

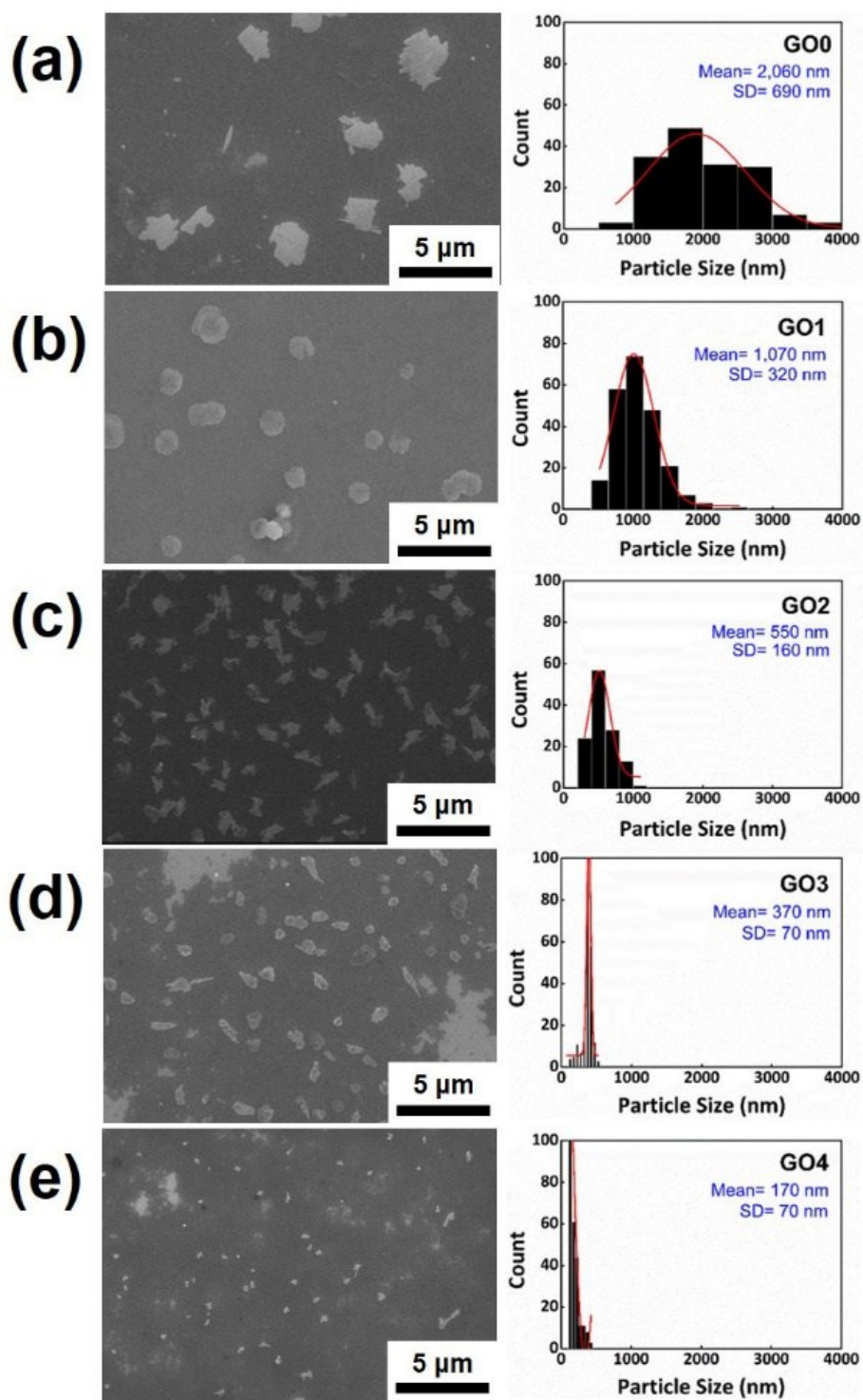
## Supporting Information

# **Impact of Size Control of Graphene Oxide Nanosheet for Enhancing Electrical and Mechanical Properties of Carbon Nanotube-Polymer Composites**

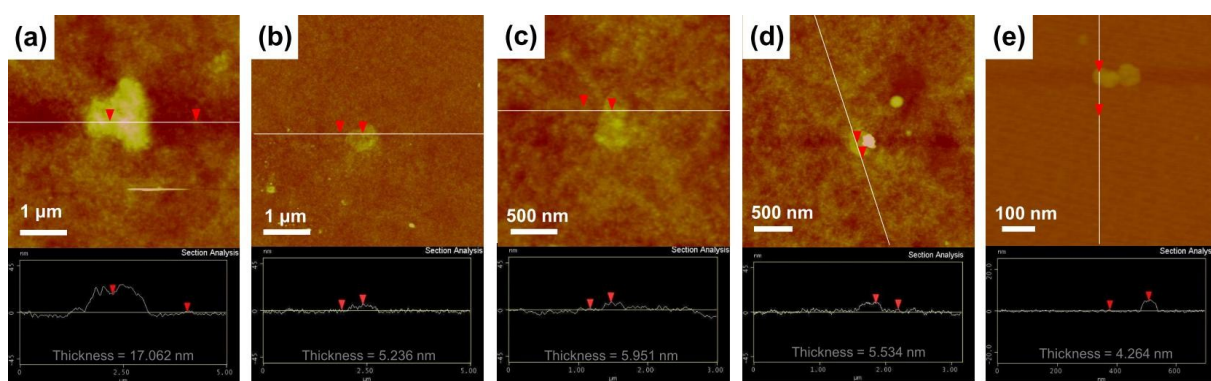
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Keywords: size-controlled graphene oxides, multi-walled carbon nanotubes (CNTs), dispersants, CNT-polymer nanocomposites



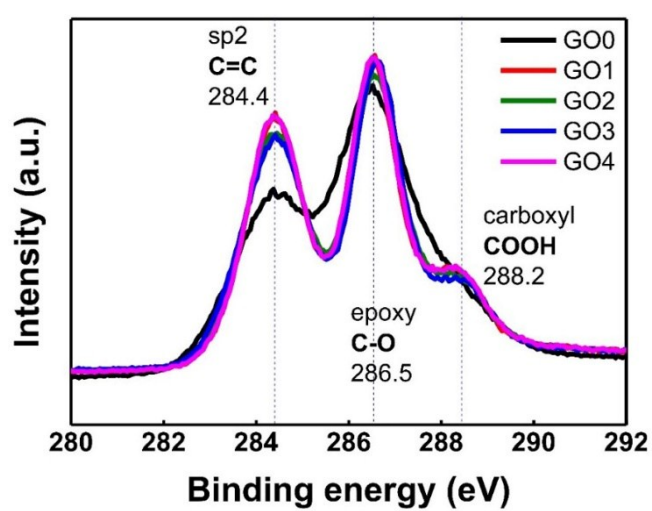
**Fig. S1.** SEM images and size histograms of GO nanosheets sonicated for (a) 0 min, (b) 10 min, (c) 30 min, (d) 60 min, and (e) 120 min, respectively.



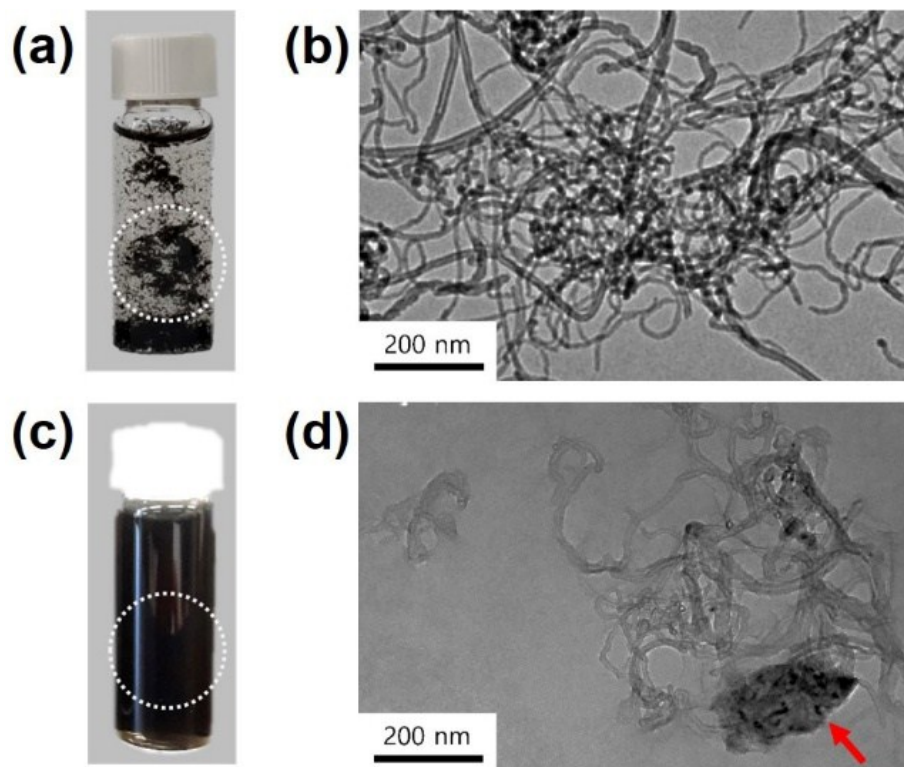
**Fig. S2.** AFM images and thickness profiles of (a) GO0, (b) GO1, (c) GO2, (d) GO3, and (e) GO4.

**Table S1.** Calculated C/O ratio of graphite and GOs with different lateral size

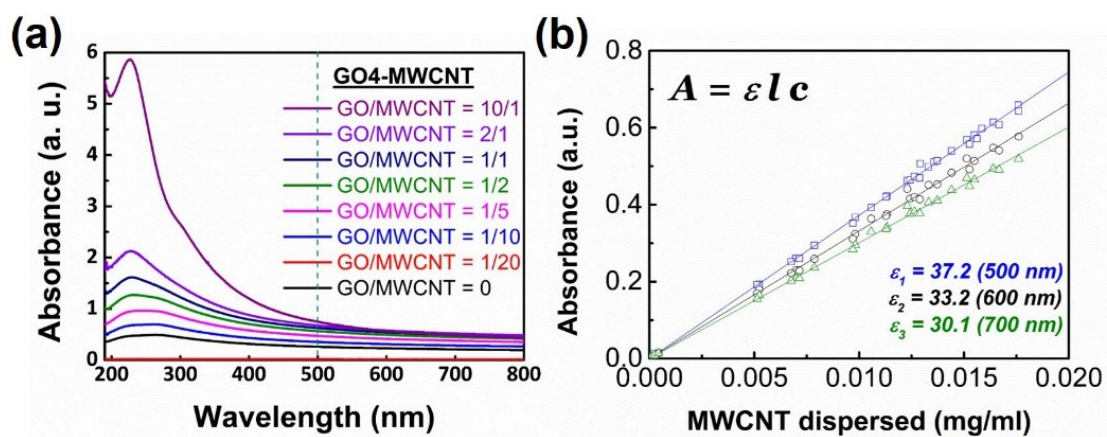
	Graphite	GO0	GO1	GO2	GO3	GO4
<b>C/O Ratio</b>	16.5	1.74	1.55	1.59	1.62	1.56



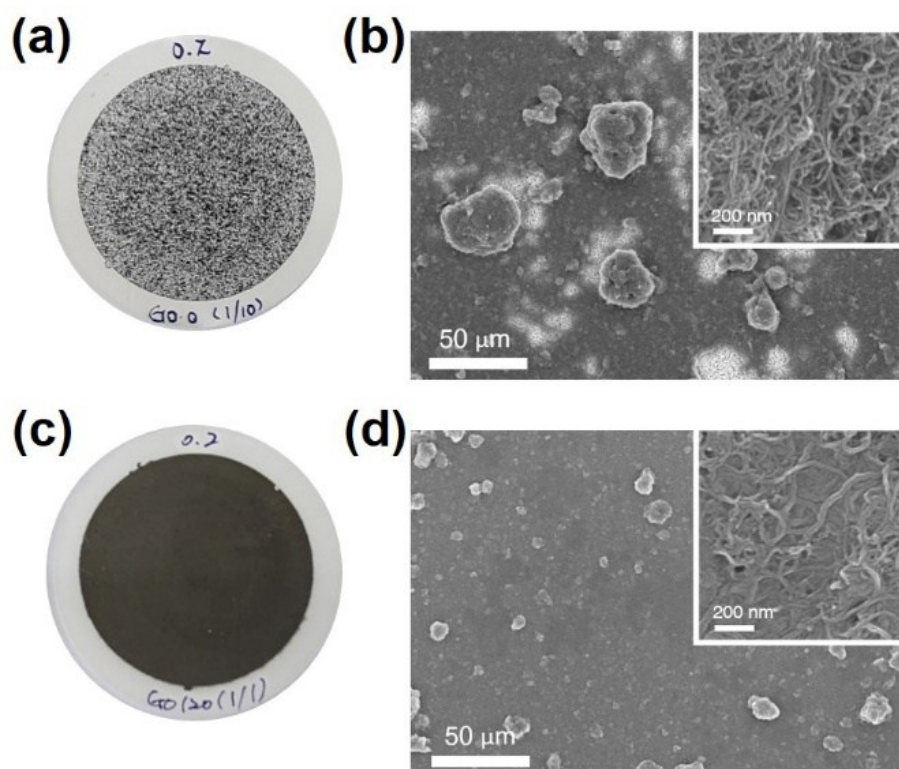
**Fig. S3.** XPS C1s spectra of GOs sonicated for 0, 10, 30, 60, and 120 min.



**Fig. S4.** Photographic and TEM images of MWCNT dispersed in DI water: (a–b) pristine MWCNTs, and (c–d) GO4-assisted MWCNT dispersion. (The red arrow indicates GO sheet.)

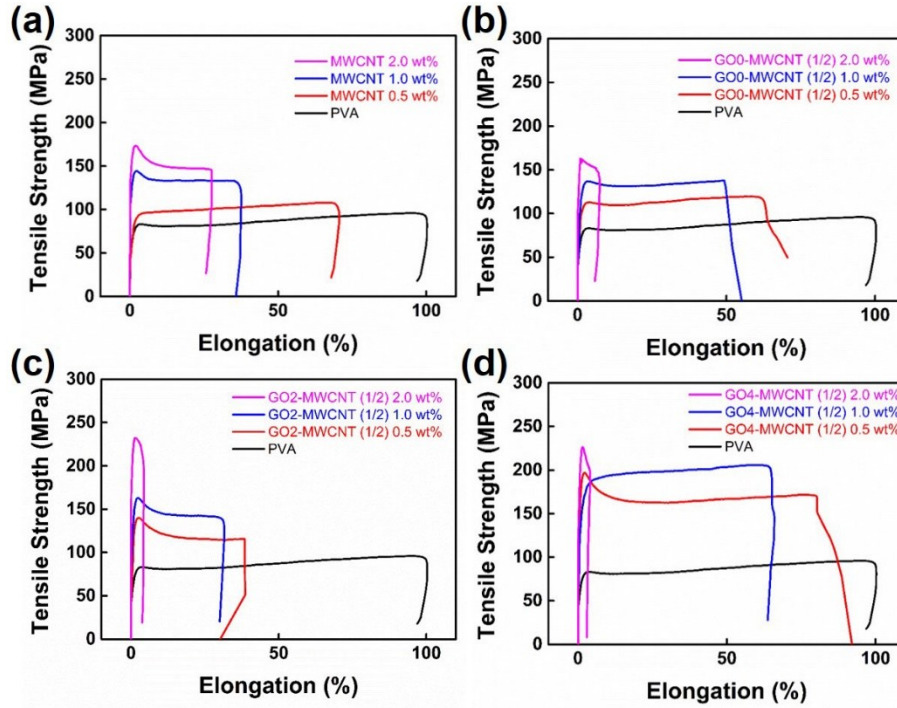


**Fig. S5.** (a) UV-vis absorption spectra of GO4-MWCNTs. (b) UV absorbance of MWCNTs at different wavelengths as a function of concentration of MWCNTs dispersed in water (from the Beer-Lambert Law)

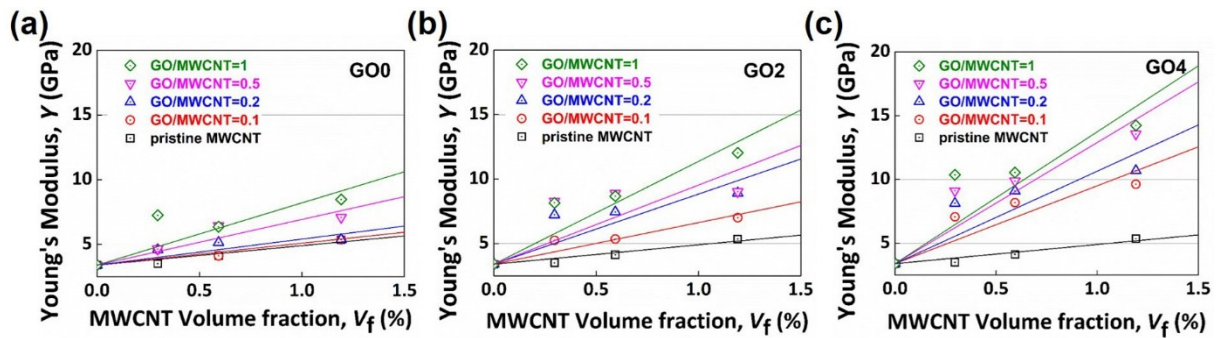


**Fig. S6.** MWCNT films deposited on polymer membranes. Digital pictures and SEM images (inset shows higher magnification) of (a–b) GO0-MWCNT film, and (c–d) GO4-MWCNT film





**Fig. S7.** Stress-strain behavior of GO-MWCNT composites containing different MWCNT volume fraction: (a) pristine MWCNT, (b) GO0-MWCNT, (c) GO2-MWCNT, and (d) GO4-MWCNT filled in the PVA composites, respectively. In all GO-MWCNT samples,  $W_{GO}/W_{MWCNT}$  were kept constant at 0.5.



**Fig. S8.** Young's moduli of GO-MWCNT composites containing different GOs as a function of the MWCNT volume fraction: (a) GO0, (b) GO2, and (c) GO4.