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Stretchable 3D Polymer for Simultaneously Mechanical Energy Harvesting and Biomimetic Force Sensing

Jie Bian ^a, Ning Wang ^{e,*}, Jinming Ma ^{b,d}, Yang Jie ^{b,d}, Jingdian Zou ^{b,c}, Xia Cao ^{b,c,d,*}

^a School of Chemistry Beihang University, Beijing, 100191, China.

^b Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, Beijing 100083, China.

^c College of Nanoscience and Technology, University of Chinese Academy of Sciences, Beijing 100049, China.

^d Research Center for Bioengineering and Sensing Technology, Beijing Key Laboratory for Bioengineering and Sensing Technology, School of Chemistry and Biological engineering, and Beijing Municipal Key Laboratory of New Energy Materials and Technologies, University of Science and Technology Beijing, Beijing, 100083, China.

^e Center for Green Innovation, School of Mathematics and Physics, University of Science and Technology Beijing, Beijing 100083, China.

C. X.: caoxia@ustb.edu.cn;

W. N.: wangning@ustb.edu.cn

* To whom correspondence should be addressed,

Abstract

Stretchability is an essential element for wearable electronics. Creating intelligent devices using stretchable polymers, which can simultaneously harvest mechanical energies and mimic the properties of fast adapting (FA) receptors, could be of significant importance for plastic bioelectronics and transistors. In this paper, we report an all-organic triboelectric nanogenerator (TENG) that enables both energy harvesting and biomimetic pressure sensing on the base of three-dimensional polypyrrole (PPy) network. By combining with polydimethylsiloxane (PDMS) and BaTiO₃ nanoparticles, this composite triboelectric interface shows not only an enhanced uniaxial stretchability of up to 310%, but also a high short circuit current density of 18.0 mA·m⁻² in response to

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