

Supplementary Material

PEDOT Thermoelectric Composites with Excellent Power Factors Prepared by 3-Phase Interfacial Electropolymerization and Carbon Nanotube Chemical Doping

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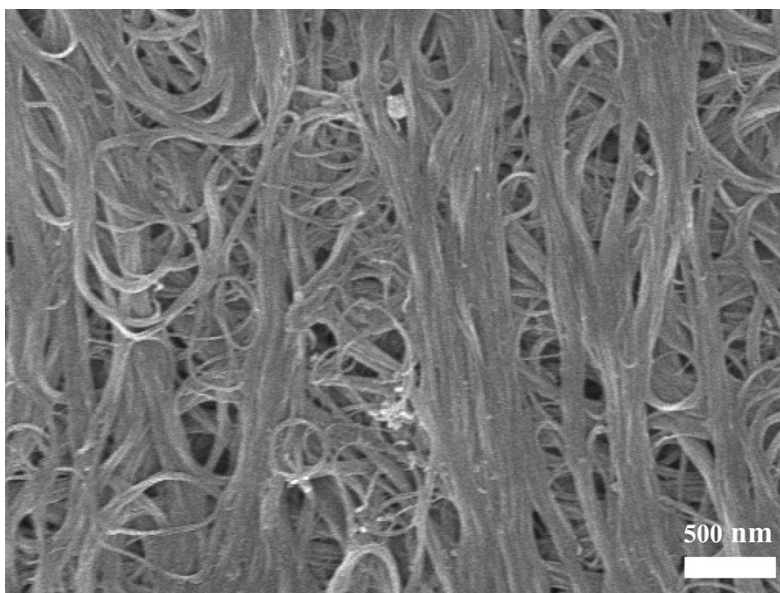


Figure S1. FESEM image of the neat a-SWCNT with a high magnification.

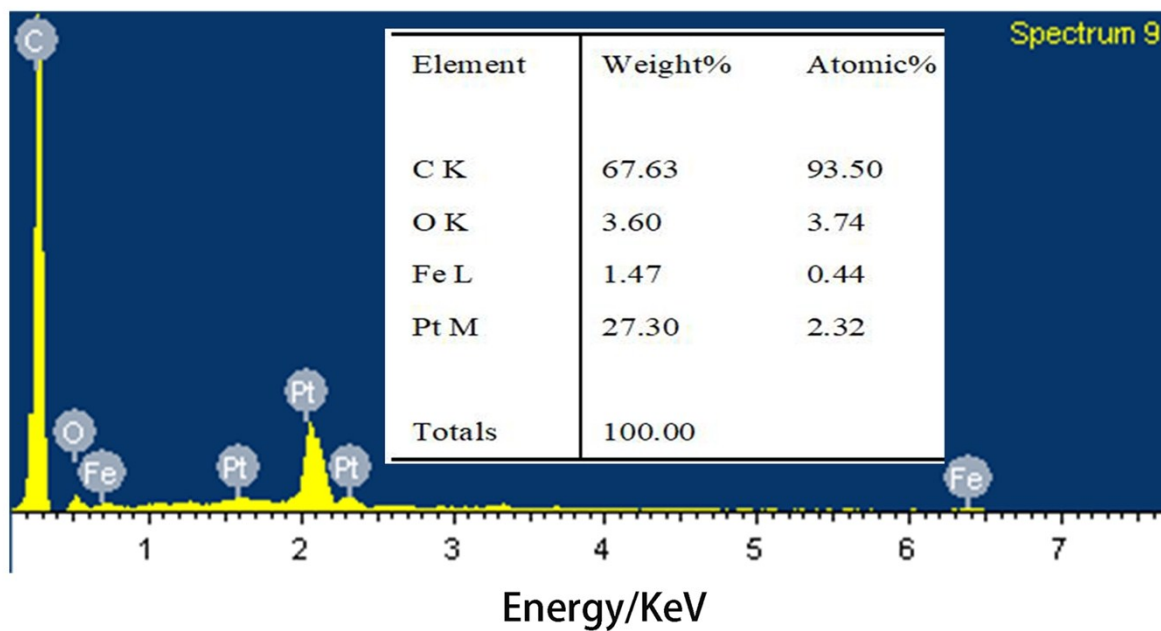


Figure S2. EDS image of the pristine SWCNT. The existence of Pt element is due to the covering electrically conductive layer for carrying out the measurement. The small amount of Fe may result from the residue during the preparation of the SWCNT.

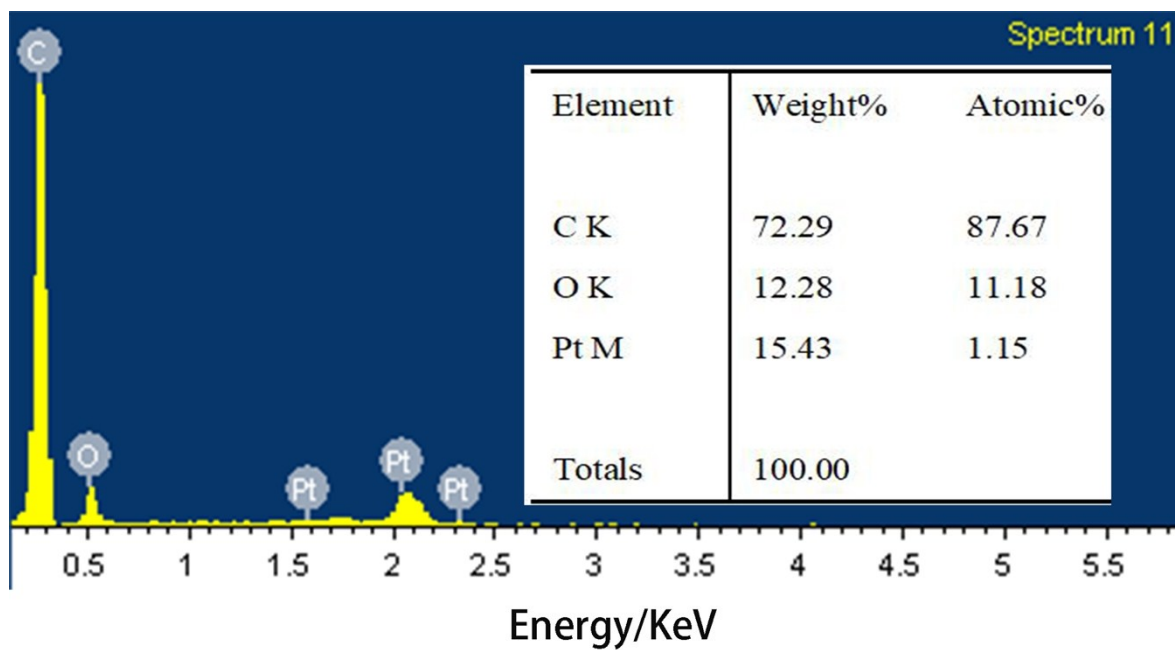


Figure S3. EDS image of the acid-doped SWCNT (a-SWCNT). The absence of Fe element suggests the removal after the mixed-acid treatment.

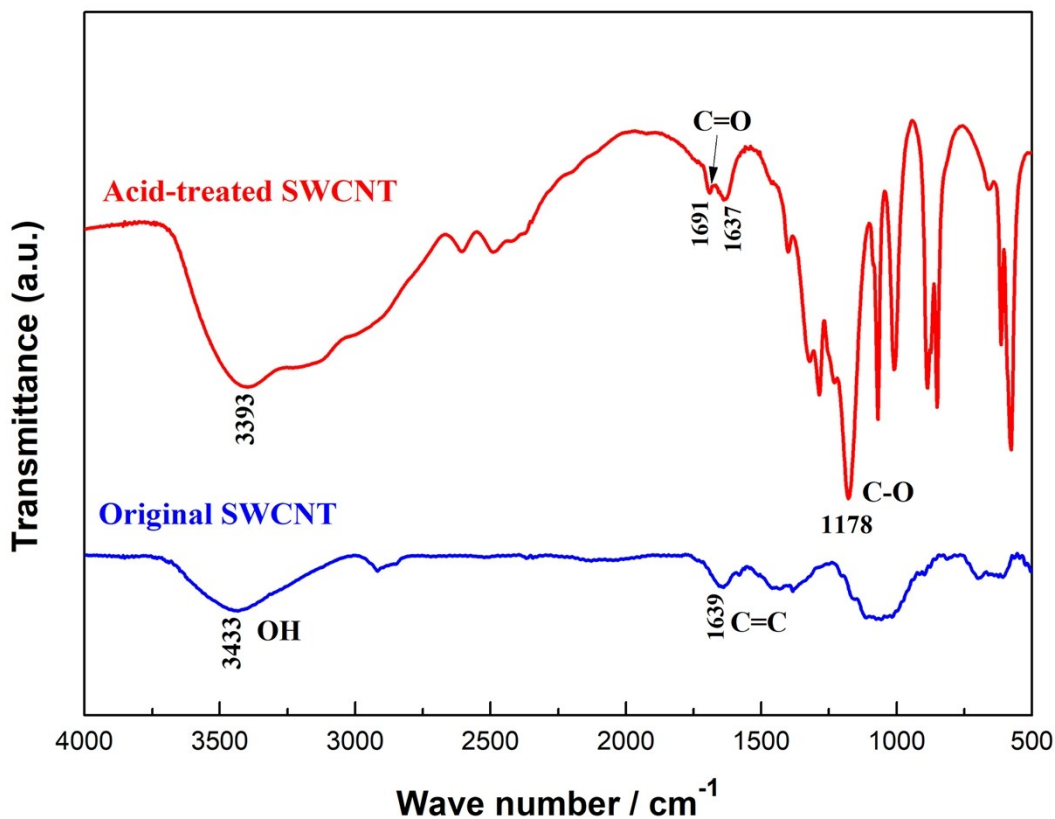


Figure S4. FTIR spectra of the pristine SWCNT and the a-SWCNT, confirming the success of the SWCNT surface functionalization.

For the pristine SWCNT, the band at 1639 cm^{-1} is characteristic of C=C stretching vibration,^[1,2] and the band at 3433 cm^{-1} can be ascribed to the OH stretching vibration, resulting from oxidation during the purification of the raw material and/or ambient atmospheric moisture.^[3]

For the a-SWCNT, the band of the OH stretching vibration becomes broaden. Two new bands of C=O stretching (at 1691 cm^{-1}) and C-O stretching (1178 cm^{-1}) appear, demonstrating that rich oxygen-containing functional groups such as carbonyl, carboxyl and hydroxyl group are introduced during the acid treatment process of the SWCNT.

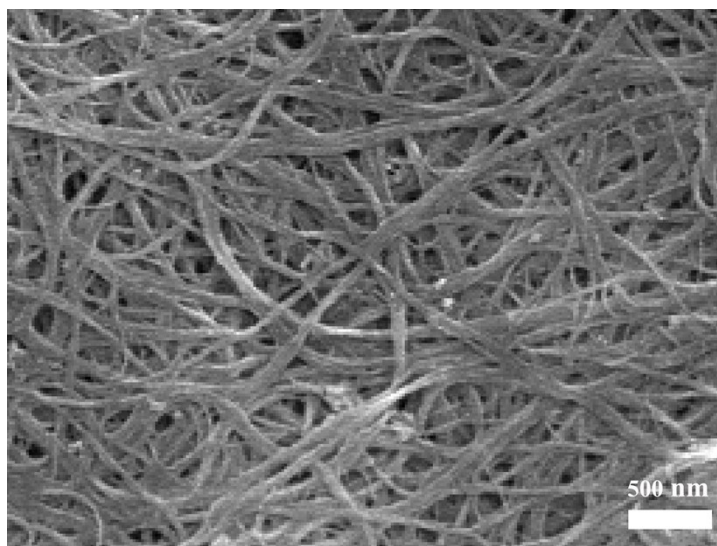


Figure S5. FESEM image of PEDOT/a-SWCNT composite film containing 60 wt% a-SWCNT with a high magnification.

References:

- [1] F. Aviles, J. V. Cauich-Rodriguez, L. Moo-Tah, A. May-Pat, *Carbon*, **2009**, 47, 2970.
- [2] P. Liu, D. C. M. Hu, T. Q. Tran, D. Jewell, H. M. Duong, *Colloids. Surf. A-Physicochem. Engin. Aspects*, **2016**, 509, 384.
- [3] N. Feng, C.Gao, C.-Y. Guo, G. Chen, *ACS Appl. Mater. Interfaces*, **2018**, 10, 5603.