# *Supporting information*

## High-performance compressible supercapacitors based on functionally synergic multiscale carbon composite textiles

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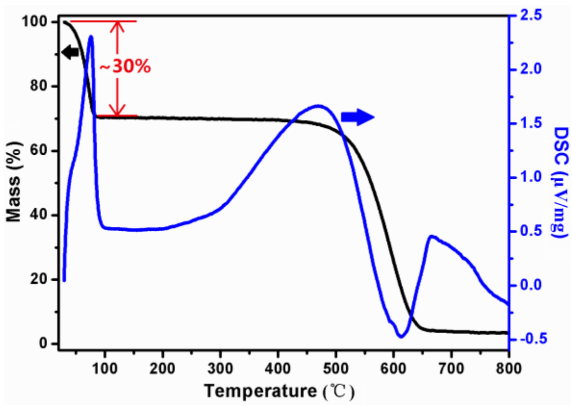


**Fig. S1** Thermogravimetric (TG) and differential scanning calorimeter (DSC) curves of original ACFF textile. Moisture content in the textile can be as high as ~30wt%, indicating that ACFF is extremely easy to absorb ambient moisture.

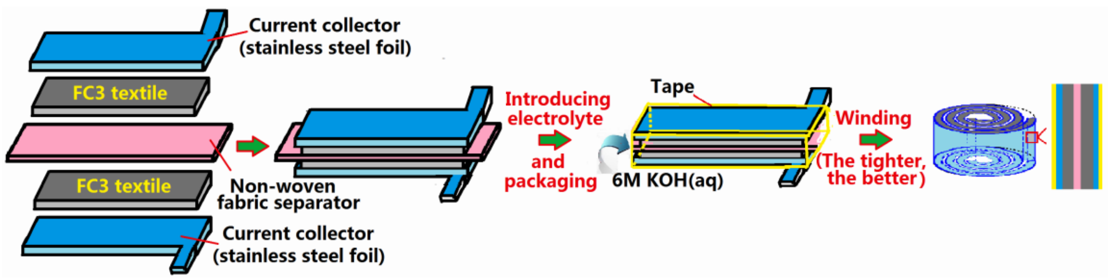


**Fig. S2** Preparation procedures of an spirally wound supercapacitor with FC3 composite textile electrodes.

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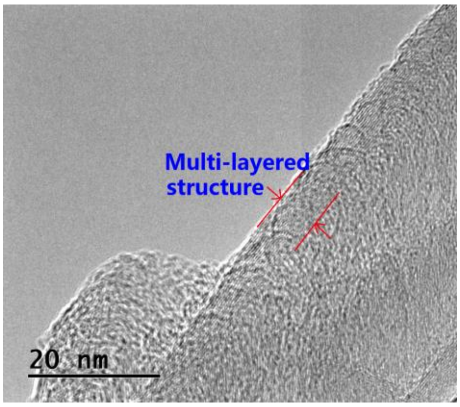


**Fig. S3** TEM image of magnified GN edge.

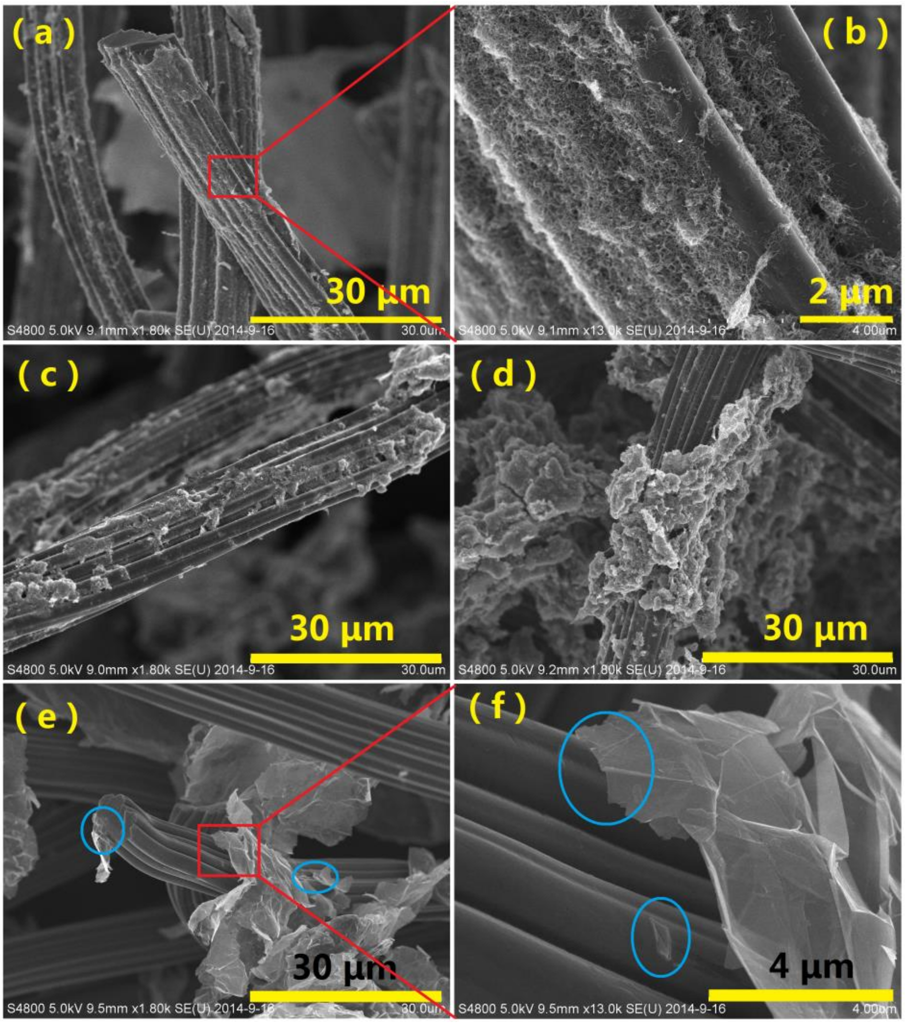


**Fig. S4** High magnification SEM images of composite textiles: (a) (b) are FC1, (c) is FC2, (d) is FC3 and (e) (f) are FG. Some nano-fillers cover at fiber surface, thus part of graves and pits existed on the surface of original activated carbon fibers "disappear".

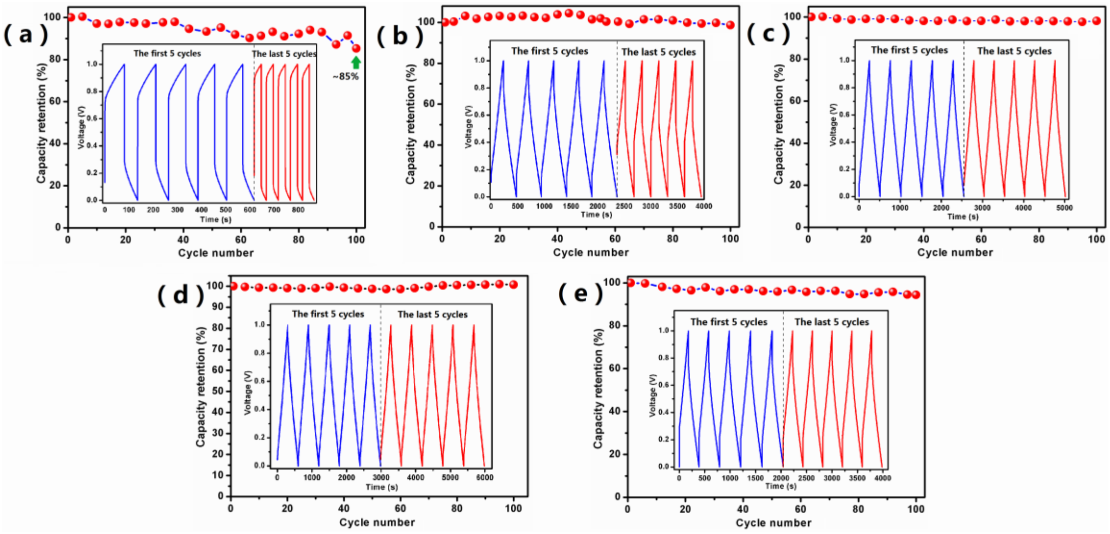


**Fig. S5** Cycling stability of each supercapacitor (current density is 5mA/cm$^2$): ACFF (a), FC1 (b), FC2 (c), FC3 (d) and FG (e) (inserts displays the first and last 5 charge-discharge cycles of corresponding device).

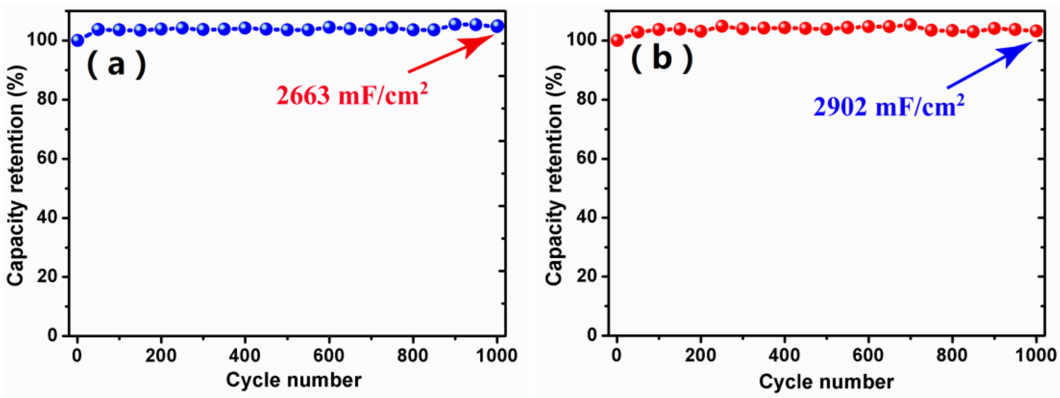


**Fig. S6** Capacity retention *vs* cycle number curves of FC2 (a) and FC3 (b). Note that the 1000 cycles in this figure exclude the first 100 cycles shown in **Fig. S5**, because the two tests of the same supercapacitors were performed under slightly different conditions, such as temperature, thus they were not merged together. Despite of this, excellent cycling stability is exhibited clearly.

**Table S1** Comparison of specific capacitances between our multiscale all-carbon composite textiles and some recently reported flexible electrodes (including fiber-like, paper-like and 3D textile electrodes) [a].

| Sample | $C_s$ (F/cm$^2$) | $C_g$ (F/g) | Ref |
|---|---|---|---|
| CNT/CMF/CNF | <0.09 (at 2mV/s) | 11.1 (at 2mV/s) | S1 |
| Fiber/pen ink | <0.05 (at 17 mA/cm$^2$) | - [b] | S2 |
| RG-O paper | - | 122 (at 5mV/s) | S3 |
| Self-stacked, solvated graphene film | - | 156.5 (at 1080A/g) | S4 |
| CNT/carbon fiber cloth/$MnO_2$ | ~1.33 (at 2mV/s) | 326 [c] (at 2mV/s) | S5 |
| SWNT/commercial paper | 0.02 (at 250 KW/Kg) | 132 (at 250 KW/Kg) | S6 |
| GN/annealed cotton cloth | - | 326.8 (at 10mV/s) | S7 |
| SWNT/Cotton | 0.48 (at 0.2 mA/cm$^2$) | ~90 (at 10 mA/cm$^2$) | S8 |
| 3D GN/$MnO_2$ composite networks | 1.42 (at 2mV/s) | 130 (at 2mV/s) | S9 |
| YP17/polyester microfiber | 0.43 (at ~0.25 A/g) | 81~90 (at 20 mV/s) | S10 |
| Activated carbon (YP17)/cotton lawn | 0.43 (at ~0.25 A/g) | 84~86 (at 20 mV/s) | S10 |
| CNT/ACFF | 124 (at 2mV/s)<br>128 (at 10 mA/cm$^2$) | 3.04 (at 10 mA/cm$^2$, *i.e.*, 0.42 A/g) | This work |
| GN/ACFF | 145 (at 2mV/s)<br>141 (at 10 mA/cm$^2$) | 2.44 (at 10 mA/cm$^2$, *i.e.*, 0.58 A/g) | This work |

[a] Ref. S1 and S2 are about fiber-like electrode materials, Ref. S3~S7 are about paper-like electrode materials, and the other references are about 3D textile electrode materials.

[b] The symbol means “not given” or “not clear”.

[c] The value is obtained based on the $MnO_2$ (4.09 mg/cm$^2$) alone, and if the substrate material (CNT/carbon fiber cloth) is also taken into account, it will be much smaller.

**References**

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