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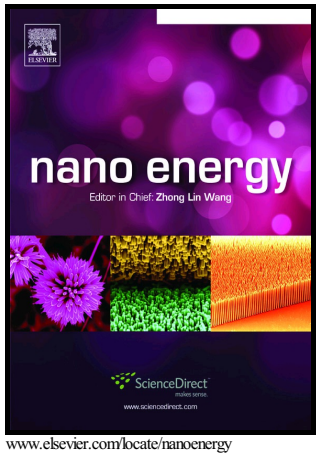

Flexible triboelectric nanogenerator based on cost-effective thermoplastic polymeric nanofiber membranes for body-motion energy harvesting with high humidity-resistance

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www.elsevier.com/locate/nanoenergy

PII: S2211-2855(18)30171-X
DOI: https://doi.org/10.1016/j.nanoen.2018.03.031
Reference: NANOEN2579

To appear in: *Nano Energy*

Received date: 13 January 2018
Revised date: 6 March 2018
Accepted date: 9 March 2018

Cite this article as: Shan Yan, Jianwei Lu, Wei Song and Ru Xiao, Flexible triboelectric nanogenerator based on cost-effective thermoplastic polymeric nanofiber membranes for body-motion energy harvesting with high humidity-resistance, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2018.03.031

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ABSTRACT

The development of triboelectric nanogenerators (TENGs) which can be utilized to transform small and irregular energy into electricity provides a new idea to alleviate the serious energy crisis. In this study, a type of flexible TENG based on cost-effective thermoplastic polymeric nanofiber membranes fabricated via melt-blending extrusion method with good compatibility to garment had been proposed, which could be used to harvest the low-frequency mechanical energy produced by human motions. In the presence of modifications, in-situ chemical oxidative polymerization and facile dip-coating, the prepared TENG exhibited excellent humidity-resistance. Triggered by periodic motions, the device which could be applied to charge the commercial capacitor and more than 200 green LEDs revealed a high output power density of 2.06 W/m^2 after introducing polyaniline. The practicability of the obtained device to scavenge the energy of body motions had been successfully proved. Especially with hand tapping as an example, the open-circuit voltage and short-circuit current reached up to 340.8 V and 73.7 μA respectively, which indicated that it is suitable for thermoplastic polymeric nanofiber membranes with outstanding wearability to be employed in TENGs to be a power supply for the