

ADVANCED FUNCTIONAL MATERIALS

Supporting Information

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Double-Twisted Conductive Smart Threads Comprising
a Homogeneously and a Gradient-Coated Thread for
Multidimensional Flexible Pressure-Sensing Devices

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Homogeneously and Gradient-Coated Conductive Smart Threads for Multidimensional Flexible Pressure-Sensing Devices

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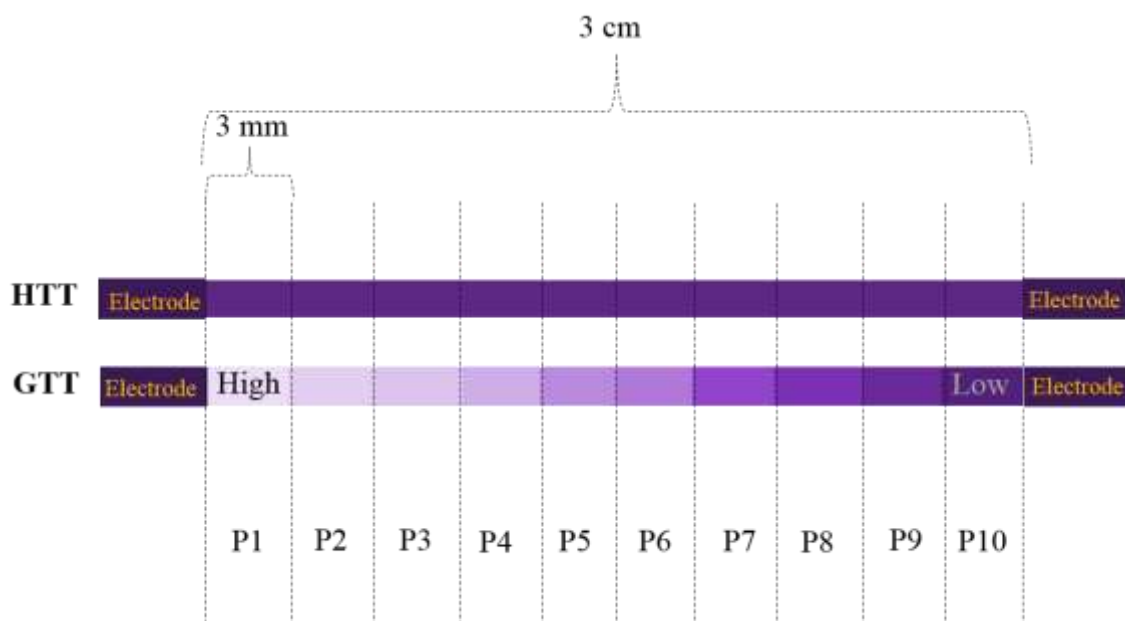


Figure S1. A schematic diagram illustrating the distribution of SWCNT at different positions from P1 to P10 along 3-cm-long HTTs and GTTs with a resolution of 3 mm. Resolution can be controlled by the length of each portion.

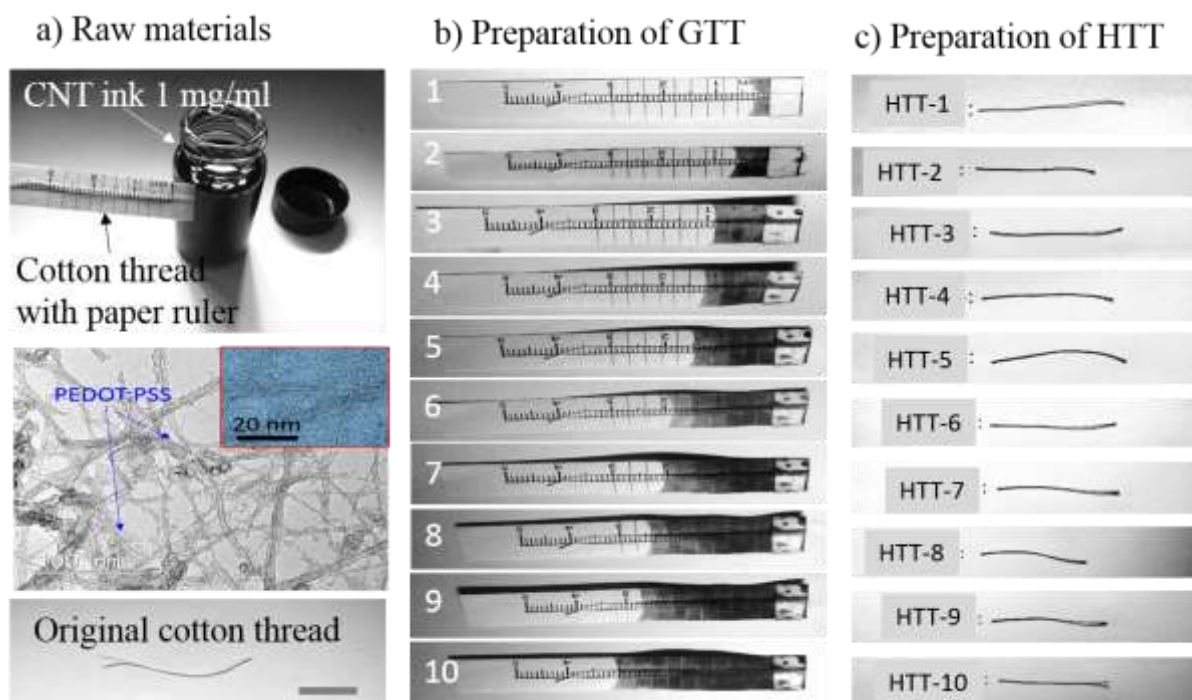


Figure S2. Preparation of GTTs and HTTs. a) Raw materials including SWCNT ink (1 mg/ml) with its TEM images and cotton thread. b) Preparation of GTT-1 to GTT-10 with different repetitions of dip-drying. c) Preparation of HTT-1 to HTT-10 by the dip-dry method, where each dip consists of 10 s; the scale bar is 1 cm.

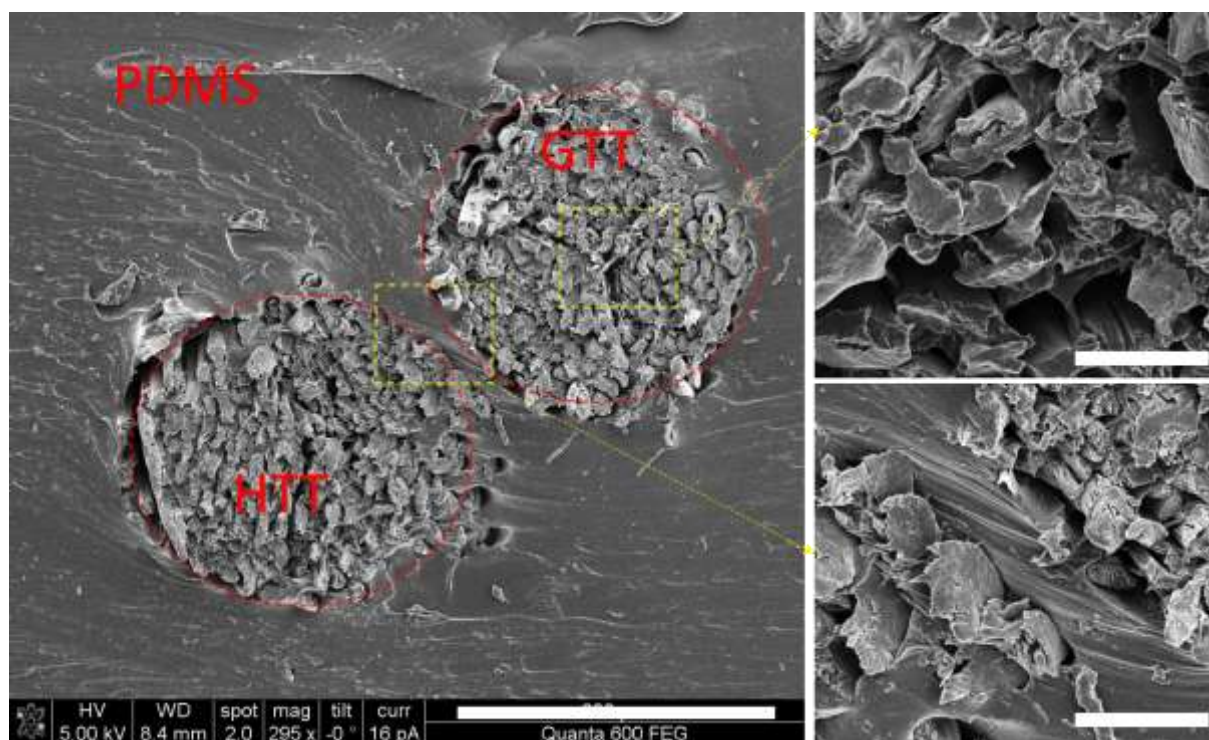


Figure S3. A typical DTST with a protective PDMS layer. The scale bars are 200 μm, 20 μm, and 20 μm, respectively. Note that in addition to the insulating PVA coating on the HTT there is also a PDMS layer between the HTT and the GTT, which effectively prevents the risk of a short circuit.

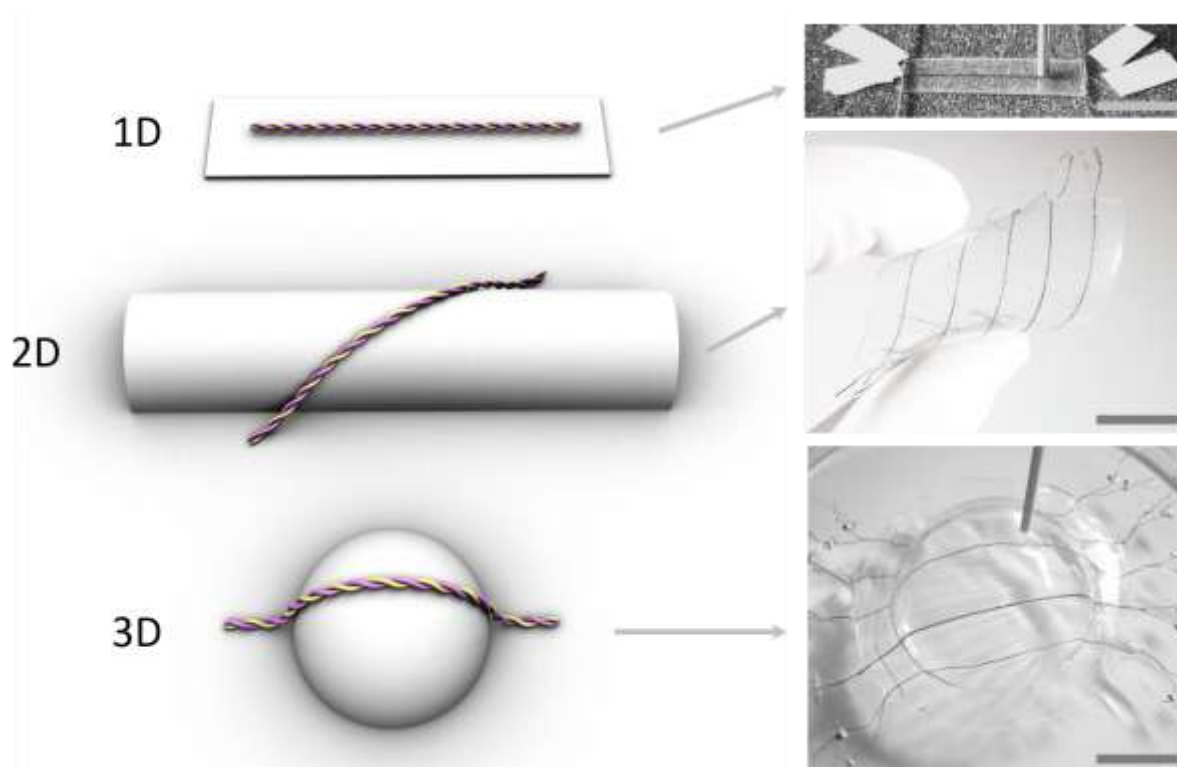


Figure S4. A schematic illustration and a typical multidimensional flexible pressure-sensing device (1D, 2D, and 3D). 400- μm -thick PDMS was used as a protective layer.

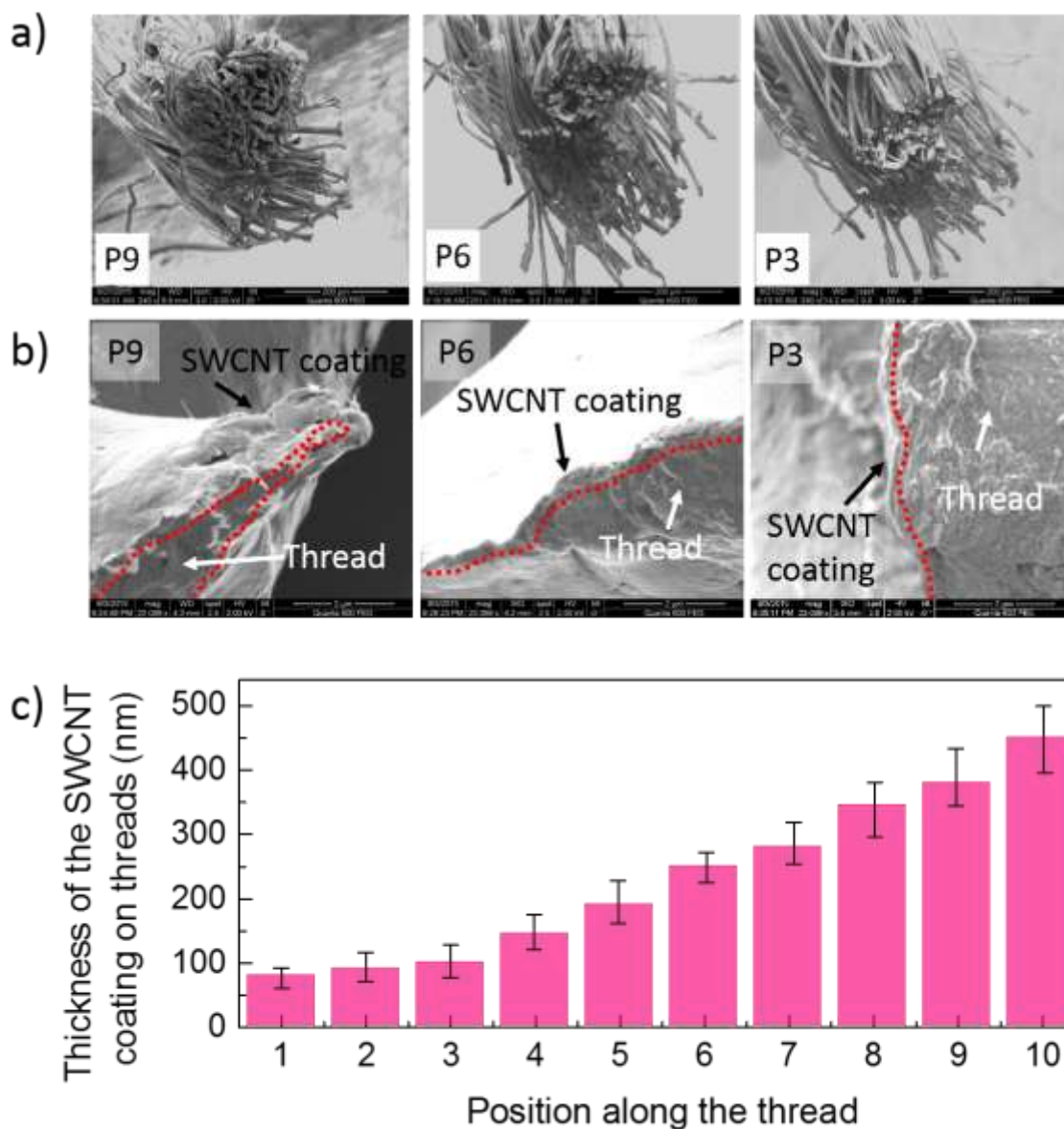


Figure S5. a) and b) SEM cross-sectional analysis at different magnifications for the thickness gradient of the SWCNT coating on a GTT at positions P9, P6, and P3. c) The thickness gradient of the SWCNT coating on a GTT. Bars are the average of five thickness measurements at a specific location; error bars show standard deviations in thickness at each location.

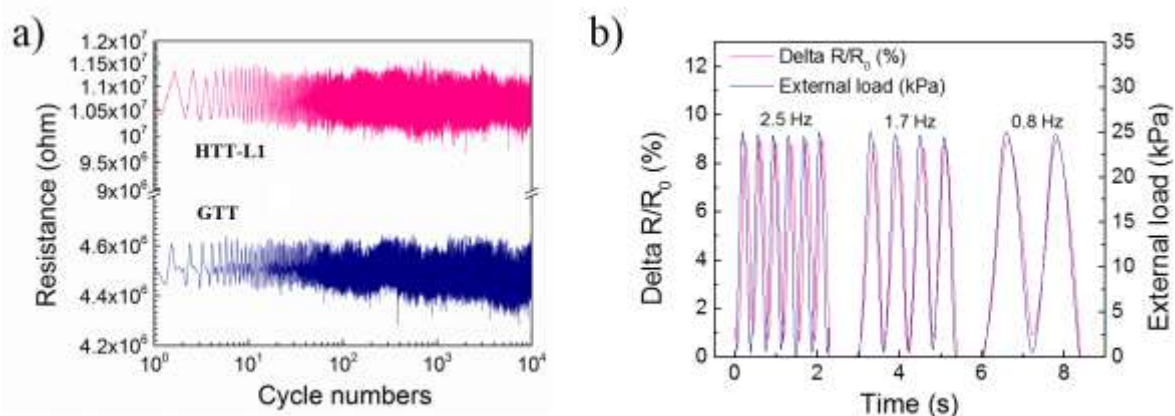


Figure S6. Performance of a 1D flexible pressure-sensing device. a) Dynamic fatigue properties of DTSTs (HTT and GTT) with PDMS as a protective layer under a 25 kPa load and a frequency of 1 Hz. b) Response to mechanical resistance by HTT-1 with PDMS as a protective layer under a 25 kPa load and at different frequencies (2.5 Hz, 1.7 Hz, and 0.8 Hz).