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Supplementary Information

A stretchable and breathable form of epidermal device based on elastomeric nanofibre textiles and silver nanowires

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Supplementary Figures

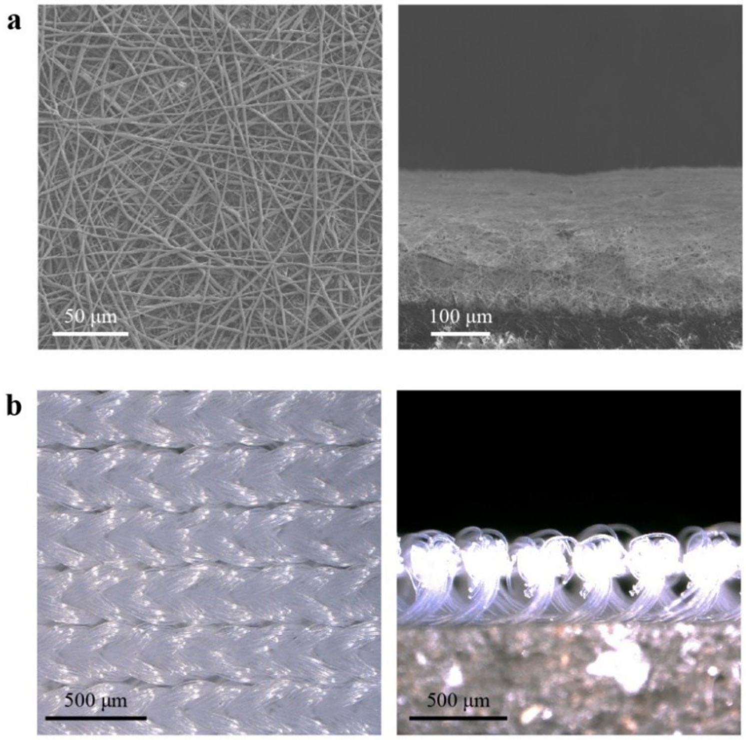

Figure S1. (a) SEM images of electrospun TPU nanotextile in the top (left) and side (right) views. (b) Optical Images of elastic textile in the top (left) and side (right) views.

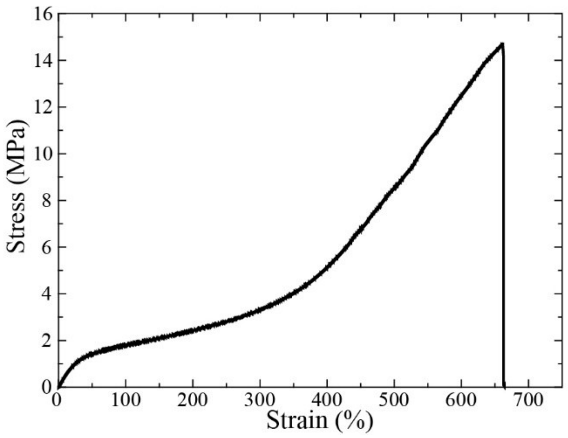

Figure S2. Stress-strain curve of TPU film under unaxial tensile stretching.

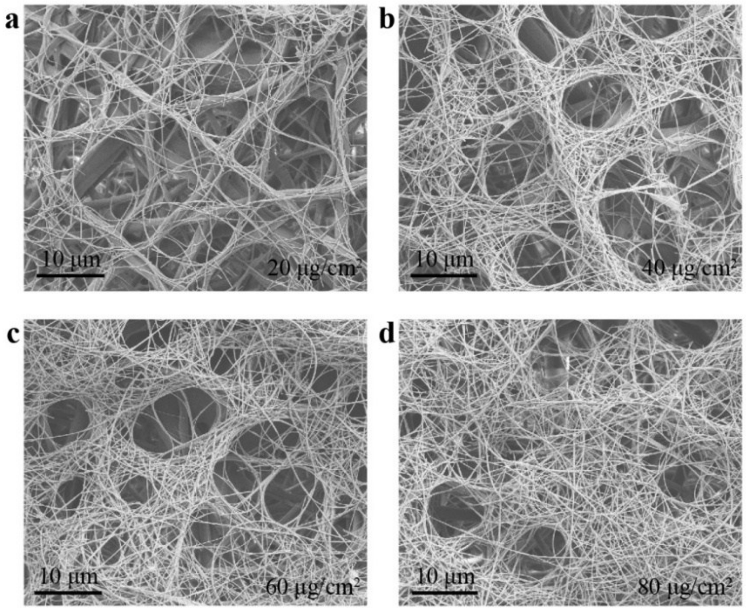

Figure S3. SEM images of AgNW-deposited conductor with different area mass loading.

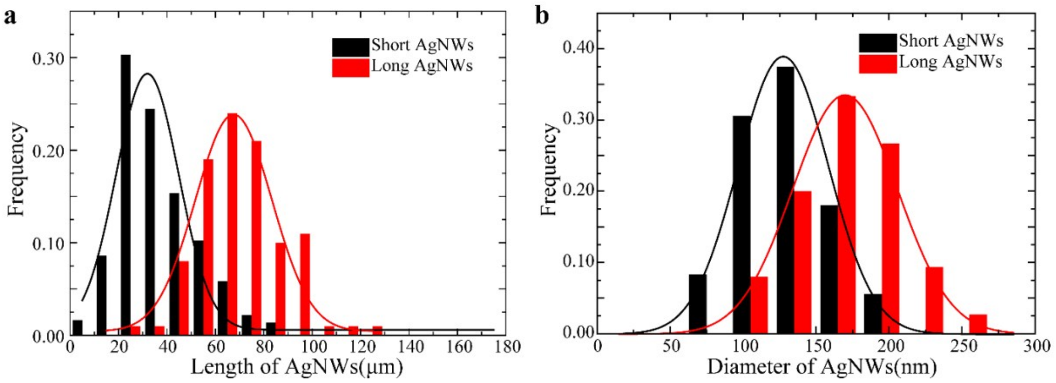

Figure S4. (a) Histrogram of length distributions for long and short AgNWs. Gaussian fits to the distributions (smooth curves) yield 31.9±1.2 μm for short AgNWs and 67.6±1.4μm for long AgNWs. **(b)** Histrogram of diameter distributions for long and short AgNWs. Gaussian fits to the distributions (smooth curves) yield 127.5±0.9 nm for short AgNWs and 169.8±1.0 nm for long AgNWs.

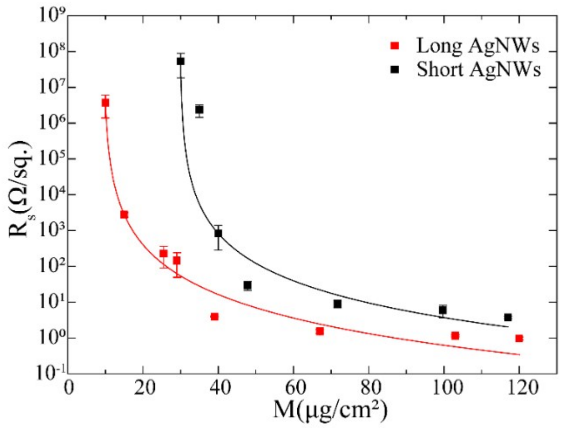

Figure S5. Properties of AgNW networks following percolation theory. The relationship between sheet resistance R_S and area mass density M in percolation network is described by

$$R_s = R_0 \left(\frac{M - M_c}{M_c} \right)^{-t} \tag{S1}$$

where R_0 *is* a prefactor, t the percolation critical exponent and M_C the percolation threshold. The fitting parameters are summarized in Table S1. Electrical percolation in conductive composites directly correlates with the aspect ratio of the fillers and their spatial distribution. Both types of AgNWs exhibit similar critical exponent of ~3, which suggest consistent network structure as a result of their synergestic assembly with elastomeric nanofibers. The percolation threshold (M_c) values are 9.5±0.1 μg/cm^2 for long AgNWs and 29.8±0.2 μg/cm^2 for short AgNWs, respectively. The difference is largely associated with the variations in the aspect ratios.

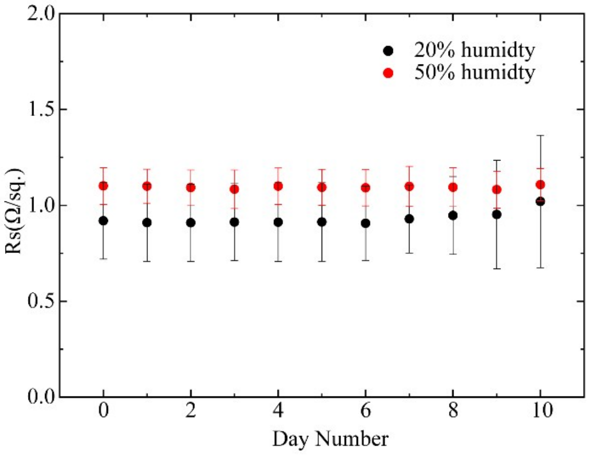

Figure S6. Change in sheet resistance over ten days for long AgNW conductor under different humidty conditions

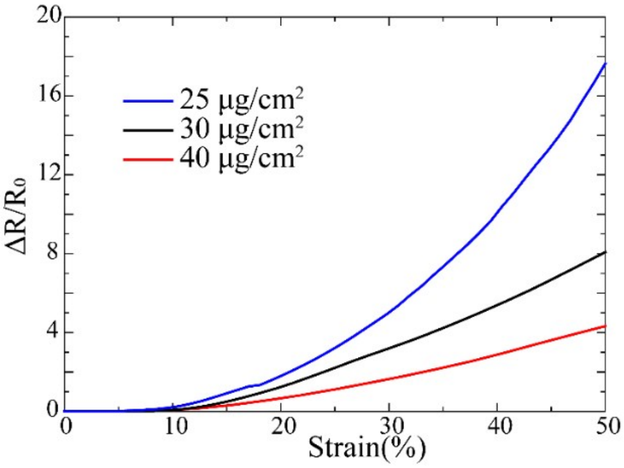

Figure S7. Changes in resistance $\Delta R/R_0$ as a function of tensile strain for stretchable conductors based on long AgNWs with different area density.

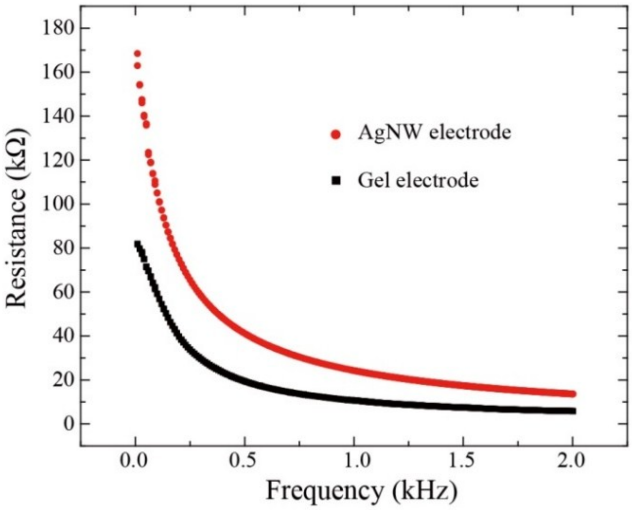

Figure S8. Skin-electrode impedance as a function of frequency for AgNW and Ag/AgCl gel electrodes, respectively.

Supplementary Tables

Table S1. Simulation values of factors for generalized excluded model

AgNWs	R_0 (Ω/sq.)	M_C (μg/cm^2)	t
Short	41±0.1	29.8±0.2	2.80
Long	544±13	9.5±0.1	2.99