Electronic Supplementary Material (ESI) for Nanoscale

Supporting Information

Graphene oxide-encapsulated carbon nanotube hybrids for high hielectric performance nanocomposites with enhanced energy storage density

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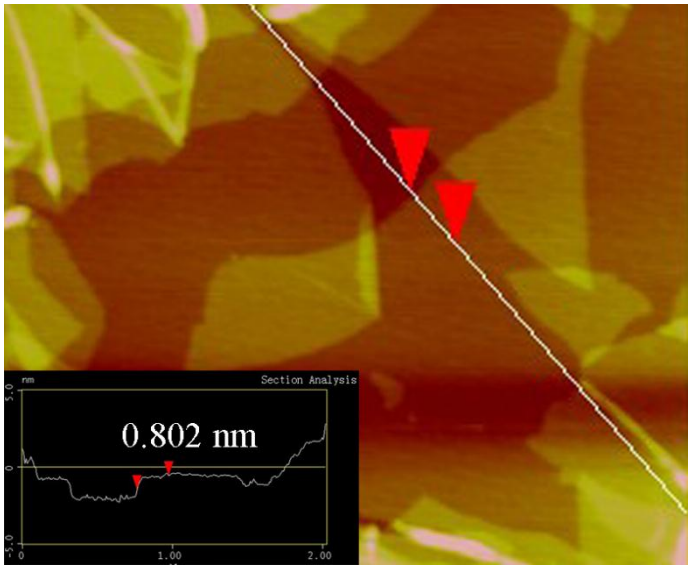

Figure S1. Typical AFM image of graphene oxide (GO)

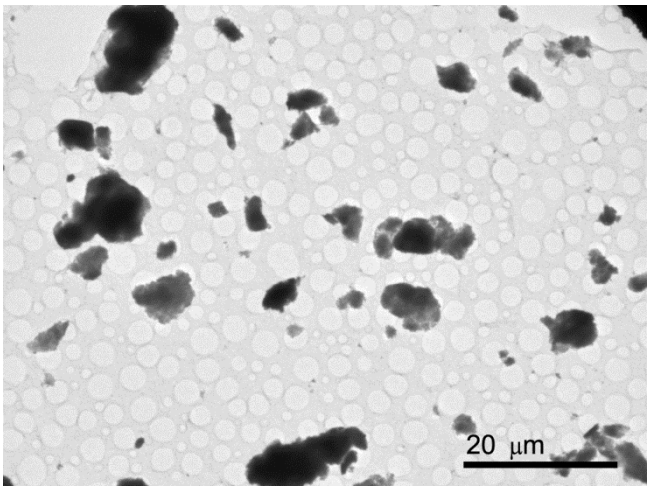

Figure S2. Representative TEM images of hydroxyl CNTs.

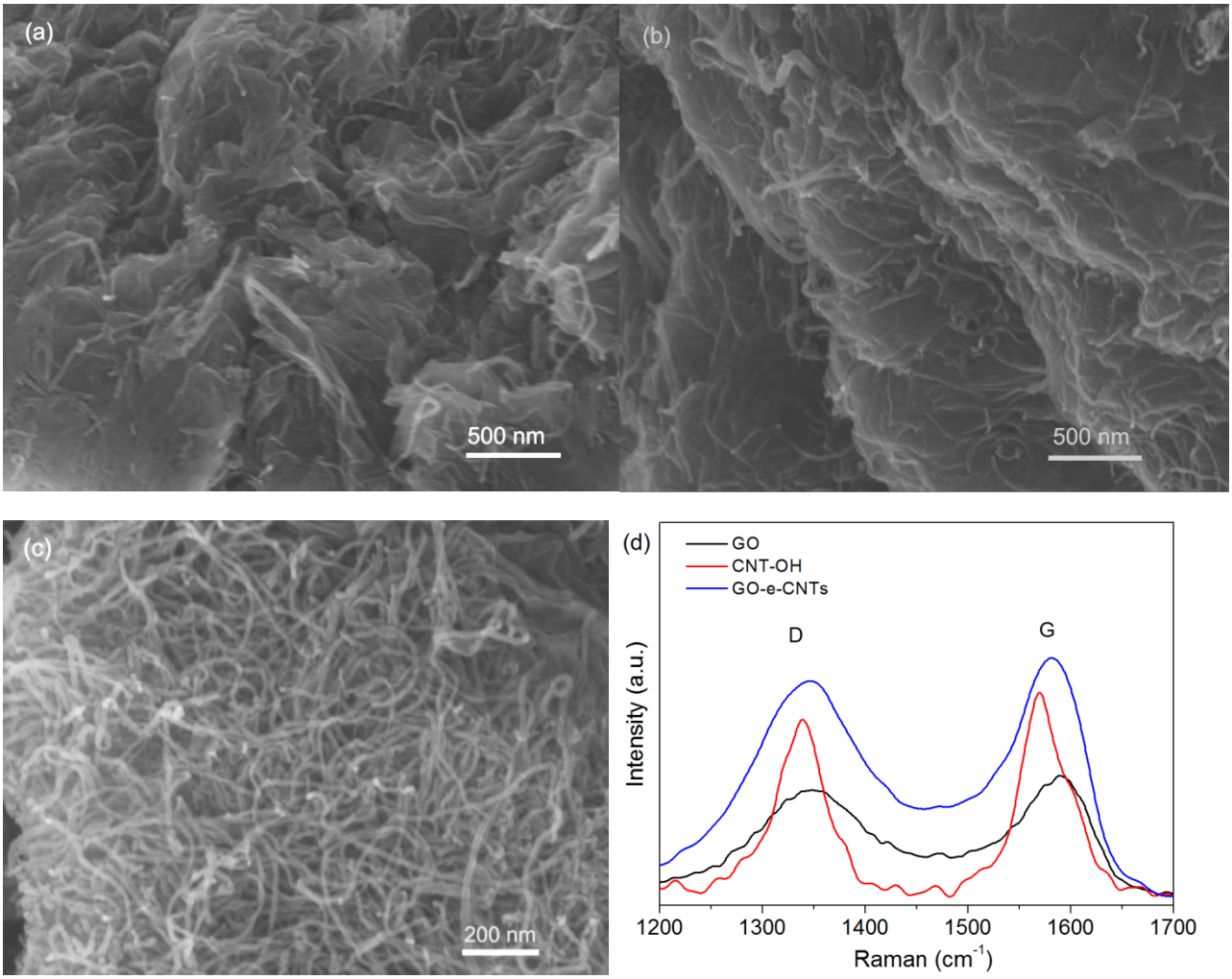

Figure S3. a,b) SEM images of in-site reduced GO-e-CNTs, clearly showing that the CNTs are encapsulated by the reduced GO sheets; Mass ratio of GO and CNT is 1 for GO-e-CNTs. c) SEM image of CNT-OH; d) Raman spectra of GO, CNT-OH and GO-e-CNTs.

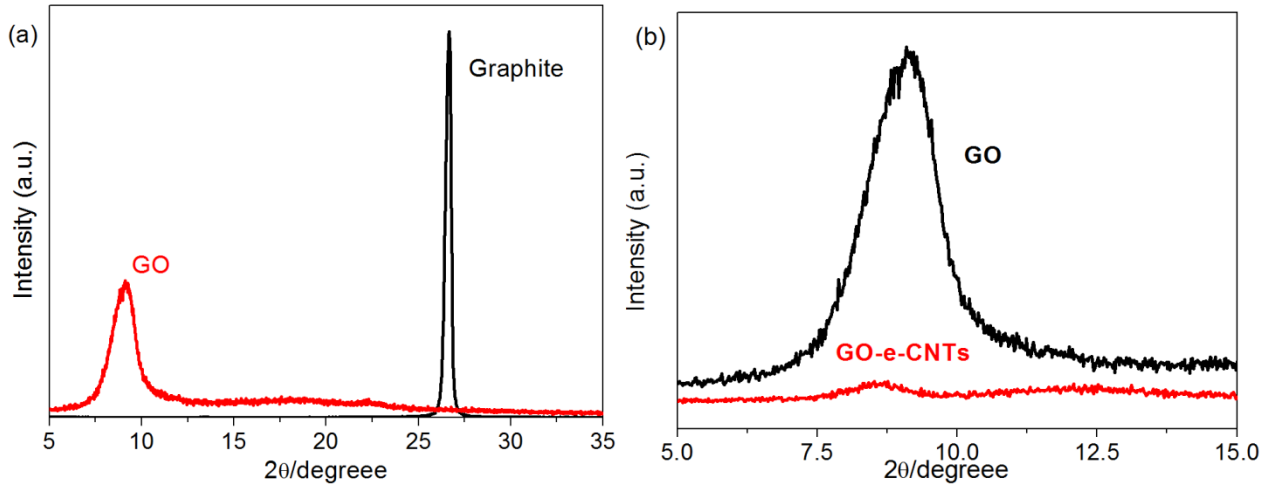

Figure S4. (a) XRD patterns of graphene oxide (GO) and graphite, (b) XRD patterns of GO and GO-e-CNTs. The weight ratio of GO and CNTs is 1:1.

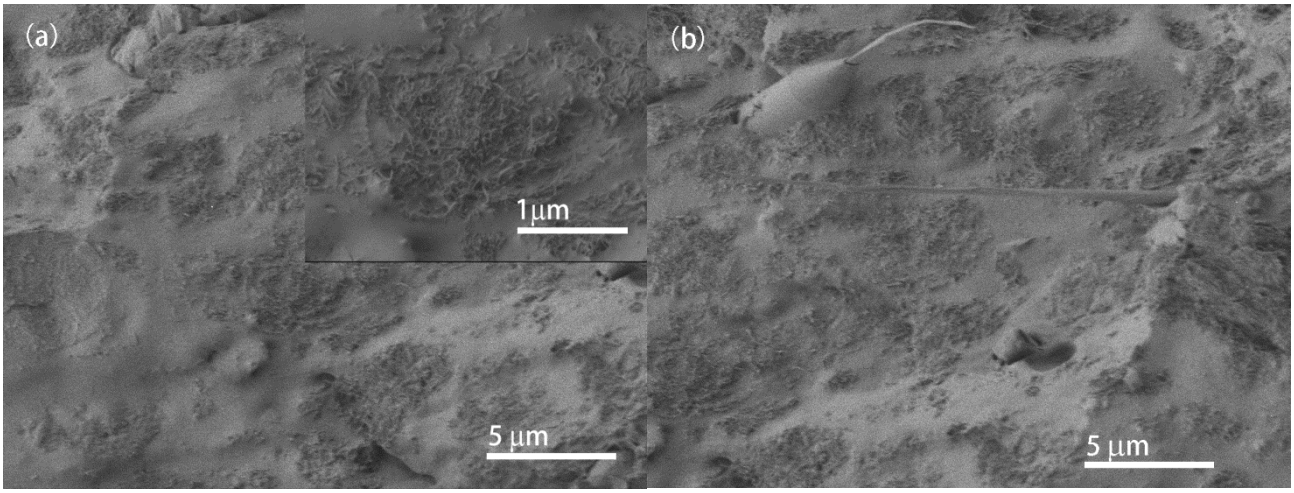

Figure S5. Representative SEM images of the CNT composites with a) 15 wt% and b) 20 wt% CNTs.

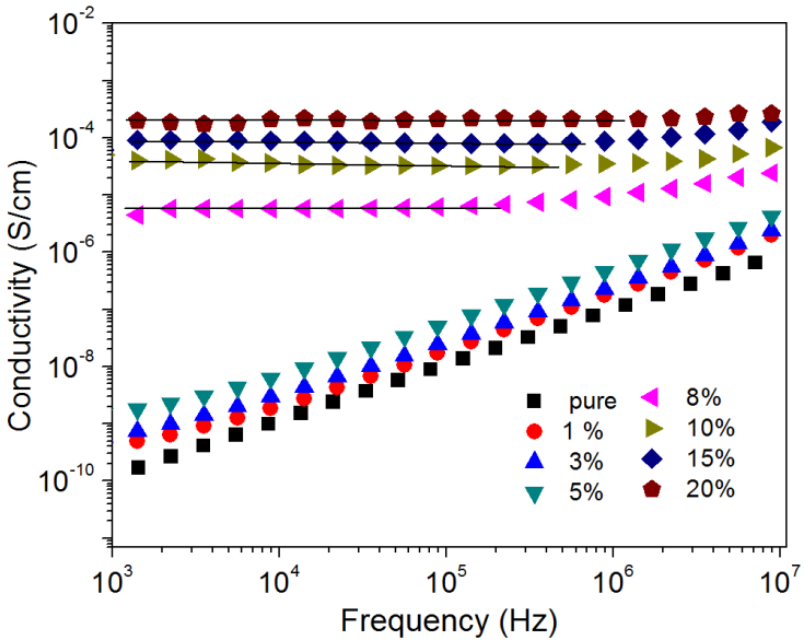

Figure S6. Frequency-dependent electrical conductivity of the pristine CNT composites with various loadings of CNTs.

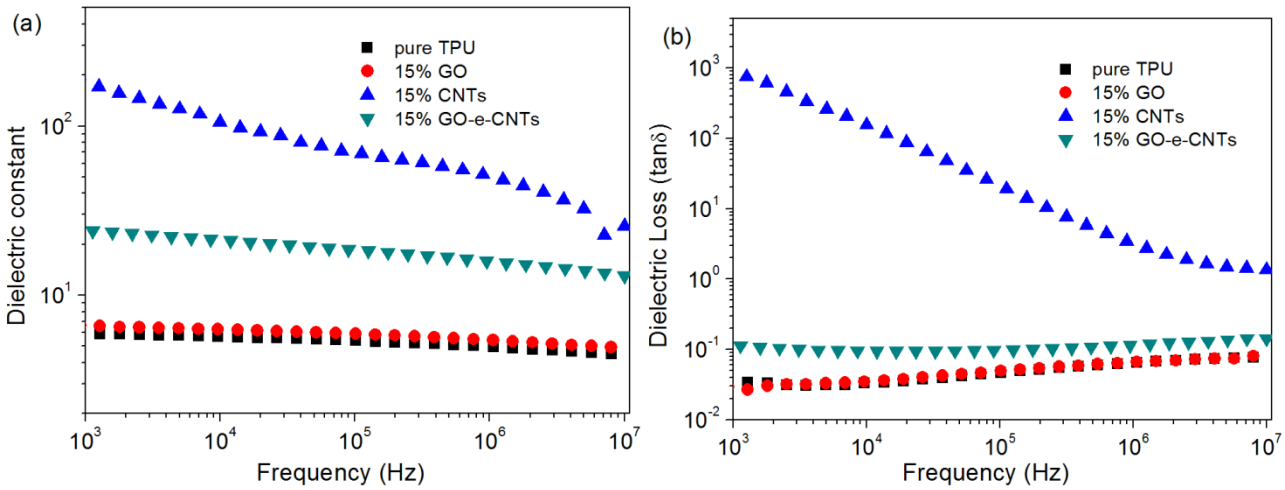

Figure S7. Frequency-dependent dielectric constant (a) and dielectric loss tangent (b) of the composites with CNT, GO, and GO-e-CNTs.

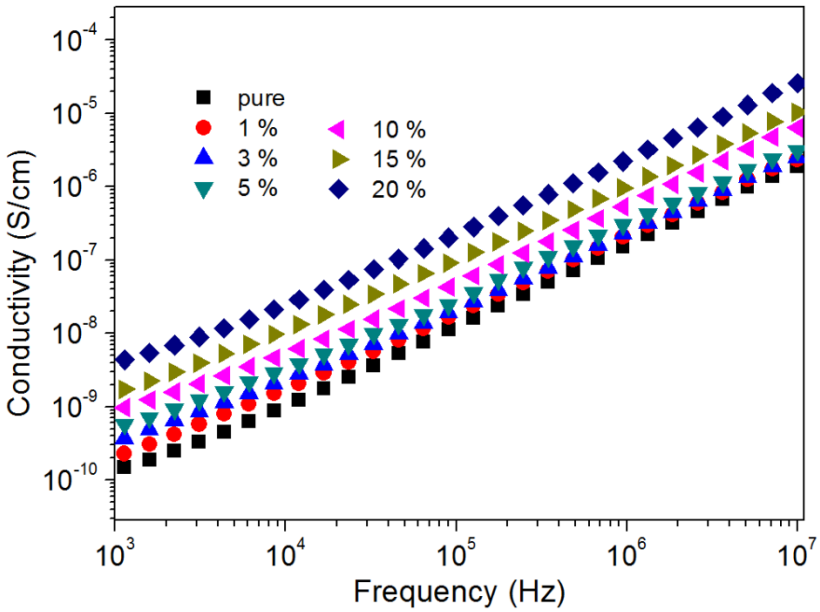

Figure S8. Frequency-dependent electrical conductivity of the GO-e-CNT composites with various loadings of CNT from 10^3 to 10^7 Hz.

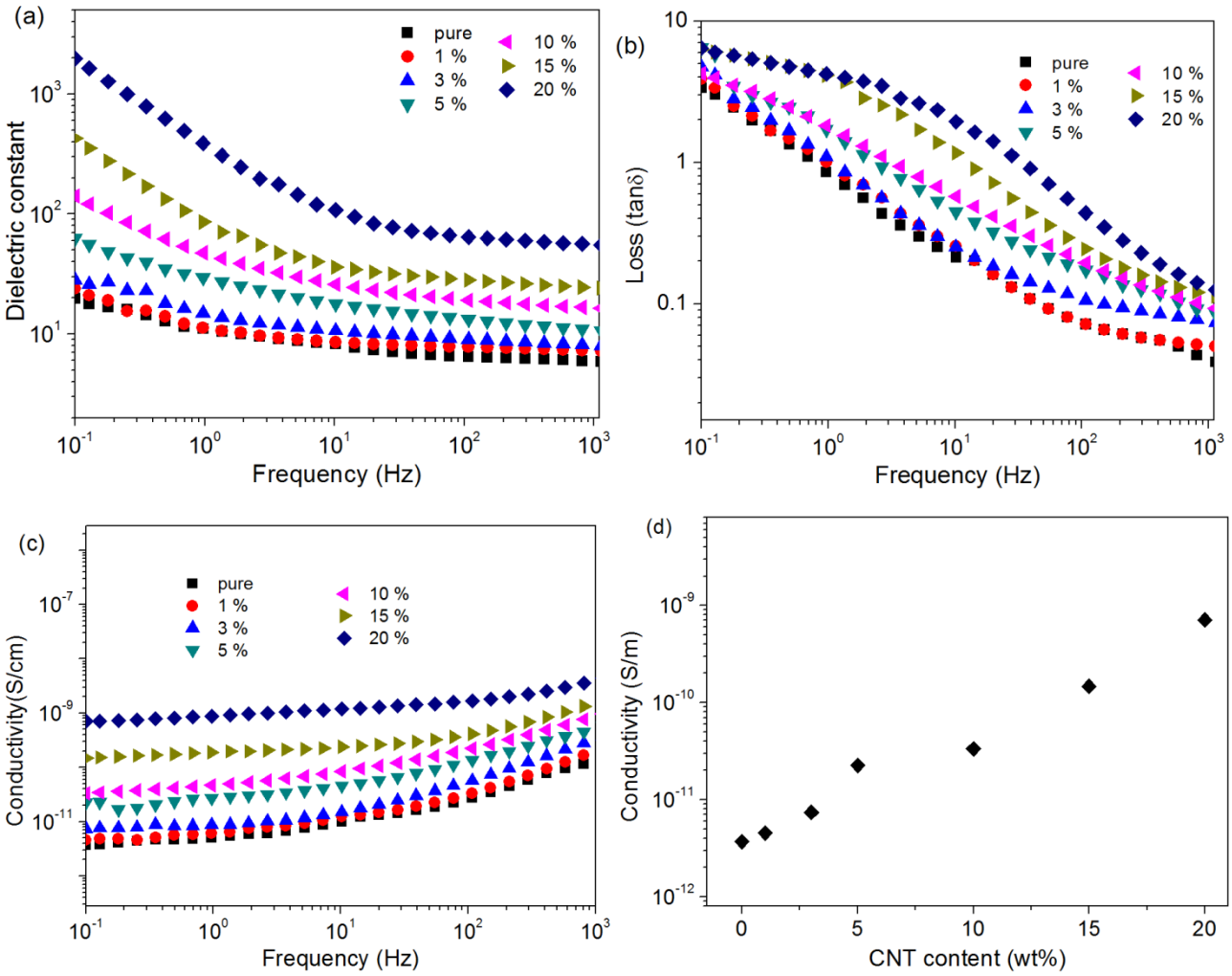

Figure S9. Frequency-dependent dielectric constant (a), dielectric loss tangent (b) and conductivity (c) of the composites as a function of the GO-e-CNT loading from 0.1 to 10^3 Hz; (d) Variation of electrical conductivity (b) of the GO-e-CNT/PU composite films as a function of the mass fraction of CNTs at 0.1 Hz.