Electronic Supplementary Information

Piezoelectric Nanogenerator Promotes Highly Stretchable and Self-chargeable Supercapacitors

Dan Zhou[1], Ning Wang[1], Taotao Yang[3], Long Wang[4], Xia Cao[1,2*], and Zhong Lin Wang[2,5*]*

[1] Center for Green Innovation, School of Mathematics and Physics & School of Chemistry and Biological Engineering, University of Science and Technology Beijing, Beijing 100083, China

[2] Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, National Center for Nanoscience and Technology (NCNST), University of Chinese Academy of Sciences, Beijing 100083, China;

[3] Basic Experimental Center for Natural Science, University of Science and Technology Beijing, Beijing 100083, China

[4] Department of Equipment Manufacture, Zhongshan Torch Polytechnic, Zhongshan 528436, China;

[5] School of Material Science and Engineering, Georgia Institute of Technology, Atlanta, Georgia 30332-0245, United State

* Corresponding author. caoxia@binn.cas.cn; wangning@ustb.edu.cn; zlwang@gatech.edu

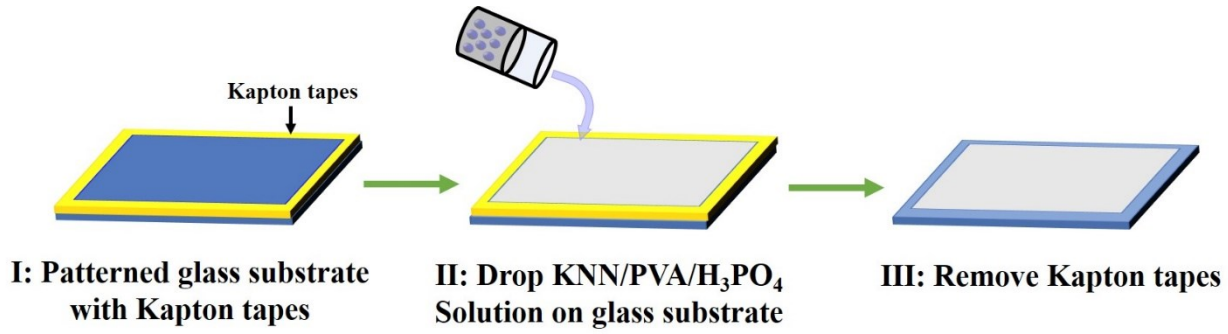

Figure S1 Schematic description of the fabrication processes of the stretchable KNN/PVA/H_3PO_4 piezo-electrolyte film.

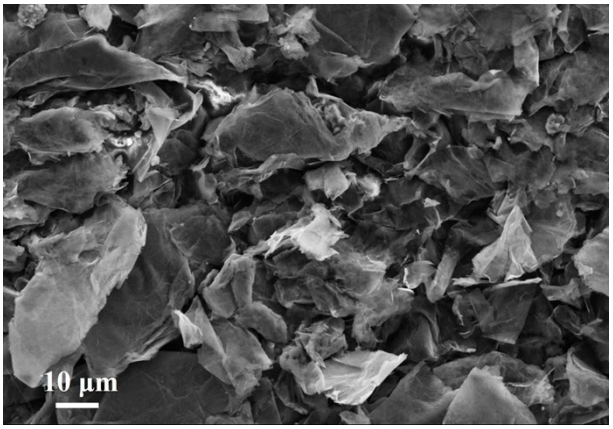

Figure S2 FE-SEM image of the surface of stretchable graphene/SEBS electrodes.

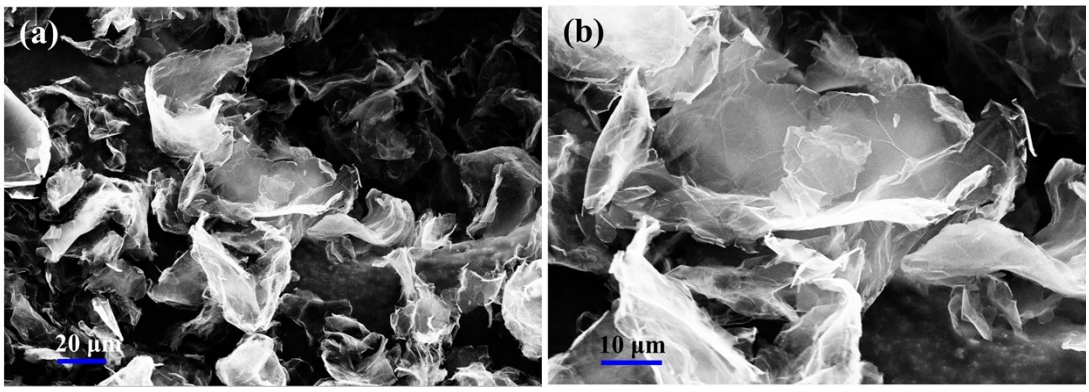

Figure S3 FE-SEM image of the graphene powders.

Areal specific capacitance, areal energy density and power density of the stretchable SCSC device were calculated from the GCD curves according to the following equations:

$$C_s = \frac{I\Delta t}{\Delta US} \qquad (1)$$

$$E = \frac{Cs\Delta U^2}{7200} \qquad (2)$$

$$P = \frac{3600E}{\Delta t} \qquad (3)$$

where I, Δt, ΔU, and S are the employed current, the discharge time, the operating potential window, and the practical active area of the device, respectively.

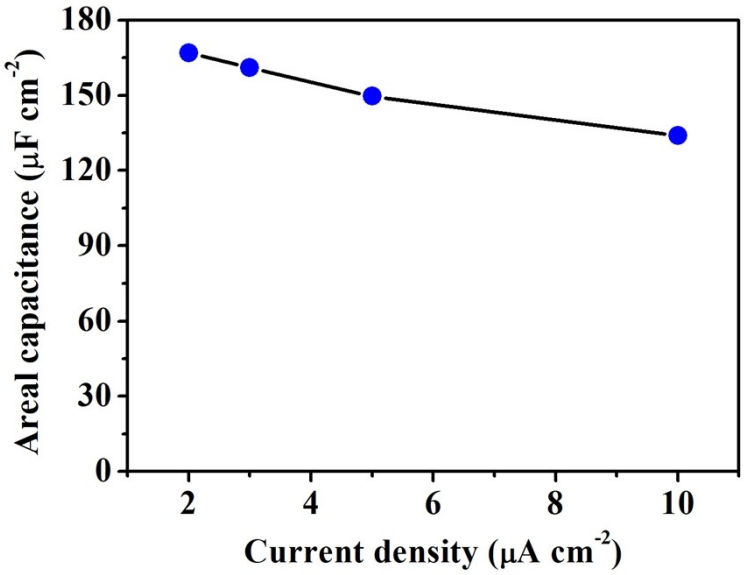

Figure S4 Relationship between the current density and areal capacitance of the stretchable SCSC under a normal state.

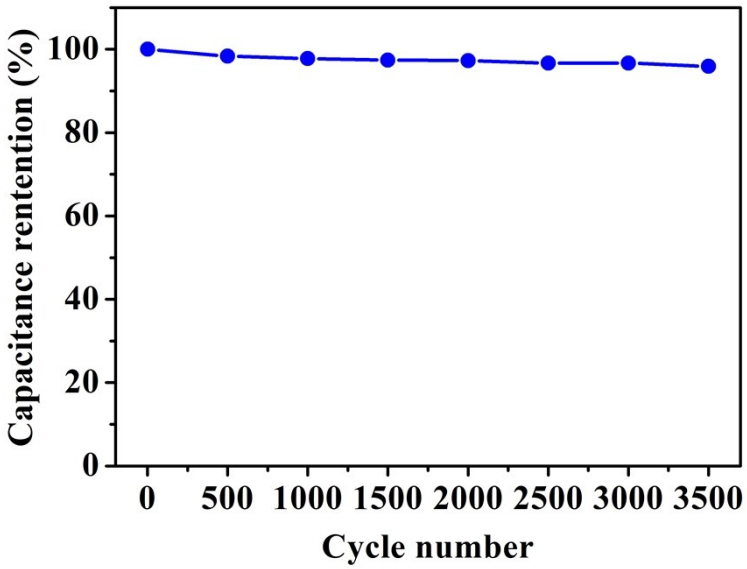

Figure S5 Long-term cycling performance of the SCSC under a constant current density of 2 μA cm^{-2} under a normal state.

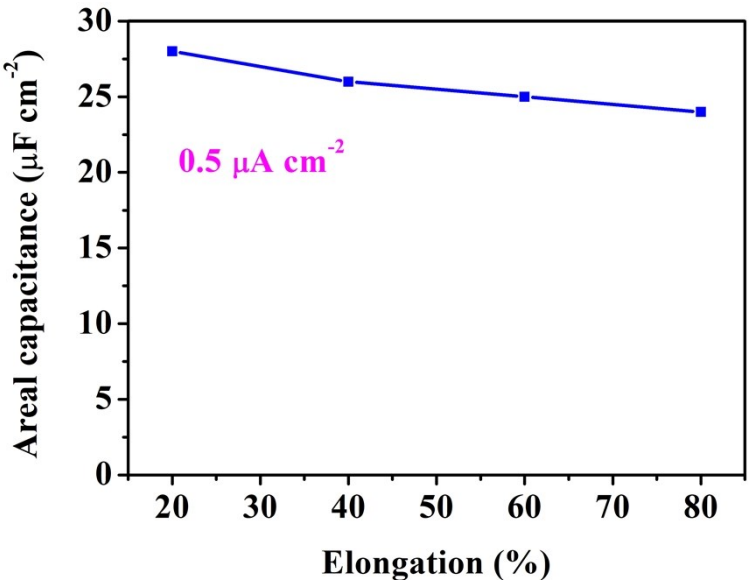

Figure S6 Areal capacitance of the stretchable SCSC at 0.5 μA cm^{-2} under various stretching rates.

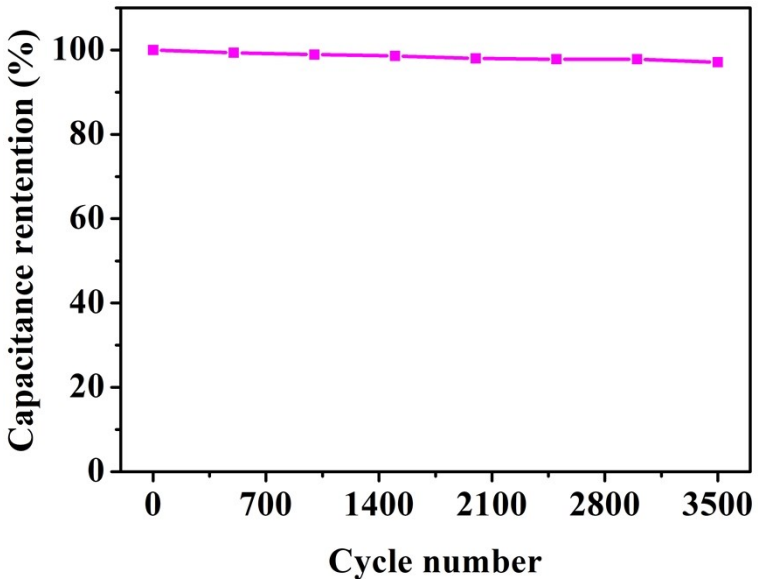

Figure S7 Long-term cycling performance of the SCSC under a constant current density of 0.5 μA cm^{-2} with a 80% elongation.

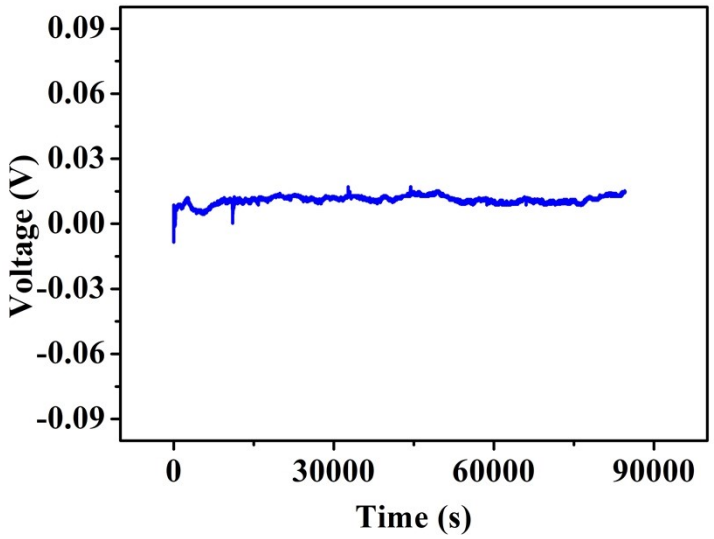

Figure S8 Voltage curve of a SC device assembled with pure PVA/H_3PO_4 electrolyte film without KNN addition under palm patting for 300 s.