Supporting Information

Lightweight, Flexible, and Conductive PEDOT:PSS Coated Polyimide Nanofibrous Aerogel for Piezoresistive Pressure Sensor Application

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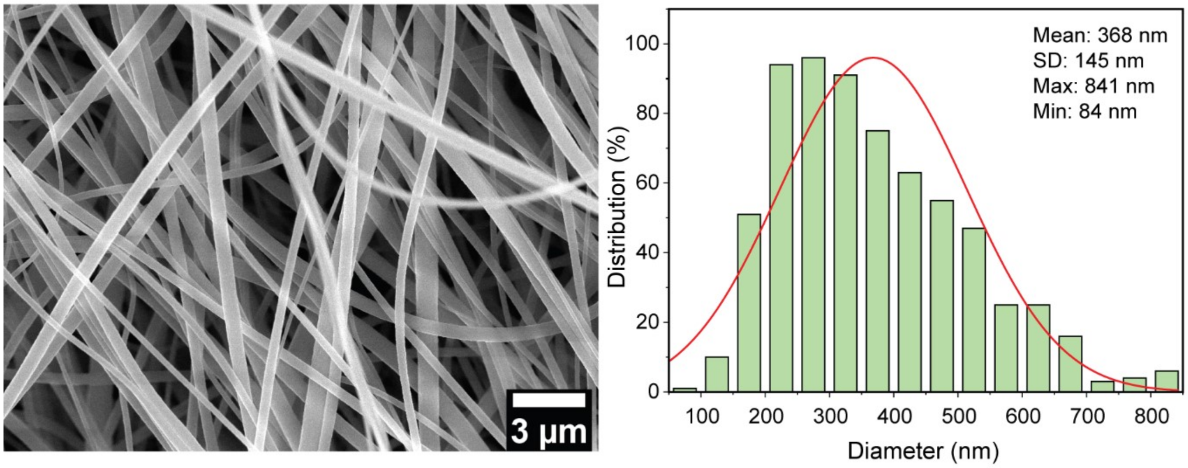

Figure S1. FE-SEM image demonstrating cross-linked PI nanofibers with an average diameter of 368 ± 145 nm.

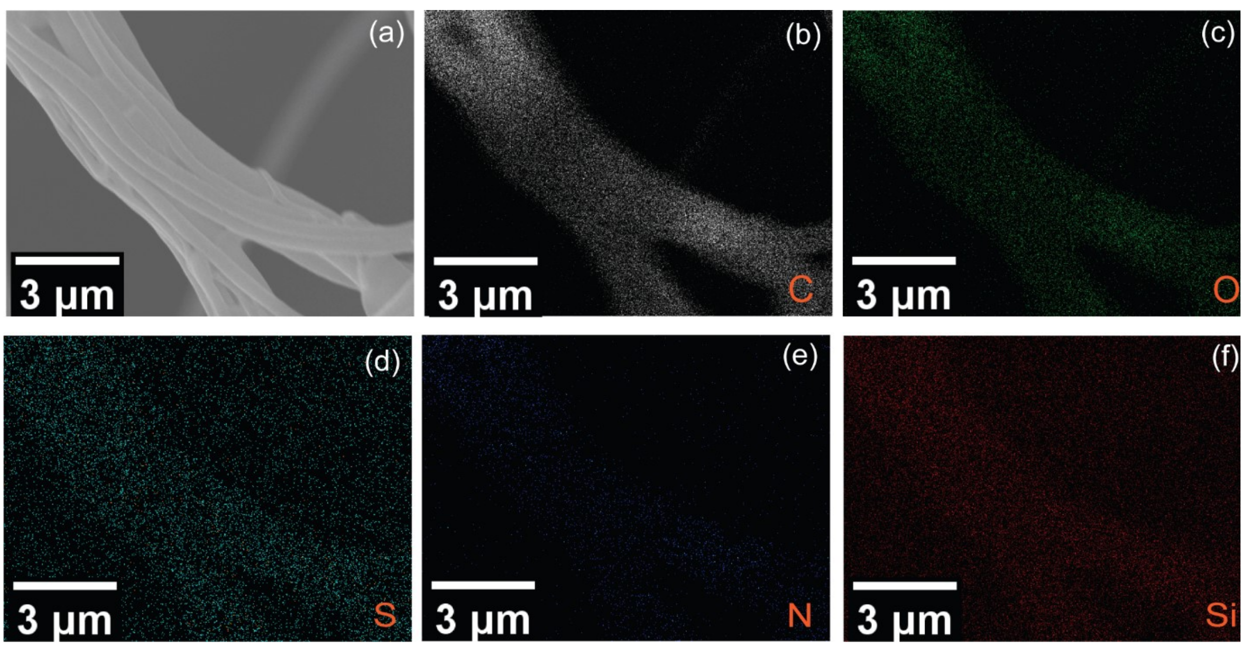

Figure S2. EDS mapping of PEDOT:PSS@PI. (a) SEM image of PEDOT:PSS@PI. (b), (c), (d), (e), and (f) are distributions of C, O, S, N, and Si elements of PEDOT:PSS@PI, respectively.

Table S1. The analysis data from TGA curves of PiNFA, PEDOT:PSS and PEDOT:PSS @PI.

Samples	First decomposition Temperature (°C)	First decomposition Weight loss (%)	Second decomposition Temperature (°C)	Second decomposition Weight loss (%)	Third decomposition Temperature (°C)	Third decomposition Weight loss (%)	Fourth decomposition Temperature (°C)	Fourth decomposition Weight loss (%)
PiNFA	-	-	145 ± 1	1.4 ± 0.1	360 ± 4	2.6 ± 0.1	548 ± 4	37.8 ± 3.9
PEDOT:PSS	50 ± 0	12.5 ± 1.4	-	-	290 ± 0.1	41.7 ± 0.4	-	-
PEDOT:PSS@PI	43 ± 2	5.1 ± 1.7	161 ± 2	1.8 ± 0.2	298 ± 8	15.0 ± 0.2	543 ± 2	23.0 ± 0.7

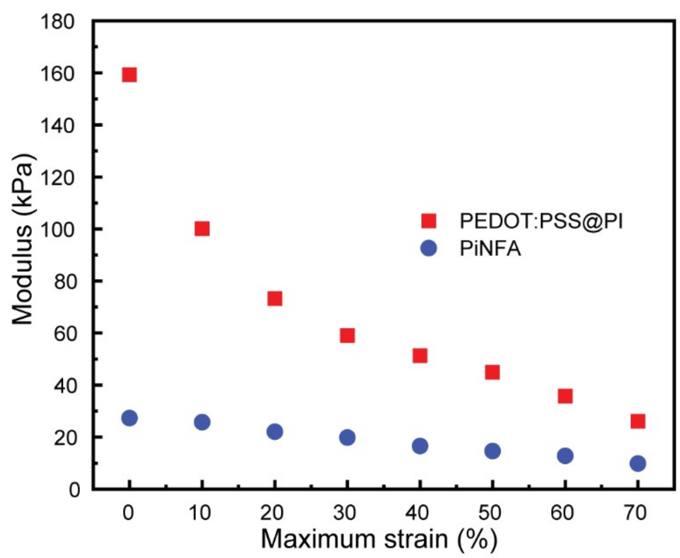

Figure S3. A relationship between Young's modulus and maximum strains for PiNFA and PEDOT:PSS@PI.

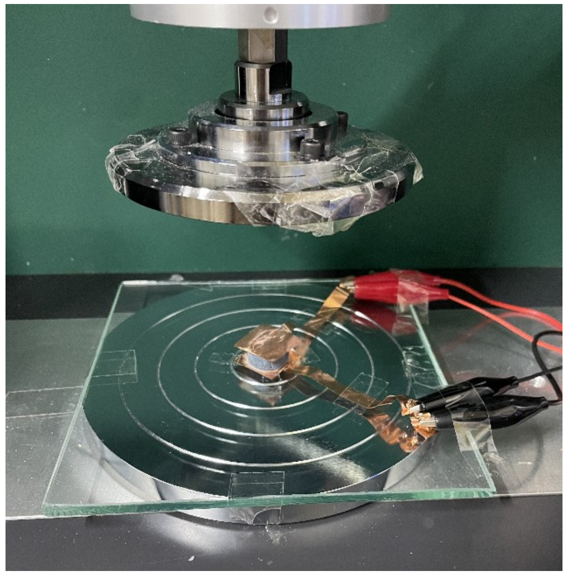

Figure S4. Photography of the experiment setup for the measurement of resistance of PEDOT:PSS@PI under compression.

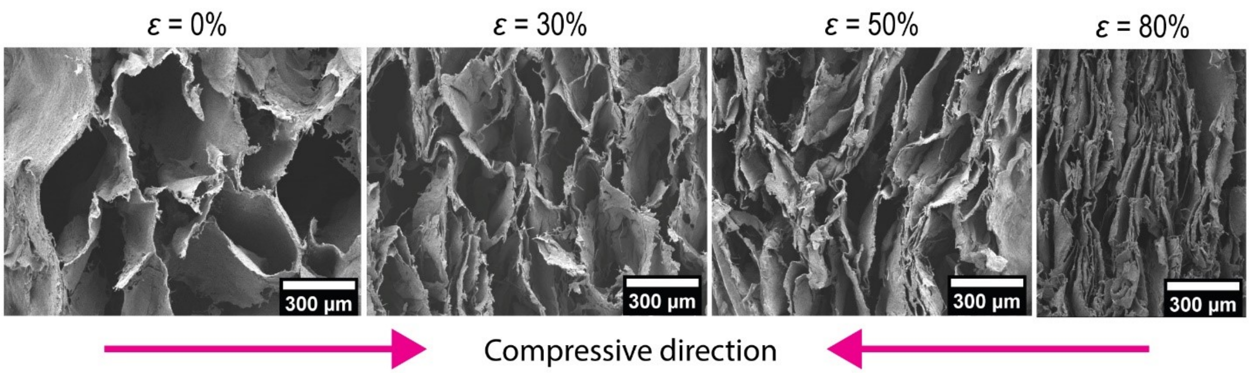

Figure S5. FE-SEM images of PEDOT:PSS@PI under different compressive strains of 0, 30, 50, and 80%.

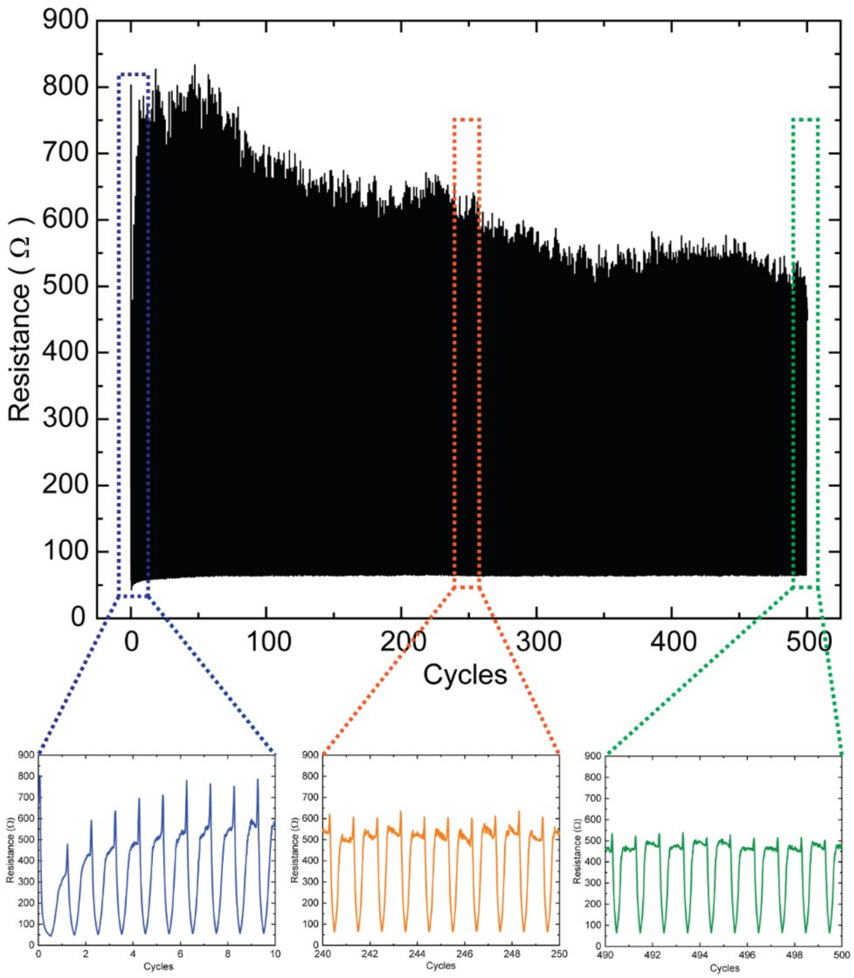

Figure S6. (a) The Resistance of the PEDOT:PSS-1@PI under continuous compression and release for 500 cycles at 50% of compressive strain.

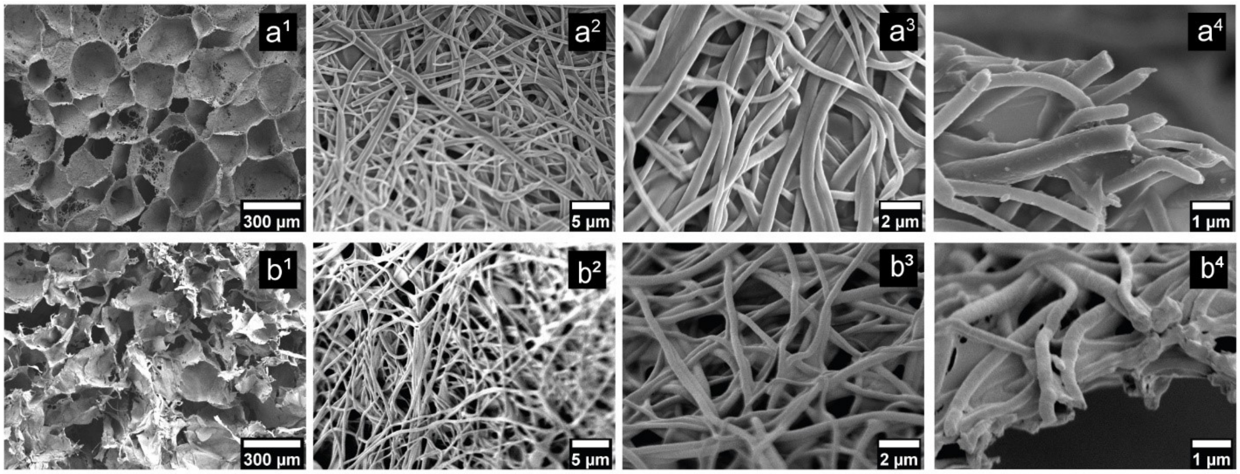

Figure S7. FE-SEM images of PEDOT:PSS@PI aerogel: (a^1-a^4) before and (b^1-b^4) after subjecting them to 500 compression-release cycles for piezoresistive sensing response testing under 50% of compressive strain, captured at different magnifications.

Mechanical Compression Behavior

Young's modulus was determined by measuring the slope of the stress-strain curves in the elastic region. The compressive stress and strain of samples were calculated using Eq.1 and 2.

Compressive stress (σ) = Axial force/Area of sample = $F/\pi r^2$ (Eq. S1)

Compressive Strain (ε) = Chang in height /original height = $(h_0\text{-}h_i)/h_0$ (Eq. S2)

Where r is the radius of the sample, h_0 is the original height, and h_i is the height at that specific point of the compression test.

The energy loss coefficient can be defined as the ratio between energy dissipation and compressive work. The energy dissipation (ΔD) was the difference between the compressive work or stored energy and the energy released in the unloading process. Expressly, W_0 represents the compressive work determined by the following equation:

$$W = \int_{\epsilon_1}^{\epsilon_2} \sigma d\epsilon \qquad \text{(Eq. S3)}$$

Where ε_1 and ε_2 are the initial and final compressive strain, respectively, and σ is the compressive stress.