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A Biomimetic Nanofiber-Based Triboelectric Nanogenerator with an Ultrahigh Transfer Charge Density

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ABSTRACT

Nature can provide inspiration for the advancement of energy-harvesting technologies.

This study describes a biomimetic nanofiber-based triboelectric nanogenerator (BN-TENG). Two-component electrospinning was used to prepare biomimetic nanofibers as the tribo-materials. The entire nanofiber mat (surficial nanostructures and internal biomimetic structures) were utilized to enhance the energy-harvesting performance of the BN-TENGs. Besides, charge retention on the mats was achieved via pressure treatment with a honeycomb mold. The optimized BN-TENG had the desirable power-generating performances: 1000 V of output voltage (with a load of 100 M Ω), and 364 $\mu\text{C}\cdot\text{m}^{-2}$ of short-circuit transfer charge density. We also demonstrate the ability of the optimized BN-TENG to power electronics.

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