

## Supporting Information for:

### Thermally Enhanced Substrate Design for Flexible Thermoelectric Devices via Ultrasonic Welding

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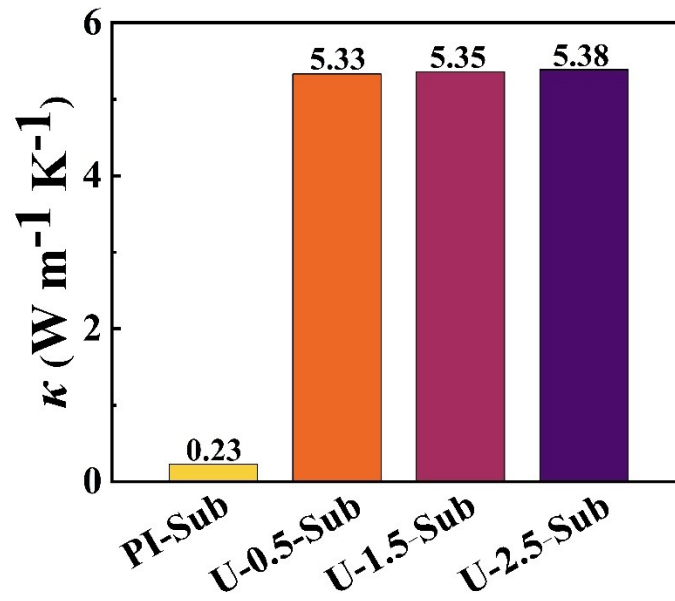
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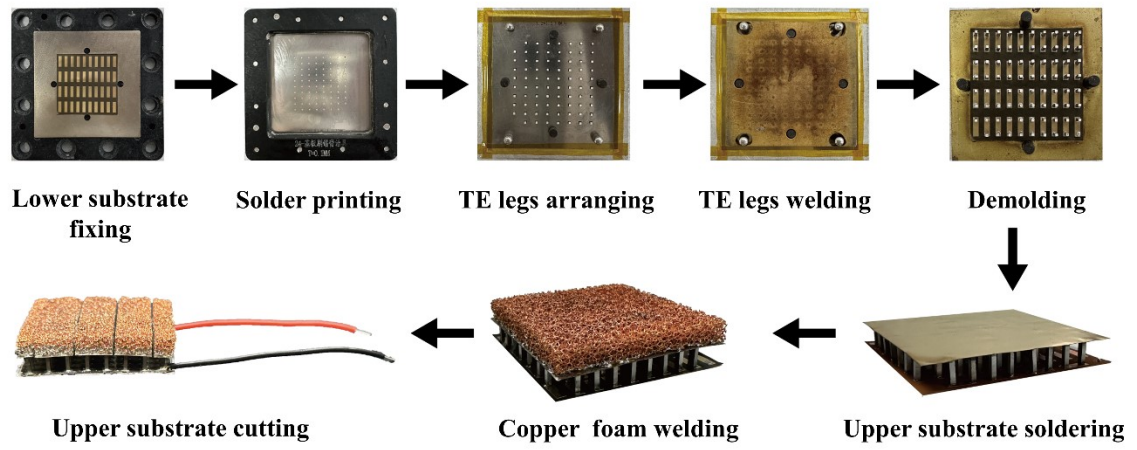
**This PDF includes:**

A. Figures S1 to S5

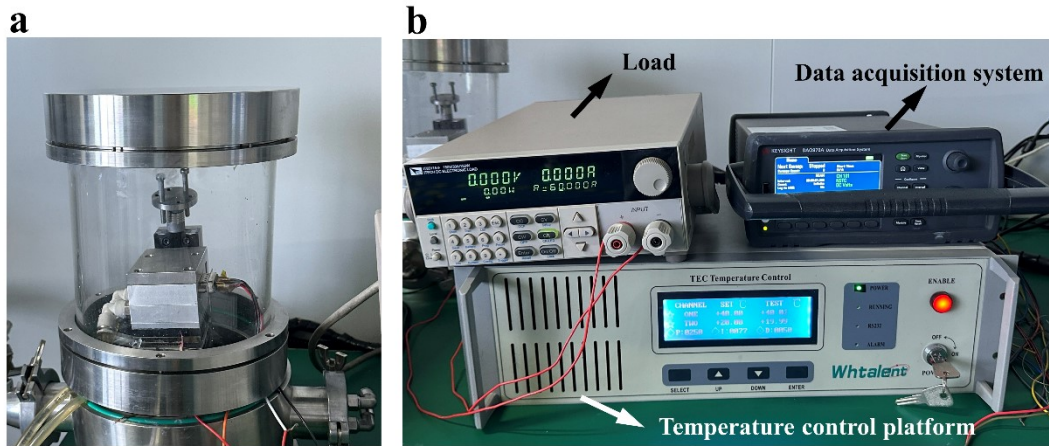
B. Videos S1 to S2



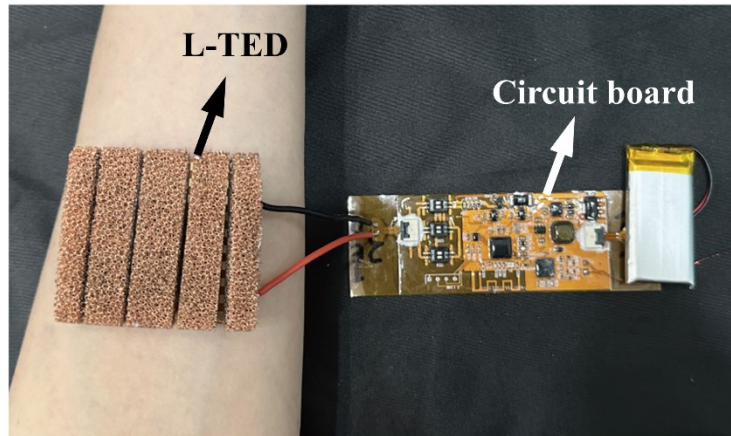
**Figure S1.** Thermal conductivity of the thermal conductive silicone pad-PI laminated substrate with the silicone pad of different thickness. PI-Sub: the PI substrate, U-0.5-Sub: laminated substrate with the silicone pad thickness of 0.5 mm, U-1.5-Sub: laminated substrate with the silicone pad thickness of 1.5 mm, U-2.5-Sub: laminated substrate with the silicone pad thickness of 2.5 mm.



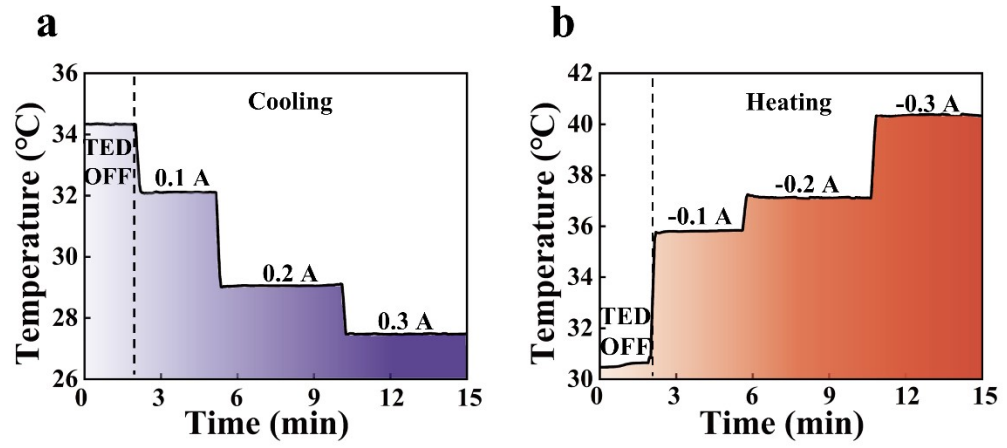
**Figure S2.** Fabrication process of the f-TED.



**Figure S3.** (a) Temperature control platform; (b) Output performance test equipment.



**Figure S4.** Circuit diagram of the wearable system.



**Figure S5.** (a) Cooling performance of P-TED; (b) Heating performance of P-TED.

P-TED: the f-TED with the PI substrate.

## **B: Videos**

**Video S1.** Heating performance of the wearable system comprising L-TED, a control circuit board, and a mobile terminal.

**Video S2.** Cooling performance of the wearable system comprising L-TED, a control circuit board, and a mobile terminal.