polymers

MDPI

*Supplementary Material*

# Enhancing the Performance of Triboelectric Generator: A Novel Approach Using Solid-Liquid Interface-Treated Foam and Metal Contacts

**Quang Tan Nguyen [1], Duy Linh Vu [2], Chau Duy Le [1] and Kyoung Kwan Ahn [2,*]**

[1] Graduate School of Mechanical Engineering, University of Ulsan, 93, Daehak-ro, Nam-gu, Ulsan 44610, Republic of Korea
[2] School of Mechanical Engineering, University of Ulsan, 93, Daehak-ro, Nam-gu, Ulsan 44610, Republic of Korea
* Correspondence: kkahn@ulsan.ac.kr

**Table S1.** Peak voltage and current density of various mechanical energy harvesters

| Types | Active materials | Size | Voltage (V) | Current density (A/m2) | Refs |
|---|---|---|---|---|---|
| Piezoelectric Generator | C/PDMS/AuNPs | 3.5 cm x 8.5 cm | 6 V | 2.35.10-4 | [62] |
| | CMC/PDMS/CNT | 3.3 cm x 2.5 cm | 30 | 6.06.10-4 | [63] |
| | Cellulose/SbSI | 1 cm x 1 cm | 0.024 | 2.10-4 | [64] |
| | TOCN/PDMS | 1 cm x 2 cm | 60 | 5.05.10-2 | [61] |
| | MoS2/PVDF | 3 cm x 3 cm | 50 | 3.33.10-5 | [65] |
| | ZnO nanowire array | ~2 mm2 | 10-3 | 7.5.10-5 | [66] |
| | ZnO nanosheets/Zn: Al layered double hydroxide layer | 6 mm2 | 0.38 | 0.217 | [67] |
| Triboelectric Generator | Treated wood | 4.5 cm x 4.5 cm | 81 | 8.89.10-4 | [68] |
| | PCL/GO | 4 cm x 4 cm | 120 | 2.5.10-3 | [69] |
| | Ppy-MWCNT | 6.25 cm2 | 196.8 | 5.04.10-2 | [70] |
| | CA/PEI/LTV | 5 cm x 5 cm | 478 | 6.30.10-2 | [34] |
| | PA/nylon-66 | 6.8 cm x 7 cm | 4500 | 8.40.10-3 | [12] |
| | FEP/Cu/Steel/Acrylic/ABS | 7.5 cm x 7 cm | 149.5 | 4.11.10-3 | [71] |
| | PTFE/Acrylic | 10 cm2 | 33 | 0.065 | [72] |
| Our generator | Cellulose/Water/Al/Cu | 2 cm x 3.5 cm | ~0.55 | 3.57 | This work |

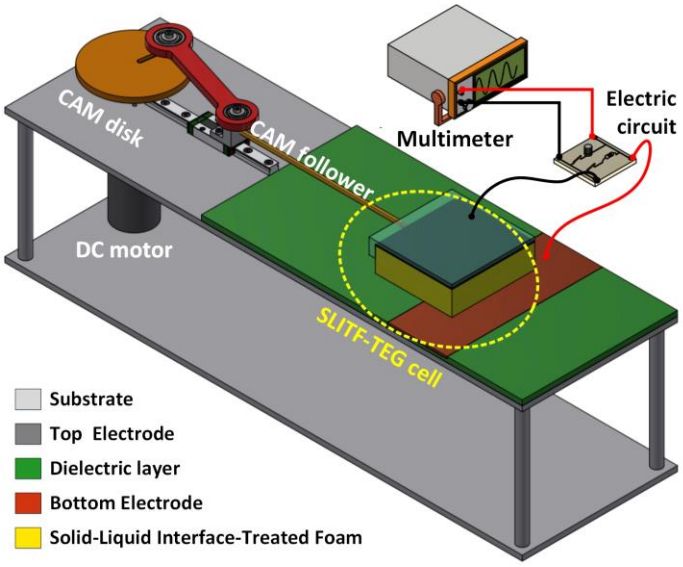


**Figure S1**. Experimental configuration of the SLITF-TEG

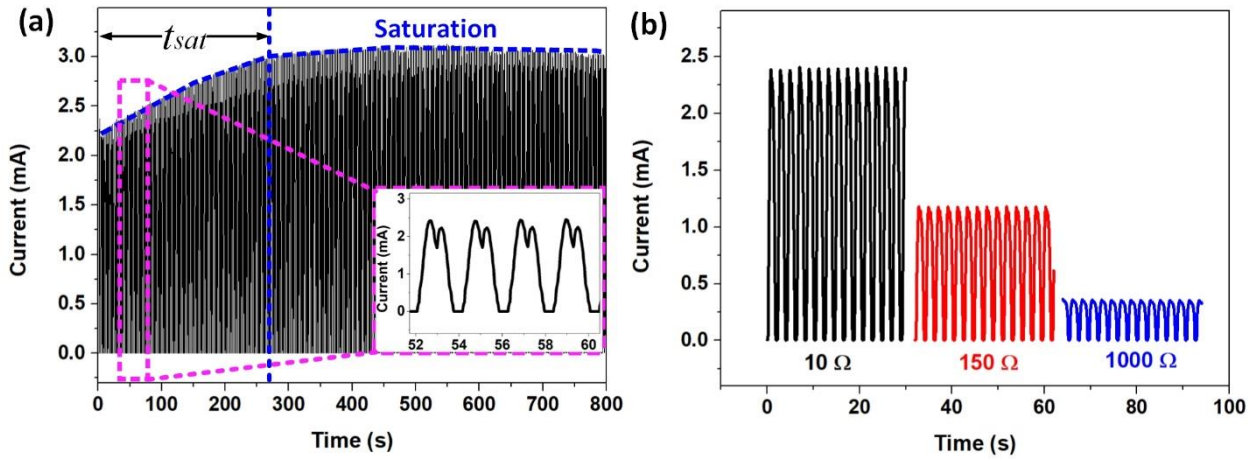


**Figure S2**. Electrical responses of the SLITF-TEG. The current outputs are measured under (a) the short-circuit condition and (b) various load resistances in the external circuit (10 Ω, 150 Ω, and 1000 Ω).

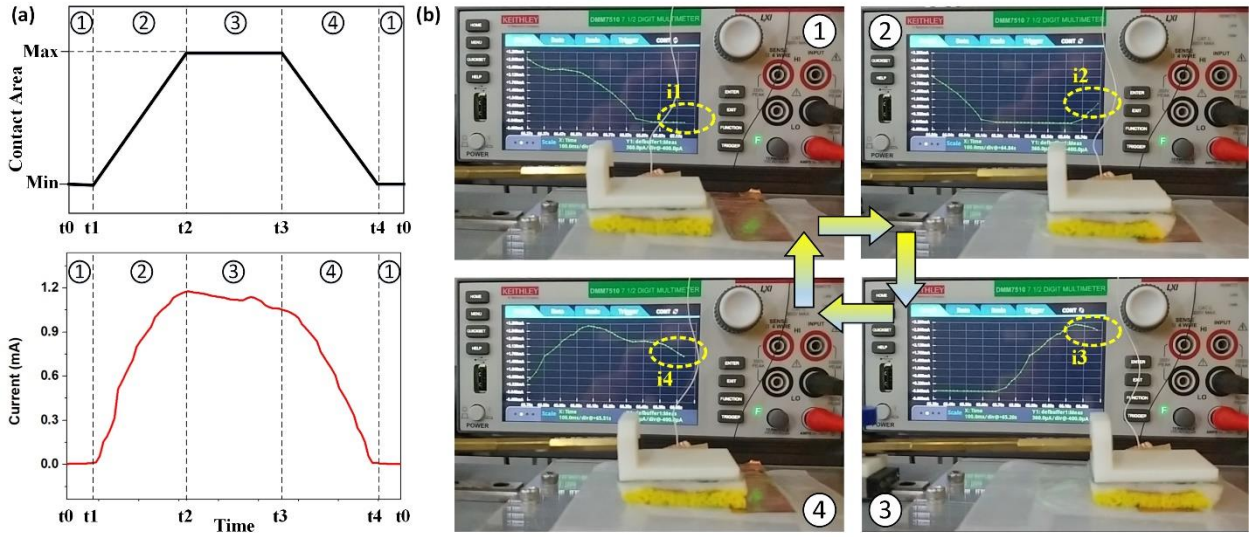


**Figure S3**. (a) Schematic of the contact area and short-circuit current of the SLITF-TEG. (b) Demonstration of the consistency between the electrical responses and the working mechanism of the SLITF-TEG.

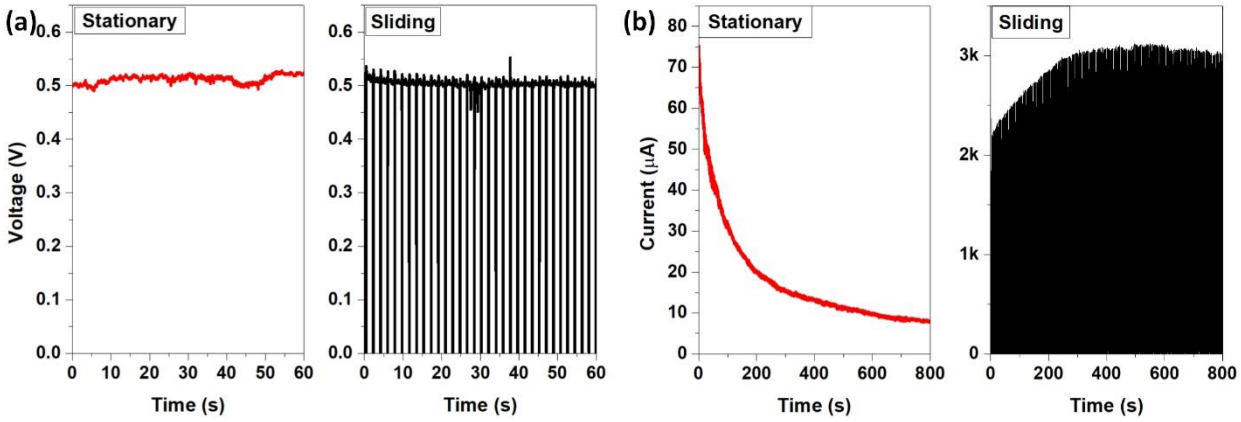


**Figure S4**. The comparison of (a) open-circuit voltage and (b) short-circuit current of the SLITF-TEG in the stationary and sliding modes.

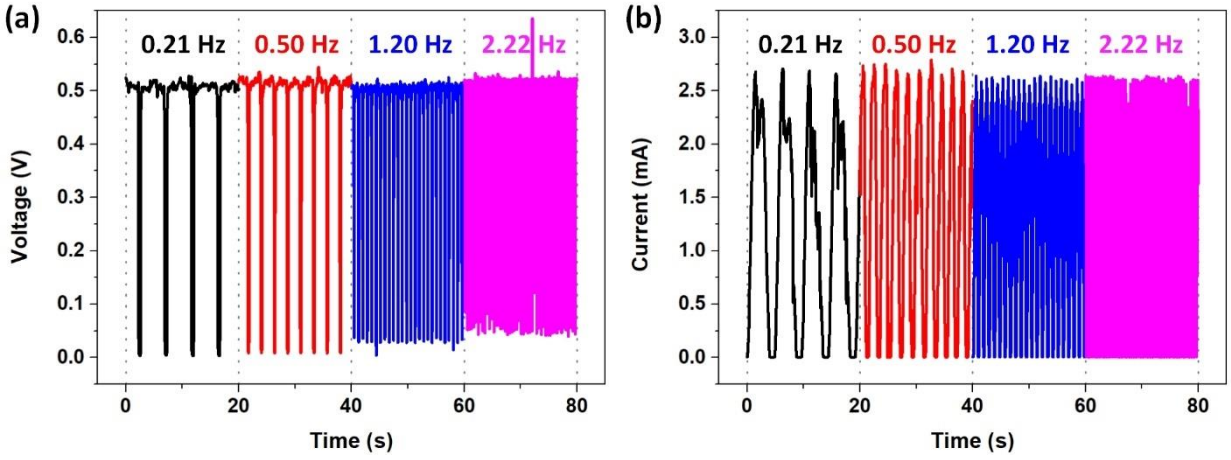


**Figure S5**. (a) The open-circuit voltage and (b) short-circuit current of the SLITF-TEG under different vibration frequencies.

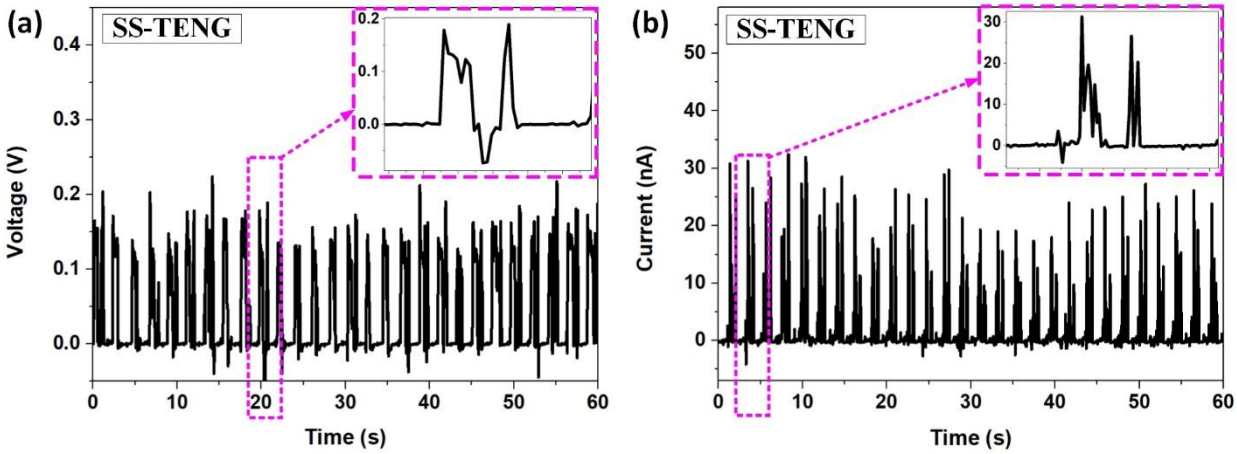


**Figure S6**. (a) The open-circuit voltage and (b) short-circuit current of the SS-TEG using a dry cellulose foam.

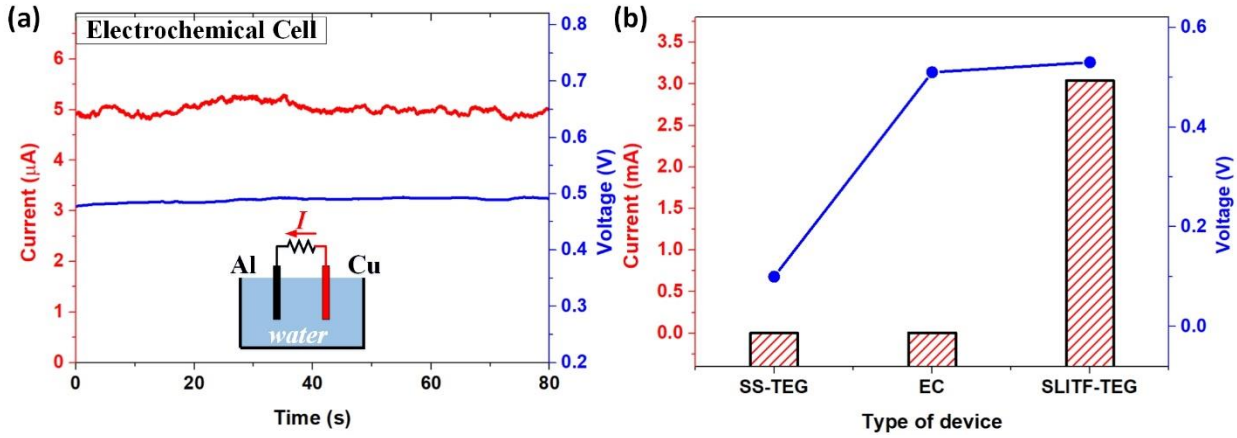


**Figure S7**. (a) The open-circuit voltage and short-circuit current of an electrochemical cell. (b) The comparison in output performances of SS-TEG, EC, and SLITF-TEG.

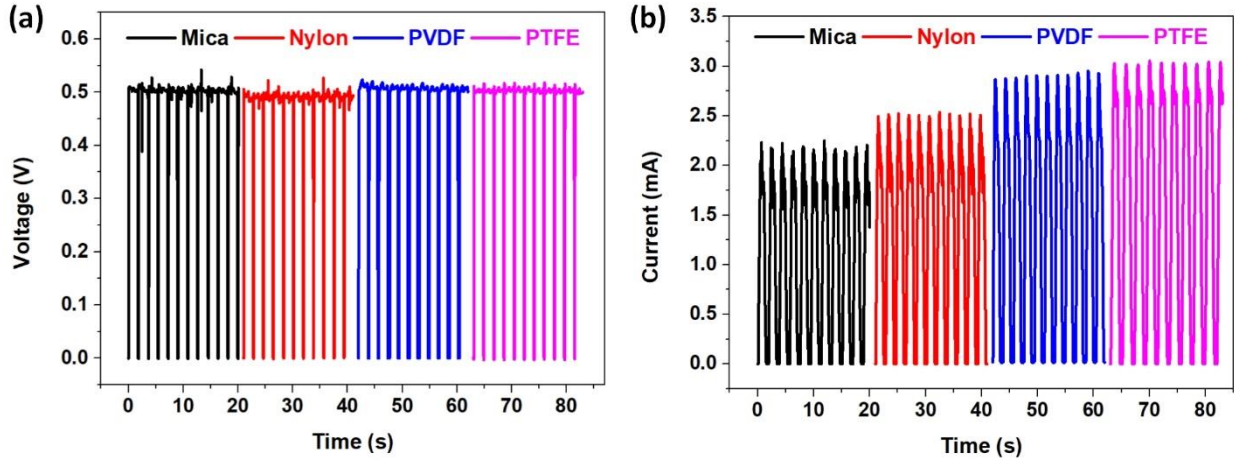


**Figure S8**. (a) The open-circuit voltage and (b) short-circuit current of the SLITF-TEG using different materials of the dielectric layer.

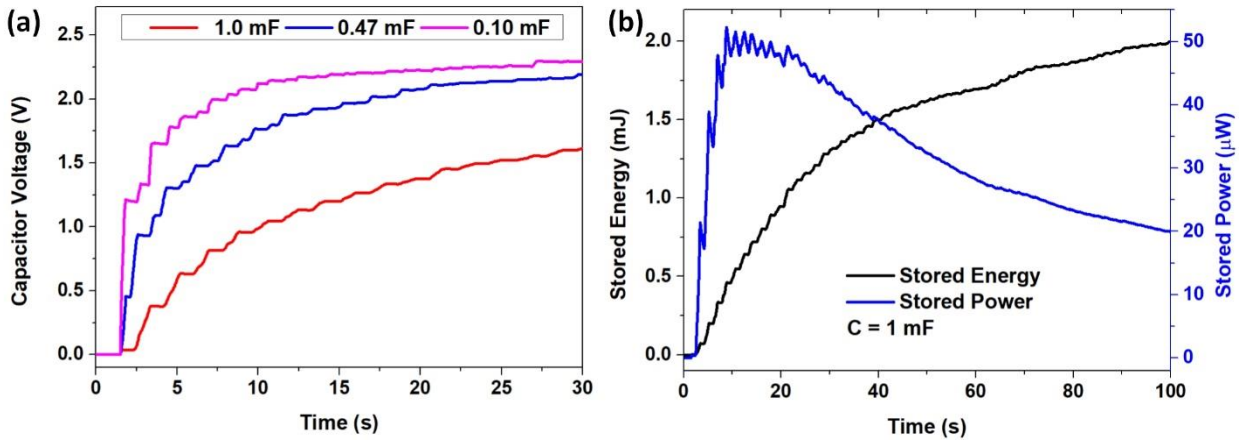


**Figure S9**. (a) Charging behaviors of six-unit cells of SLITF-TEG at different load capacitances. (b) Stored energy-time and stored power-time relationships for a fixed capacitor of 1 mF.

**Video S1:** Measurement of the open-circuit voltage

**Video S2:** Measurement of the short-circuit current

**Video S3:** SLITF-TEG directly charges a 6.8 mF capacitor

**Video S4:** Six-unit cells of SLITF-TEG directly power a light-emitting diode