

## Author's Accepted Manuscript

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PII: S2211-2855(17)30771-1  
DOI: <https://doi.org/10.1016/j.nanoen.2017.12.004>  
Reference: NANOEN2385

To appear in: *Nano Energy*

Received date: 9 November 2017  
Revised date: 4 December 2017  
Accepted date: 4 December 2017

Cite this article as: Meng-Fang Lin, Jiaqing Xiong, Jiangxin Wang, Kaushik Parida and Pooi See Lee, Core-Shell nanofiber mats for tactile pressure sensor and nanogenerator applications, *Nano Energy*, <https://doi.org/10.1016/j.nanoen.2017.12.004>

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## Core-Shell nanofiber mats for tactile pressure sensor and nanogenerator applications

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Keywords: tactile pressure sensor, nanogenerator, electrospinning, core-shell nanofibers

### Abstract

Core-shell nanofibers of PDMS ion gel /PVDF-HFP were successfully prepared by incorporating cross-linking agent during electrospinning. The electrospun nanofiber mats were used to fabricate pressure sensors to detect the static and dynamic pressures by harnessing the capacitance changes and triboelectric effects judiciously. The core-shell PDMS ion gel/PVDF-HFP nanofiber sensor functions as a capacitive pressure sensor, which offers high sensitivity of  $0.43 \text{ kPa}^{-1}$  in the low pressure ranges from 0.01 kPa to 1.5 kPa. The sensitivity, flexibility, and robustness of our capacitive pressure sensor allows it to be utilized as a wrist-based pulse wave detector for heart-rate monitoring. In addition, the core-shell PDMS ion gel/PVDF-HFP nanofiber mat made a good triboelectric based pressure sensor in the high pressure range with a linear pressure sensitivity  $0.068 \text{ V}\cdot\text{kPa}^{-1}$  from 100 kPa to 700 kPa, one of the best reported at present. The increase in inductive charges and the enhanced dielectric capacitance of the core-shell nanofiber layer compared to the pure PVDF-HFP nanofiber layer allows it to function in the triboelectric nanogenerator (TENG) with the maximum power density reaching  $0.9 \text{ W/m}^2$ , which is sufficient to light up several hundred light emitting diodes (LEDs) instantaneously.

**Graphical abstract:**

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