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NPB Derivatives as Hole Transport Molecules in Fiber-Based Triboelectric Nanogenerators

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Polymer fiber-based triboelectric nanogenerators (PF-TENGs) are promising systems due to desirable advantages such as facile, affordable, and eco-friendly production and the ability to integrate into a wide range of applications [1]. But, its complex material network suffers from insufficient charge production due to the surface charge mitigation mechanism, which decreases the electrical output of the devices [2]. Chemical modification of the triboelectric polymer matrix can be utilized to enhance the performance of the PF-TENGs. Herein, we have shown the applications of NPB derivatives as hole transport materials in tribopositive fibers. The application of molecules has led to a structural and topological alteration in the obtained nanofibers that changed the surface features of the fiber films. TENG device parameters before and after HTM treatment have been compared. The results have shown that HTM treatments have improved the instant voltage by 45% and power values by 75%. Under external electrical loads, the increase in the voltage reached 50%, and the recorded maximum value was 598 V. In this regard, the proposed study provides a facile method to manage the electrical output of the fabricated device. It contributes to the material design for integrating organic semiconductors and dielectrics for enhanced energy conversion devices.

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