# Supporting Information

# Meters-long, sewable, wearable conductive polymer wires for thermoelectric applications

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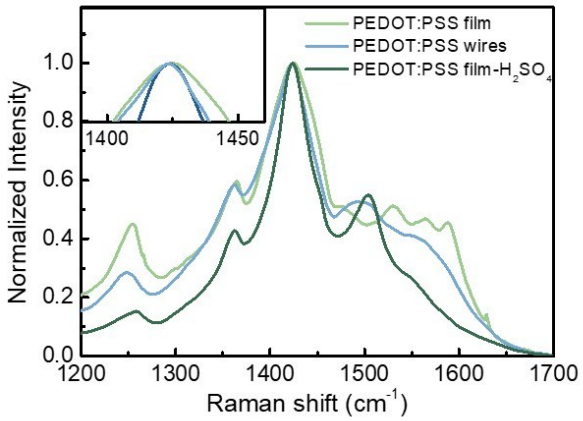


**Figure S1**. Raman spectra of PEDOT:PSS films and wires. The inset is the zoom-in spectra.

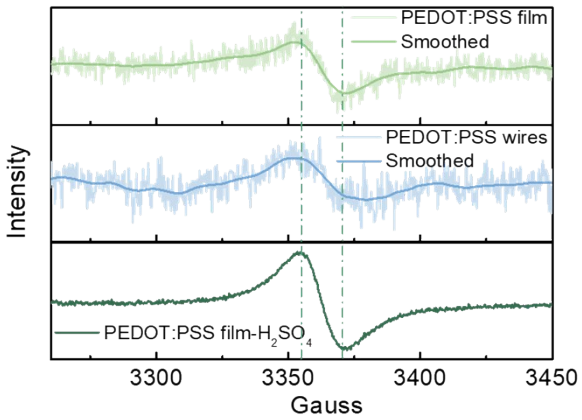


**Figure S2**. ESR spectra of PEDOT:PSS films and wires at 300 K. The two parallel horizontal lines indicate the peak-to-peak line widths for the PEDOT:PSS films.

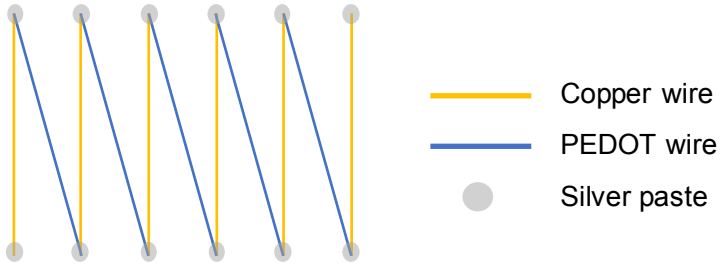


**Figure S3.** Schematic illustration of the TE modules on a glass substrate.

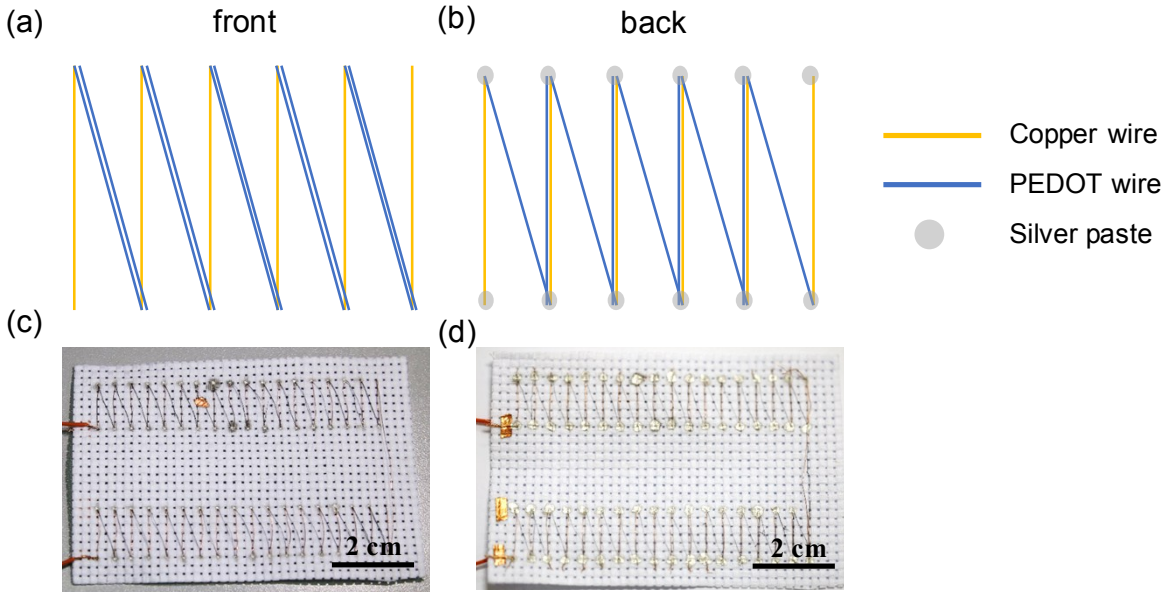


**Figure S4.** (a-b) Schemes and (c-d) pictures of the TEG prepared on a fabric with PEDOT:PSS wires and copper wires. (a)(c) show the front side of the TEG, and (b)(d) shows the back side.

**Table S1.** Summaries of the fabrication of P-type wire-shaped thermoelectric devices and their thermoelectric performance reported previously.

| Fabrication Method | Thermoelectrical Materials | $\sigma$ (S/cm) | $S$ (μV/K) | PF (μW/(mK$^2$)) | Refer. |
|---|---|---|---|---|---|
| PEDOT:PSS coated on cotton fabric and textile | PEDOT:PSS | 18.8 | 17 | 0.54 | [S1] |
| Vapor phase polymerization PEDOT coated on cotton textile | PEDOT | Sheet resistance 24 Ω/sq | 16 | / | [S2] |
| PEDOT:PSS coated on polyester fabric | PEDOT:PSS | 1.4 | 18.5 | 0.045 | [S3] |
| PEDOT:PSS and sulfuric acid gelatinized in capillary | PEDOT:PSS | 172.5 | 17.5 | ~4.8 | [S4] |
| PEDOT:PSS coated on silk and cotton yarns | PEDOT:PSS | 14 | 15 | 0.32 | [S5] |
| P-type undoped graphene oxide hydrogel fiber | graphene oxide | 11.6 | 21.4 | 0.53 | [S6] |
| **PEDOT:PSS injected into sulfuric acid** | **PEDOT:PSS** | **1433** | **21.3** | **65.0** | **This work** |

**References:**


[S1] X. Lan, T. Wang, C. Liu, P. Liu, J. Xu, X. Liu, Y. Du and F. Jiang, *Compos. Sci. Technol.*, 2019, **182**, 107767.

[S2] Y. Jia, L. Shen, J. Liu, W. Zhou, Y. Du, J. Xu, C. Liu, G. Zhang, Z. Zhang and F. Jiang, *J. Mater. Chem. C*, 2019, **7**, 3496-3502.

[S3] Y. Du, K. Cai, S. Chen, H. Wang, S. Z. Shen, R. Donelson and T. Lin, *Sci. Rep.*, 2015, **5**, 6411.

[S4] J. Liu, Y. Jia, Q. Jiang, F. Jiang, C. Li, X. Wang, P. Liu, P. Liu, F. Hu, Y. Du and J. Xu, *ACS Appl. Mater. Interfaces*, 2018, **10**, 44033-44040.

[S5] J. D. Ryan, D. A. Mengistie, R. Gabrielsson, A. Lund and C. Muller, *ACS Appl. Mater. Interfaces*, 2017, **9**, 9045-9050.

[S6] Y. Lin, J. Liu, X. Wang, J. Xu, P. Liu, G. Nie, C. Liu and F. Jiang, *Composites Communications*, 2019, **16**, 79-83.