

Electronic Supplementary Information (ESI) for Bio-inspired Helical EGaIn/TPU Conductive Fiber by Twisted Coating Method for Flexible Electronics

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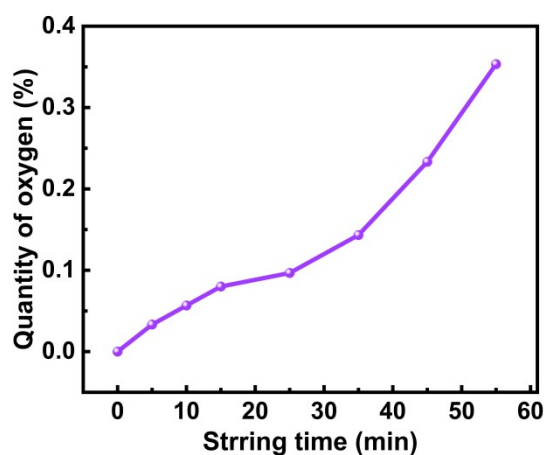


Figure S1. Changes of oxygen content with EGaIn stirring time.

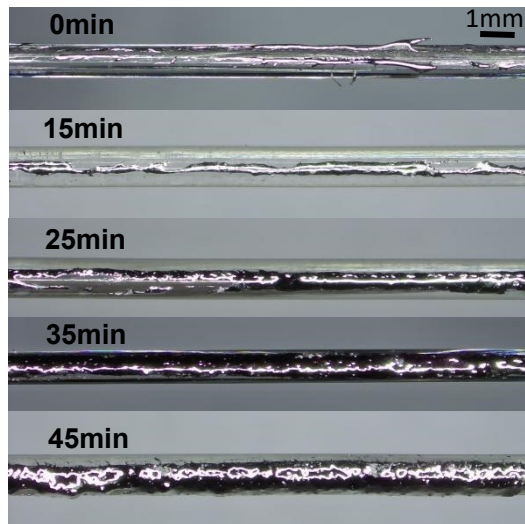


Figure S2. Optical microscope image of EGaIn stirred at different times coated on twisted TPU fibers.

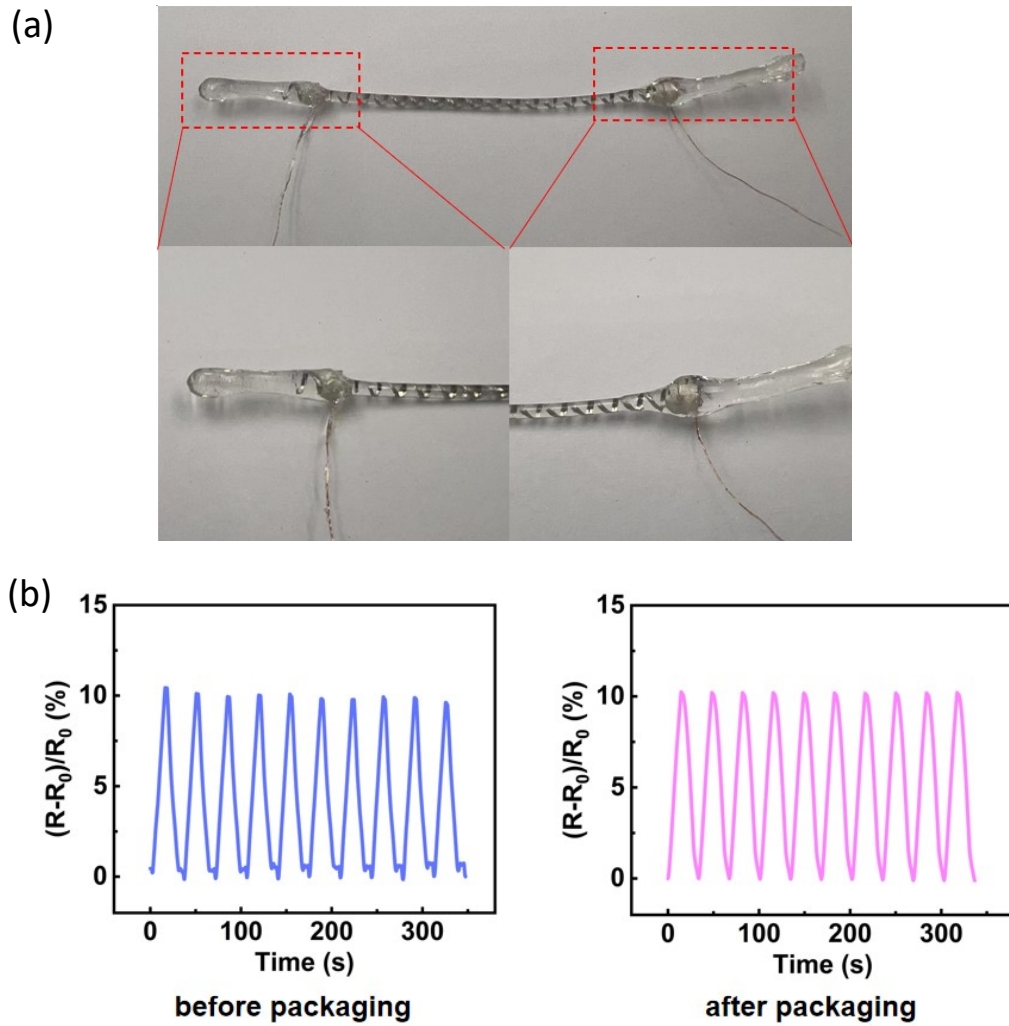


Figure S3. Electrode package diagram and reliability test. (a) Photo of electrode package (b) 20 stretch cycles at 30% before and after packaging.

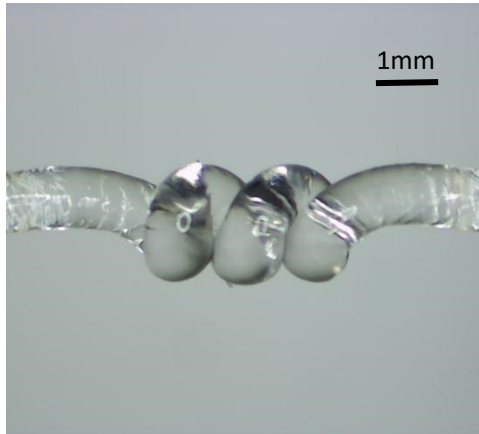


Figure S4. Optical microscope image of nodules produced by fiber torsion overload. (over 4 r/cm)

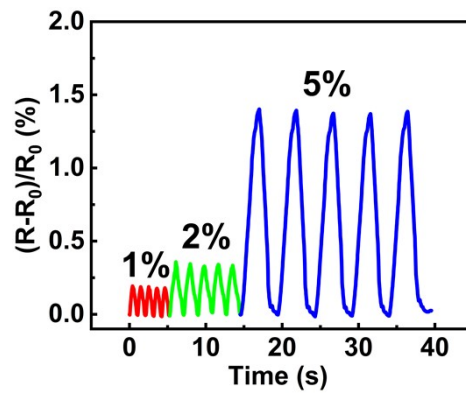


Figure S5. Changes in relative resistance under different cyclic small strains.

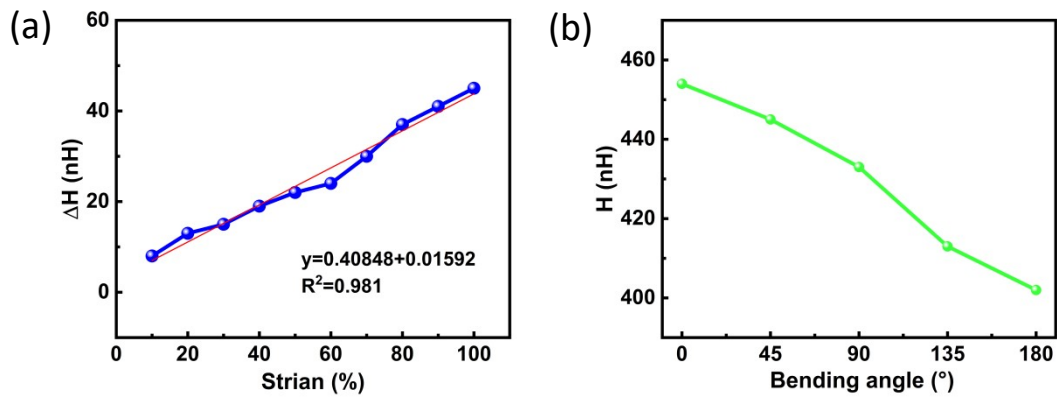


Figure S6. Application of HETF as an inductive sensor (a) Variation of inductance with elongation (b) Variation of inductance with bending angle.

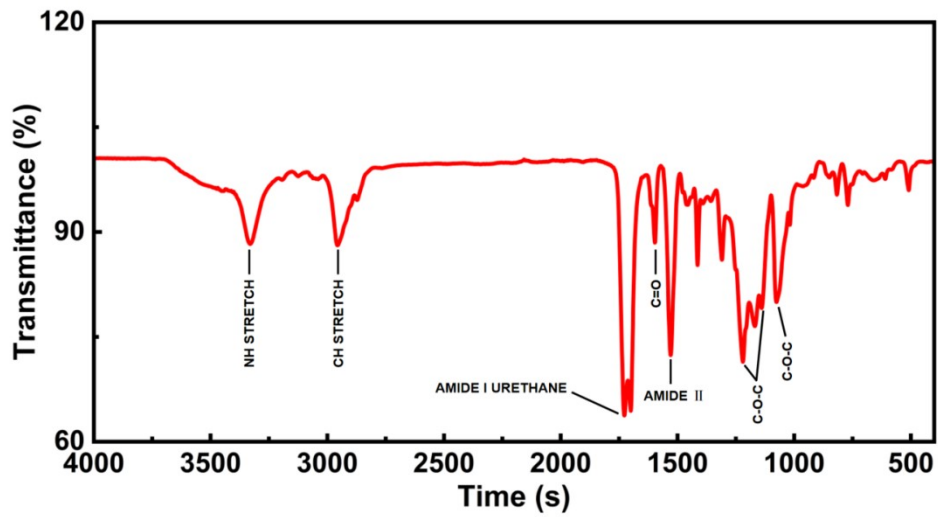


Figure S7. ATR-FTIR transmission curve of TPU fibers.

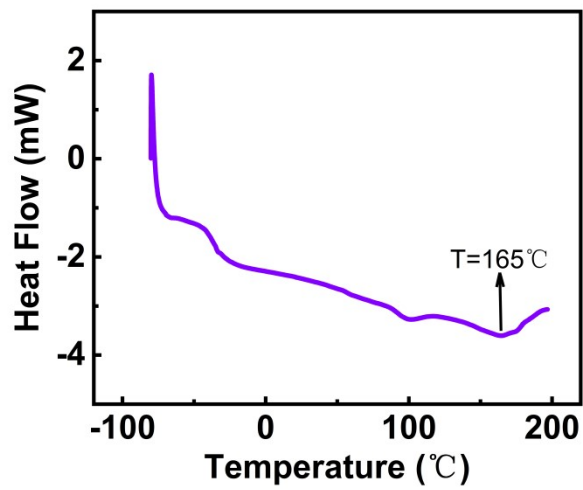


Figure S8. DSC curve of the TPU wire. The melting point of the TPU wire used in this work is 165° C.

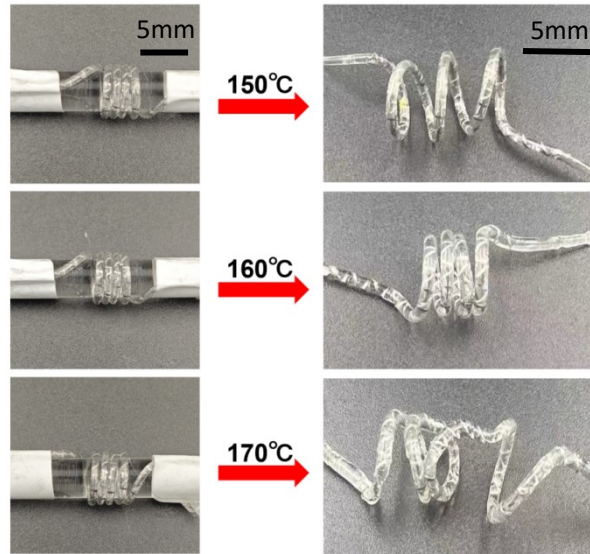


Figure S9. Before and after pictures of HETF thermoformed at different temperatures.

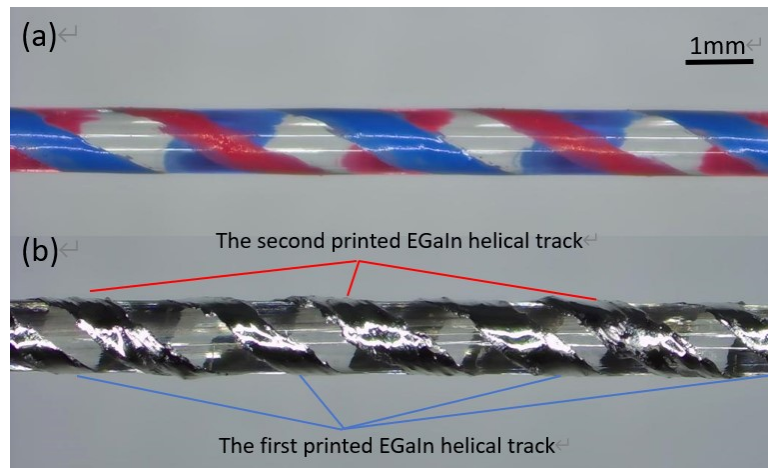


Figure S10. Image of double HETF (a) Schematic diagram of double HETF (For ease of differentiation, we use blue marker to represent the first applied EGaIn and red marker to represent the second applied EGaIn) (b) Optical microscope image of double HETF.

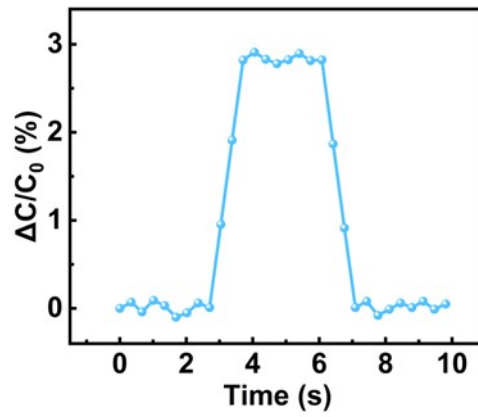


Figure S11. The response and restoration intervals of DHETF subjected to 10% strain.

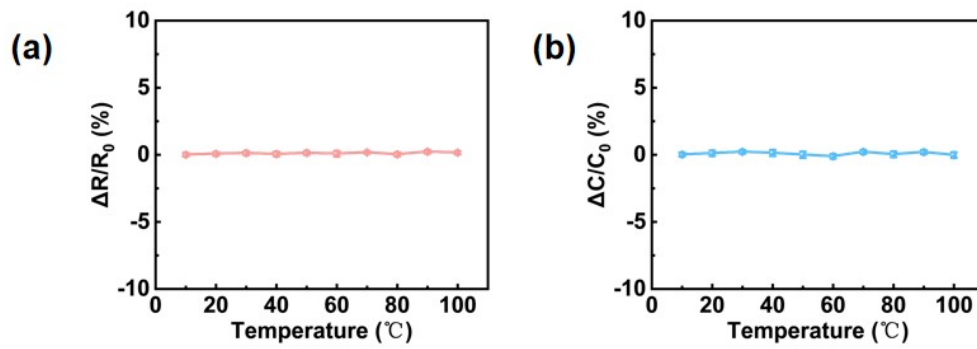


Figure S12. Relative changes of (a) HETF and (b) DHETF fiber under a wide temperature.

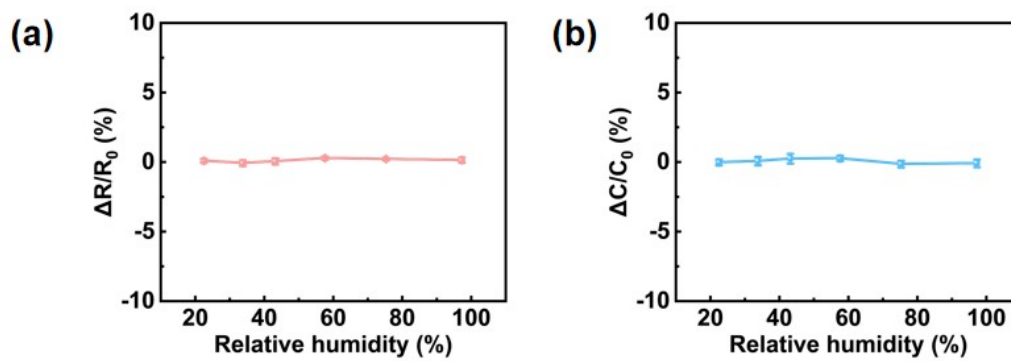


Figure S13. Relative changes of (a) HETF and (b) DHETF fiber under a high humidity range.

Table. S1 Comparison of similar helical fibers

References	Preparation methods	Helical types	Wearability
[44]	mechanical winding	three-dimensional helix	no
[46]	wet spinning torsion	three-dimensional helix	no
[41]	twisted and electron beam evaporation	helical pattern	no
[49]	twisted and electrochemical deposition	helical pattern	no
This work	twisted coating	helical pattern	yes

Table. S2 Comparison of similar helical LM-based fibers

References	Preparation methods	Demonstrations	Wearability
[6]	thermoforming	stretchable electrode, recyclability	no
[7]	thermoforming	stretchable electrode	no
[43]	double torsion	strain sensor	no
[47]	double torsion	strain sensor	no
This work	twisted coating	strain sensor, non-contact sensor	yes