

# Light-Weight, Self-Powered Sensor Based on Triboelectric Nanogenerator for Big Data Analytics in Sports

Xiaofei Ma <sup>1</sup>, Xuan Liu <sup>2</sup>, Xinxing Li <sup>3</sup> and Yunfei Ma <sup>4,5,\*</sup>

<sup>1</sup> Physical Education Department, Northeastern University at Qinhuangdao, Qinhuangdao 066000, China; maxiaofei7555@163.com

<sup>2</sup> Physical Education Centre, Xi'an Jiaotong-liverpool University, Jiangsu 215123, China; liuxuanivan@gmail.com

<sup>3</sup> Institute of Sports Science, Department of Physical Education, Seoul National University, Seoul 08826, Korea; shinsunglee2021@snu.ac.kr

<sup>4</sup> Parallel robot and mechatronic system laboratory of Hebei province, Yanshan University, Qinhuangdao 066004, China

<sup>5</sup> Key Laboratory of Advanced Forging & Stamping Technology and Science of Ministry of National Education, Yanshan University, Qinhuangdao 066004, China

\* Correspondence: mayunfei@ysu.edu.cn

**Citation:** Ma, X.; Liu, X.; Li, X. Ma, Y. Light-Weight, Self-Powered Sensor Based on Triboelectric Nanogenerator for Big Data Analytics in Sports. *Electronics* **2021**, *10*, 2322. <https://doi.org/10.3390/electronics10192322>

Academic Editor: Giovanni Dimauro

Received: 20 August 2021

Accepted: 17 September 2021

Published: date

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

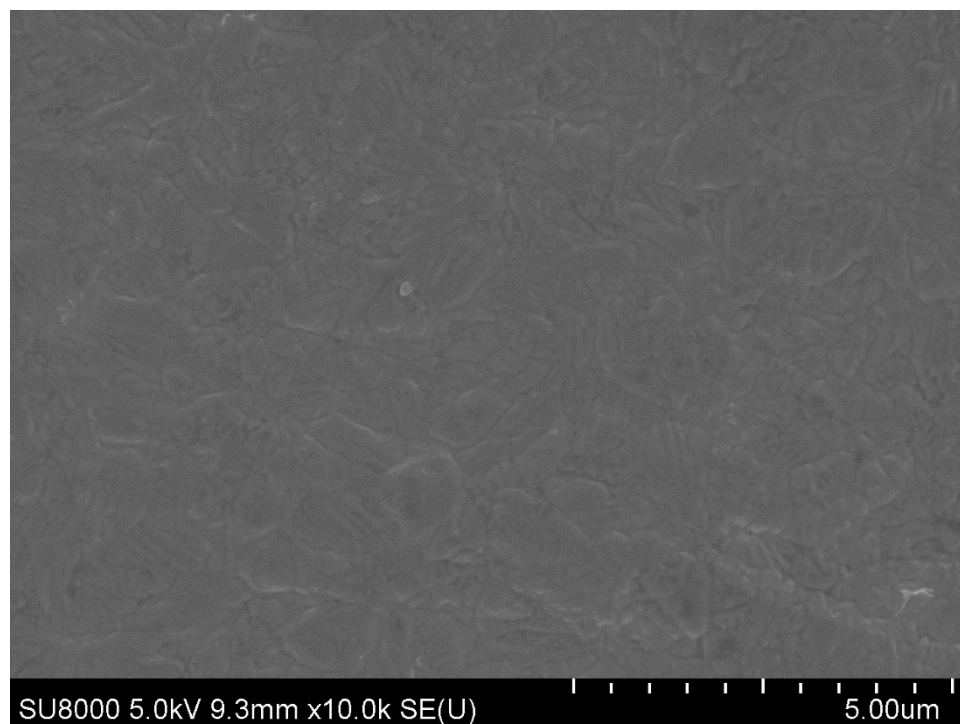
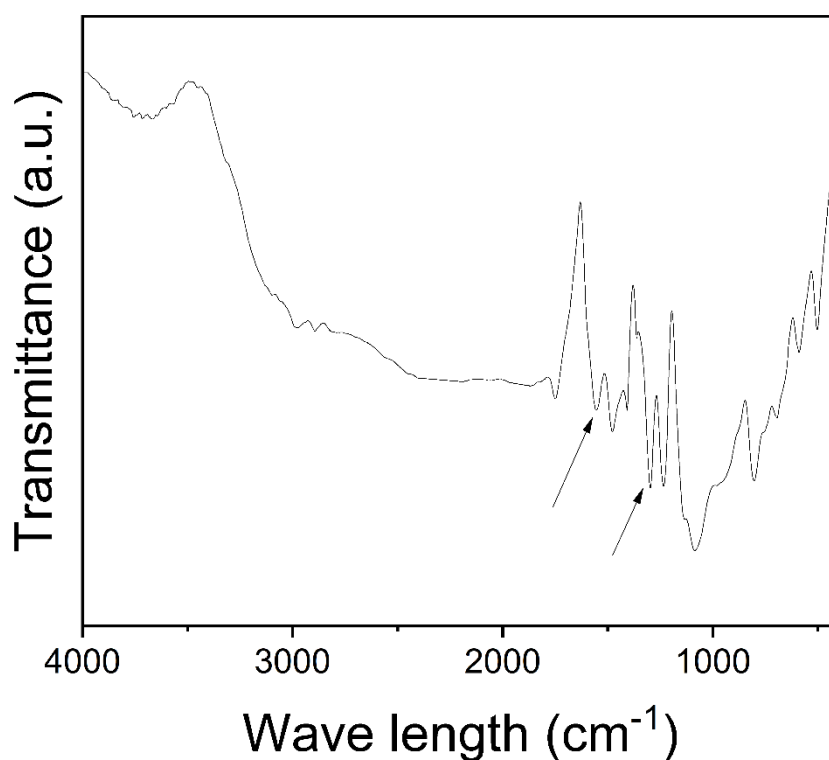


Figure S1. SEM image of PTFE film before polishing: The surface is smooth.



**Figure S2.** Fourier Spectroscopy of PANI: The two peaks near 1475 cm<sup>-1</sup> and 1300 cm<sup>-1</sup> belong to PANI.

**Supplementary Video S1.** Powering for an electronic calculator: The electronic calculator can work after hitting the device for ~30 s.

**Supplementary Video S2.** Powering for an electronic watch: The electronic watch can work after hitting the device for ~30 s.

**Supplementary Video S3.** The self-powered smart table tennis bat lighting the LED: When the sensing unit is hit by a table tennis ball, the LED will be lighted.