

Electronic Supplementary Materials

Flexible All-Carbon Nanoarchitecture Built from In Situ

Formation of Nanoporous Graphene Within “Skeletal-Capillary”

Carbon Nanotube Networks for Supercapacitors

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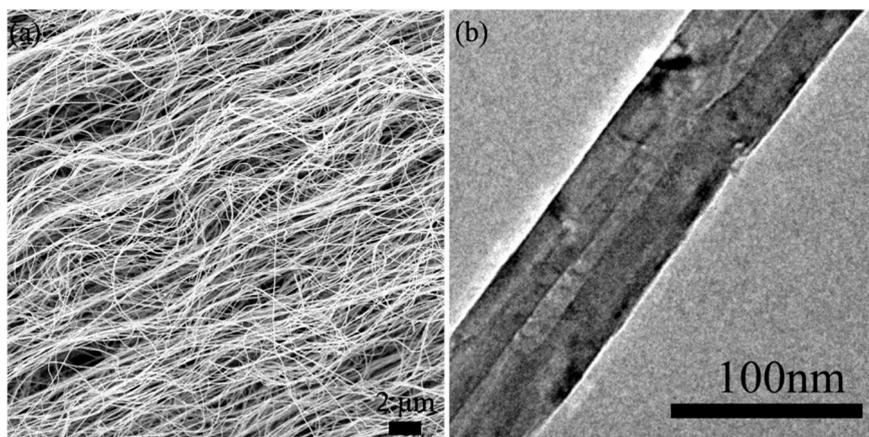


Figure S1 (a) SEM and (b) TEM images of long- skeletal CNTs. This kind of CNTs has the length up to half a millimeter level and the diameter at 30-50 nm. More details of such CNTs and their treatments are included in reference S1.

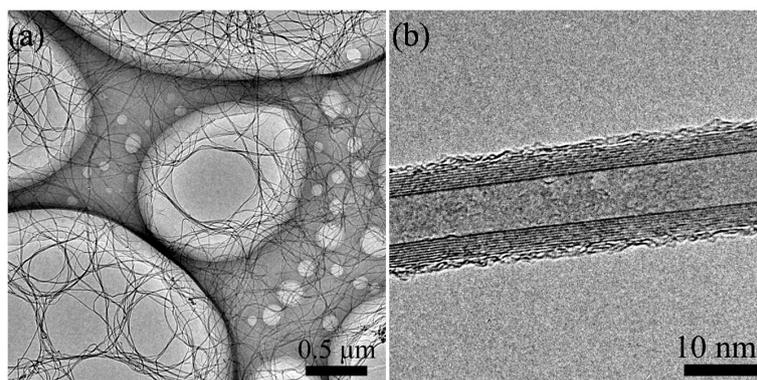


Figure S2 (a) Low- and (b) high- magnification TEM images of short-capillary CNTs. This kind of CNTs has the length up to 100 micrometers and diameter of ~11 nm. More details of such CNTs and their treatments are included in reference S2.

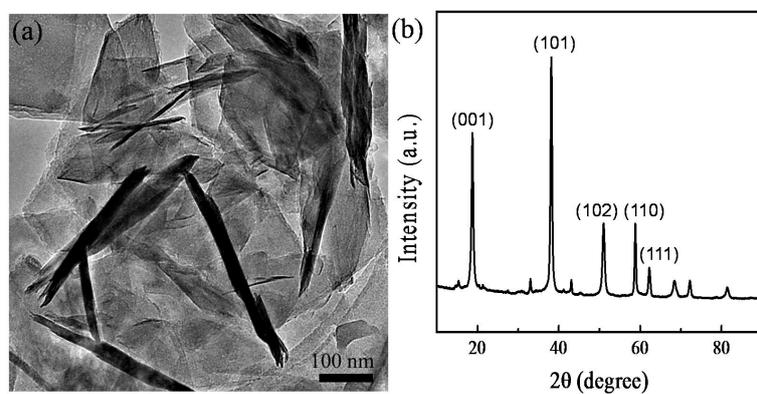


Figure S3 (a) TEM image and (b) XRD pattern of $Mg(OH)_2$ powder. It displays nanosheet morphology, with typical diffraction peaks.

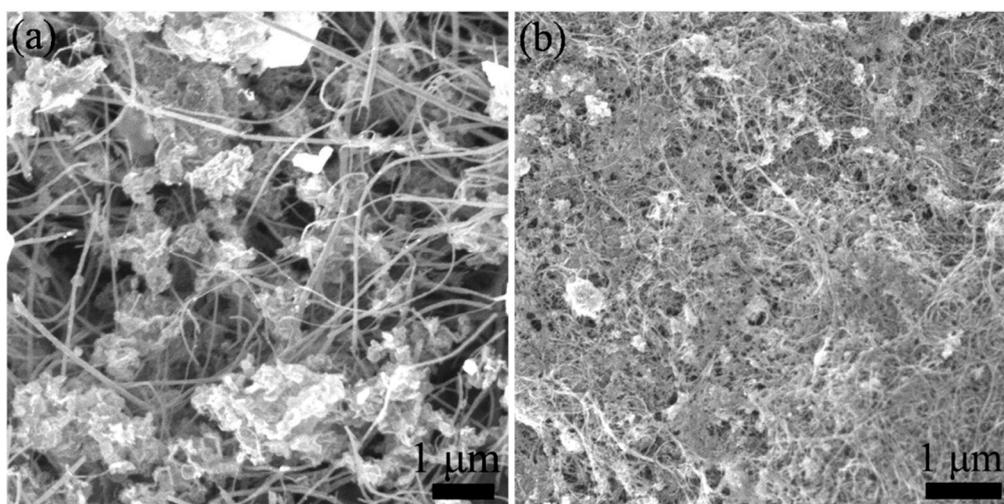


Figure S4 (a) SEM image of long-skeletal CNT/graphene nanocomposite, showing a loose phase separation. (b) SEM image of short-capillary CNT/graphene nanocomposite, showing tight integration with partial graphene aggregates.

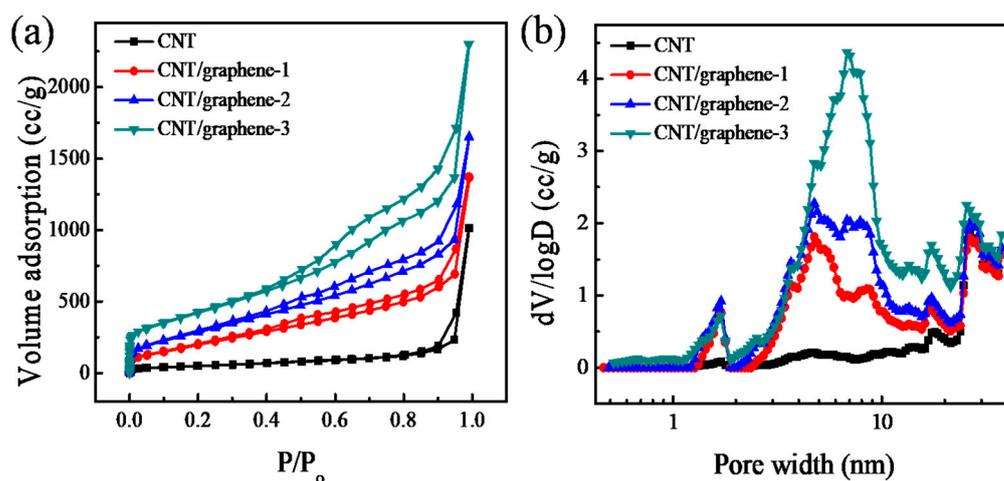


Figure S5 (a) N_2 sorption isotherms and (b) pore size distribution of the CNT and CNT/graphene composites with different compositions.

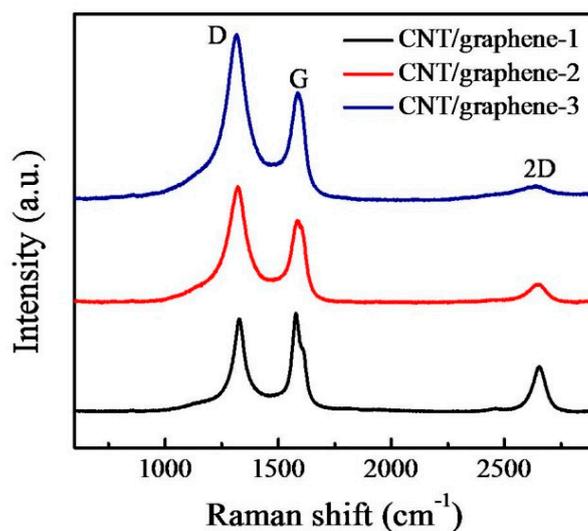


Figure S6 Raman spectrum of the as-prepared CNT/graphene composites.

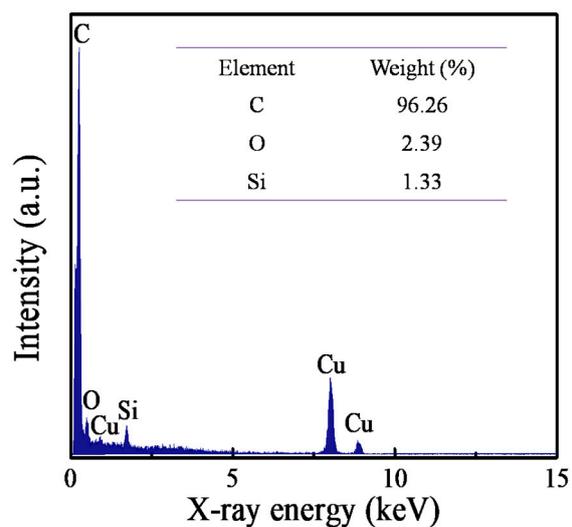


Figure S7. EDX spectrum of the skeletal-capillary CNT/graphene nanocomposite, showing the C and O lines, and Cu sample holder line.

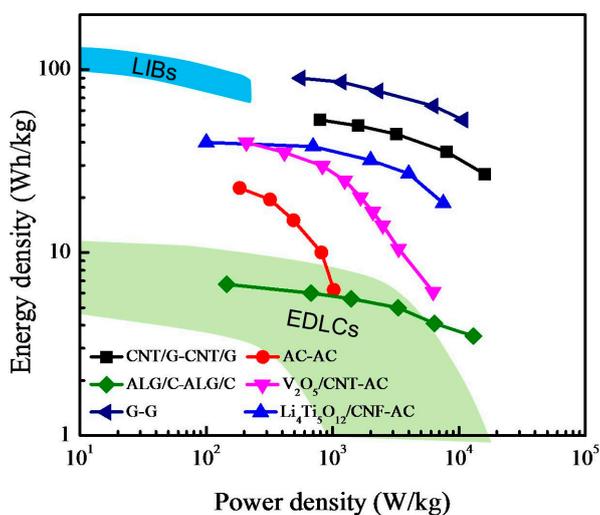


Figure S8 Comparison of Ragone plots of the ternary CNT/graphene supercapacitor with other devices, including symmetric supercapacitors made from ALG-C [S3], AC [S4] or graphene [S5], and asymmetric supercapacitors based on a V_2O_5/CNT [S4] or $Li_4Ti_5O_{12}/CNF$ [S6] nanocomposite anode and AC cathode. All the data are based on the total mass of electrode materials.

Table S1 The composition and N₂ sorption characterization of the nanocomposites.

Sample	Composition (CNT skeleton: CNT capillary: Mg(OH) ₂)	Composition* (CNT skeleton: CNT capillary: graphene, %)	Surface area (m ² /g)	Pore volume (cm ³ /g)
CNTs	1:2:0	33:67:0	169.1	0.76
CNT/graphene-1	1:2:26	18:37:45	668.1	1.44
CNT/graphene-2	1:2:54	12:25:63	959.3	1.86
CNT/graphene-3	1:2:93	8:17:75	1453.7	2.72

* 9.5 wt-% carbon yield based on the weight of Mg(OH)₂.

References

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