Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Conformable and ionic textiles using sheath-core carbon nanotube microyarns for highly sensitive and reliable pressure sensors

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Keywords: conformable; i-textiles; sheath-core carbon nanotube microyarns; piezocapacitive pressure sensor; human-adaptive wearable electronics

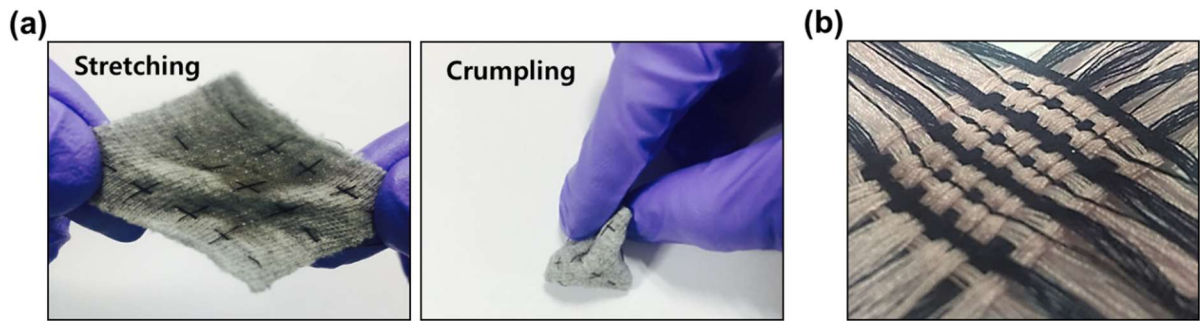

Figure S1. (a) Photographs of i-textile pressure sensor under stretching and crumpling conditions. (b) Wearable woven i-textiles.

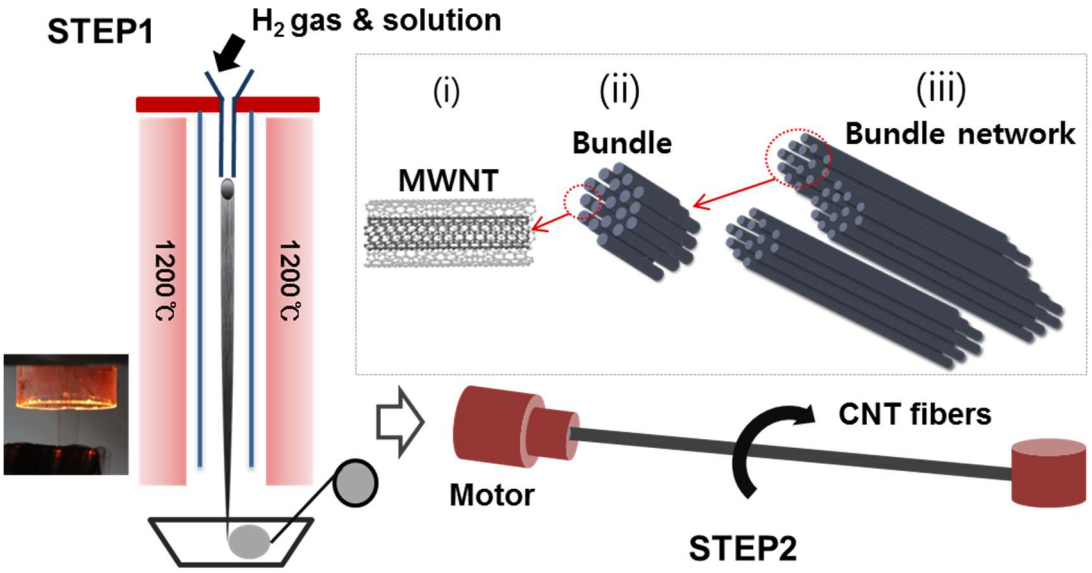

Figure S2. Schematic picture and photograph of the synthesis and fabrication steps of CNT microyarn using dry chemical vapor deposition (CVD). Step 1) Production of CNT web. Step 2) Fabrication of CNT microyarns through winding method. Note that schematic picture of sequential self-assembly of individual CNTs during CVD synthesis and winding process: (i) individual MWNT (ii) CNT bundle (iii) bundle network.

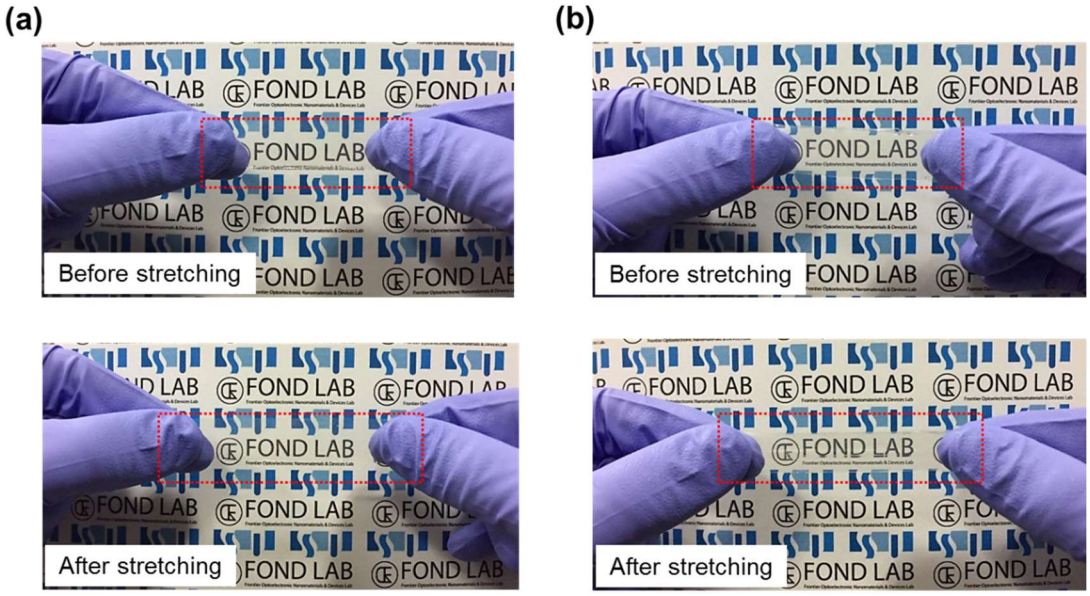

Figure S3. Photographs of (a) TPU and (b) i-TPU films before and after stretching.

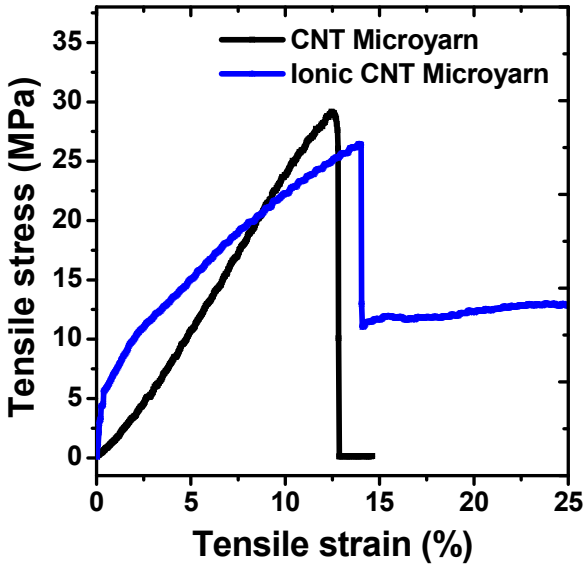

Figure S4. Stress-strain plot of hierarchically engineered CNT microyarns and ionic CNT microyarns coated with i-TPU film.

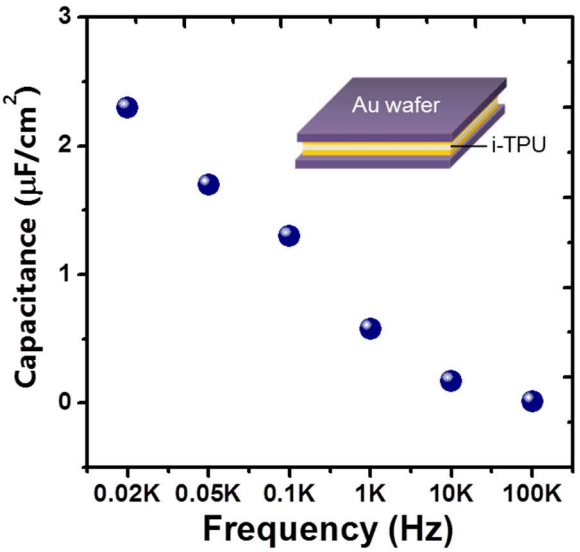

Figure S5. *C-f* characteristics of i-TPU film that is embedded into Au-coated wafer. Inset shows a view of the capacitor used in this work.

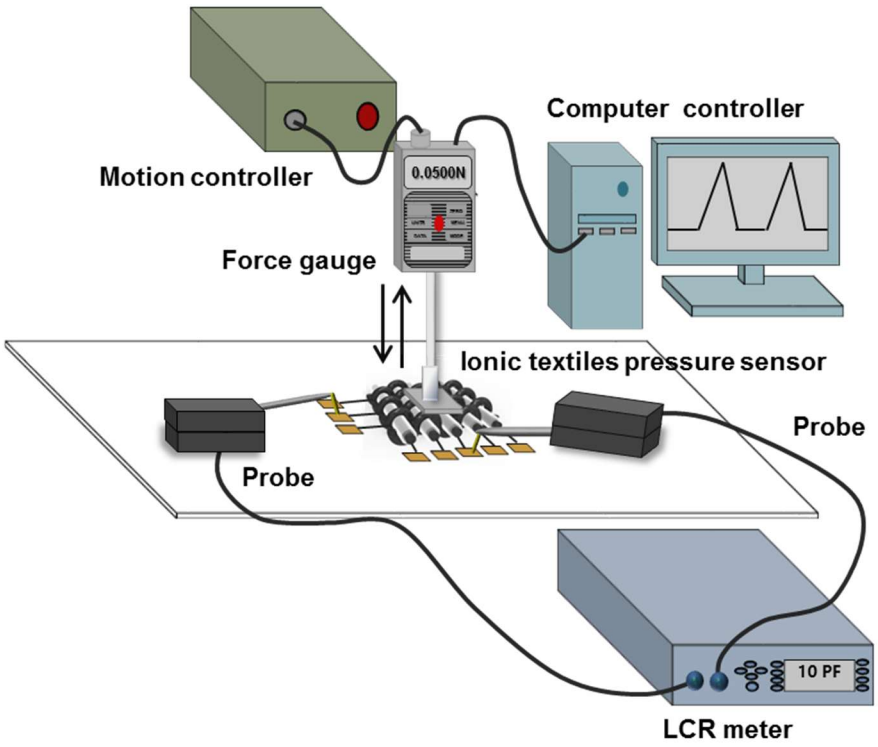

Figure S6. Schematic diagram of the custom built pressure sensor probe station. A motion controller and a force gauge are controlled by a computer input with applied pressure showing different value or frequency. The experimental sample is connected with two separated gold electrodes. LCR meter provides the feedback on the output signal change in capacitance.

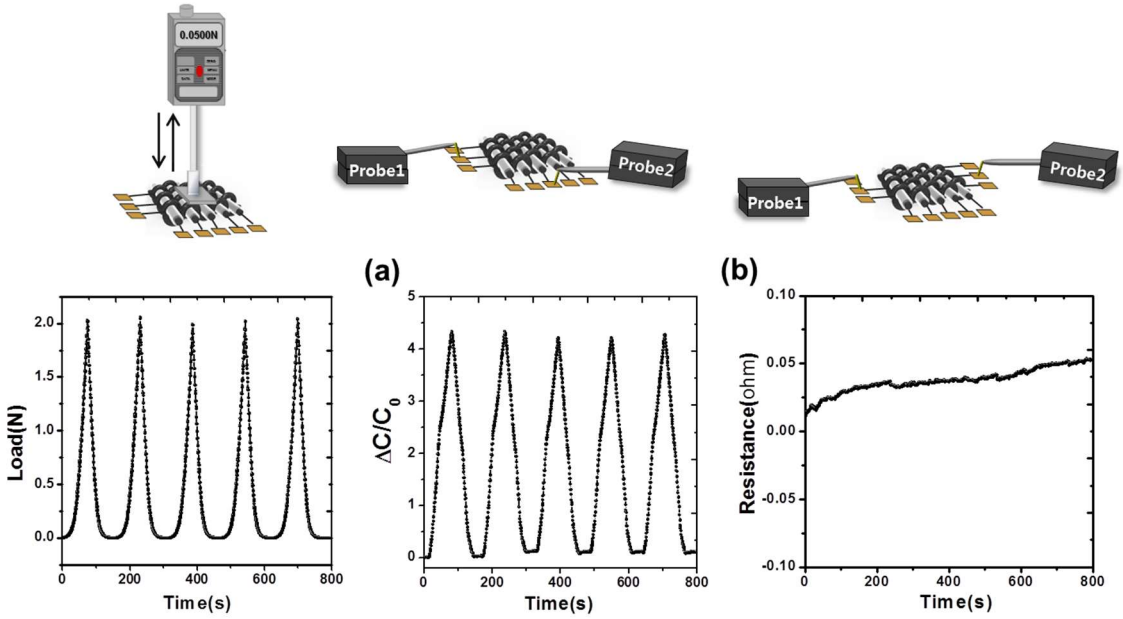

Figure S7. (a) Capacitance and (b) resistance change according to repetitive loading/unloading cycles for i-textile pressure sensors.

Table S1. Detailed sensitivity derived from non-ionic (TPU) and ionic (i-TPU) textiles pressure sensors at each pressure regimes.

	Sensitivity (kPa^{-1}) (< 10 kPa)	**Sensitivity (kPa^{-1}) (> 10 kPa)**
i-TPU	0.68	0.12
TPU	0.01	0.001

Table S2. Detailed sensitivity derived from i-textiles pressure sensor at each pressure regimes in terms of measurement frequencies.

	Sensitivity (kPa^{-1}) (< 10 kPa)	**Sensitivity (kPa^{-1}) (> 10 kPa)**
20Hz	1.00	0.16
50Hz	0.83	0.12
100Hz	0.68	0.11
1kHz	0.28	0.02
10kHz	0.07	0.01
100kHz	0.05	0.003