

Supporting Information

## **Enhancing Artifact Protection in Smart Transportation Monitoring Systems via a Porous Structural Triboelectric Nanogenerator**

Jiabin Zhang <sup>1,2,†</sup>, Erming Su <sup>1,2,†</sup>, Chengyu Li <sup>2,3,†</sup>, Shuxing Xu <sup>1,2</sup>, Wei Tang <sup>1,2,3</sup>,  
Leo N.Y. Cao <sup>2,3</sup>, Ding Li <sup>1,2,3,\*</sup> and Zhong Lin Wang <sup>2,3,4,\*</sup>

<sup>1</sup>Center on Nanoenergy Research, School of Physical Science and Technology,  
Guangxi University, Nanning 530004, P. R. China

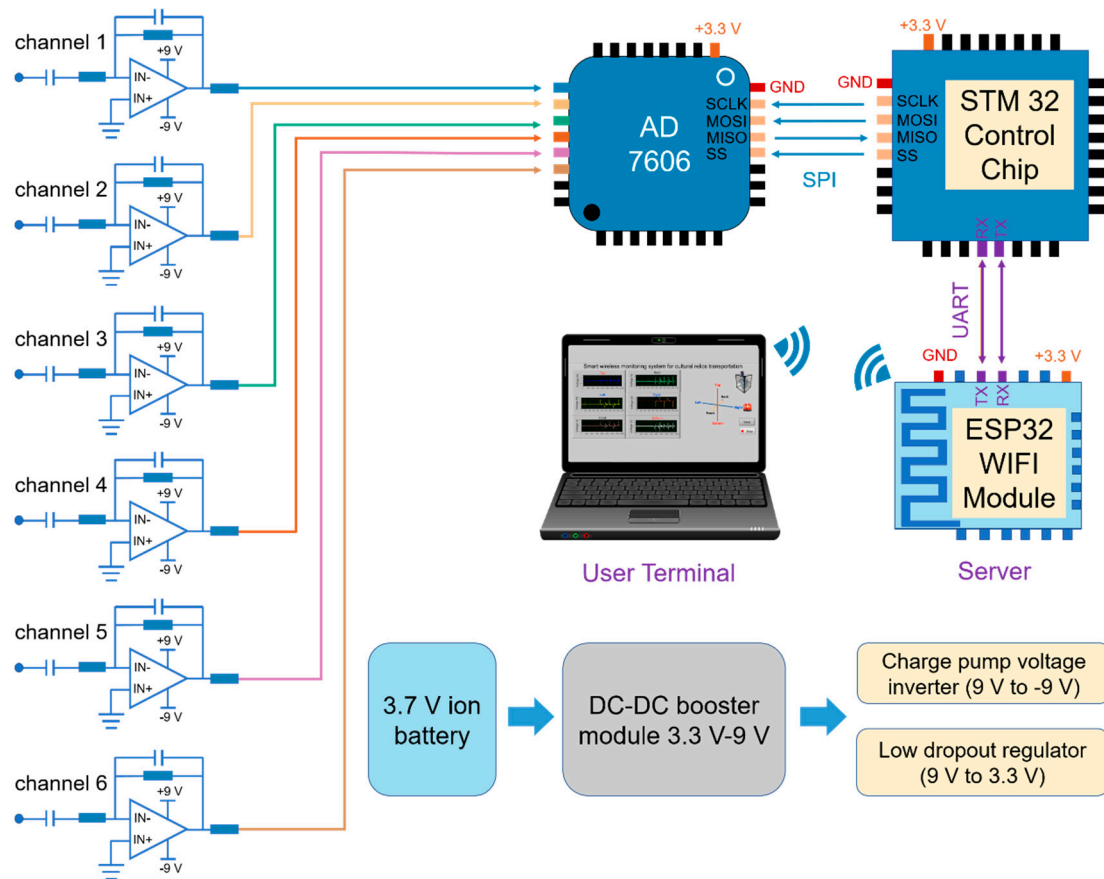
<sup>2</sup>Beijing Key Laboratory of Micro-Nano Energy and Sensor, Beijing Institute of  
Nanoenergy and Nanosystems, Chinese Academy of Sciences,  
Beijing 101400, P. R. China

<sup>3</sup>School of Nanoscience and Engineering, University of Chinese Academy of Sciences,  
Beijing 100049, P. R. China

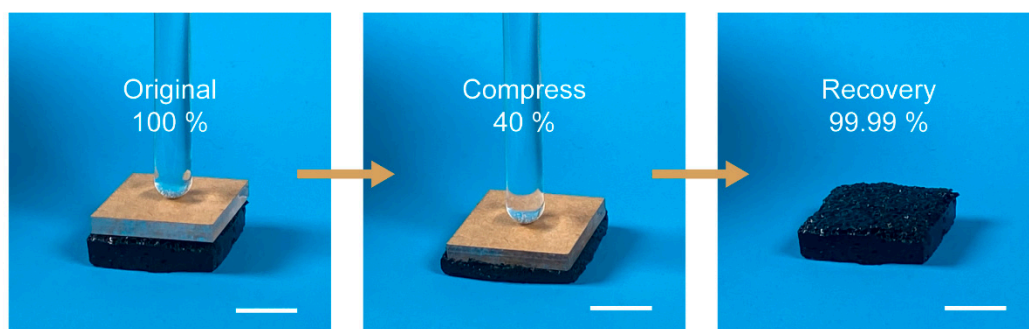
<sup>4</sup>School of Materials Science and Engineering, Georgia Institute of Technology,  
Atlanta, Georgia 30332-0245, United States

<sup>†</sup>These authors contributed equally.

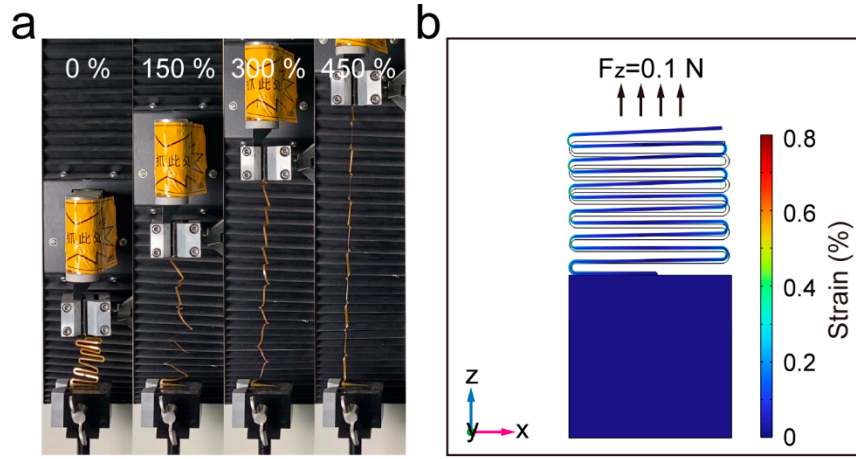
\*Correspondence: liding@binn.cas.cn (D.L.); zhong.wang@mse.gatech.edu (Z.L.W.)



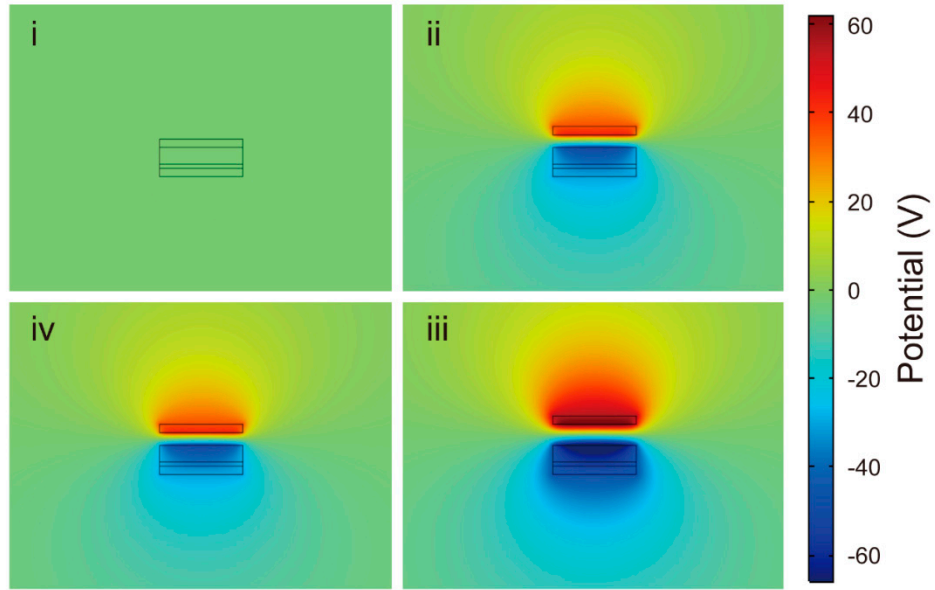
**Figure S1.** Detailed circuit schematic of the SAMS.



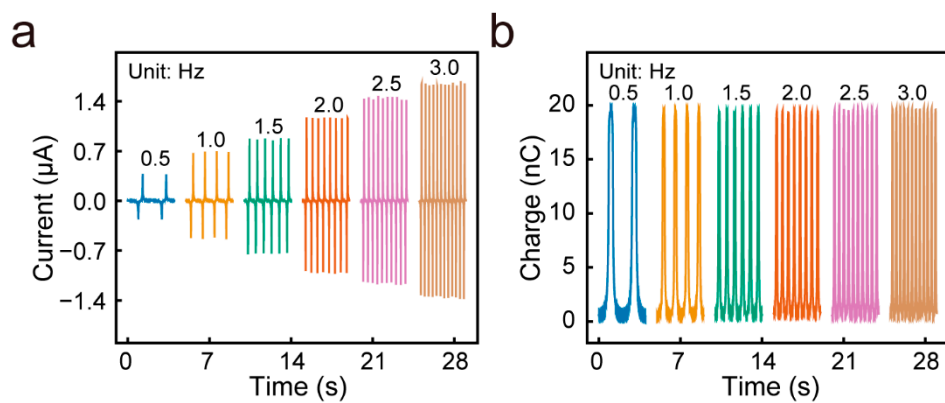
**Figure S2.** Compression-recovery property of the porous CB/Ecoflex. Scale bar: 1 cm.



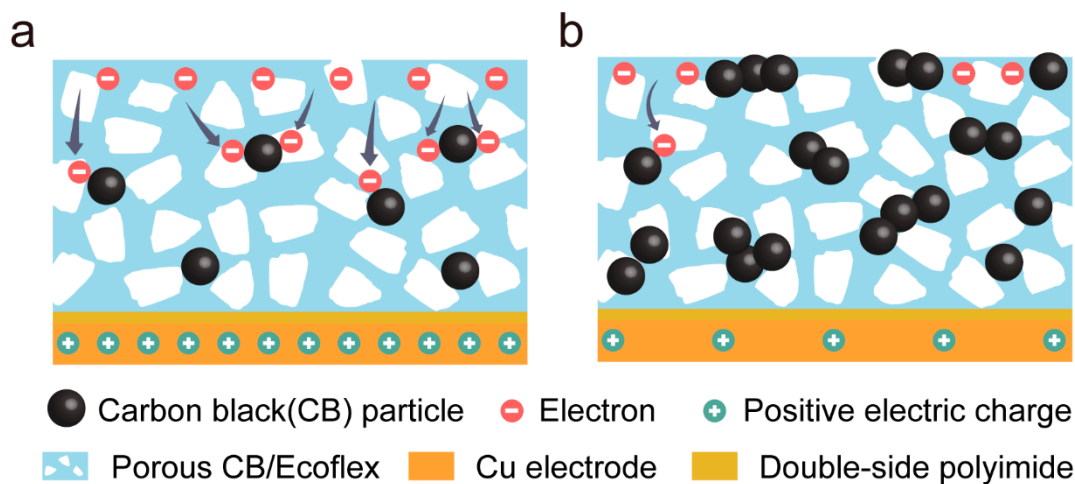
**Figure S3.** (a) Photograph of the serpentine interconnect FPCB under mechanical stretching with various strains. (b) Simulation results of uniaxial stretching of the whole serpentine interconnect FPCB at 0.1 N.



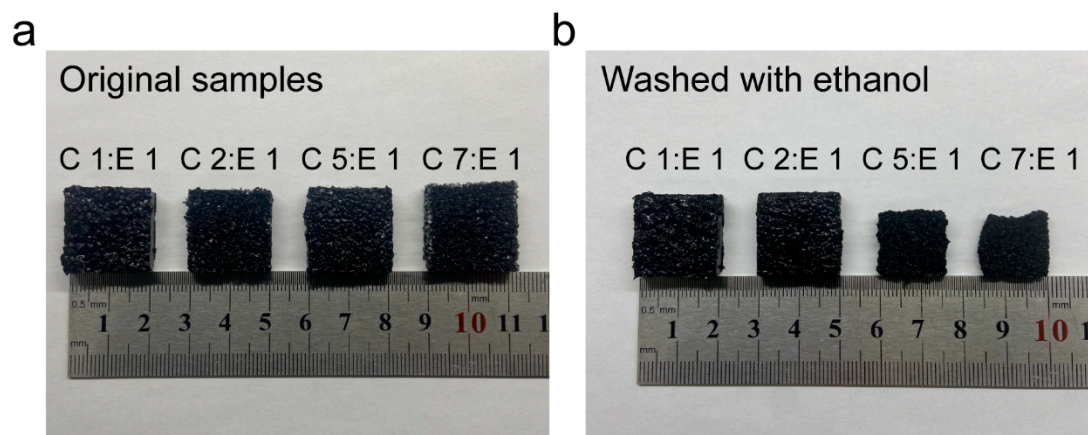
**Figure S4.** The spatial distribution of electric field at different stages (Simulated by COMSOL Multiphysics). (i) Initial stage. (ii) Separating stage. (iii) Maximum Separated stage. (iv) Approaching stage.



**Figure S5.** (a) The  $I_{sc}$  and (b) the  $Q_{sc}$  of the PCE-TENG (made by mixing CAM and Ecoflex with a weight ratio of 2:1, with a 2 wt% CB powder content) at various applied frequencies (0.5-3.0 Hz).



**Figure S6.** Schematic of the dynamic behavior of electrical charges in PCE-TENG with (a) the low carbon black content and (b) high carbon black content.



**Figure S7.** (a) Photographs of original samples. (b) Photographs of the porous CE/Ecoflex washed with ethanol.



**Video S1.**

Lighting up the 30 LEDs by PCE-TENG.

**Video S2.**

Demonstration of real-time directions alarm for the porcelain transport package equipped with SAMS during the simulated manual transportation process.