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Supporting Information

Polymer nanocomposite enabled high-performance triboelectric nanogenerator with self-healing capability

Huidan Niu,†[a] Xinyu Du,†[a] Shuyu Zhao,†[b] Zuqing Yuan,[a] Xiuling Zhang,[a] Ran Cao,[a] Yingying Yin,[a] Chi Zhang,[a] Tao Zhou,[a] and Congju Li*[a b]

[a]Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, Beijing 100083, P. R. China; School of Nanoscience and Technology, University of Chinese Academy of Sciences, Beijing 100049, P. R. China.

[b]School of Energy and Environmental Engineering, University of Science and Technology Beijing, Beijing 100083, China.

*Corresponding author: congjuli@126.com

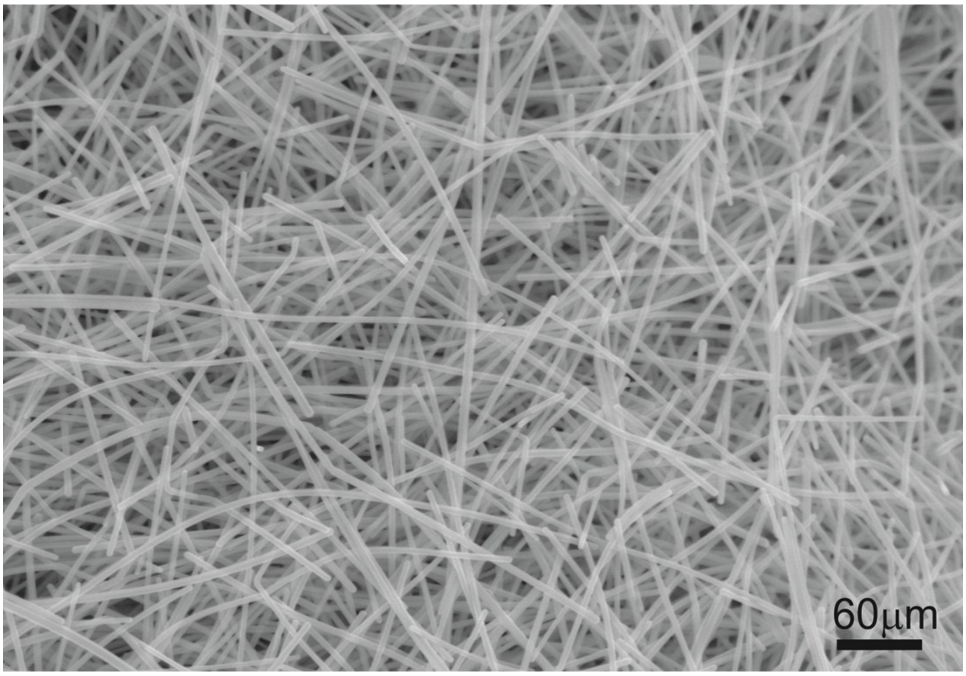

Fig. S1. The SEM images of the Silver Nanowires (AgNWs)

1. The Optimal Amount of Graphite Powder (GP)

Graphite powder (GP) can improve the healing efficiency of PDMS. In the experiment, we added 3wt% graphite powder (GP) in the moulding process of the PDMS film, which is the optimal experimental result. We measured the dielectric constant of PDMS film on the different additions of graphite, such as pure PDMS, 1wt% GP of PDMS, 3wt% GP of PDMS, 5wt% GP of PDMS, as shown in Figure S1. At the 3wt% GP, we get the maximum dielectric constant of PDMS film, which is the optimal experimental result for self-healing. In the process of mixing GP and PDMS precursor, the PDMS film will bring more bubbles with the weight increase of GP. When the GP increase a certain value added to PDMS, the dielectric constant of PDMS film will reduce, because the dielectric constant of air is 1. And these bubbles are not conducive to the healing of the broken interface. Therefore, we choose 3wt% as the optimal amount of GP for PDMS film.

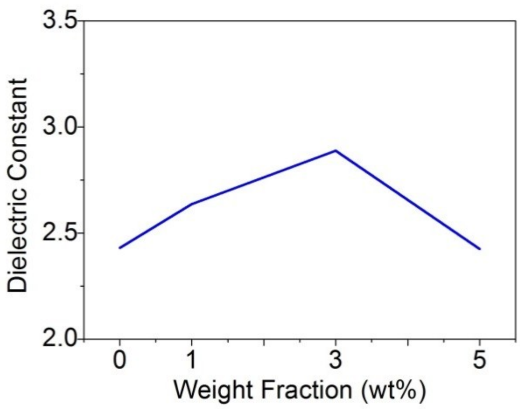

Fig. S2. The relative change of the Dielectric Constant at Different Doping Concentration of Graphite powder

2. The Impact of the Change of Dielectric Constant

Finite element simulations were employed to verify the electric potential distribution in the TENG and the charge transfer by modulating the relative distance and different material properties using COMSOL. Figure S3 shows the calculated results of the electric potential distribution with the dielectric constant of 2.75, 2.0, and 1.5, respectively. The electric potential difference increases with reducing dielectric constant. When the dielectric constant of negative friction materials had a small change, the power performance of TENG did not have a greater impact.

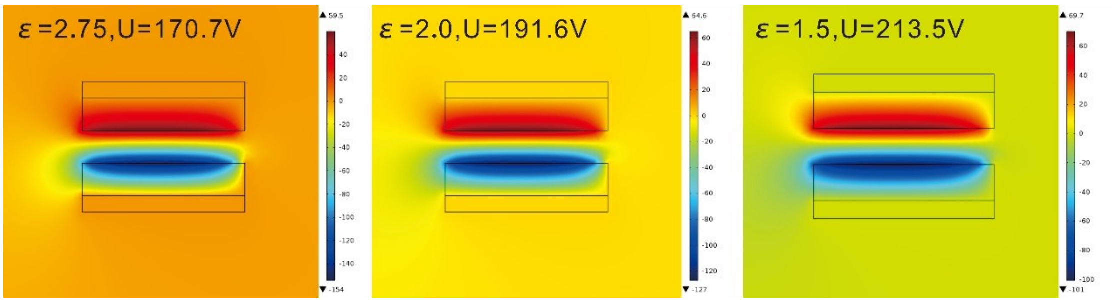

Fig. S3. The relative change of the Potential difference at Different Dielectric Constant

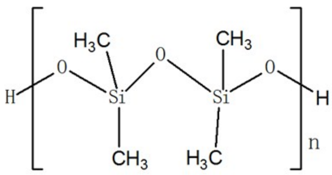

Fig. S4. Molecular structure of PDMS.

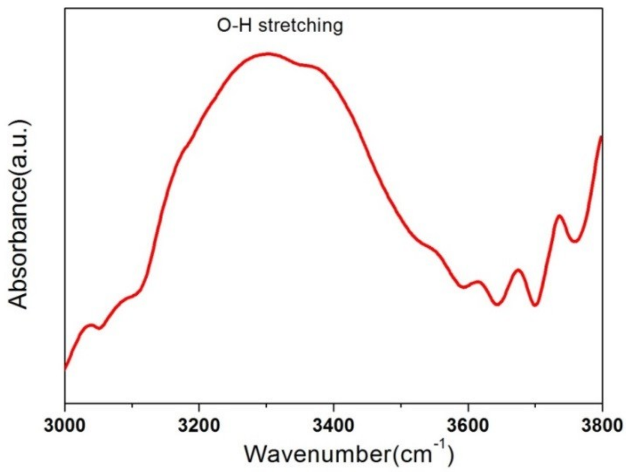

Fig. S5. FTIR spectra of PDMS.

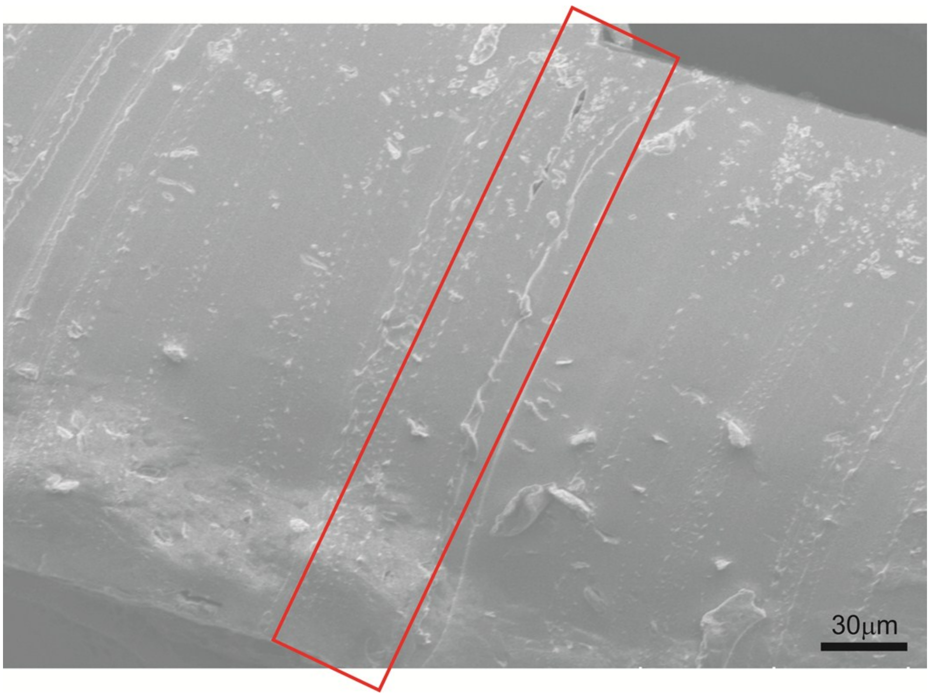

Fig. S6. The cross-sectional SEM images of the healing TPU samples.

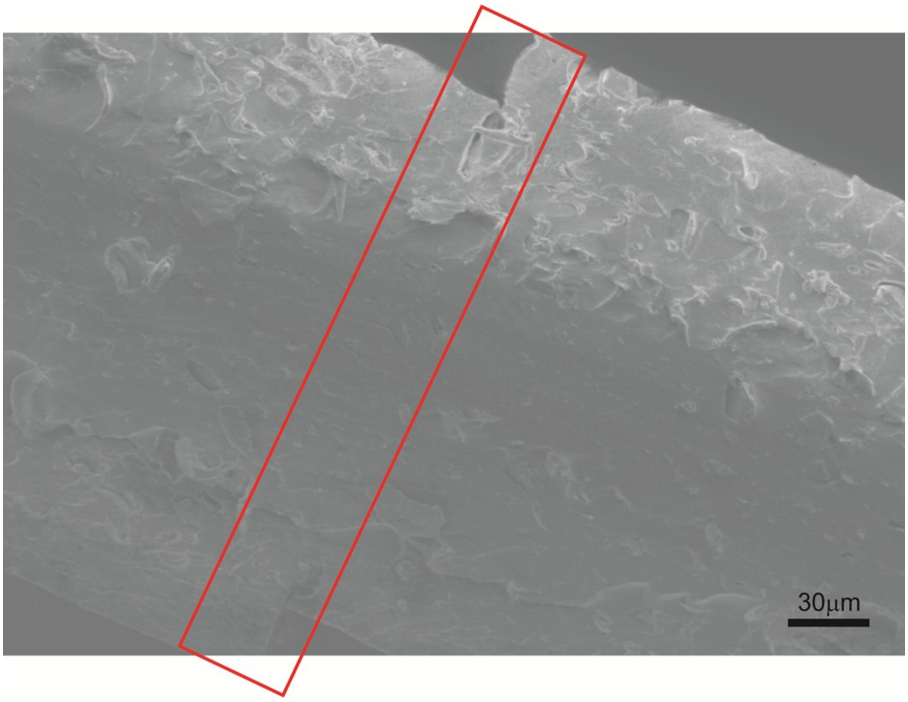

Fig. S7. The cross-sectional SEM images of the healing PDMS samples.

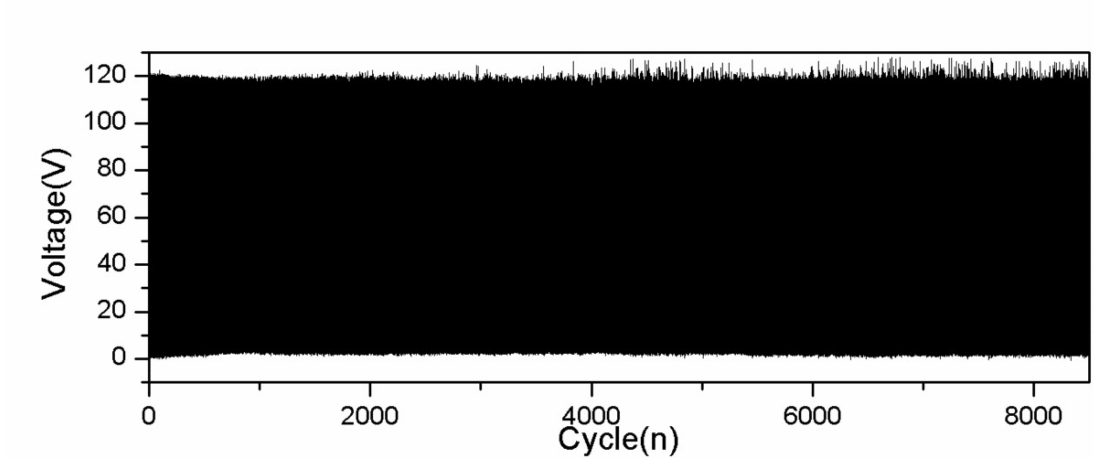

Fig. S8. Durability of the SH-TENG, exhibiting an excellent reliability performance.

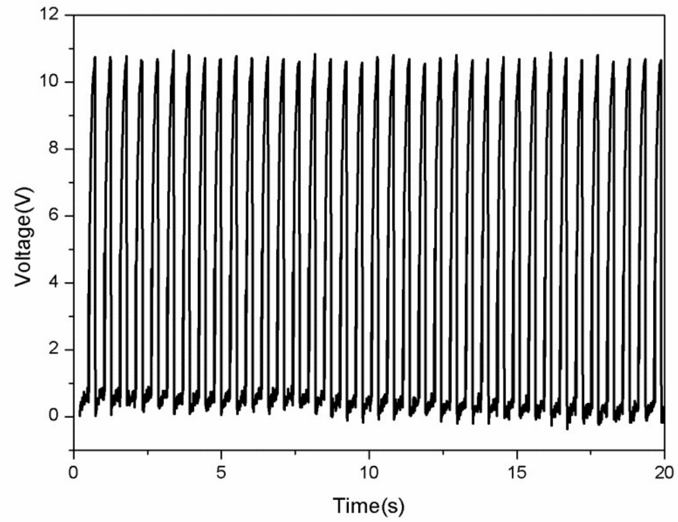

Fig. S9. The performance characterization of open-circuit voltage for Cu and TPU.

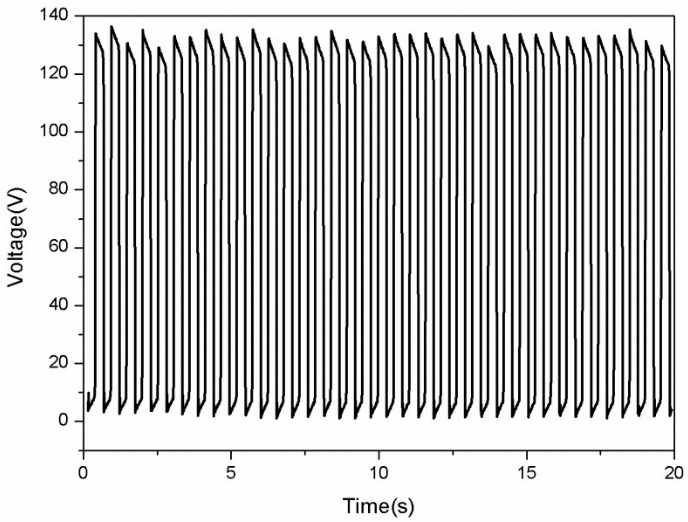

Fig. S10. The performance characterization of open-circuit voltage for Cu and PDMS.

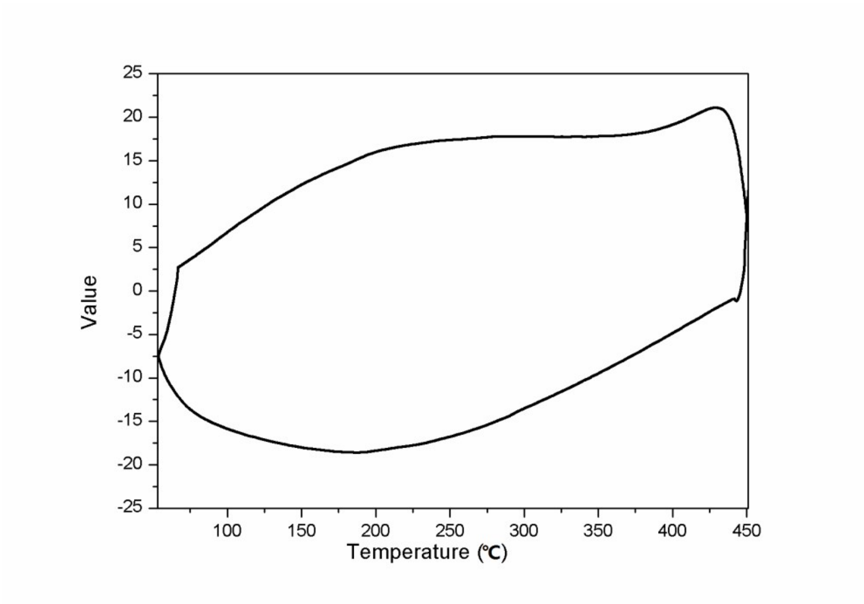

Fig. S11. the DSC of PDMS.

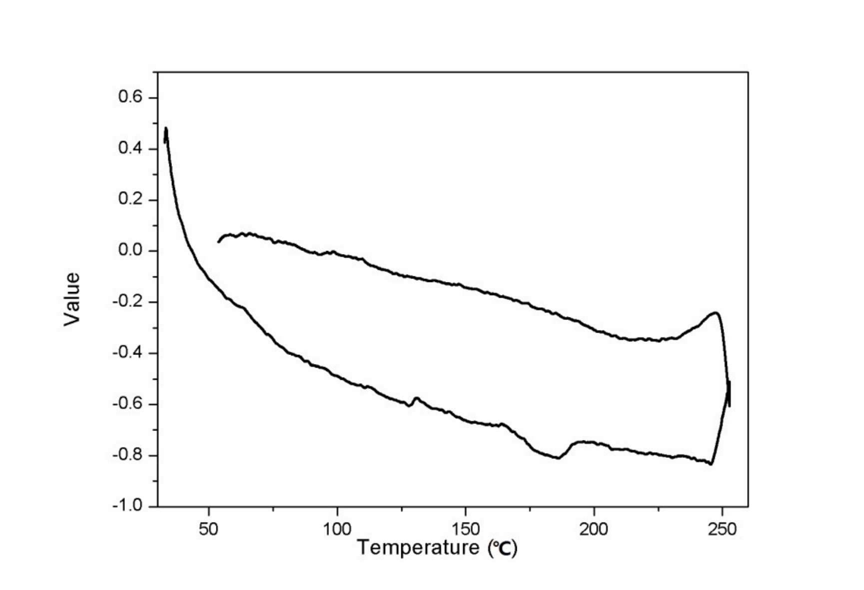

Fig. S12.the DSC of TPU.

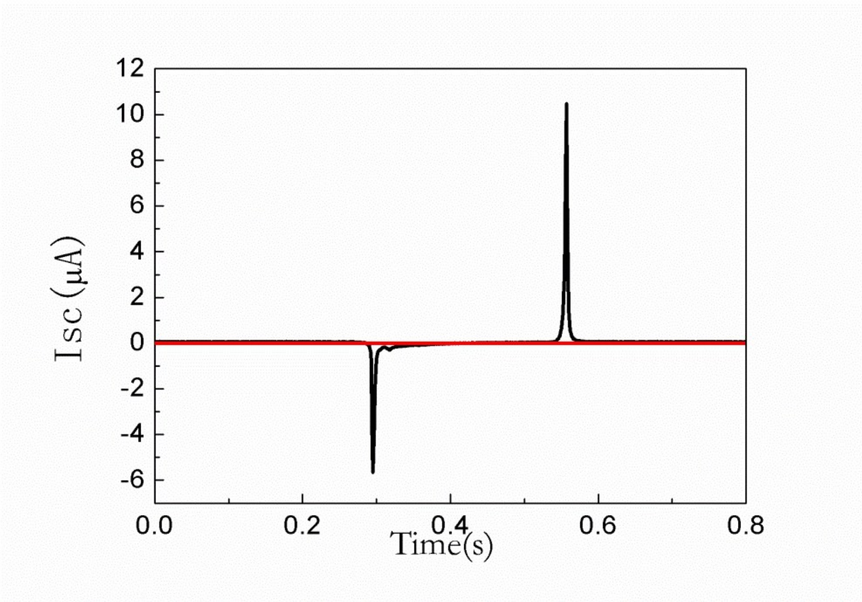

Fig. S13. Short-circuit current (I_{SC}) of the SH-TENG.