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Supplementary Information

Engineered Nanocarbon Mixing for Enhancing Thermoelectric Properties of Telluride-PEDOT:PSS Nanocomposite

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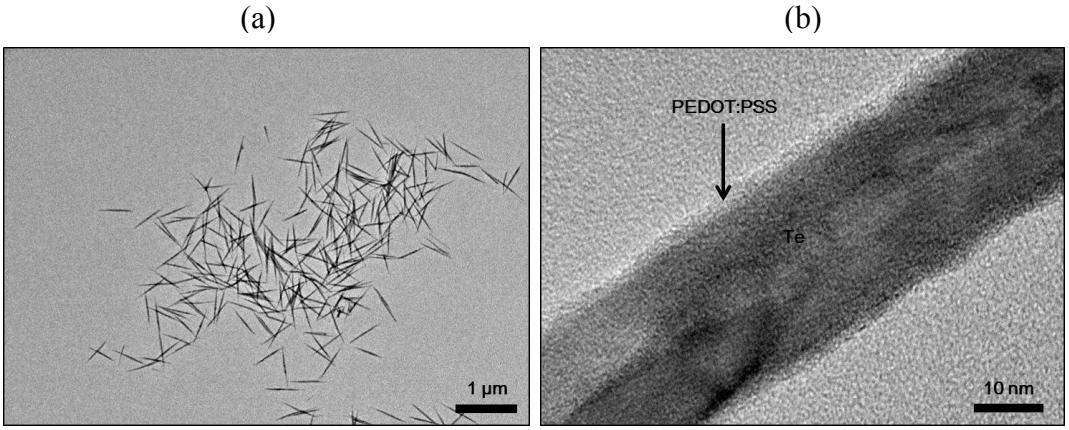

Fig. S1 TEM images of telluride-PEDOT:PSS: (a) low magnification of telluride-PEDOT:PSS; (b) high magnification of telluride nanorods coated with PEODT:PSS.

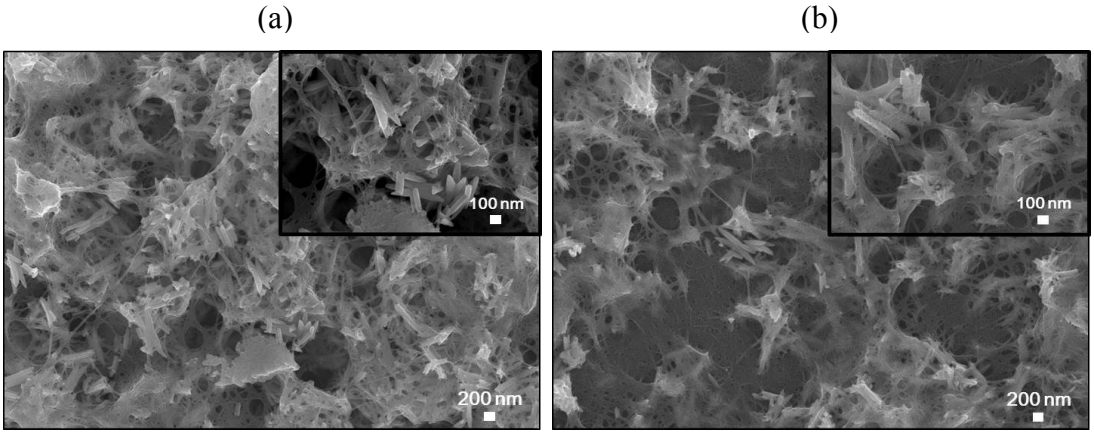

Fig. S2 Surface SEM images of telluride nanorods without PEDOT:PSS containing different amounts of SSNWTs: (a) 0.4 wt% of SSWNTs; (b) 0.8 wt% of SSWNTs.

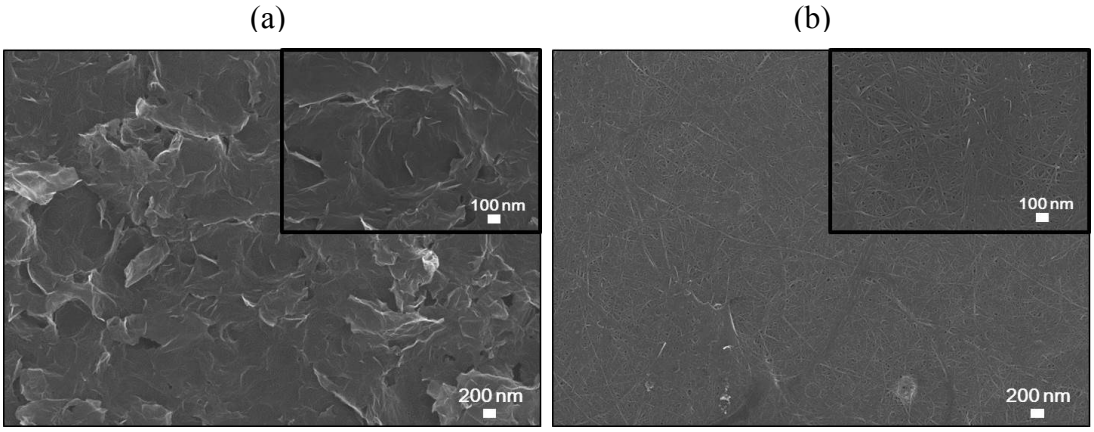

Fig. S3 Surface SEM images of the nanocarbons: (a) GNPs; (b) SSWNTs.

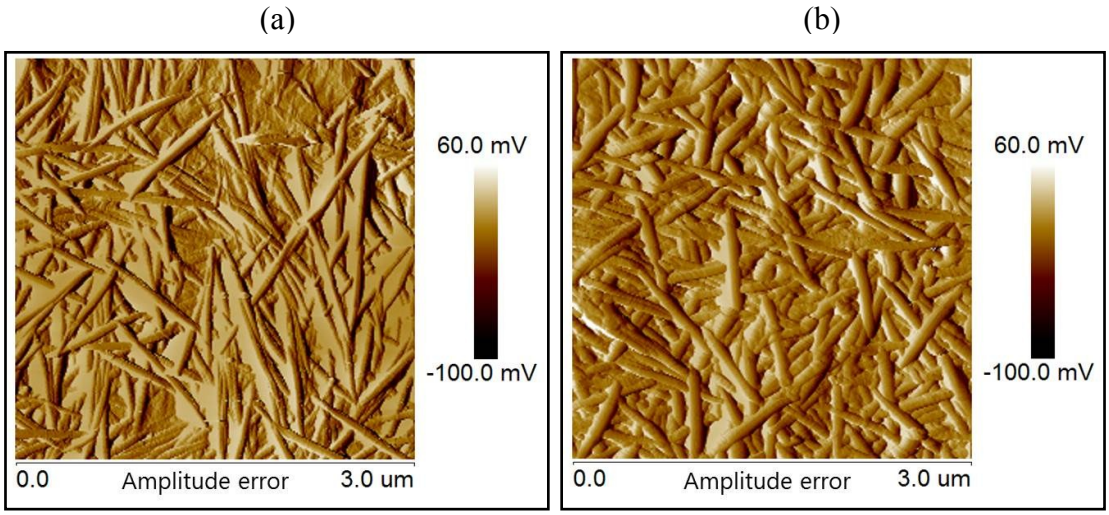

Fig. S4 Atomic force microscopy step profiler images of Te-PEDOT:PSS films with different types of nanocarbon: (a) 0.4 wt% of GNPs; (b) 0.4 wt% of SSWNTs.

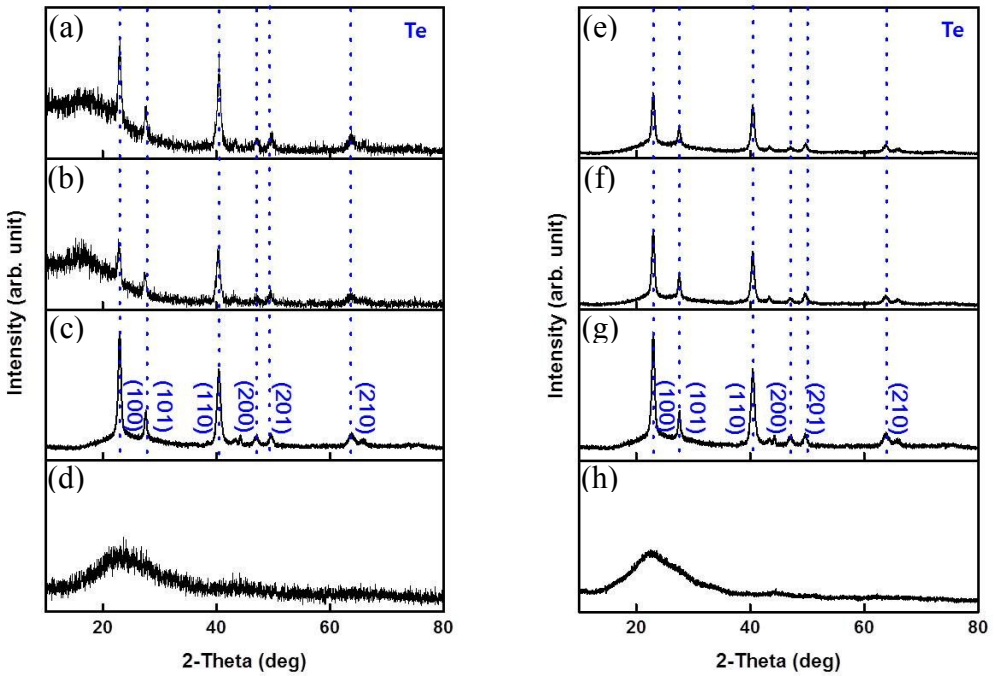

Fig. S5 XRD patterns of films with different nanocarbon content: (a) Te-PEDOT:PSS with 0.8 wt% of GNPs; (b) Te-PEDOT:PSS with 0.4 wt% of GNPs; (c) Te-PEDOT:PSS, (d) GNPs, (e) Te-PEDOT:PSS with 0.8 wt% of SSWNTs, (f) Te-PEDOT:PSS with 0.4 wt% of SSWNTs, (g) Te-PEDOT:PSS; (h) SSWNTs.

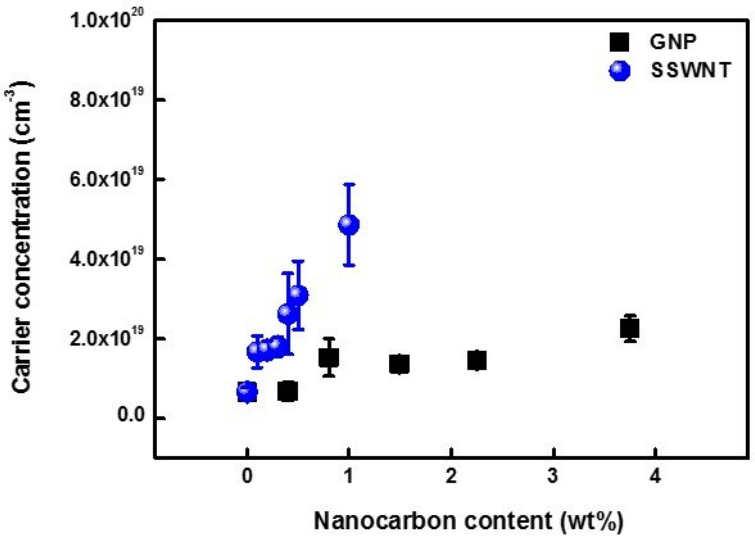

Fig. S6 Carrier concentration in nanocarbon-mixed Te-PEDOT:PSS as a function of the nanocarbon content.

Table S1. Thermoelectric properties of nanocarbon-mixed Te-PEDOT:PSS with different GNP content.

GNP content (wt%)	Electrical conductivity[a] (S cm^{-1})	Seebeck coefficient[a] (μV K^{-1})	Power factor[a] (μW m^{-1} K^{-2})
0	23.82 ± 2.59	142.33 ± 16.10	49.19 ± 13.95
0.4	29.47 ± 5.68	136.00 ± 1.00	54.59 ± 8.99
0.8	50.69 ± 7.60	135.40 ± 10.40	93.59 ± 21.84
1.49	38.51 ± 6.55	127.87 ± 8.79	63.36 ± 15.82
2.25	41.71 ± 9.42	107.00 ± 10.39	50.35 ± 16.84
3.75	59.36 ± 4.43	98.83 ± 7.48	58.32 ± 10.59

[a] Error ranges are based on sample to sample variation.

Table S2. Thermoelectric properties of nanocarbon-mixed Te-PEDOT:PSS with different SSWNT content.

SSWNT content (wt%)	Electrical conductivity[a] (S cm^{-1})	Seebeck coefficient[a] (μV K^{-1})	Power factor[a] (μW m^{-1} K^{-2})
0	23.82 ± 2.59	142.33 ± 16.10	49.19 ± 13.95
0.1	102.44 ± 6.30	121.00 ± 2.83	150.23 ± 16.24
0.2	139.69 ± 17.96	117.50 ± 3.54	192.21 ± 13.20
0.3	139.38 ± 8.92	118.33 ± 6.03	206.06 ± 6.70
0.4	170.33 ± 20.34	103.67 ± 3.21	174.77 ± 4.27
0.5	180.20 ± 11.87	101.67 ± 6.66	189.11 ± 20.43
0.8	252.62 ± 11.82	80.75 ± 2.75	166.31 ± 9.12
1	383.75 ± 10.54	65.30 ± 0.42	136.61 ± 2.37

[a] Error ranges are based on sample to sample variation.