Electronic Supplementary Information (ESI)

Thermoelectric fibers from well-dispersed carbon nanotube/poly(vinyliedene fluoride) pastes for fiber-based thermoelectric generators

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$$S_{Composites} = \frac{v_{SWCNTs}S_{SWCNTs}\sigma_{SWCNTs}+v_{PVDF}S_{PVDF}\sigma_{PVDF}}{v_{SWCNTs}\sigma_{SWCNTs}+v_{PVDF}\sigma_{PVDF}} = S_{SWCNTs} \quad \text{Eq. (S1)}$$

$$\sigma_{Composites} = v_{SWCNTs}\sigma_{SWCNTs} + v_{PVDF}\sigma_{PVDF} = v_{SWCNTs}\sigma_{SWCNTs} \quad \text{Eq. (S2)}$$

Where v_{SWCNTs} and v_{PVDF} are volume fractions of the SWCNTs and PVDF, respectively, in the composites.

Table S1 Thermoelectric properties of the SWCNT/PVDF composite fibers with SWCNT contents ranging from 30 to 60 wt%

wt% CNT	Seebeck coefficient [μV K^{-1}]	Electrical conductivity [S cm^{-1}]	Power factor [μW m^{-1}K^{-2}]
30	30.2 ± 3.0	607 ± 110	68.0 ± 14.8
40	41.4 ± 3.4	842 ± 110	182 ± 46
50	40.2 ± 4.5	1950 ± 483	378 ± 56
60	36.9 ± 3.1	791 ± 162	131 ± 19

Table S2 Thermoelectric properties of the PEI-treated SWCNT/PVDF composite fibers with the SWCNT content of 50 wt%

PEI concentration [wt%]	Seebeck coefficient [μV K^{-1}]	Electrical conductivity [S cm^{-1}]	Power factor [μW m^{-1}K^{-2}]
1	-32.1 ± 3.2	1460 ± 185	190 ± 52
2	-37.6 ± 1.2	1550 ± 317	289 ± 98
3	-33.1 ± 6.7	2050 ± 481	266 ± 60
4	-22.8 ± 2.0	2770 ± 477	182 ± 59

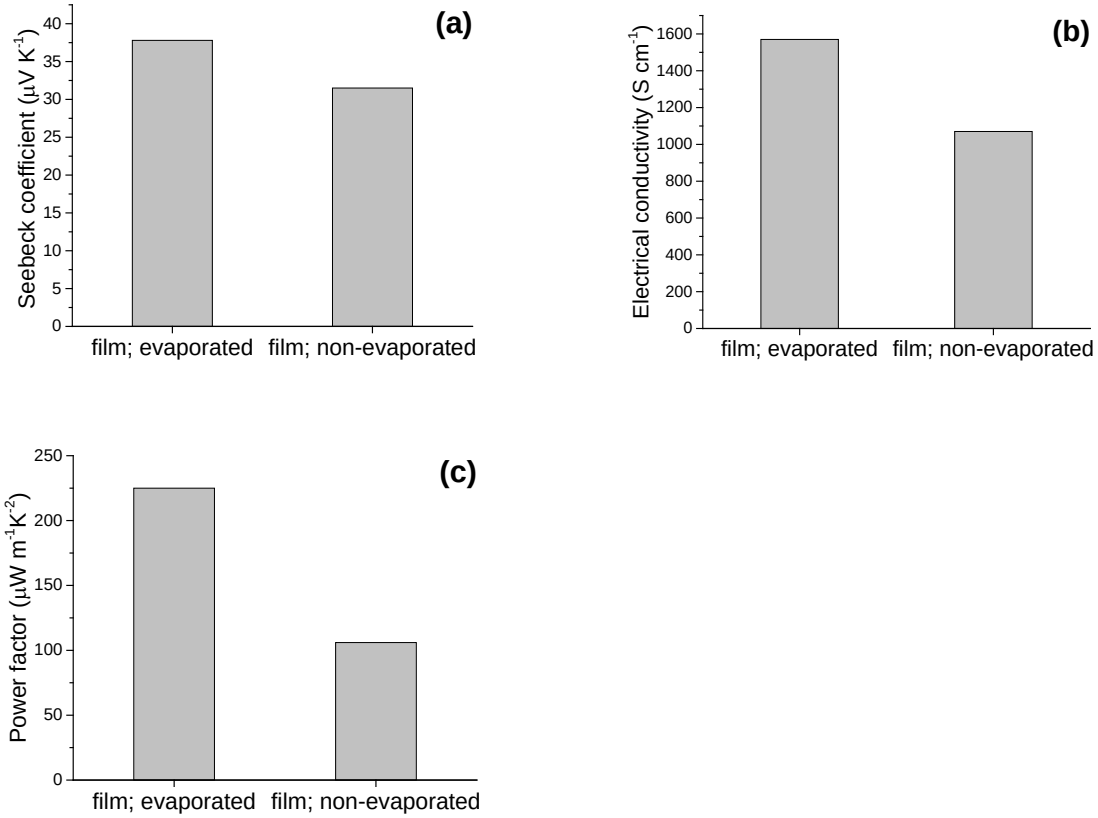

Fig. S1 (a) Seebeck coefficients, (b) electrical conductivities, and (c) power factors of the SWCNT/PVDF composite films drop-cast from the paste ball-milled with a solid concentration of 1 wt% and evaporated, and paste ball-milled with a solid concentration of 5 wt% and non-evaporated.

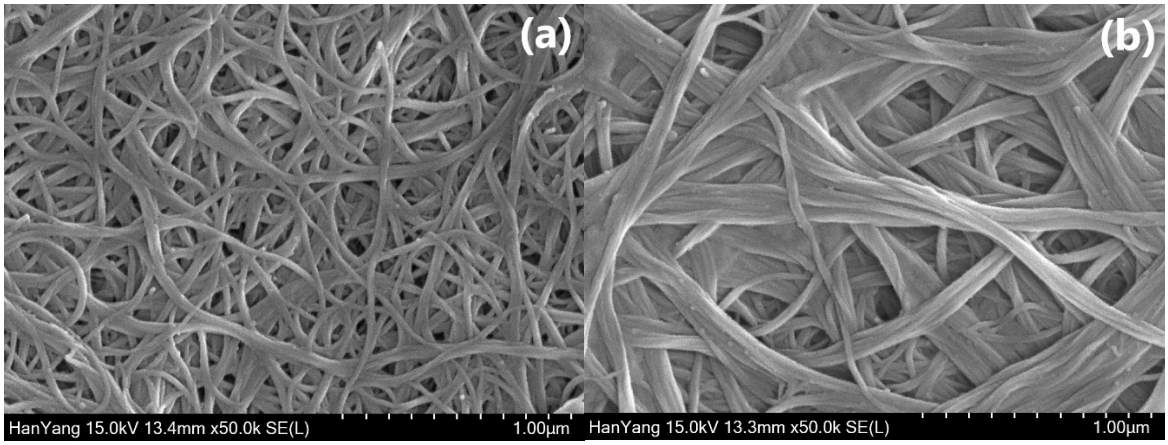

Fig. S2 SEM image of the SWCNT/PVDF composite films with the SWCNT content of 50 wt% drop-cast from the (a) paste ball-milled with a solid concentration of 1 wt% and evaporated, and paste ball-milled with a solid concentration of 5 wt% and non-evaporated.

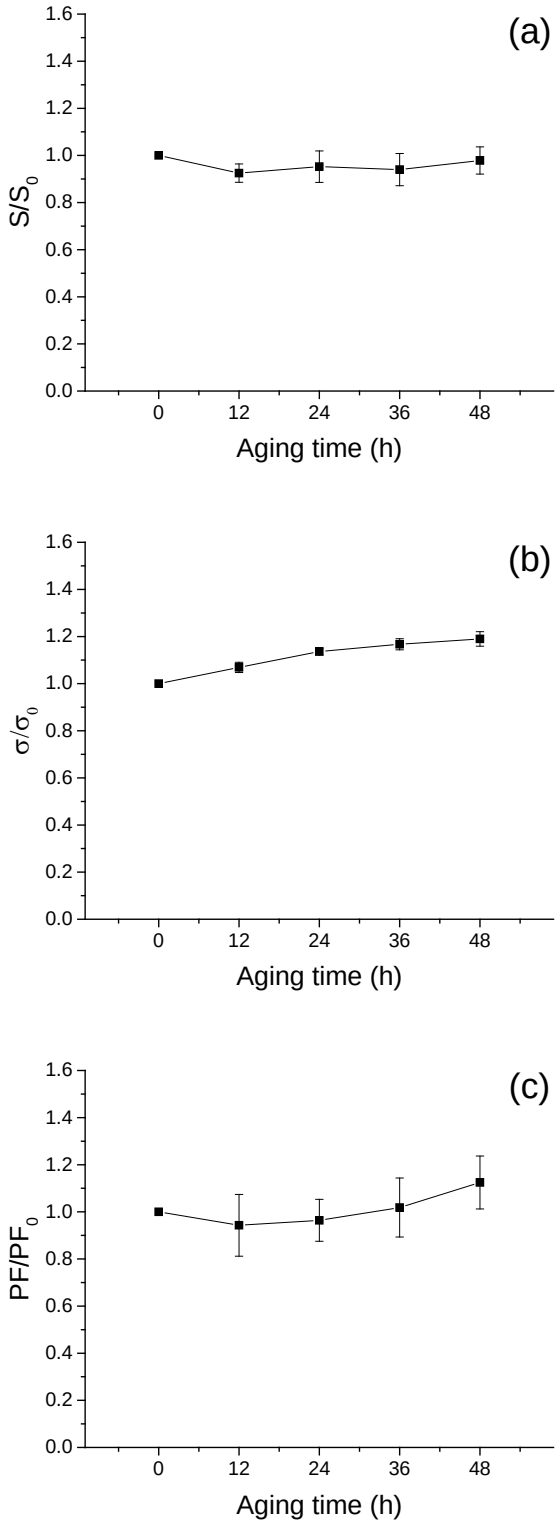

Fig. S3 Dependence of the (a) Seebeck coefficient, (b) electrical conductivity, and (c) power factor on the aging time in the p-type SWCNT/PVDF composite fibers with the CNT content of 50 wt%.

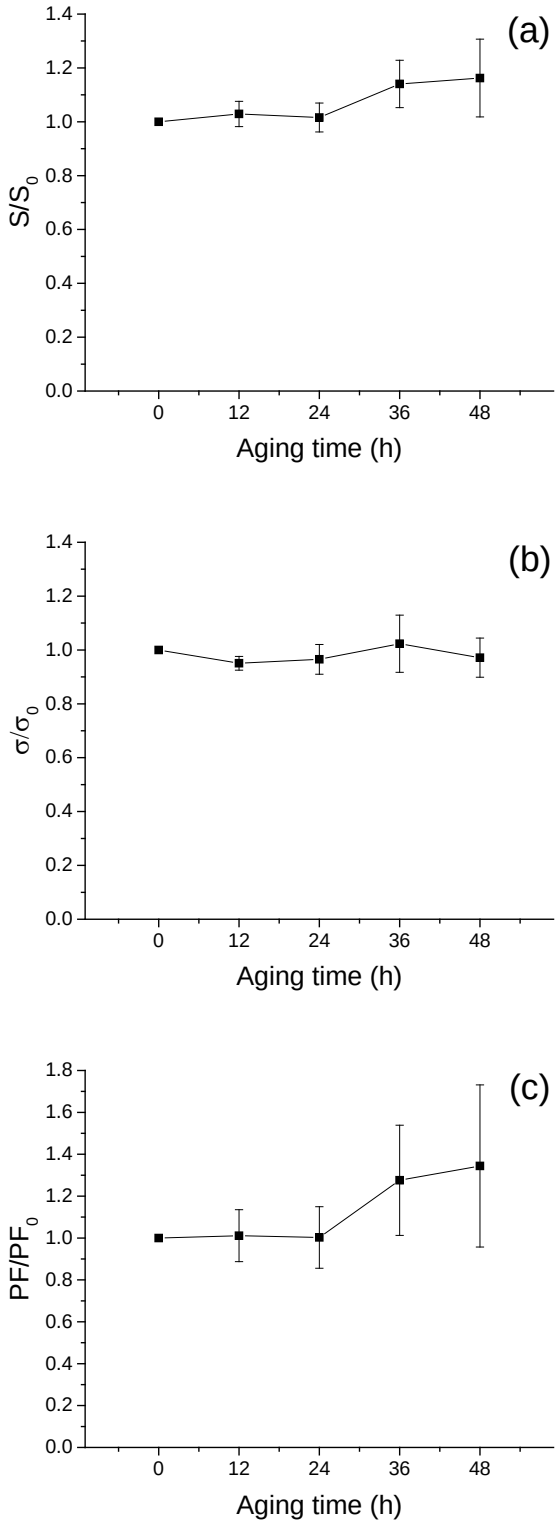

Fig. S4 Dependence of the (a) Seebeck coefficient, (b) electrical conductivity, and (c) power factor on the aging time in the PEI (2 wt%)-treated n-type SWCNT/PVDF composite fibers with the CNT content of 50 wt%.

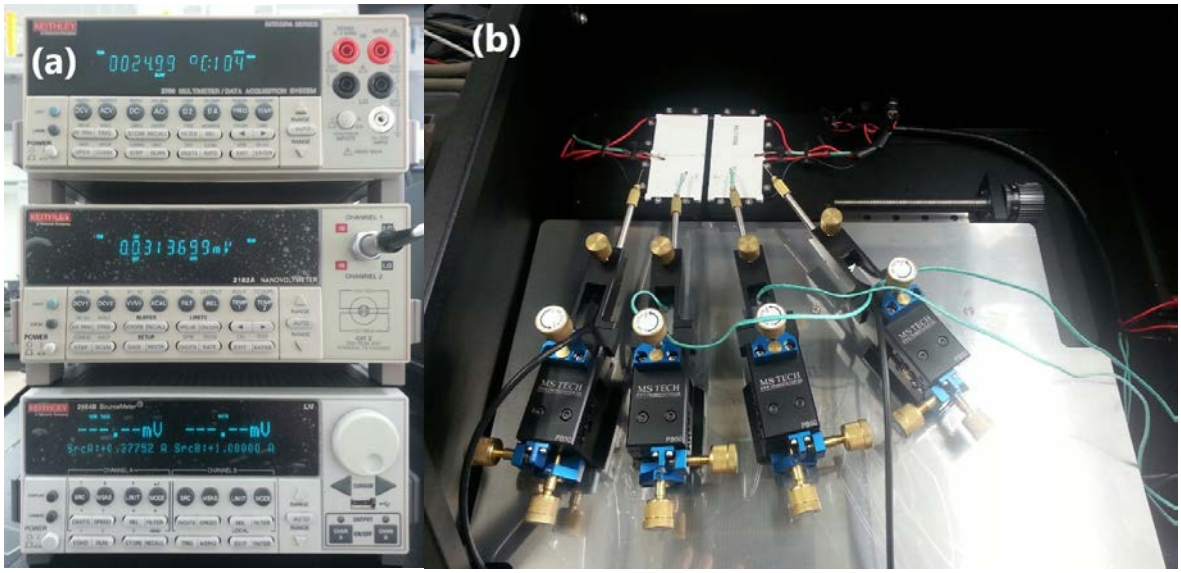

Fig. S5 Photographs of (a) the temperature control and electrical measurement part and (b) the measurement stage part of Seebeck coefficient and resistance measurement system. The temperature difference between both ends of the fiber was controlled using Peltier devices, which were elaborately controlled by a Keithley 2200 power source and a Keithley 2460 source meter. Two pairs of Pt thermocouples were used to detect and control the temperatures of the Peltier plates and thermoelectric fibers. The Seebeck voltage (ΔV) was measured using a Keithley 2182A nanovoltmeter.

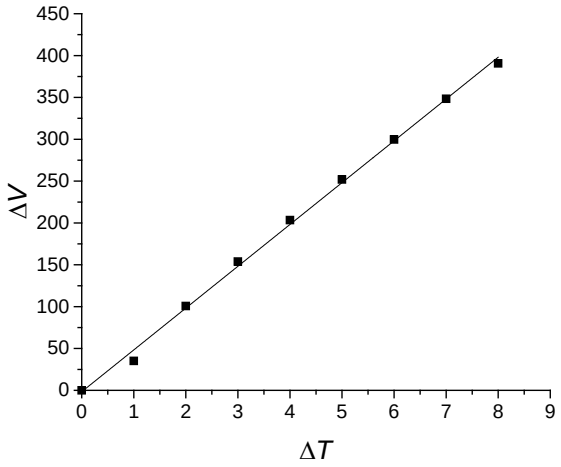

Fig. S6 Representative ΔV -ΔT curve of a SWCNT/PVDF composite fiber.

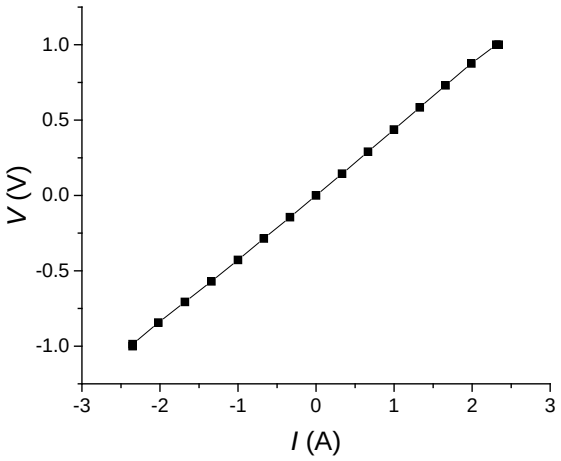

Fig. S7 Representative *V*–*I* curve of a SWCNT/PVDF composite fiber.