Journal of Metals, Materials and Minerals, 37(1), e2823, 2027

Supplementary Information

Commercial nail polish-based single-electrode triboelectric nanogenerator for mechanical energy harvesting and water droplet energy conversion

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Received date:
27 July 2026
Revised date:
25 August 2026
Accepted date:
26 September 2026

Keywords:
Triboelectric nanogenerator;
Nail polish;
Mechanical energy harvesting;
Electronics;
Water droplet energy harvesting

Abstract

Triboelectric nanogenerators (TENGs) have brought new opportunities to realize relevant low-frequency mechanical energy self-powered systems, it is still a challenge and holds back the development of simple, low-cost, and scalable triboelectric materials. In this work, a triboelectric layer is made of commercially available nail polish used to fabricate a single-electrode TENG (abbreviated as N-TENG). The device was driven in single-electrode mode and exhibited an open-circuit voltage of 195 V, short-circuit current of 1300 nA, and maximum output power of 51.09 μW at an external load resistance of 500 MΩ. The electrical performance illustrates how nail polish acts as a feasible triboelectric material used for energy conversion, especially due to its availability. The practical applicability was validated through powering a commercial calculator, and other experiments proved that the device could harvest energy from free-falling water droplets under gravitational potential, indicating further applications for rain-energy harvesting. With the advantages of simple fabrication process, low-cost materials and acceptable electrical performance, the proposed N-TENG is practical for self-powered electronics and environmental energy harvesting.

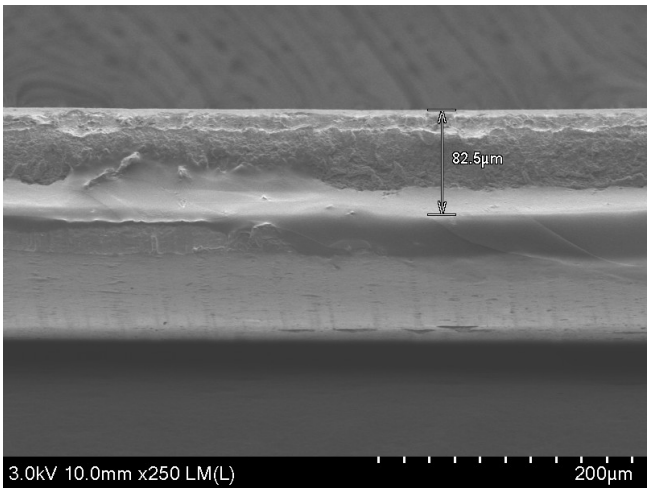


Figure S1. Cross-sectional SEM image of the dried nail-paint layer coated on the aluminum electrode.

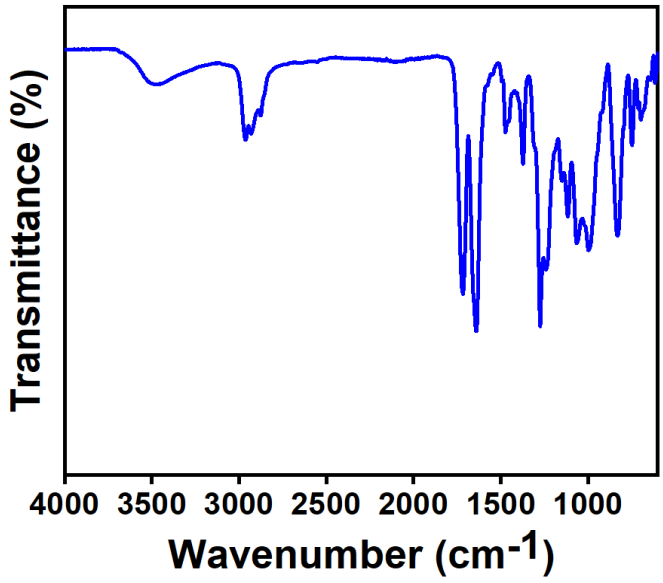


Figure S2. FTIR spectra of dried nailpaint layer.

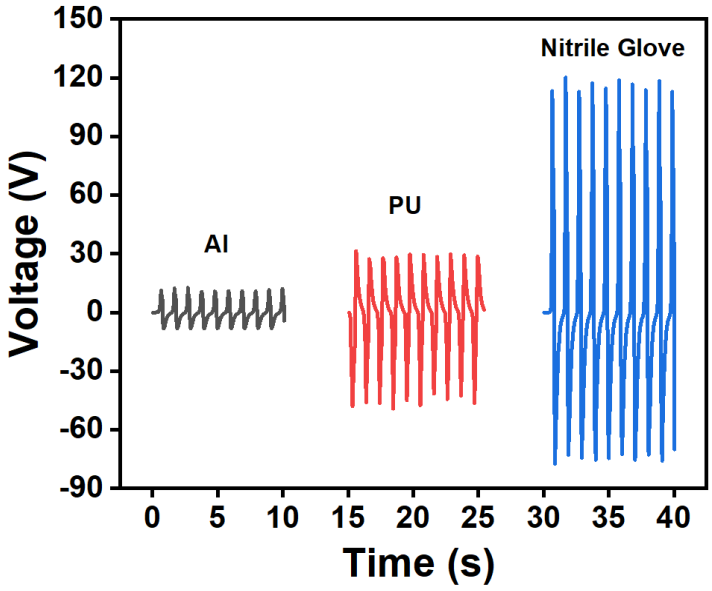


Figure S3. Output voltage of the N-TENG with different opposite layers.

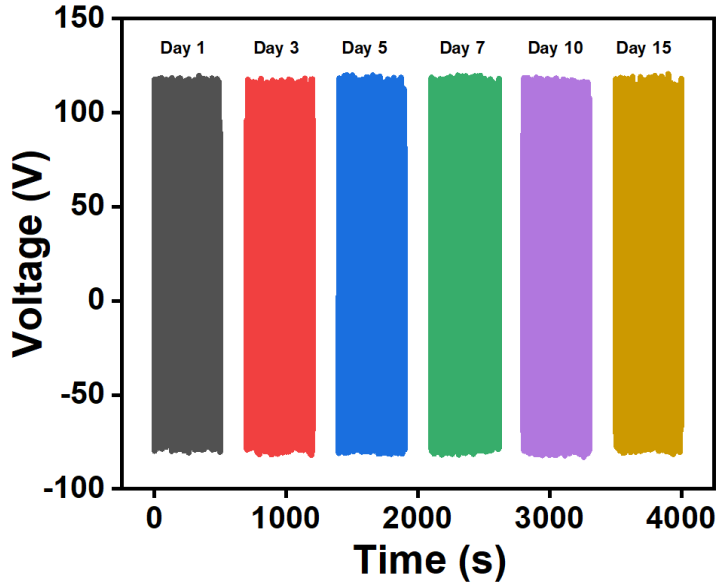


Figure S4. Day-wise stability of the N-TENG measured on 1 day, 3 day, 5 day, 7 day, 10 day, and 15 day under identical experimental conditions.

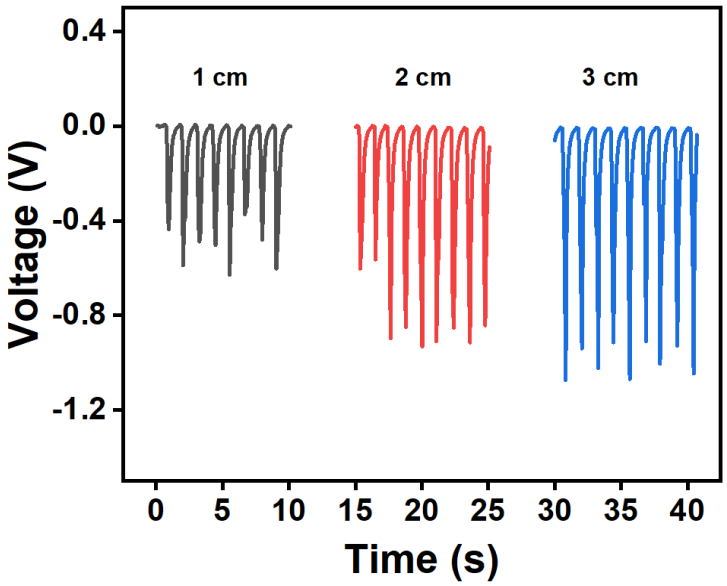


Figure S5. Voltage of the N-TENG at different falling heights of water droplets.

Table S1. Comparison table of various coating/paint-based TENGs.

Sr. no.	Material	Working mode	Voltage	Current	Reference
1	Seagrass coated on the Al tape/PET	CS	288 V	32 µA	[1]
2	Sparypaint/ PTFE	SL	10.5 V	302 nA	[2]
3	Silk fibroin coated on PET/ITO film/PET	CS	213.9 V	-	[3]
4	Nailpaint coated on Al tape/ Nitile glove	SL	195	1300 nA	Current work

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