

Supporting Information

Biodegradable pressure sensors with high sensitivity and wide detection range via a piezoresistive/capacitive dual response

Xiaowan Luan,^a Yanlong Zhu,^a Yankun Chen,^a Xiaoxia Gu,^a Qian Xu,^a Guoming Liu,^b Xiuqin Zhang,^a Minxuan Kuang^{a,*}

^a Beijing Key Laboratory of Clothing Materials R & D and Assessment, Beijing Engineering Research Center of Textile Nanofiber, School of Materials Design & Engineering, Beijing Institute of Fashion Technology, Beijing 100029, China

^b CAS Key Laboratory of Engineering Plastics, Beijing National Laboratory for Molecular Sciences, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China

* Corresponding Author

Emails: mxkuang@bift.edu.cn

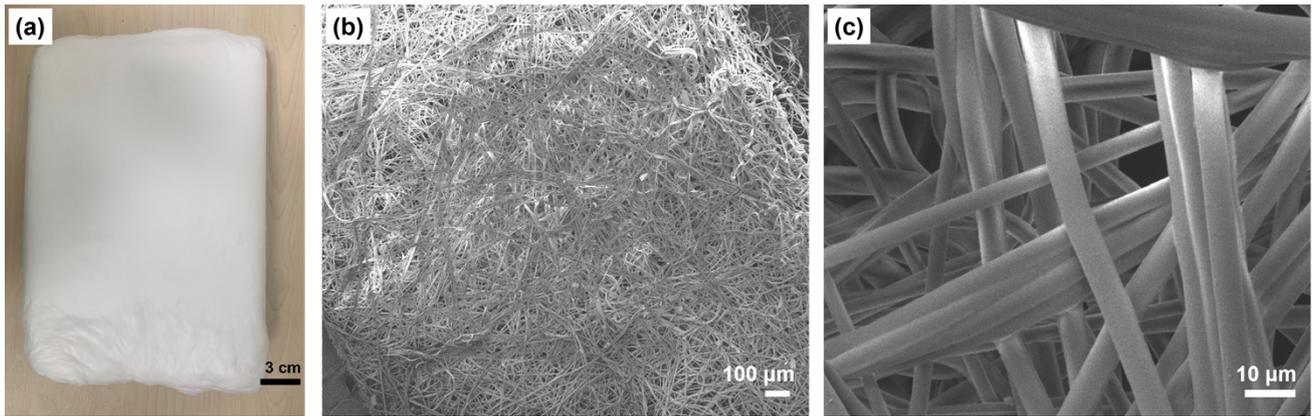


Figure S1. (a) Photograph of the pristine PLA nonwoven, (b,c) SEM images of the pristine PLA nonwoven.

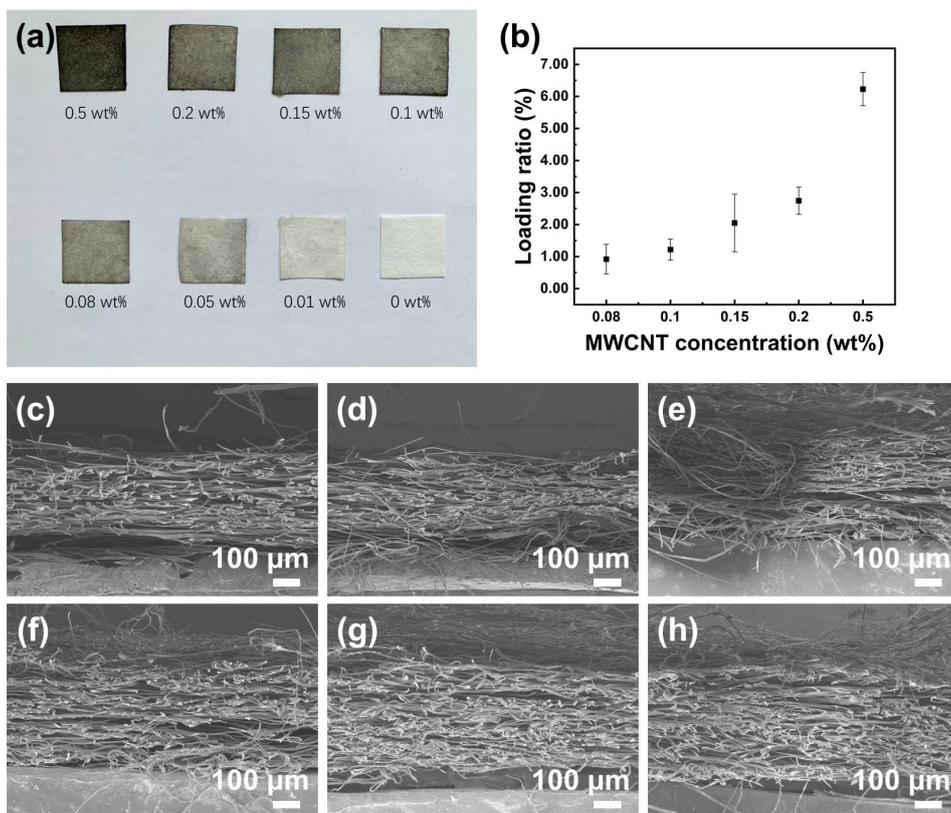


Figure S2. (a) Photographs of the CPPFs prepared from MWCNT solutions with varied concentrations. (b) The load ratio of MWCNTs on the PLA porous nonwovens dip-coated from the MWCNT dispersions with different concentrations. (c-h) The cross-view SEM images of the CPPF after dip-coating MWCNTs: (c) 0%, (d) 0.08%, (e) 0.1%, (f) 0.15%, (g) 0.2%, and (h) 0.5%.

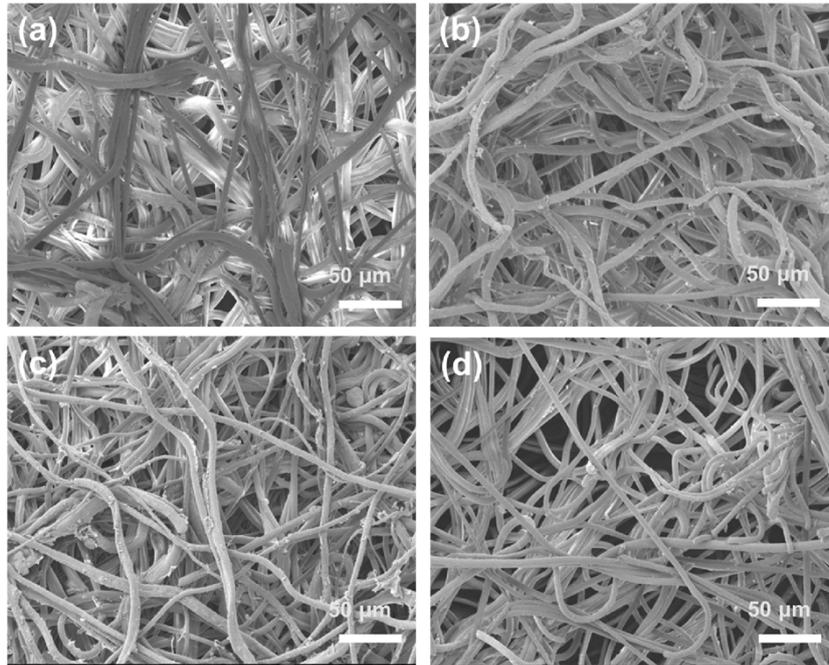


Figure S3. SEM images of the PLA nonwovens post-immersion in MWCNT solutions with different concentrations: (a) 0.01 wt%, (b) 0.1 wt%, (c) 0.2 wt%, (d) 0.5 wt%.

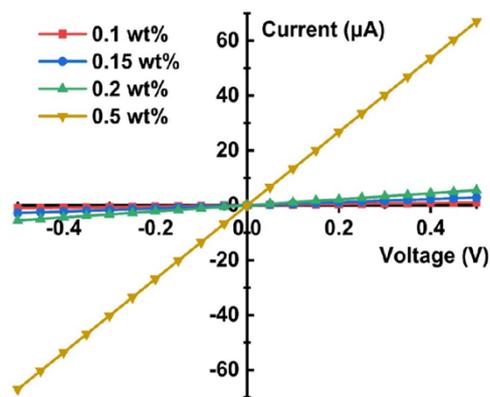


Figure S4. I-V curves of CPPFs prepared from MWCNT solutions with different concentrations.

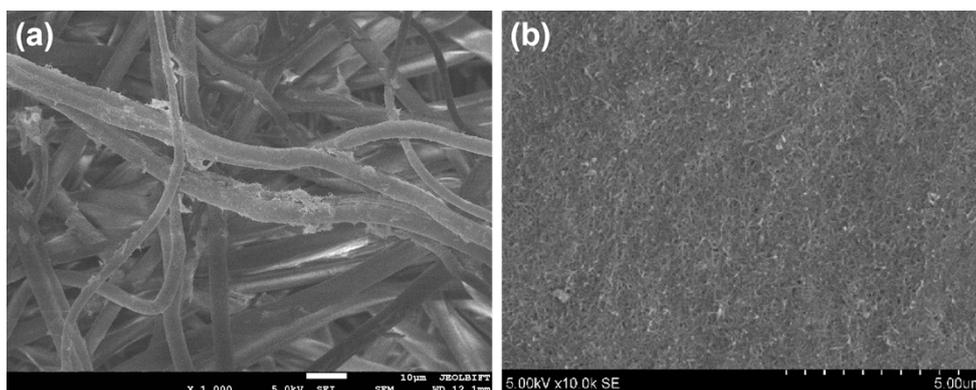


Figure S5. SEM images of (a) CPPF and (b) CNT Buckypaper.

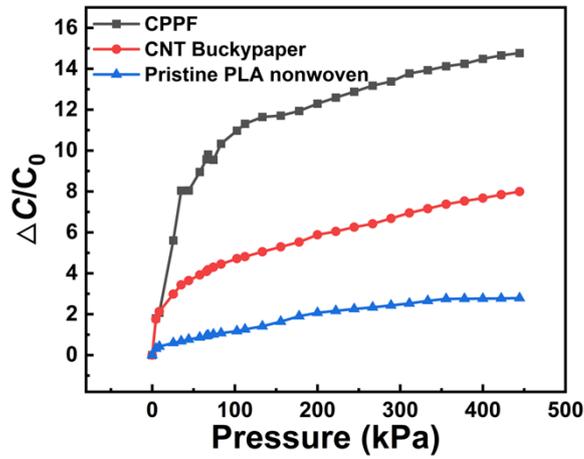


Figure S6. Capacitive pressure response of the pressure sensors crafted from CPPF, CNT Buckypaper, and pristine PLA nonwoven.

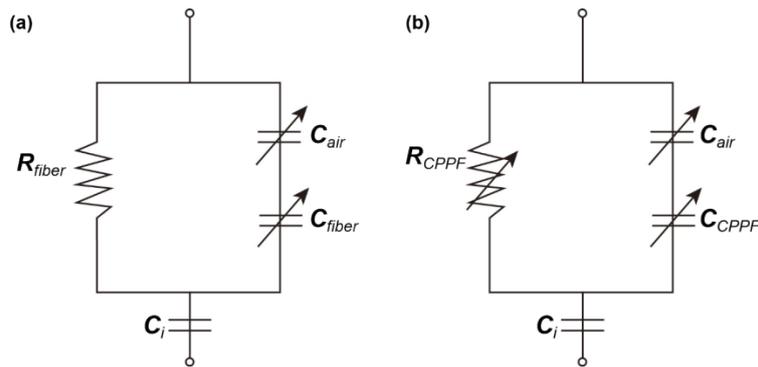


Figure S7. The equivalent circuits for the pressure sensors made from (a) the pristine nonconductive PLA nonwoven and (b) CPPF.

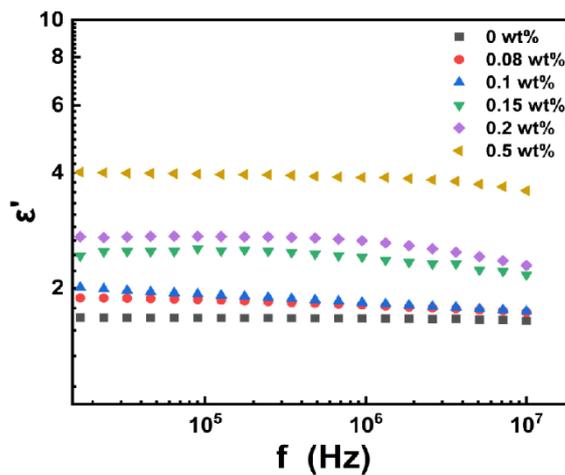


Figure S8. The permittivity of PLA nonwovens impregnated with different MWCNT concentrations.

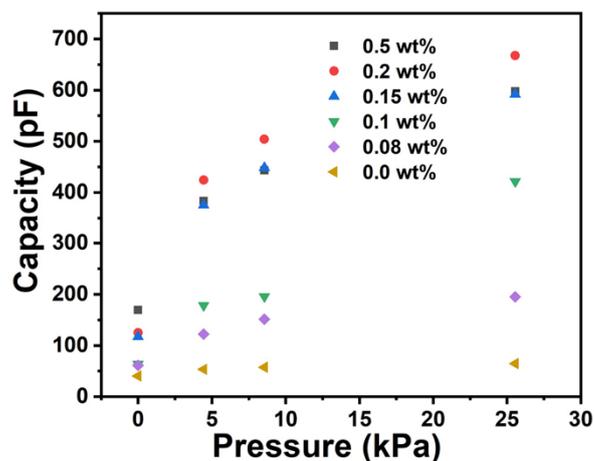


Figure S9. Absolute capacitance response of pressure sensor with different impregnation concentration (low pressure range).

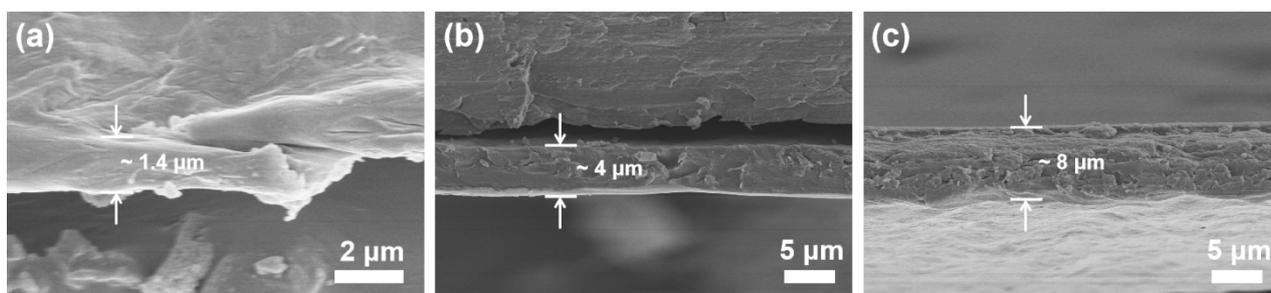


Figure S10. The cross-view SEM images of the spin-coated PLA films from PLA solutions with varied concentrations: (a) 0.03 g/ml, (b) 0.05 g/ml, (c) 0.1 g/ml.

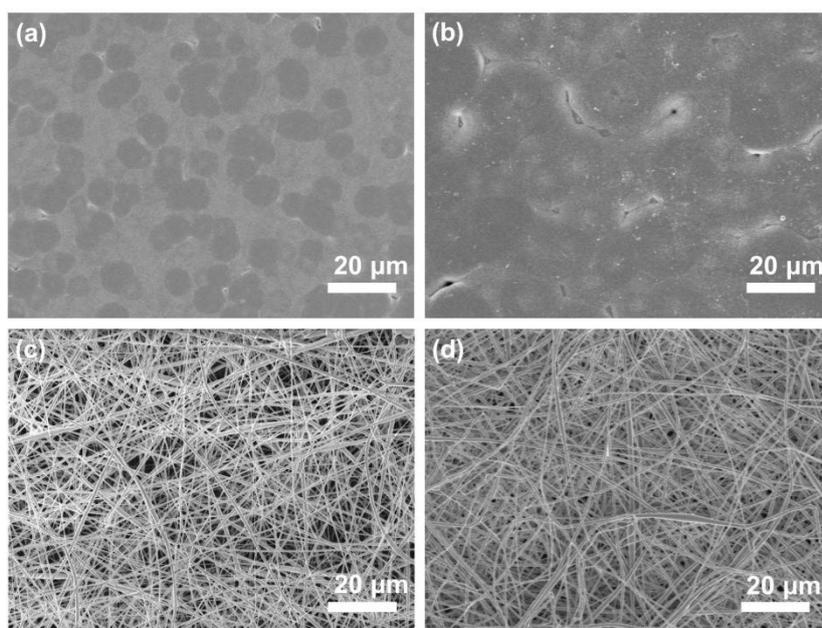


Figure S11. SEM images of the spin-coated PLA films (a) before and (b) after the durability test. SEM images of

the PLA nanofiber membranes (c) before and (d) after the durability test.

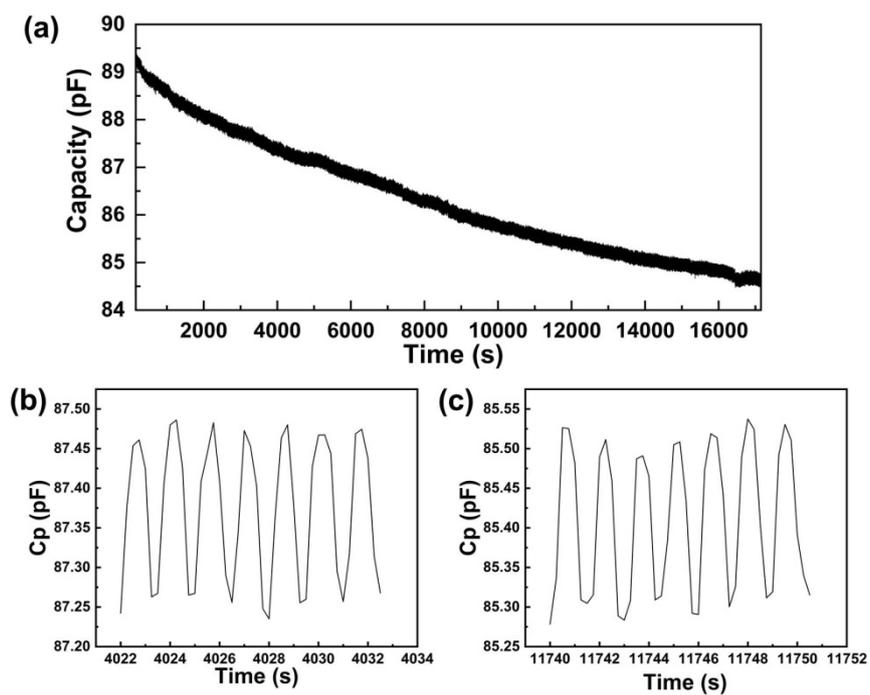


Figure S12. Cycling test of the pressure response for the sensor utilizing the spin-coated PLA film as the insulating layer.

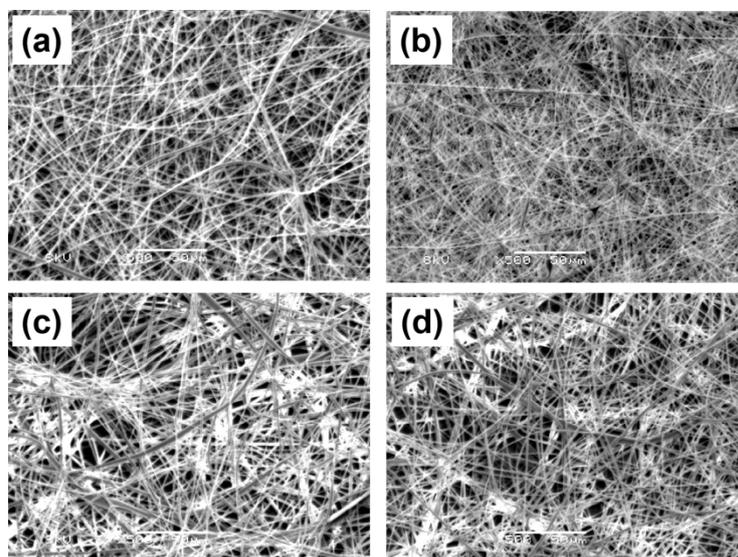


Figure S13. SEM images of PLA nanofiber films prepared via different spinning durations: (a) 0.5 h, (b) 1 h, (c) 1.5h, (d) 2 h.

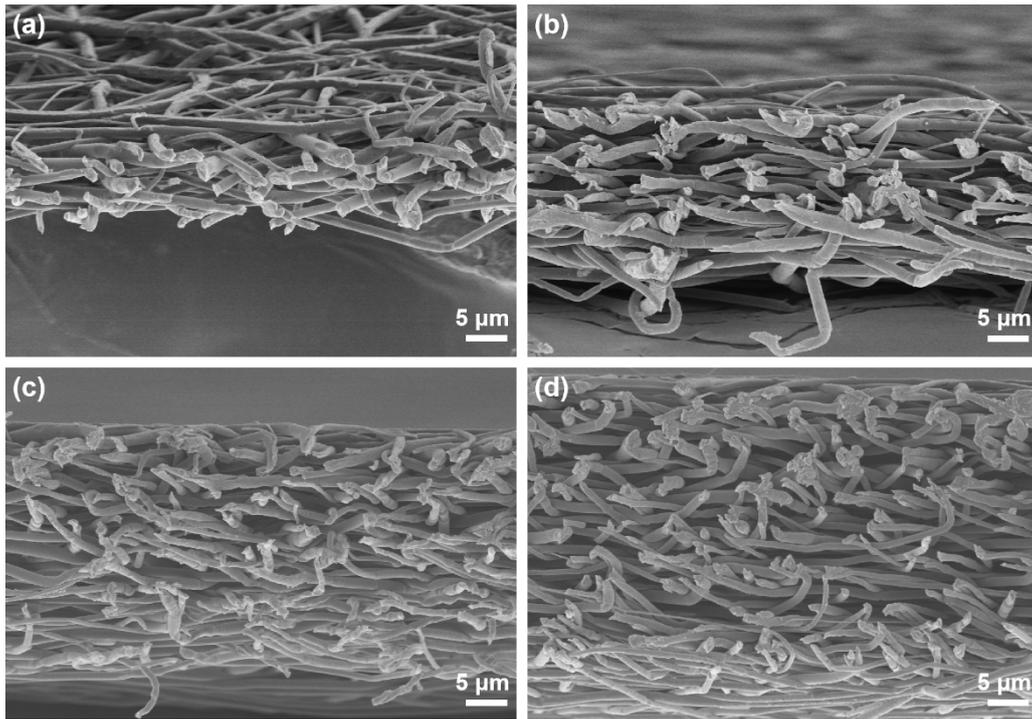


Figure S14. The cross-view SEM images of the PLA nanofiber films prepared via different spinning durations: (a) 0.5h, (b) 1h, (c) 1.5h, (d) 2h.