

Electronic Supplementary Information

**Cotton Modified with Silver-Nanowires/Polydopamine for Wearable
Thermal Management Device**

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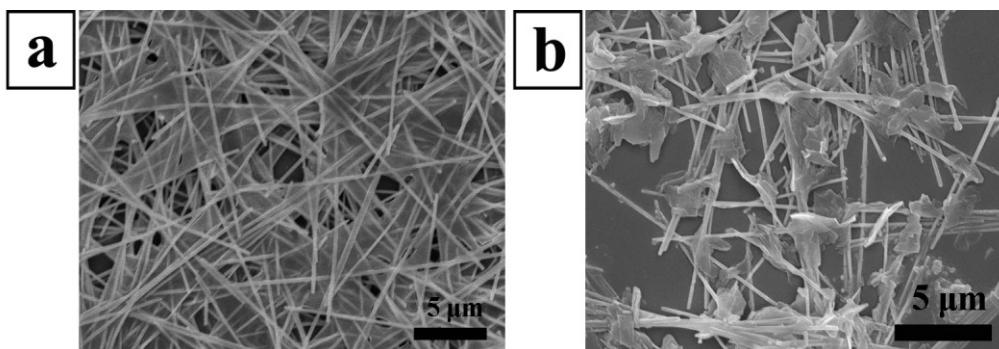


Figure S1. The excess dopamine hydrochloride will accelerate aggregation process of AgNW through the self-polymerization of monomer dopamine, (a) dopamine hydrochloride 0.1 g/mL, (b) dopamine hydrochloride 1 g/mL.

Joule Heating Measurement.

ADNC samples were cut into $2\text{ cm} \times 2\text{ cm}$ shapes, and two adhesive aluminum tapes were attached on each end of the sample for electrical contacts. The voltage was supplied by a DC power supply (Masien), and the sample temperature was monitored by a thermal couple (Watlow), which connects to a temperature controller (Digi-Sense).

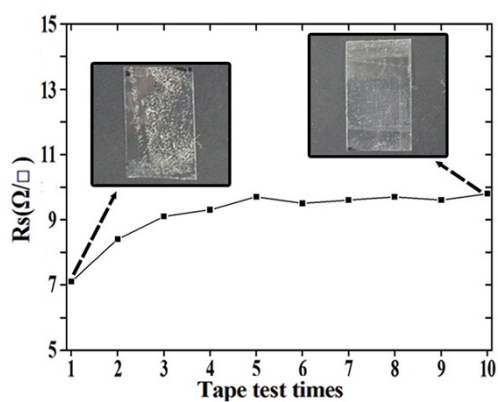


Figure S2. The enhanced adhesion of the AgNWs to the polydopamine-modified cotton surface was monitored using the tape test; the inset shows images captured by a

digital camera after the first tape test and the tenth tape test in the same experiment.

Tape Test.

The tape test measured the adhesion strength quantitatively according to the JIS Z0237-2000 standard. Figure S1 shows the resistance as a function of the tape test times. As shown in Figure S1, the sheet resistance of ADNC increased from $7.13 \Omega \square^{-1}$ to $8.48 \Omega \square^{-1}$ during the first tape testing, from $8.48 \Omega \square^{-1}$ to $9.11 \Omega \square^{-1}$ during the second tape testing, and it remained approximately $9.5 \Omega \square^{-1}$ afterward. The insets show the digital camera images of the tapes after the first and tenth tape tests in the same experiment, respectively. A few adhesive AgNWs were peeled off from ADNC after the first tape test, while many fewer AgNWs were peeled off after the tenth tape test. This fact may be attributed to the embedding effect because the majority of the AgNWs are buried in the polydopamine layers (Figure 1b), and only a few AgNWs on the upmost top layer can be peeled off from ADNC.

Washing Test.

The AgNWs/polydopamine nanocomposite cloths were hung and immersed in swirling distilled water. The water was stirred by a magnetic bar with a rotational speed of 600 rpm.