Electronic Supporting Information

Structure Design and Wireless Transmission Application of Hybrid Nanogenerator for Swinging Mechanical Energy and Solar Energies Harvesting

Huijie Shi#, Haowei Lu#, Xu Liu, Xiaobing Wang, Yonghui Wu*, Haiwu Zheng*

#These authors contribute equal to this work.

Henan Province Engineering Research Center of Smart Micro-nano, Sensing Technology and Application, School of Physics and Electronics, Henan University, Kaifeng 475004, P. R. China.

**Correspondence to: Y. H. Wu (defey@vip.henu.edu.cn), H. W. Zheng (zhenghaiw@ustc.edu).*

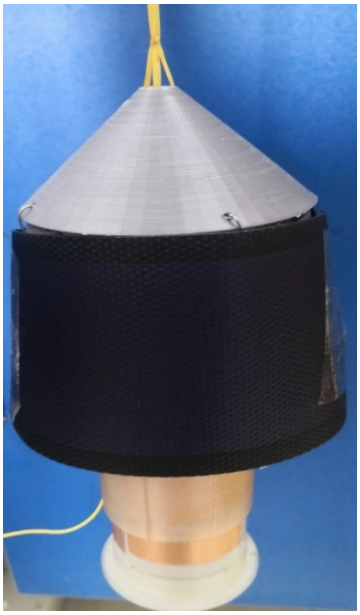

Fig. S1 Photograph of hybrid nanogenerator.

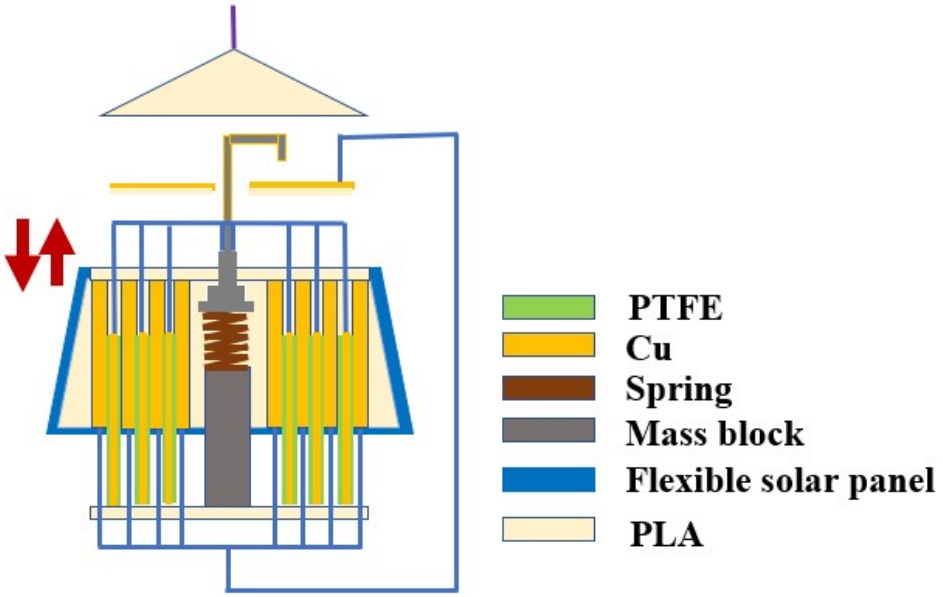

Fig. S2 Sectional view of hybrid generator.

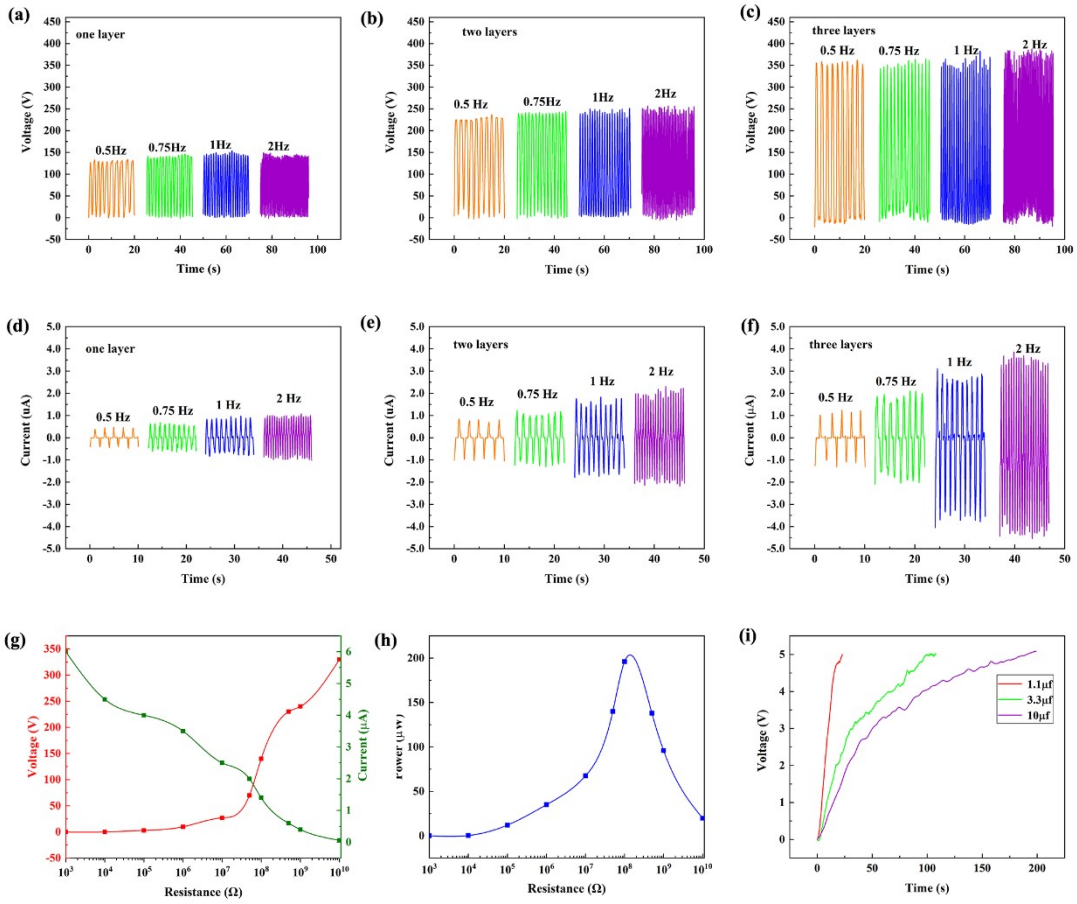

Fig. S3 Evaluating the energy collection performance of TENG device under different layers and frequencies. (a-f) V_{oc} and I_{sc} at different frequencies under the structure of the TENG with one layer, two and three layers. (g-h) the output voltage, the output

current and the output power of the TENG with different loads under 2 Hz working frequency. (i) The charging curves of the capacitors with different capacitance by TENG at 2 Hz.

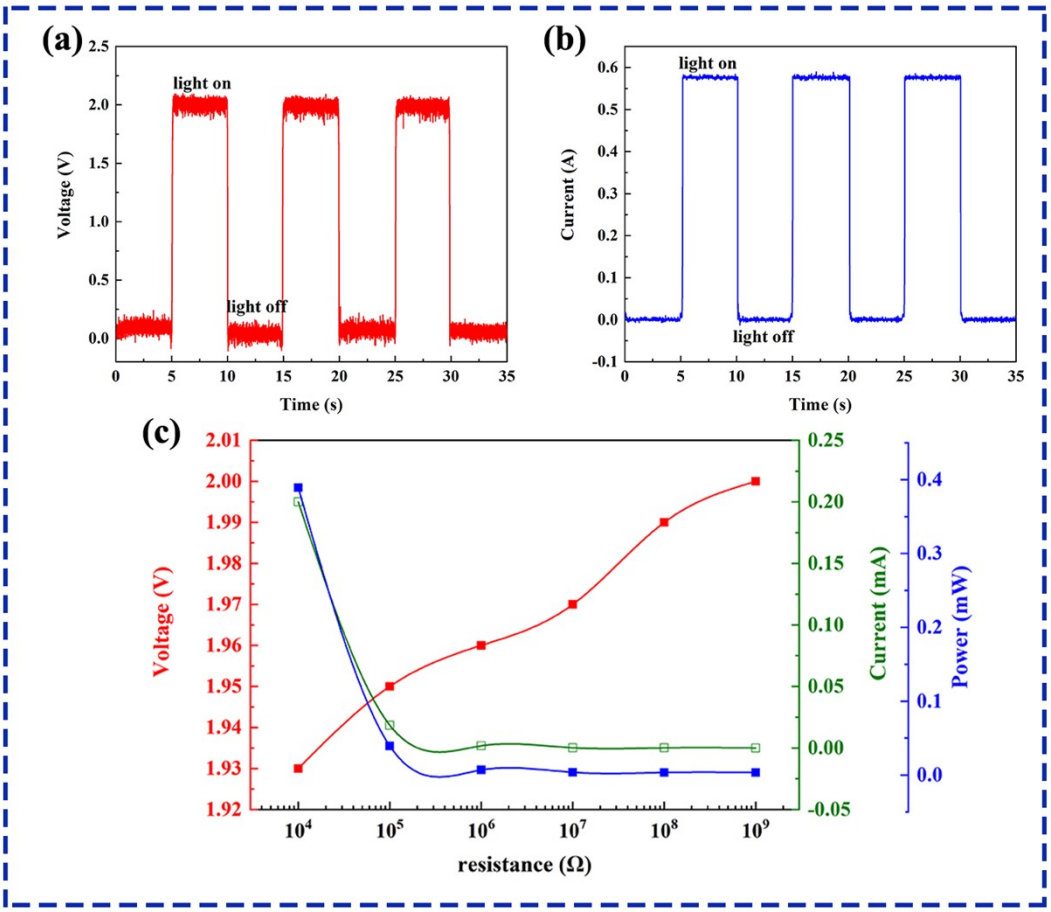

Fig. S4 The (a) V_{oc} and (b) I_{sc} of commercial flexible photovoltaic cell (c) The output voltage, current and power of photovoltaic cell varying with different loads.

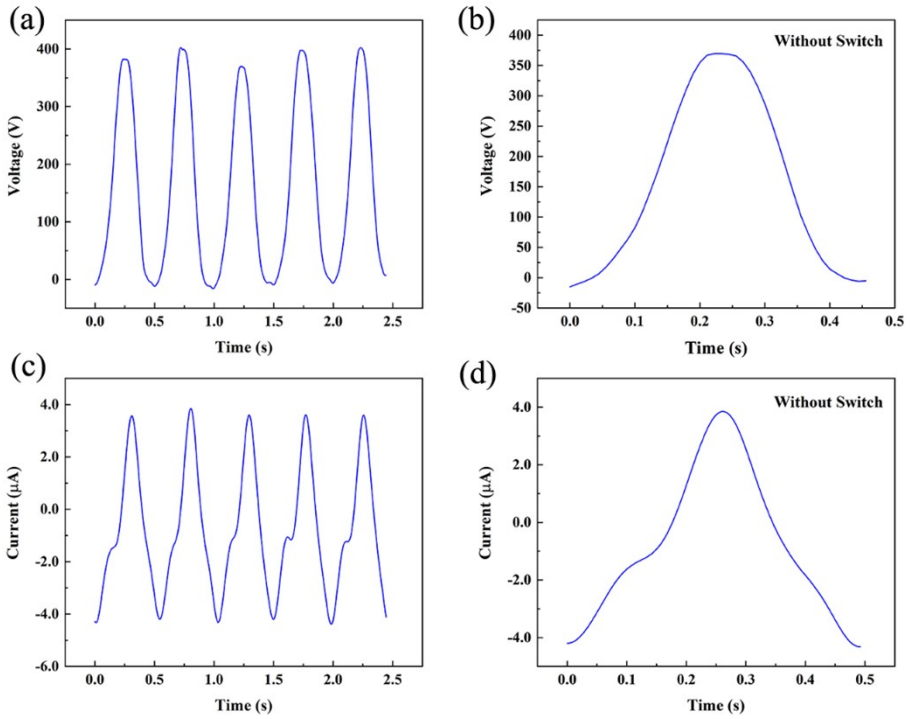

Fig. S5 (a) The V_{oc} waveform of the TENG without integrated mechanical switch and (b) its enlarged view (c) I_{sc} waveform and (d) its enlarged view.

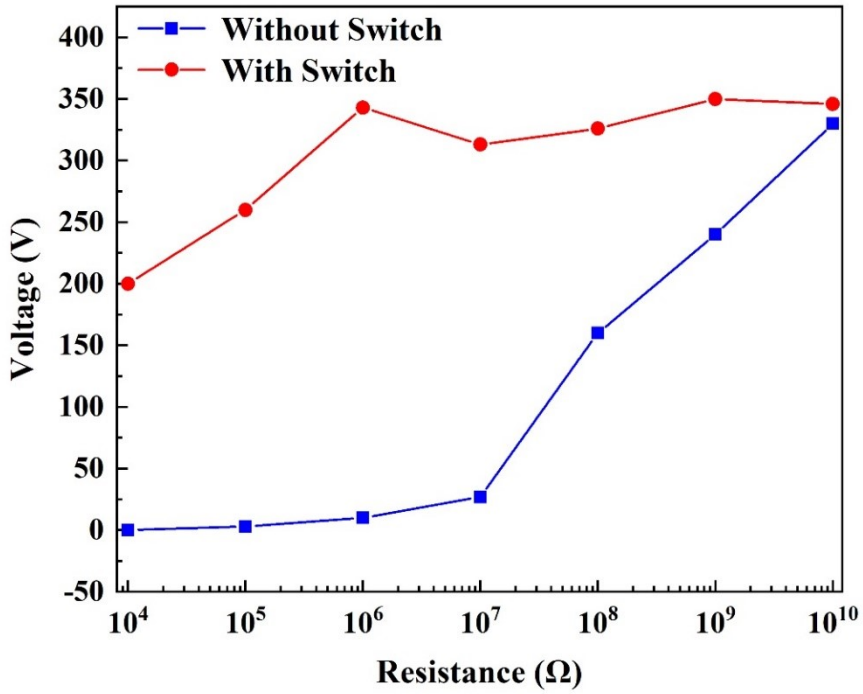

Fig. S6 Voltage comparison of TENG with and without integrated mechanical switch.

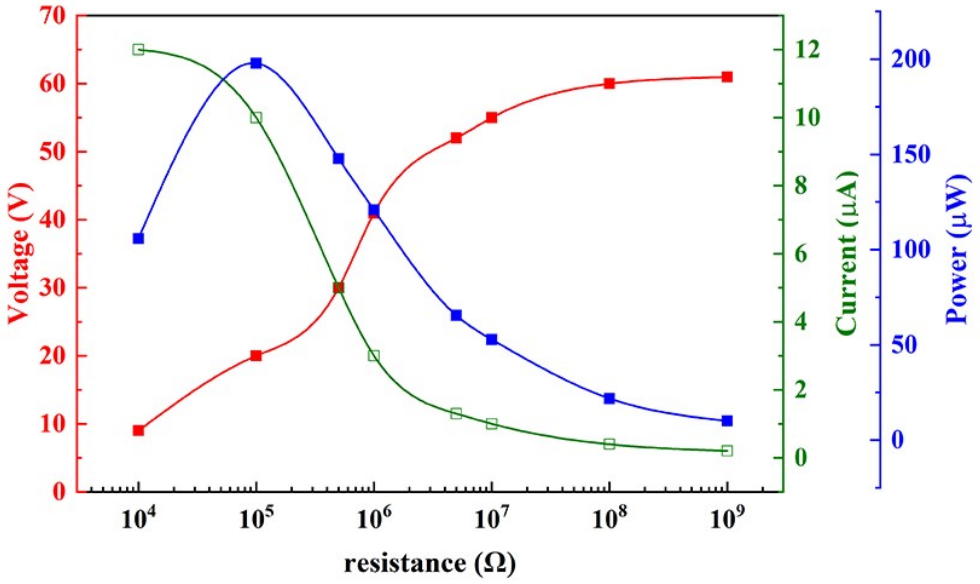

Fig. S7 The output voltage, current, and instantaneous power outputs of TENG dependence on different load resistance ranging from 10^4 to 10^9 Ω.

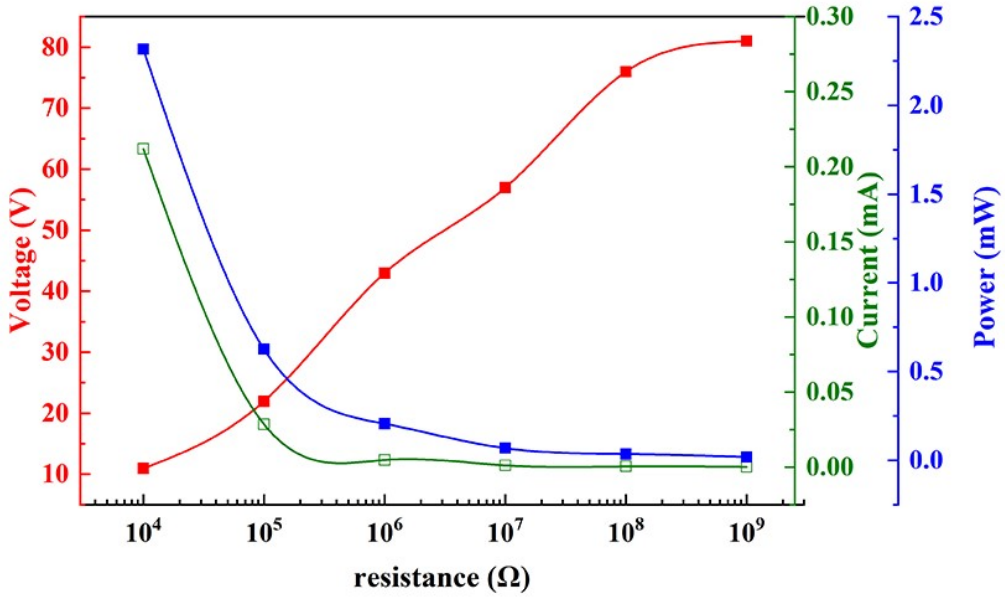

Fig. S8 The output voltage, current, and instantaneous power outputs of hybrid generator dependence on different load resistance ranging from 10^4 to 10^9 Ω.

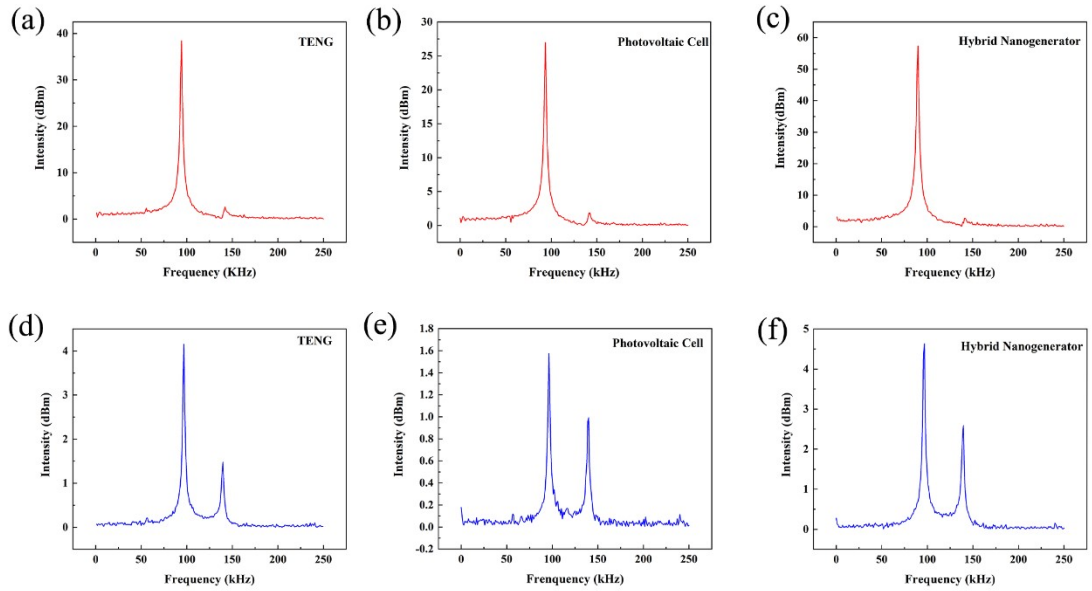

Fig. S9 (a-c) The fast Fourier transform (FFT) spectrum of the emitter and (d-f) receiver coil ends of the TENG, photovoltaic cell and hybrid nanogenerator at 2 Hz.

Supporting Movies

Movie S1. The 8 green LEDs can be easily lit up without any external electrical source based on wireless systems.

Movie S2. Hybrid nanogenerator acting as a power source can easily drive a commercial temperature-humidity meter wirelessly.