Electronic Supplementary Information (ESI) for

Multifunctional and Highly-stretchable Gold-leaf/WPU/TPU Fibers by A Rolling Adhesive Method

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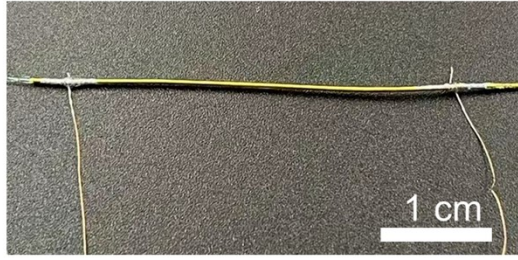
E-mail address: bsheng@usst.edu.cn, (B. Sheng)

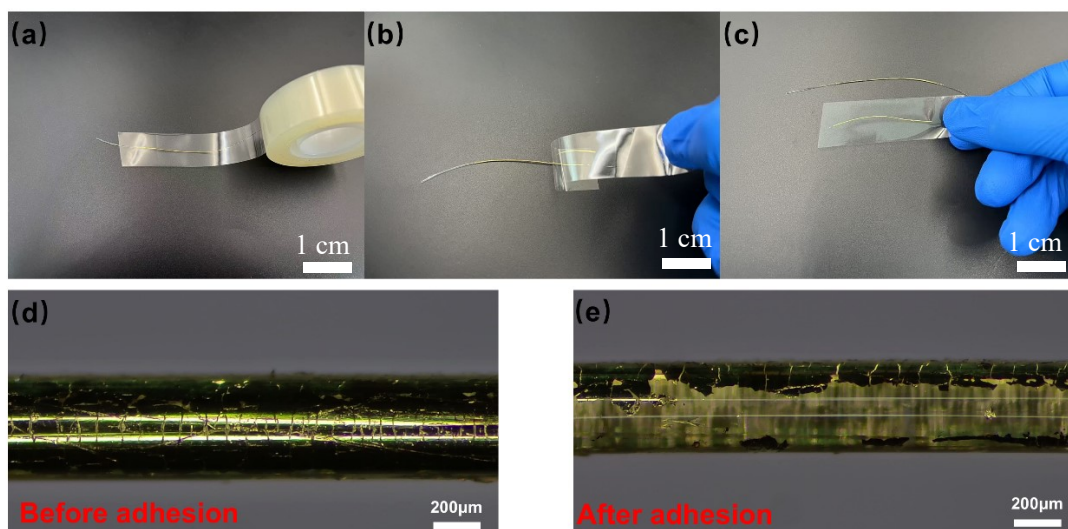Fig. S1 Digital photograph of GLWT fibers.

Fig. S2 Adhesion testing of physically adhered fibers. (a) 3M Tape (Type: 600) adhered to the surface of fibers. (b) Tape removed. (c) Optical image of fibers and tape after adhesion testing for one time. (d) Surface morphology of fibers before adhesion testing. (e) Surface morphology of fibers after adhesion testing for one time.
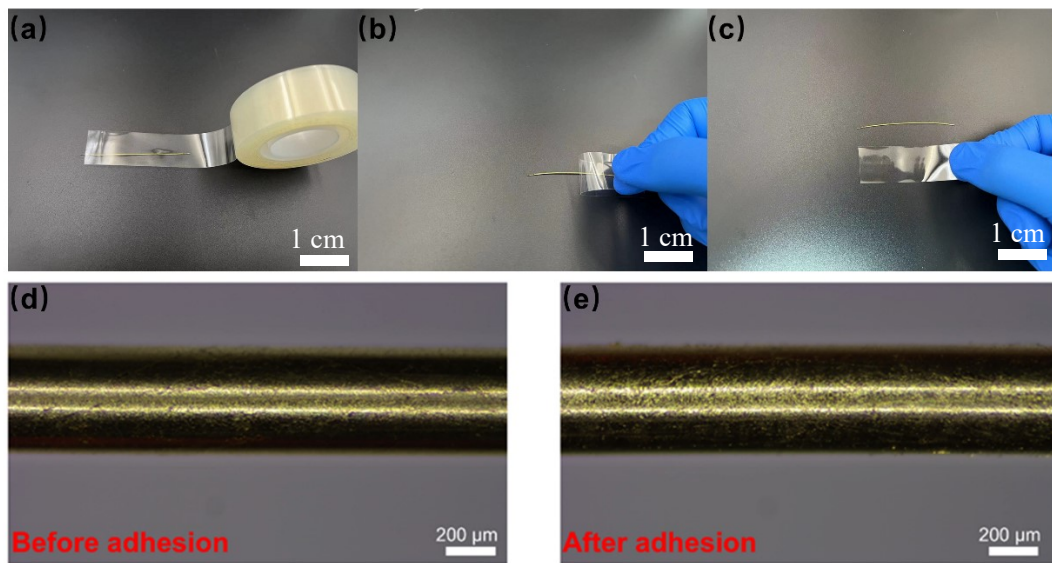
Fig. S3 Adhesion testing of GLWT fibers. (a) 3M Tape (Type: 600) adhered to the surface of GLWT fibers. (b) Tape removed. (c) Optical image of fibers and tape after adhesion testing for 100 times. (d) Surface morphology of fibers before adhesion testing. (e) Surface morphology of fibers after adhesion testing for 100 times.
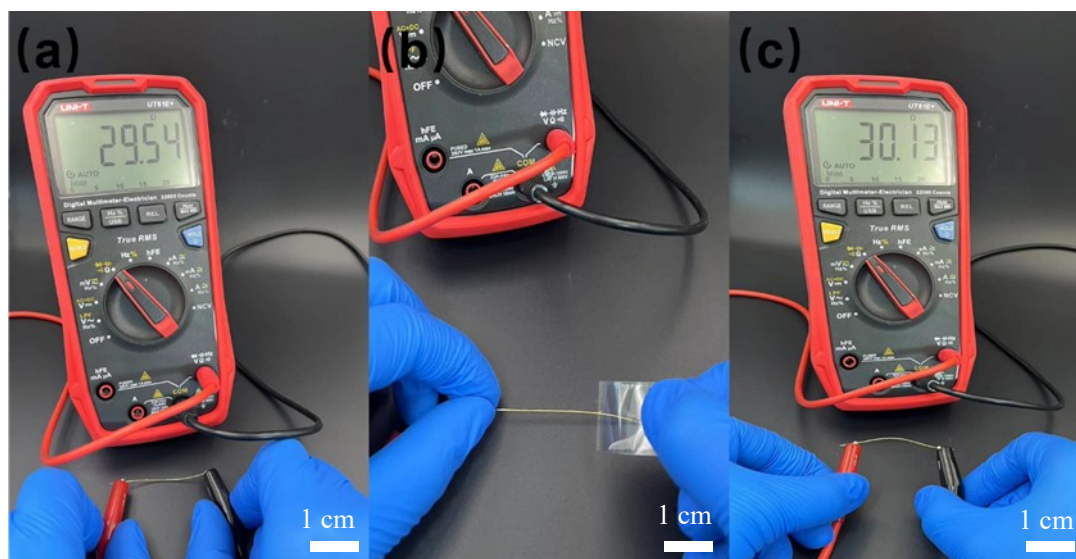
Fig. S4 Changes in resistance of GLWT fibers before and after adhesion testing. (a) Initial resistance of the fibers. (b) Adhering tape onto the GLWT fiber and then removing it. (c) Resistance of the fibers after adhesion testing for 100 times.
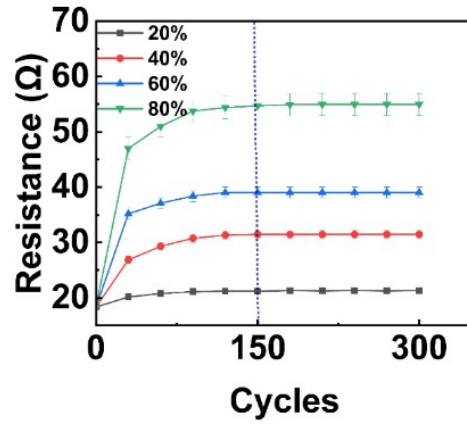
Fig. S5 Variation recovery resistance of GLWT fibers after different aging cycles.
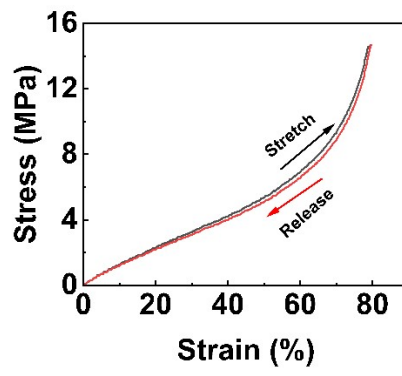
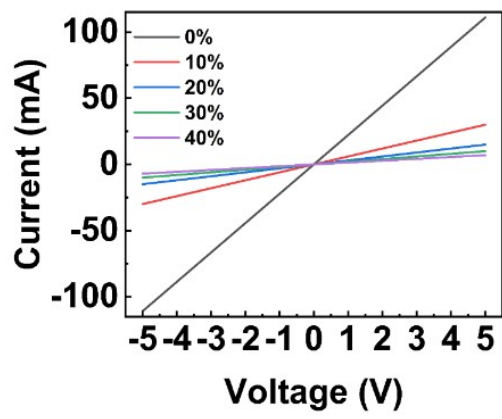Fig. S6 Stretch-release curve of GLWT fiber at 80% strain.

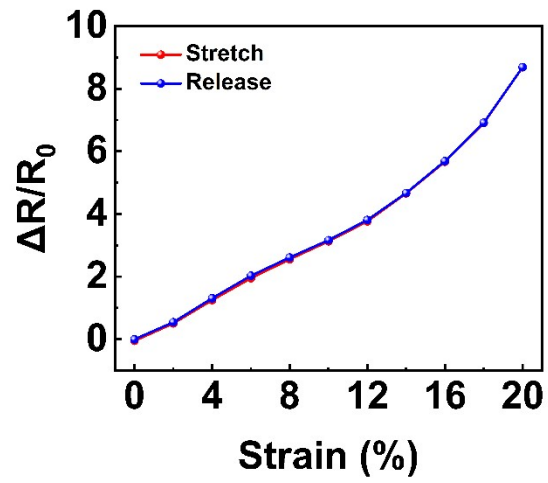Fig. S7 I-V characteristic curve of GLWT fiber.

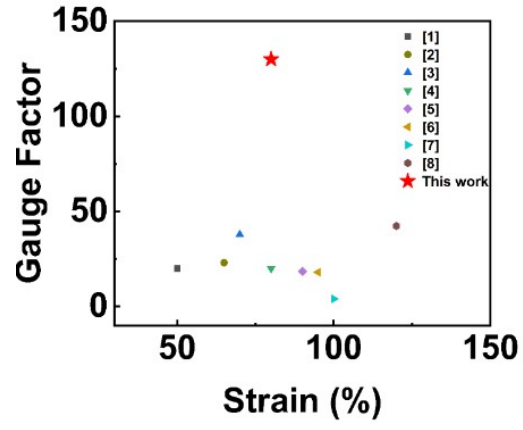Fig. S8 Hysteresis curve of GLWT fibers over 0-20% strain.

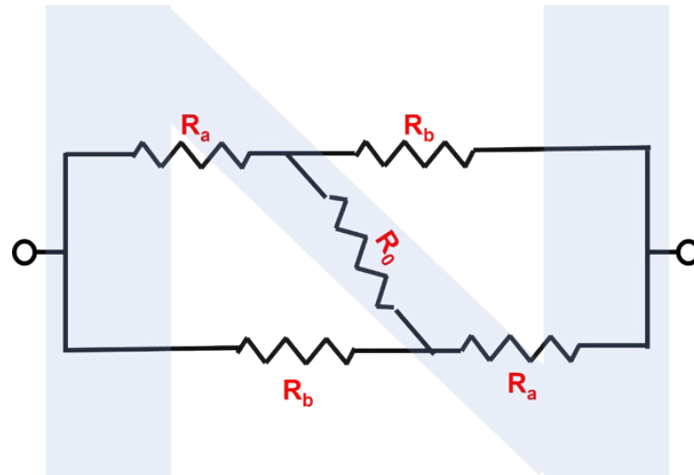Fig. S9 Performance comparisons of our GLWT fiber with previous works.

Fig. S10 Equivalent model of GLWT fibers.

$$R_{eq} = \frac{R_a R_0 + 2R_a R_b + R_b R_0}{R_a + 2R_0 + R_b} \#Eq.S1$$

where R_a, R_0 and R_b are the gold island resistance, the gold island gap resistance and the gold inter-island bridge resistance, respectively. In fact, with increasing strain, the cracks are opened and Since R_a R_b depends on the variation of R_b with respect to the Eq. S1. The opening of cracks in the nano gold leaf reduces the inter-current paths of the gold bridges, leading to an increase in total resistance.
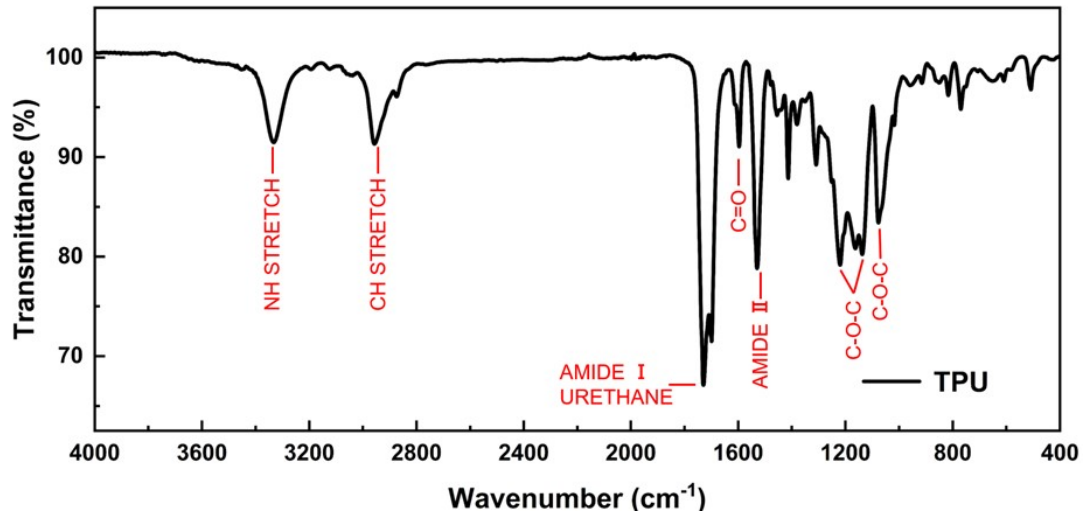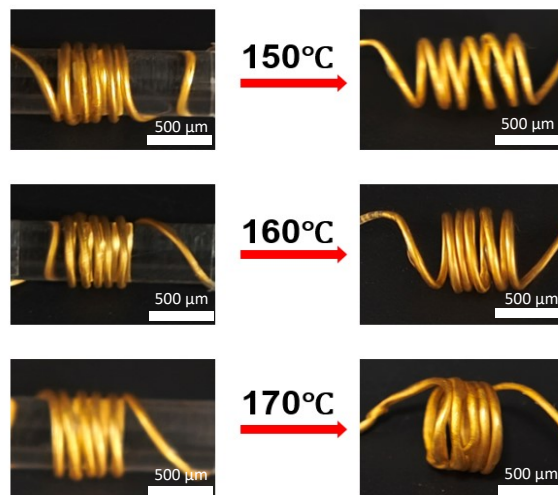
Fig. S11 ATR-FTIR transmission curve of TPU.

Fig. S12 Optical image of GLWT fibers thermally molded into helixes at different temperatures.
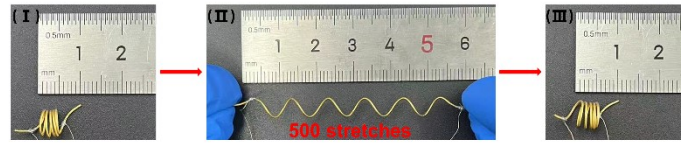
Fig. S13 500 stretching cycles at 1000% (C=10). (I) Initial image of helical fibers. (II) 500 stretching cycles. (III) Helical fiber image after cyclic stretching.

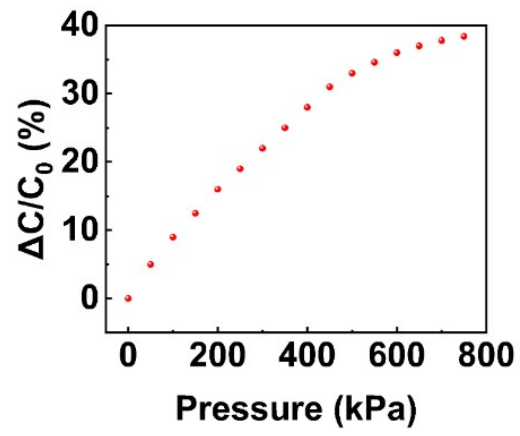Fig. S14 Relative capacitance response with pressure.

Table. S1: GLWT fiber preparation cost table.

Materials	Price	GLWT fiber
Nano gold leaf	0.07 RMB /cm^2	1cm×4cm
TPU wire	0.0015 RMB /cm	5cm
WPU	0.068 RMB /g	1g
Copper wire	0.035 RMB /cm	10cm
Liquid metal	20 RMB/g	＜0.01g

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