

SUPPLEMENTARY INFORMATION

Biaxially stretchable supercapacitors based on the buckled hybrid fiber electrode array

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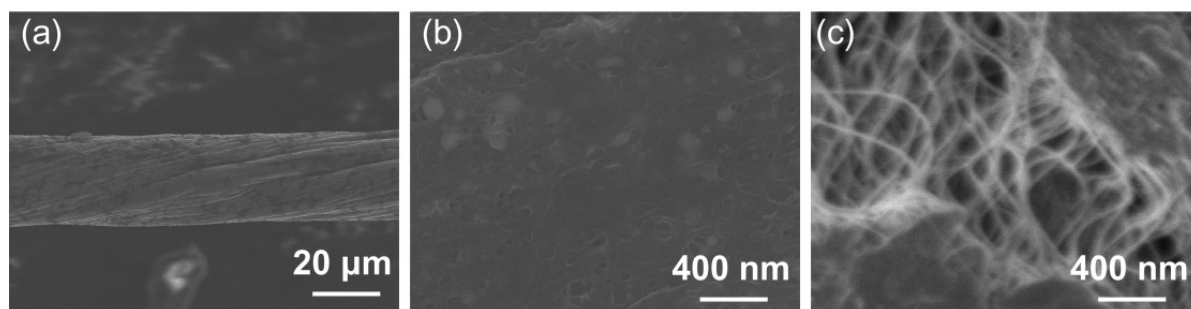


Fig.S1 SEM images of (a) the twist-first hybrid fiber at low-magnification, (b) the surface and (c) the rip at high-magnification.

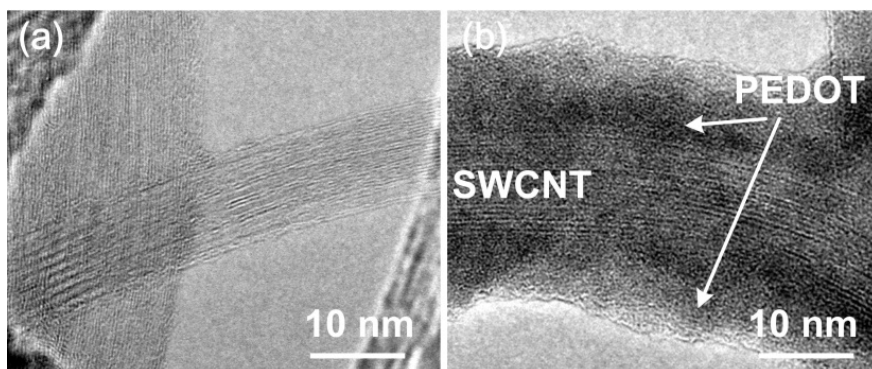


Fig.S2 TEM images of (a) pure SWCNT bundles and (b) SWCNT/PEDOT hybrid bundles.

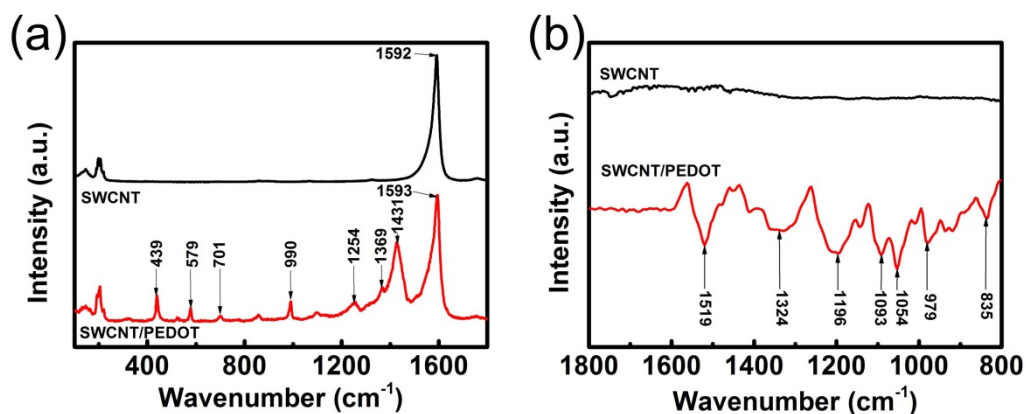


Fig. S3 (a) The Raman spectra (633 nm) of the SWCNT fiber and SWCNT/PEDOT hybrid fiber. Peaks at about 1590 cm^{-1} corresponding to G band of SWCNTs were normalized to 1. Peaks at about 439 cm^{-1} , 579 cm^{-1} and 990 cm^{-1} were assigned to oxyethylene ring deformation. Peak at 701 cm^{-1} was assigned to Symmetric C–S–C deformation. Peaks at about 1254 cm^{-1} and 1369 cm^{-1} were assigned to C–C stretching. Peak at about 1431 cm^{-1} was assigned to Symmetric C-C (–O) stretching.¹ (b) FTIR spectra of the pure SWCNT film and SWCNT/PEDOT hybrid film. Peaks at 1519 cm^{-1} and 1324 cm^{-1} originated from the C-C or C=C stretching in the thiophene ring. Peaks at 1196 cm^{-1} , 1093 cm^{-1} and 1054 cm^{-1} are assigned to stretching in the alkyleneedioxy group. Peaks at 979 cm^{-1} and 835 cm^{-1} are the C-S bond in the thiophene.²

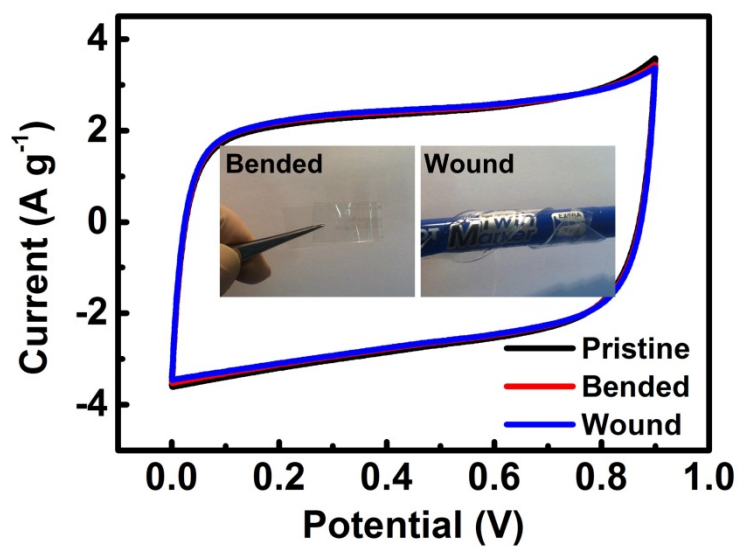


Fig. S4 CVs of a supercapacitor while it was pristine, bended and wound at a sweep rate of 50 mV s^{-1} . Inset: optical images of the bended and wound supercapacitor.

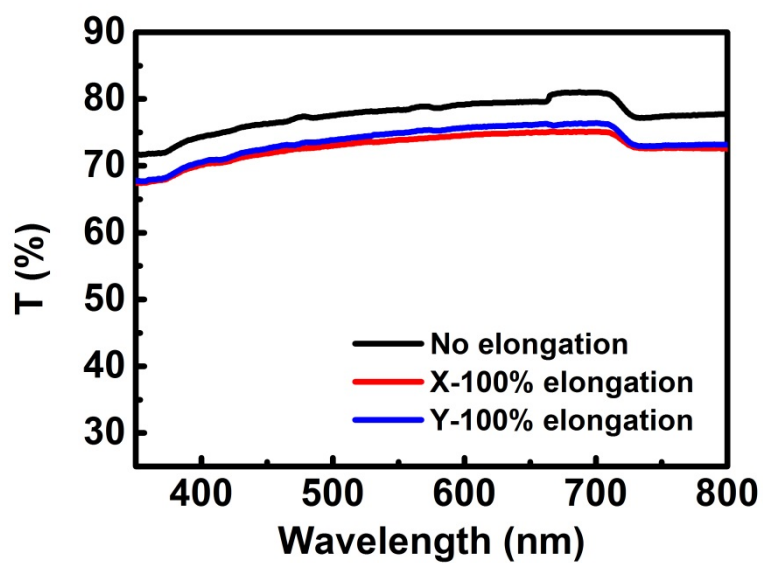


Fig. S5 Transmittance spectra of a supercapacitor under no elongation, 100% elongation in X- and Y-direction.

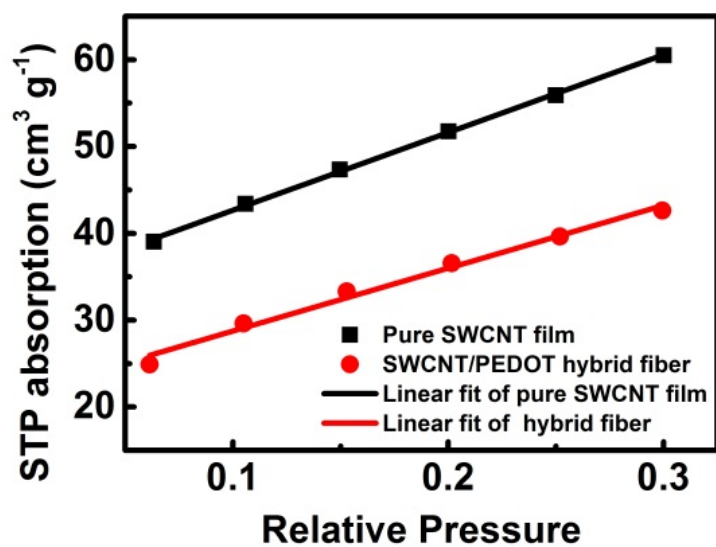


Fig. S6 Multi-point BET plots of the as-prepared pure SWCNT film and optimized SWCNT/PEDOT hybrid fiber (electrodeposition-first fiber with 10 electrodepositing cycles). The specific surface area of the pure SWCNT film is $190.3 \text{ m}^2 \text{ g}^{-1}$, and the specific surface area of the hybrid fiber decreased to $135.7 \text{ m}^2 \text{ g}^{-1}$ because of electrodeposition and twisting processes. The samples were tested by Quadrasorb SI-MP system (Quantachrome, USA) and the analysis gas is Nitrogen. Note: STP denotes standard temperature and pressure.

- 1 W. W. Chiu, J. Travaš-Sejdić, R. P. Cooney and G. A. Bowmaker, *Journal of Raman Spectroscopy*, 2006, **37**, 1354-1361.
- 2 C. Kvarnström, H. Neugebauer, S. Blomquist, H. J. Ahonen, J. Kankare and A. Ivaska, *Electrochim. Acta*, 1999, **44**, 2739-2750.