

Supplementary Information

Self-standing positive electrodes of oxidized few-walled carbon nanotubes for light-weight and high-power lithium batteries

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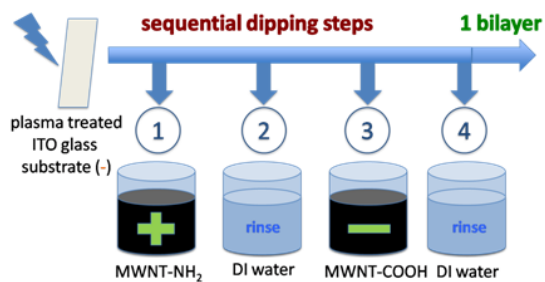
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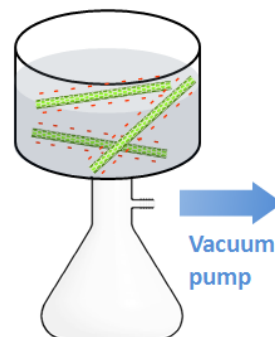
Layer-by-Layer (LbL) process



Advantages of LbL

- Precise thickness control < 1 μm
- Uniform coating on various substrates
- Ideal for MEMS and microelectronics

Vacuum Filtration (VF) process



Advantages of VF

- Thicknesses > 5 μm
- Free-standing, flexible films
- Suitable for higher-energy applications

Fig. S1 Schematic comparison between layer-by-layer (LbL) process and vacuum-filtration (VF) process of functionalized carbon nanotubes.

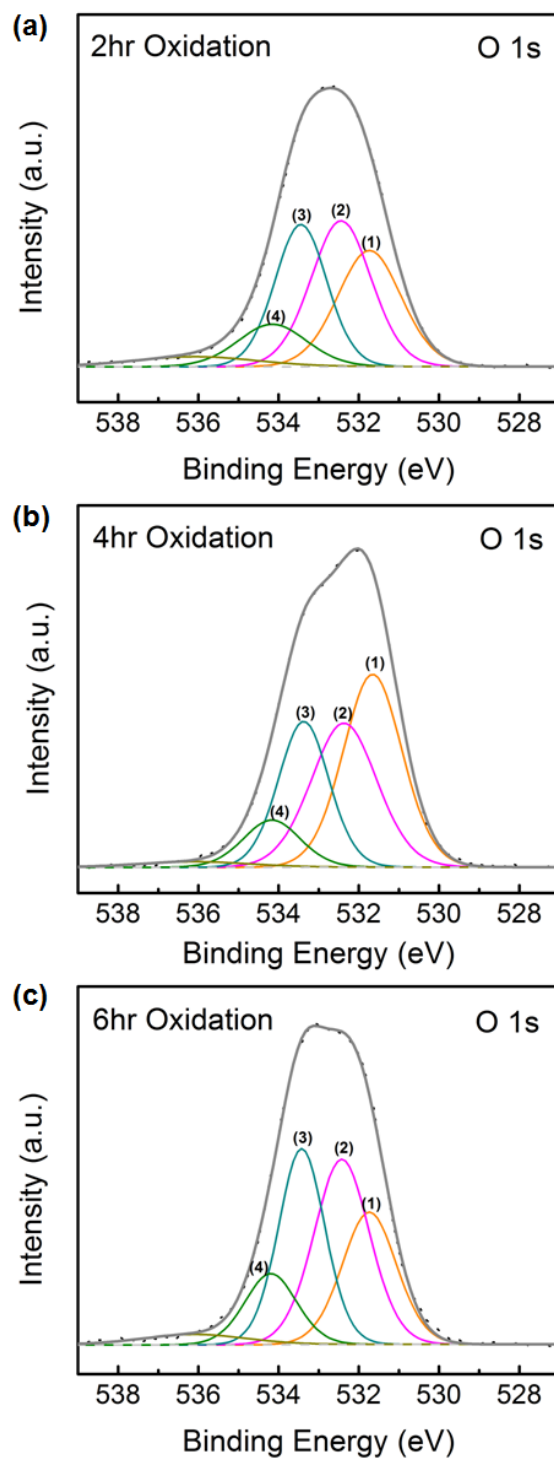


Fig. S2 XPS O1s spectra of (a) 2hr-oxidized, (b) 4hr-oxidized and (c) 6hr-oxidized FWNTs. O 1s peaks were analyzed as following groups: carbonyl oxygen atoms in ester and anhydride groups at 531.7 eV (group 1), oxygen atoms in ether and hydroxyl groups at 532.4 eV (group 2), ether oxygen atoms in anhydride groups at 533.4 eV (group 3), and oxygen atoms in carboxylic acid groups at 534.2 eV (group 4).¹⁻³

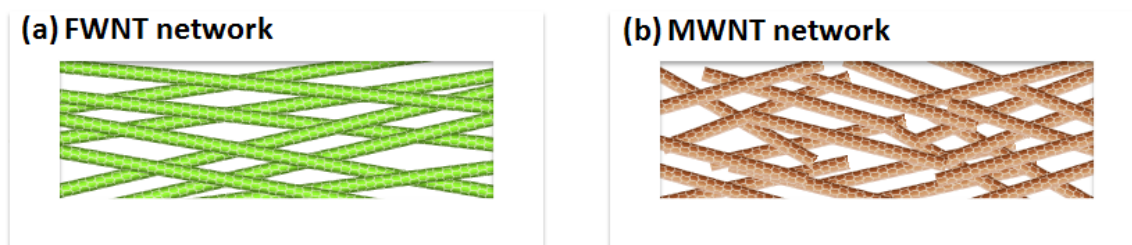


Fig. S3 Comparison of schemes between FWNT network and MWNT network. Sub-millimeter-long FWNT. Sub-millimeter-long FWNTs (0.4 mm length) can minimize the number of junctions in the network compared to short-MWNTs (1~5 μm), results in higher electrical conductivity of FWNT network than one of MWNT (Fig.5).

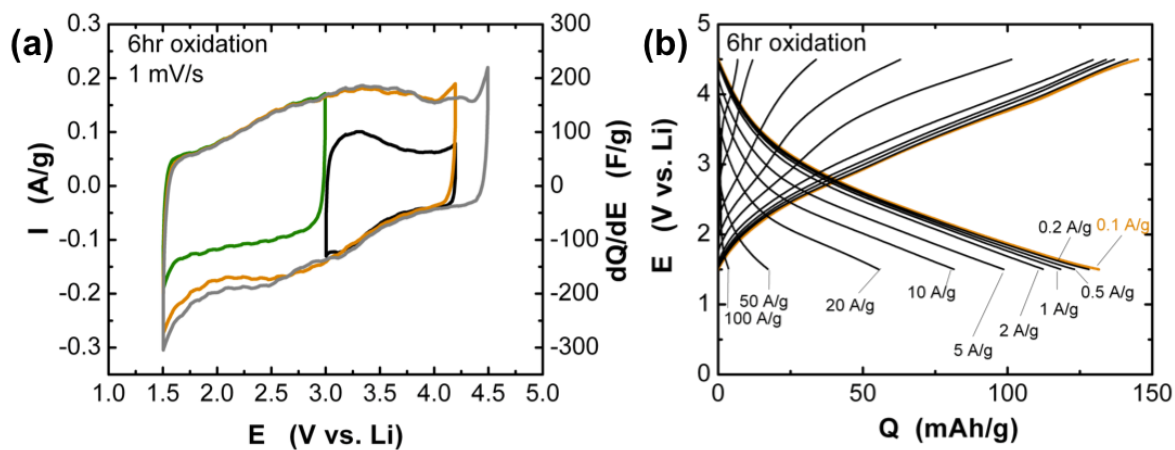


Fig. S4 (a) Potential-dependent cyclic voltammetry at a scan rate of 1 mV/s for a 6hr-oxidized FWNT electrode. (b) Galvanostatic rate capability test of a 6hr-oxidized FWNT electrode in the voltage range 0.1 – 100 A/g. Preceding charge or discharge, the cells were held at a constant voltage of 4.5 or 1.5 V vs. Li, respectively, for 30 minutes.

References

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S2. J. L. Figueiredo, M. F. R. Pereira, M. M. A. Freitas and J. J. M. Orfao, *Carbon*, 1999, **37**, 1379-1389.
S3. S. Kundu, Y. M. Wang, W. Xia and M. Muhler, *Journal of Physical Chemistry C*, 2008, **112**, 16869-16878.