Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Intrinsically stretchable porous liquid-metal conductor for multifunctional electronics application

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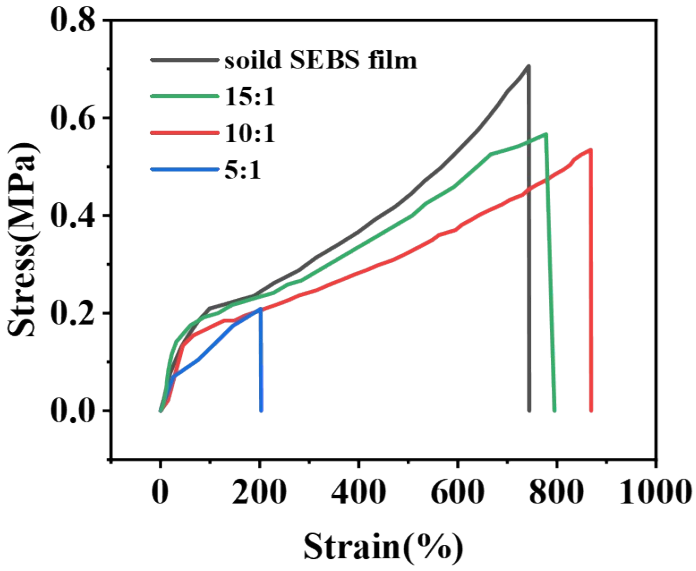

Fig. S1 Tensile stress–strain curves of SEBS films with different weight ratios of SEBS/sugar.

As shown in Fig. S1, the weight content of sugar would greatly affect the SEBS mechanical properties. When the weight ratios of SEBS/sugar are 15:1 and 10:1, the fracture strain increase with fracture stress decrease, which results from the introduction of porous to alleviate the stress concentration.[S1] However, the fracture stress would greatly decrease with more sugars in the SEBS matrix, resulting from the introduction of more inherent defects and potential crack initiation sites.[S2] Therefore, the mechanical property of porous SEBS can be easily tuned by controlling the weight content of sugar particles, and the weight ratio of SEBS/sugar is 10:1 is chosen for stretchable p-EnGaIn/SEBS conductor.

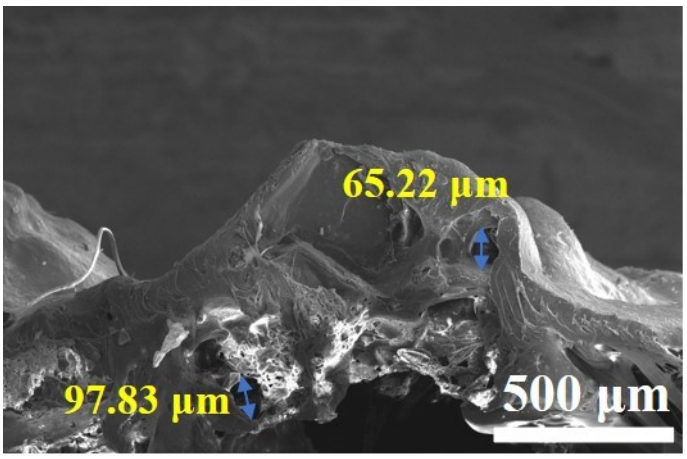

Fig. S2 Cross-sectional SEM image of porous SEBS.

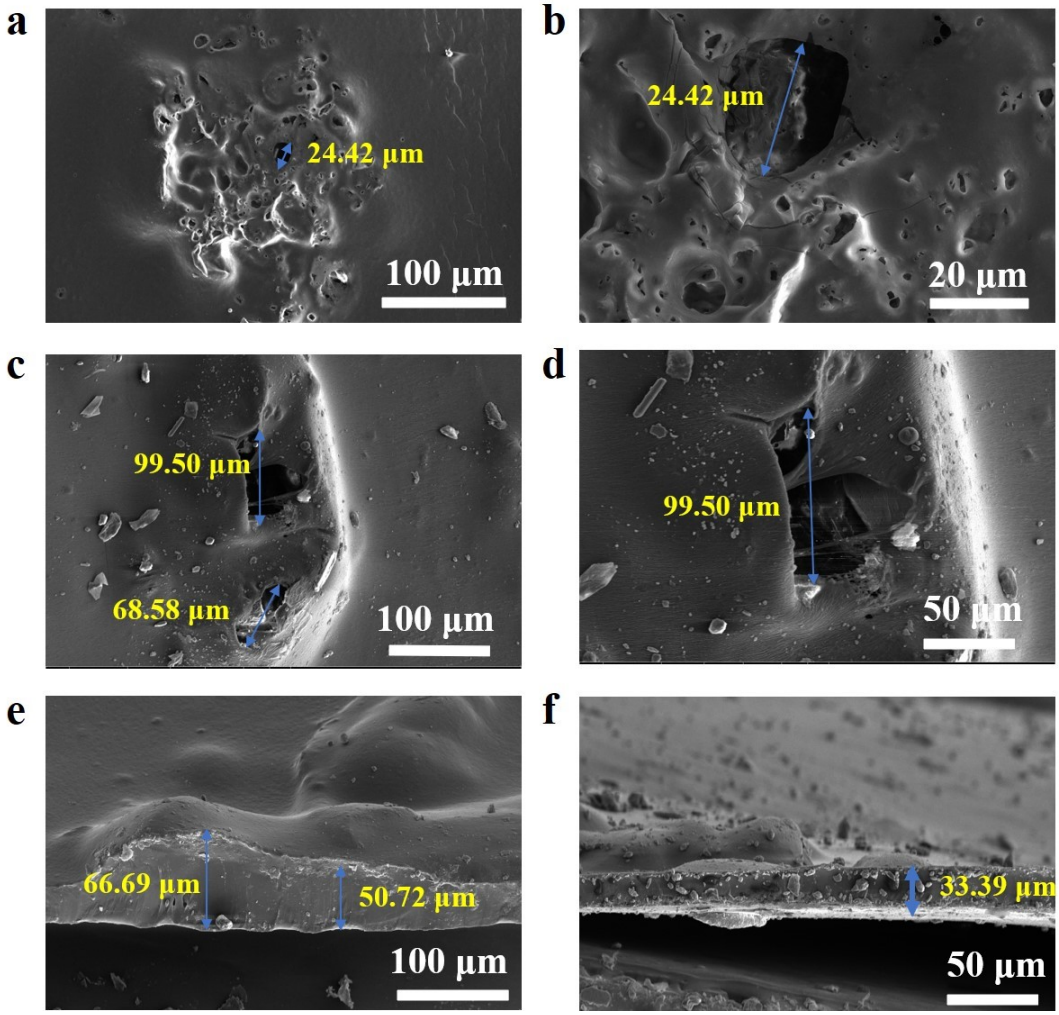

Fig. S3 SEM image of porous SEBS and its region enlargement before (a, b) and after (c, d) pre-stretching treatment. Cross-sectional SEM image of porous SEBS before (e) and after (f) pre-stretching treatment.

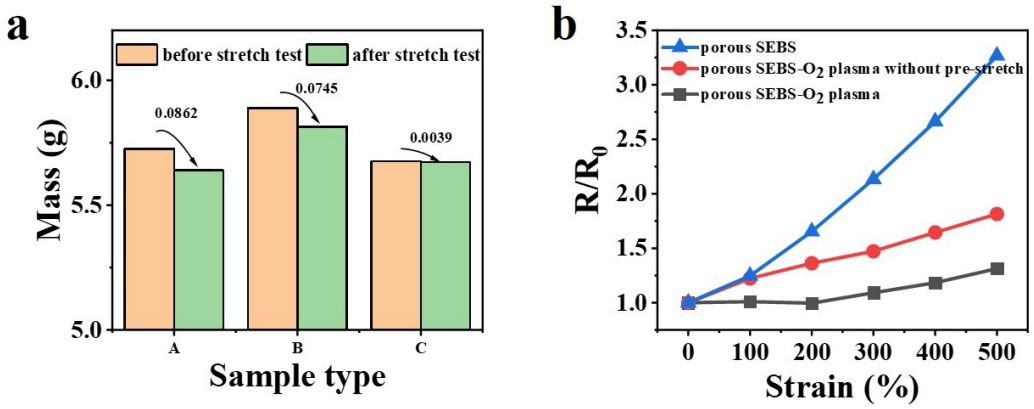

Fig. S4 (a)Weight change of three samples after ten 500% stretching cycles. (A is the porous SEBS; B is the porous SEBS-O_2-plasma without pre-stretch; C is the porous SEBS-O_2-plasma) (b) Resistance changes of EGaIn-based conductors versus tensile strain.

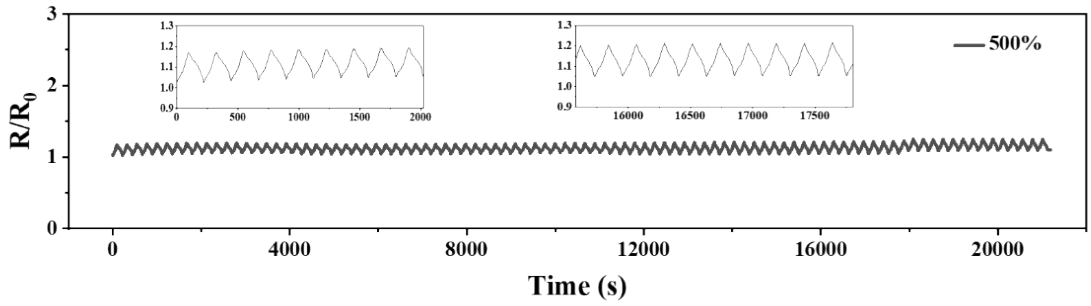

Fig. S5 100 cycle tests of stretchable p-EGaIn/SEBS electrode at 500% strain.

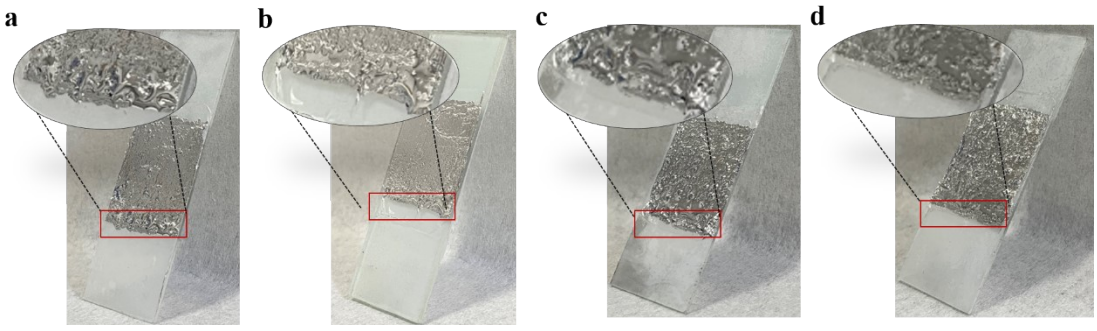

Fig. S6 Photographs of EGaIn on the solid SEBS film without (a) and with (b) O_2 plasma treatment. Photographs of EGaIn on the 3D porous SEBS film without (c) and with (d) O_2 plasma treatment.

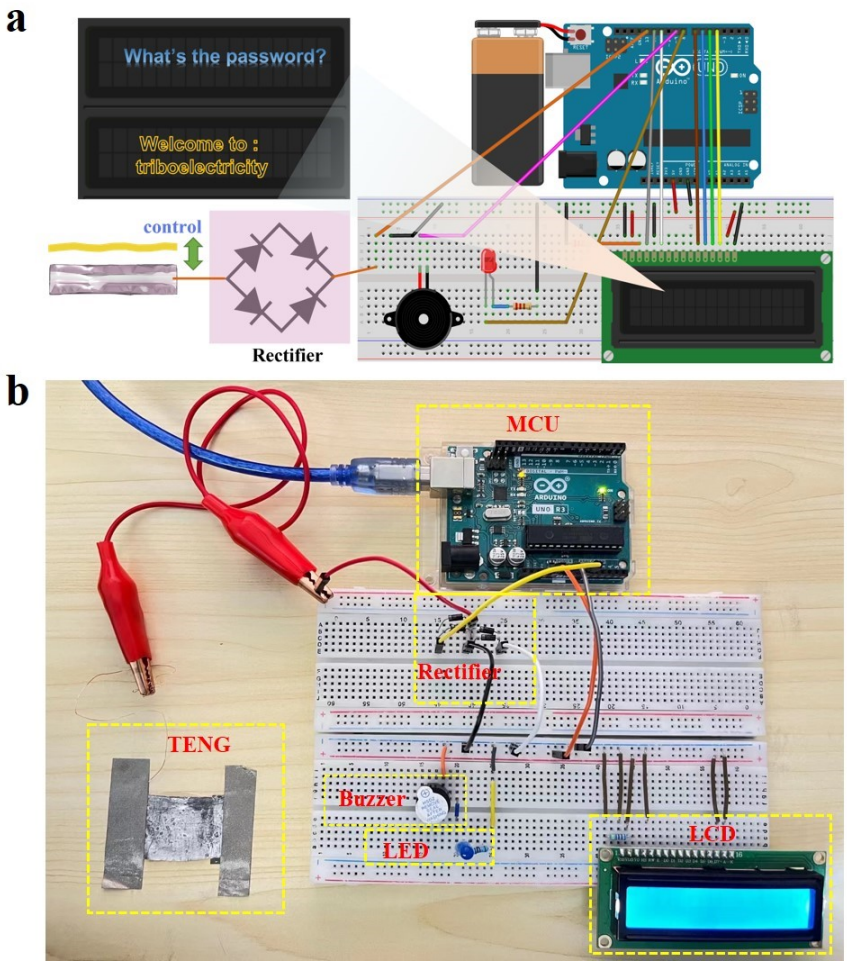

Fig. S7 Schematic (a) and optical image (b) of decoding system controlled by p-EGaIn/SEBS TENG.

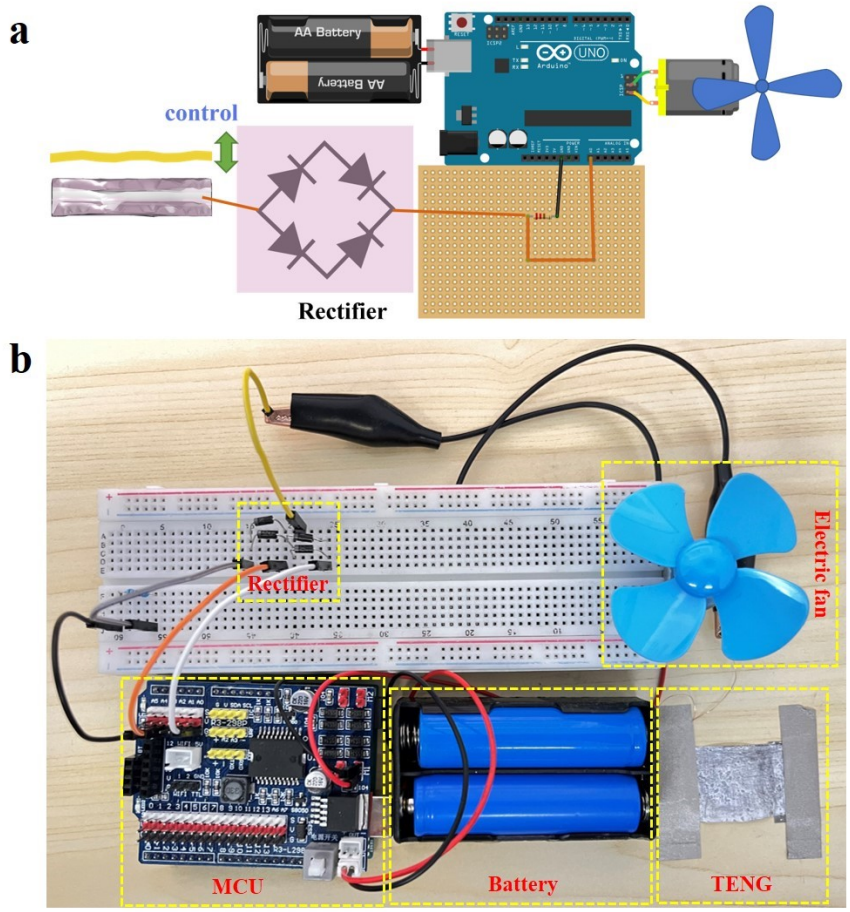

Fig. S8 Schematic (a) and optical image (b) of p-EGaIn/SEBS TENG for electric fan control.

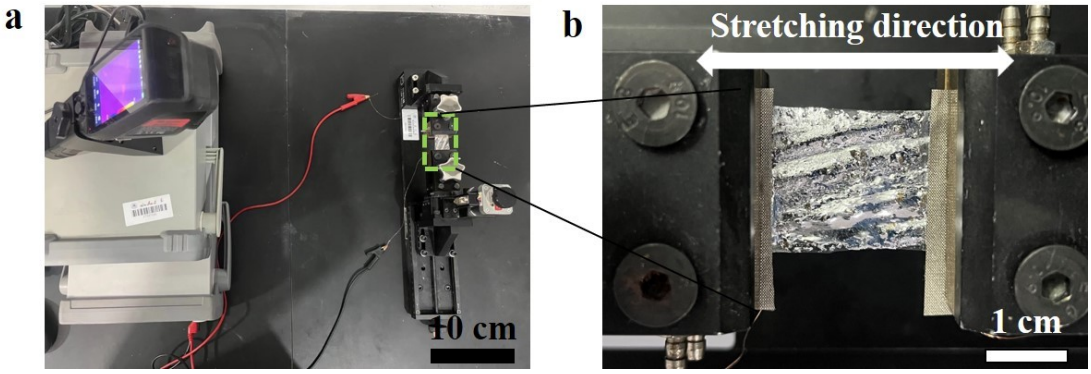

Fig. S9 Optical photo(a) and enlarged view(b) of p-EGaIn/SEBS conductor heater test.

Movie S1. The LEDs in series at 0% strain powered by the p-EGaIn/SEBS-based TENG.

Movie S2. The LEDs in series at 300% strain powered by the p-EGaIn/SEBS-based TENG.

Movie S3. Decoding system with p-EGaIn/SEBS-based TENG.

Movie S4. Electric fan rotation control system with p-EGaIn/SEBS-based TENG.

Movie S5. EMI shielding behavior.

References

S1. S. Moon, H. K. Park, J. H. Song, S. Cho, J. C. Kim, J. Kim, H. Hwang, H. S. Kim and U. Jeong, *Adv. Mater*, 2018, **30**, e1801408.2.

S2. Y. Zhang, Y. Tan, K. Yang, Z. Wu, Z. Zhang, M. Zhang and K. Mai, *J. Mater. Chem. A*, 2016, **4**, 10091-10097.