

**High-performance piezoresistive flexible pressure sensor based on wrinkled
microstructures prepared from discarded vinyl records and ultra-thin,
transparent polyaniline films for human health monitoring**

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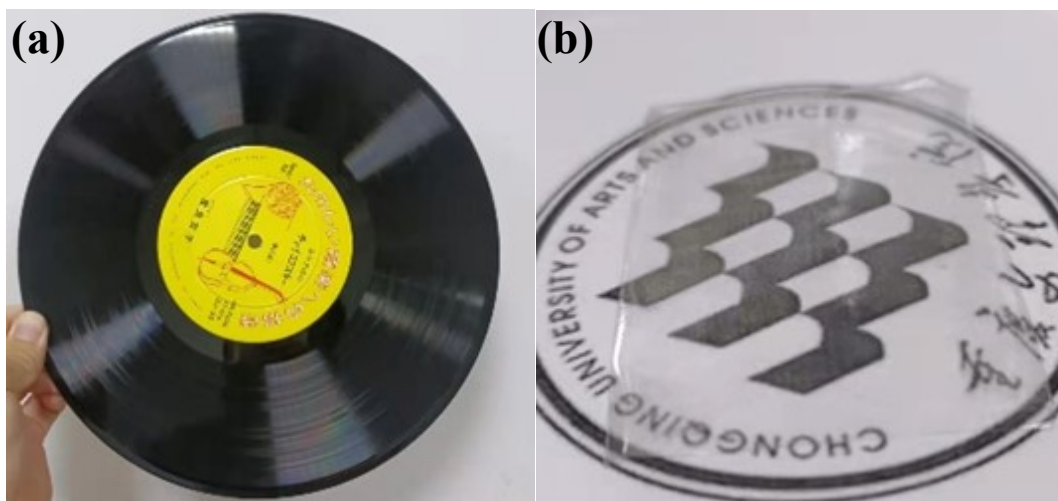


Figure S1. (a) Optical photograph of the vinyl record. (b) Optical photograph of the PDMS thin film.

Synthesis of the PANI powder

The aniline was used after vacuum distillation, and the other materials were not otherwise treated. First, Solution A was formed by dissolving 14.25 g ammonium persulphate in 125 ml DI water and stirring. Then, 11.4 ml aniline, 12.5 ml concentrated hydrochloric acid, and 125 ml deionized (DI) water were mixed and stirred to form solution B. Solutions A and B were cooled to 0 °C. Using a pipette gun, solution A was added dropwise at a rate of 250 ml/h to solution B, which was being stirred. The reaction continued at 0 °C for 8 h. The obtained powder was washed with a large amount of DI water on a vacuum filter and the powder was stirred in ammonia for 12 h. The PANI powder was rinsed with 5 L DI water on the vacuum extractor. The PANI powder was sequentially Soxhlet-extracted with toluene, a mixture of ethanol and water (v/v=9:1) for 72 h under the protection of nitrogen to remove oligomers and salts. The dark blue PANI powder was ground to a powder after drying in a vacuum at 40 °C. The preparation process is shown in Figure S2.

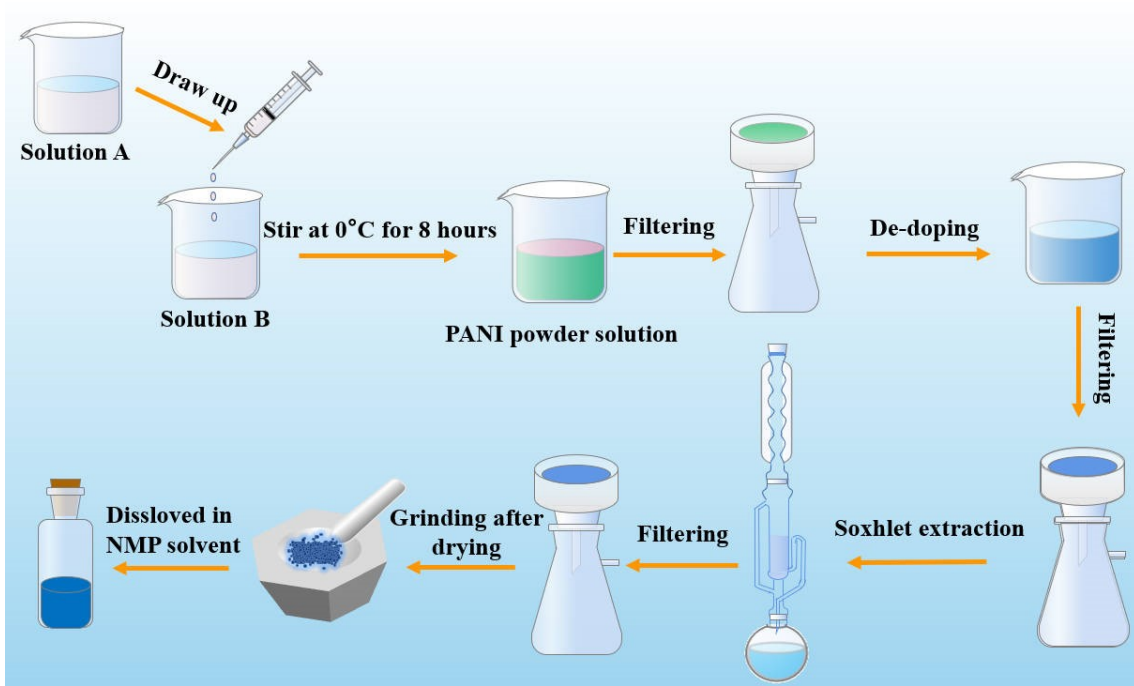


Figure S2. The diagram of the PANI synthesis process.

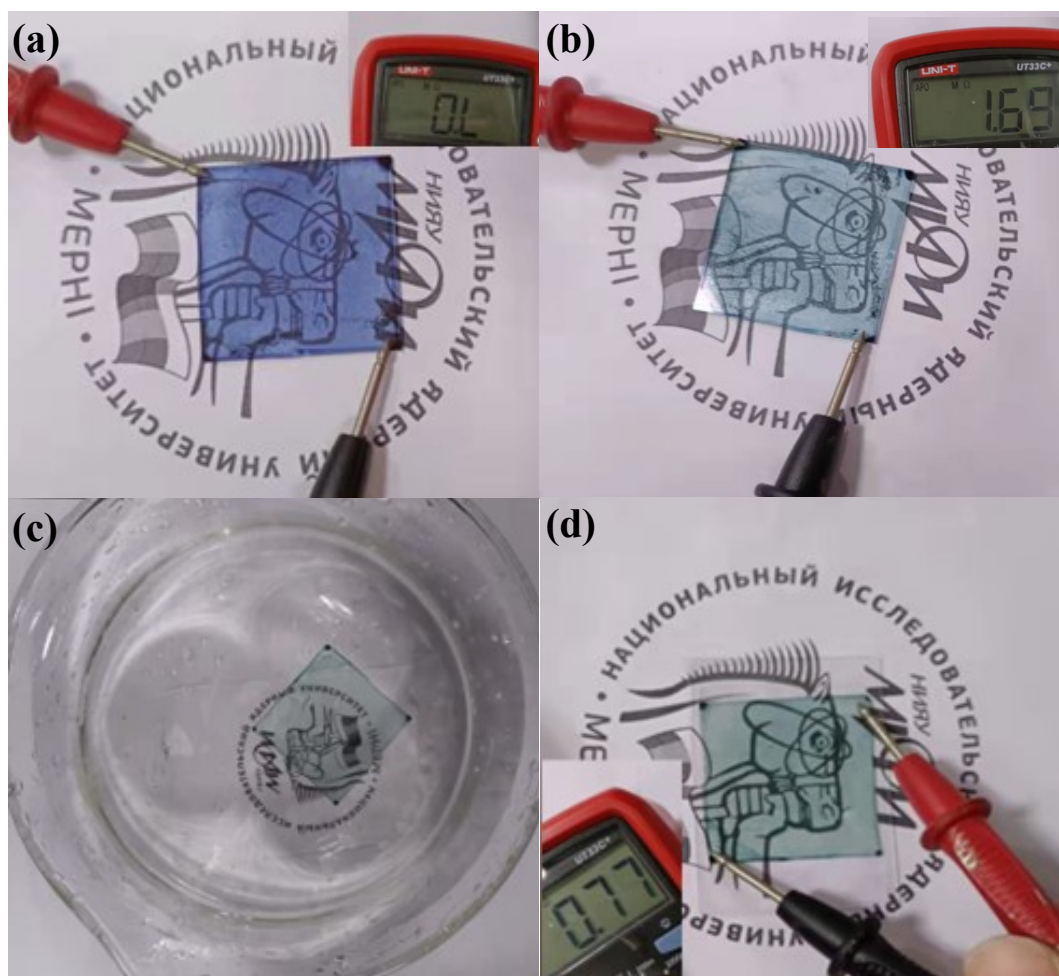


Figure S3. (a) Conductivity of undoped PANI thin film on the glass substrate. (b) Conductivity of PPF on the glass substrate. (c) Optical photograph of PPF floating on the liquid surface of dilute hydrochloric acid. (d) Conductivity of PPF composite film.



Figure S4. Optical photograph of PFP flexible pressure sensor placed on patterned paper.

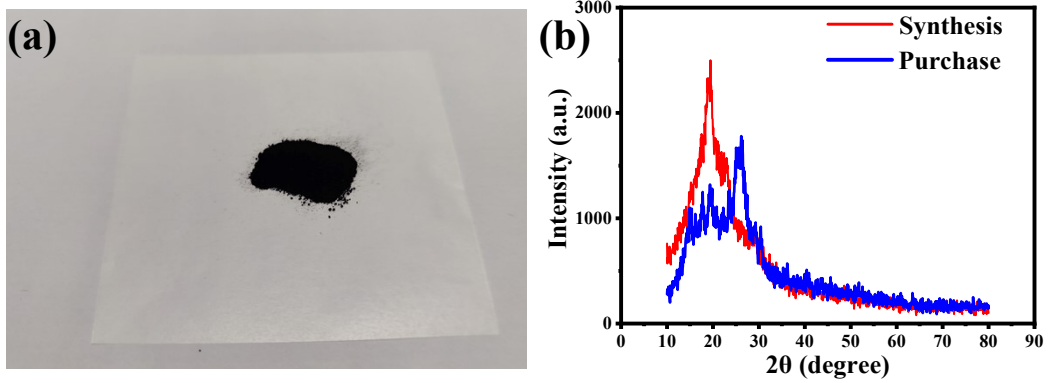


Figure S5. (a) Optical photograph of synthesized PANI powder. (b) XRD pattern of synthetic and purchased PANI powders.

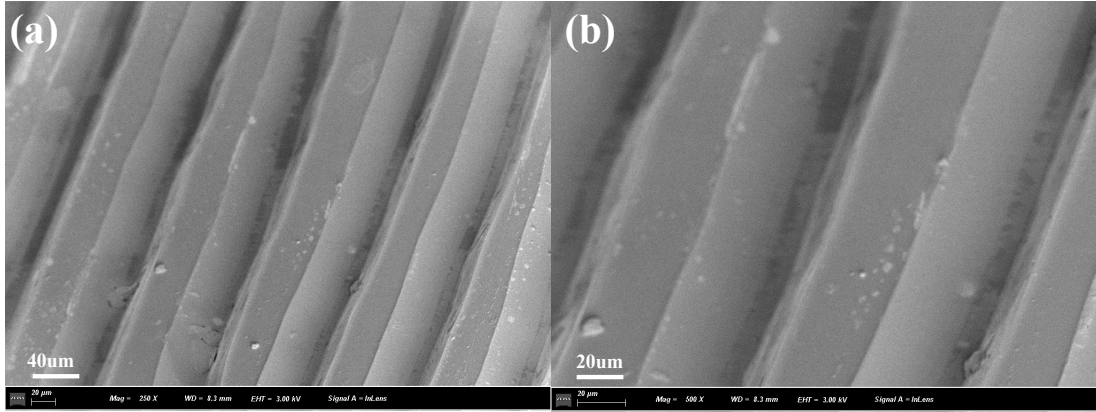


Figure S6. (a,b) SEM images of the surface of the vinyl record.

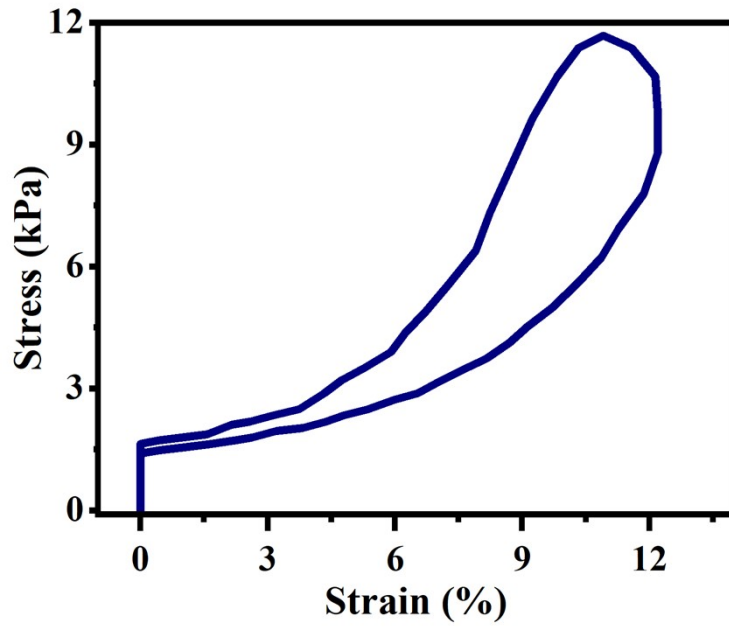


Figure S7. The compressive stress-strain analysis of the sensor.

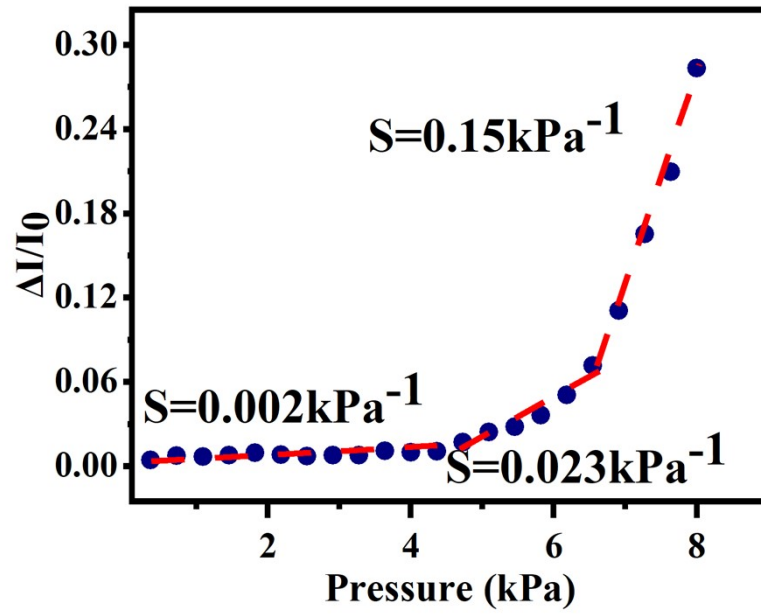


Figure S8. Relative current-pressure relationship curve for pressure sensor with a parallel structure.

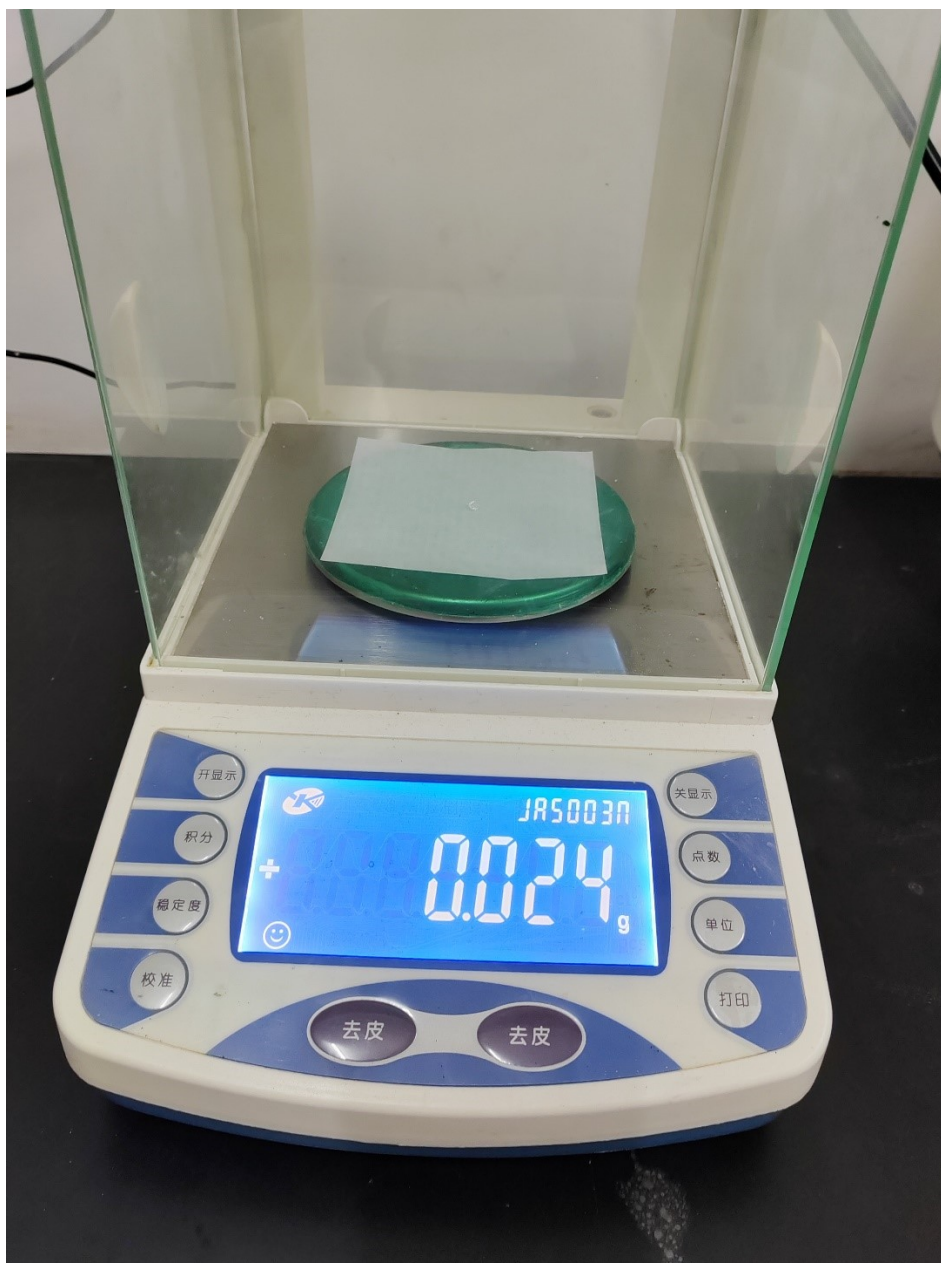


Figure S9. Optical photograph of the weighing of polystyrene particle.

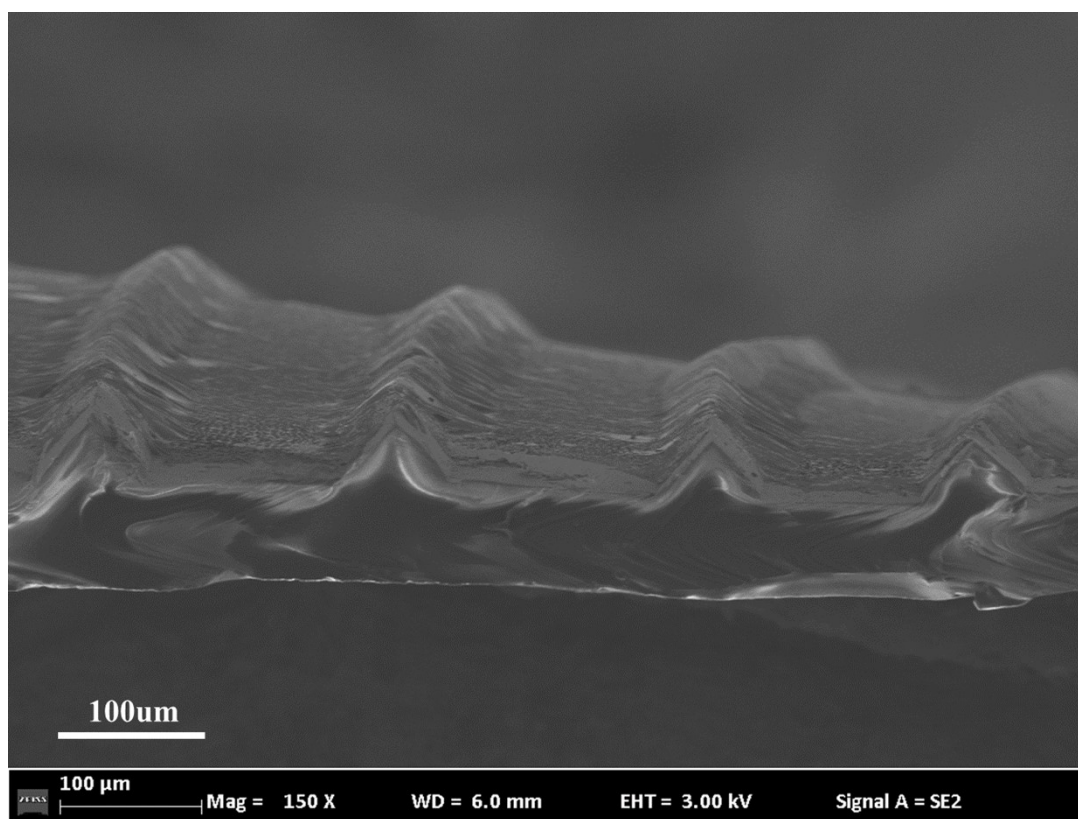


Figure S10. Micromorphology of the PFP composite film after stability testing.