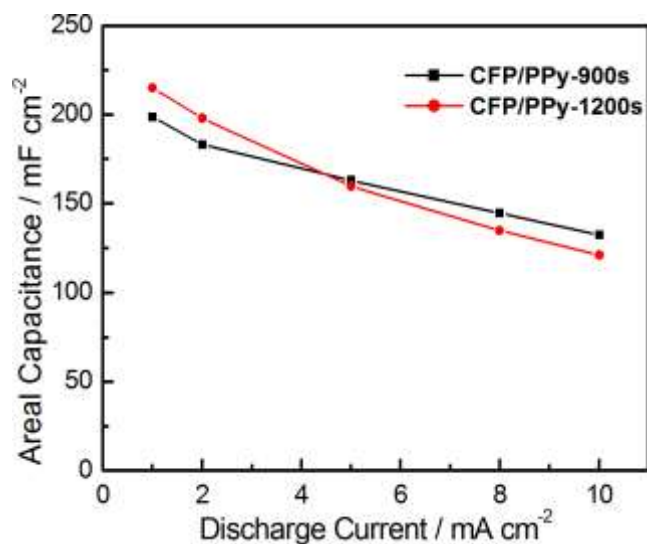**Fig. S2** FE-SEM image of CFP/PPy-1200s film with high magnification.

Fig. S3 Specific capacitance of CFP/PPy-900s and CFP/PPy-1200s
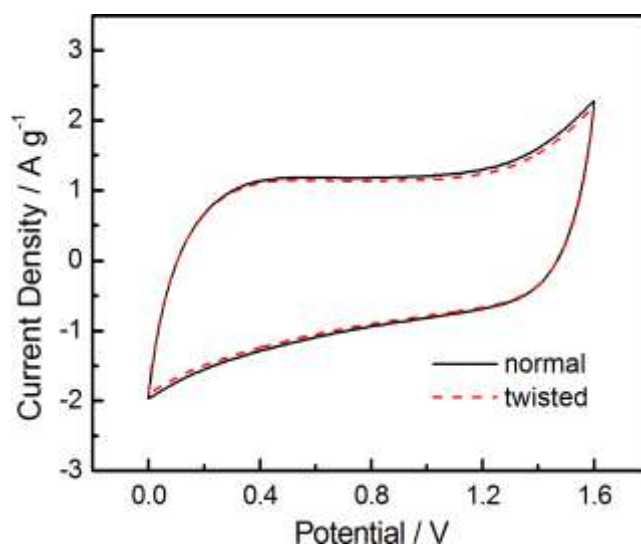
as a function of current densities.

Fig. S4 Cyclic voltammetry curves of CFP/PPy//RGO/*c*MWCNT ASC

at normal and twisted states.

References

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