

## Supporting Information

### Healable and Shape-memory Dual Functional Polymers for Reliable and Multipurpose Mechanical Energy Harvesting Devices

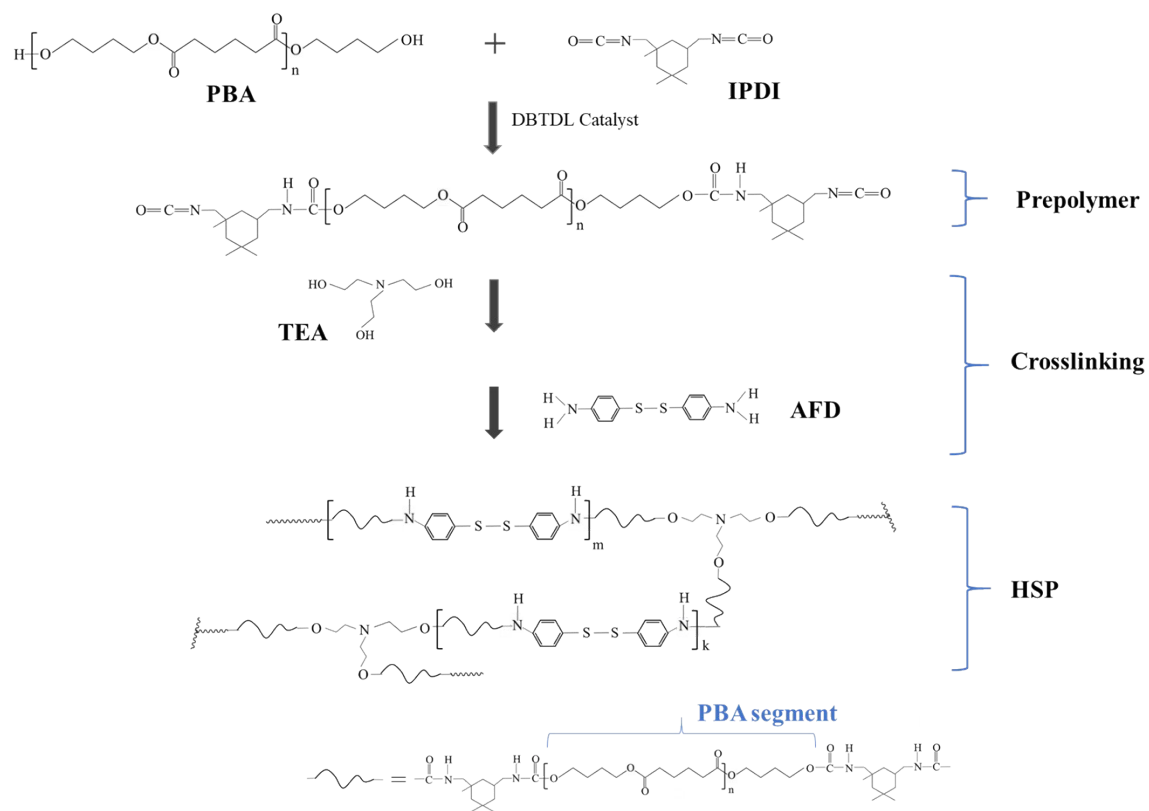
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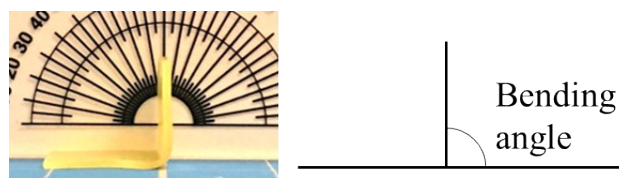
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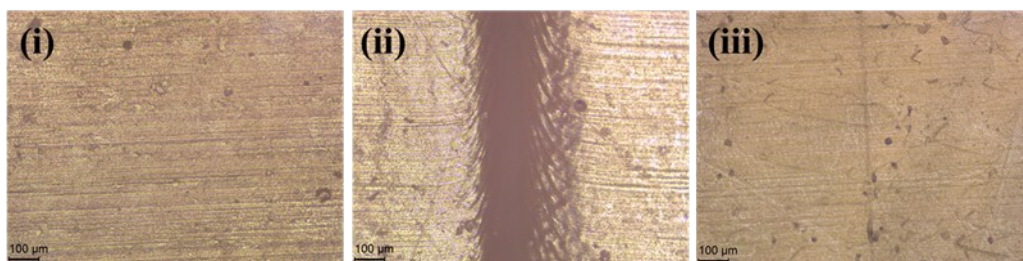
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**Figure S1.** Schematic illustrating the preparation of HSP.



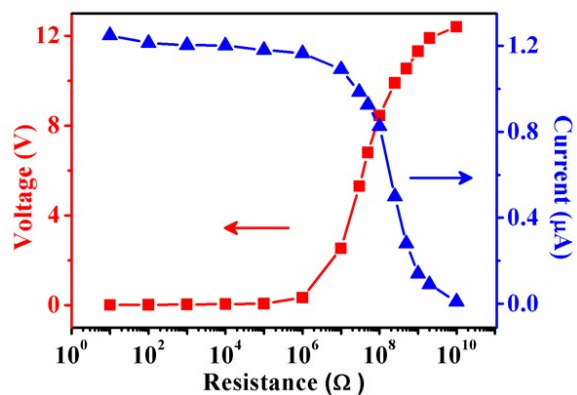
**Figure S2.** Schematic of bending angle during shape-memory process of HSP.



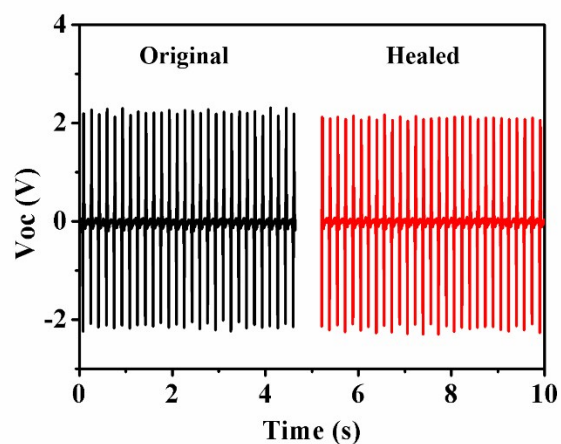
**Figure S3.** Optical microscope images of the sample at (i) original, (ii) damaged, and (iii) healed states.



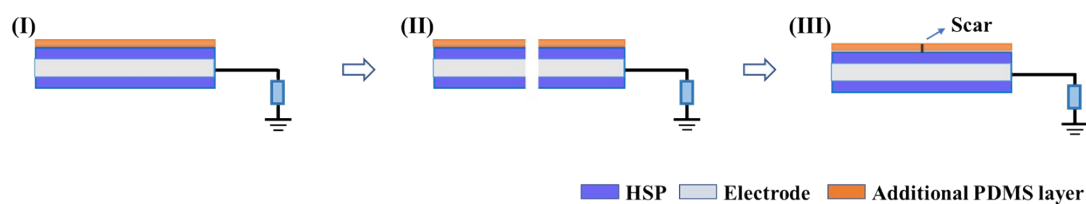
**Figure S4.** Schematic of aromatic disulfide metathesis reaction.



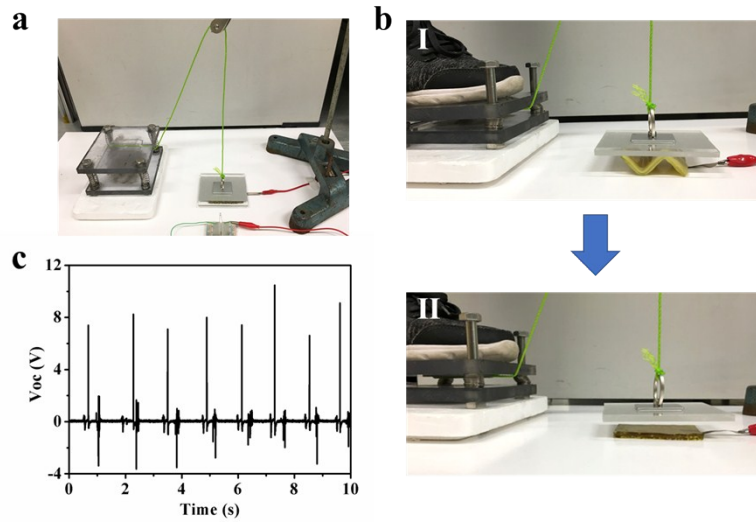
**Figure S5.** Output voltage and current versus the load resistance.



**Figure S6.** The output voltage of the HSP-TENG with Ag electrode at original and healed states.



**Figure S7.** The healing process of the HSP-TENG with an additional PDMS layer on the device surface. (I), (II) and (III) represent the original, broken, and healed device, respectively.



**Figure S8.** (a) Photograph of a prototype of a self-powered fire alarm and escape indicator system based on HSP-TENG with PDMS layer. (b) Photograph of the temperature response process of the self-powered fire alarm and escape indicator system from (I) room temperature to (II) 90 ° C. (c)  $V_{oc}$  generated by the HSP-TENG in self-powered fire alarm and escape indicator system driven by treading on movable floor.