Supporting Information

The all-fiber structure covered with two-dimensional conductive MOF materials to construct a comfortable, breathable and high-quality self-powered wearable sensor system

Youwei Zhao,[a, b] Ningle Hou,[b] Yifan Wang,[a] Chaochao Fu,[*b] Xiaoting Li,[*b] Ling Li,[*a] Wenming Zhang[*a]

[a] *National-Local Joint Engineering Laboratory of New Energy Photoelectric Devices, College of Physics Science and Technology, Hebei University, Baoding 071002, China.*

[b] *National & Local Joint Engineering Research Center of Metrology Instrument and system, College of Quality and Technical Supervision, Hebei University, Baoding 071002, China.*

Figure S1 (a) The photo of individual sensor unit and **(b)**the physical picture of super capacitor. (c)The size of screen-printed electrodes. **(d-e)** The pictures of the electrode of the flexible sensor before and after working 5000 times under a pressure of 60kPa.

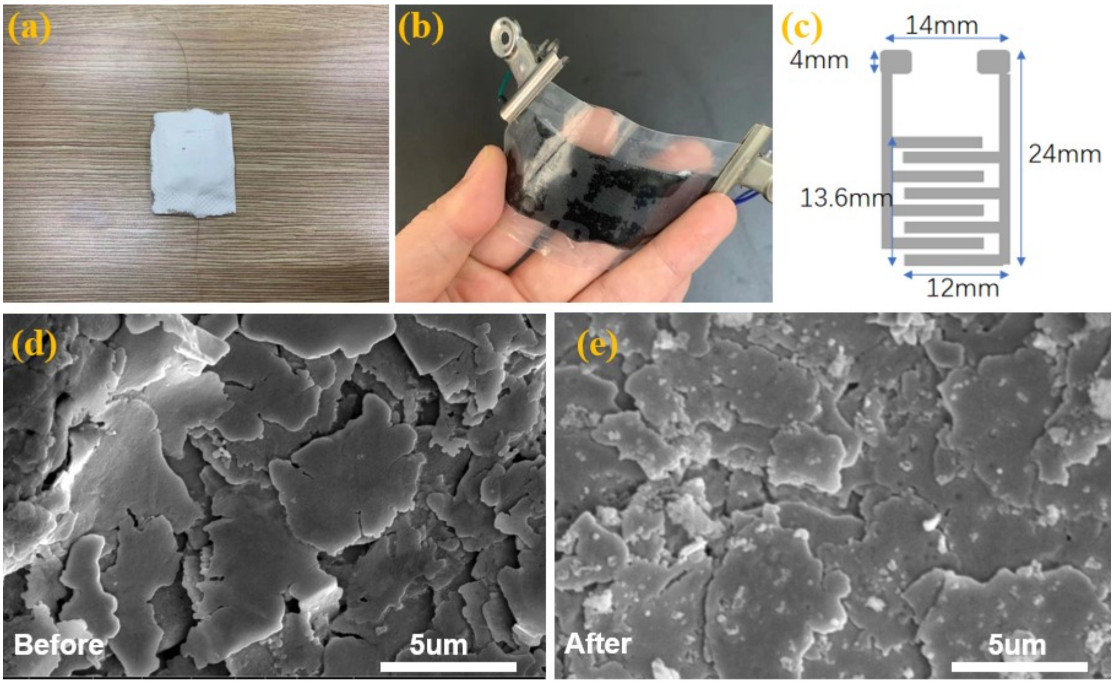


Figure S2 (a) PU fiber with a smooth surface, (b) Optical photo of hand pressure plastic film sealing machine, (c) Flexible sensor array, (d) Flexible sensor array with high breathability. (e-f) Iodine vapor experiment verifies the gas tolerance of the sensor. (g-h) Tolerance test of packaged sensor to large droplets (Before and after the droplets fall for 2h).

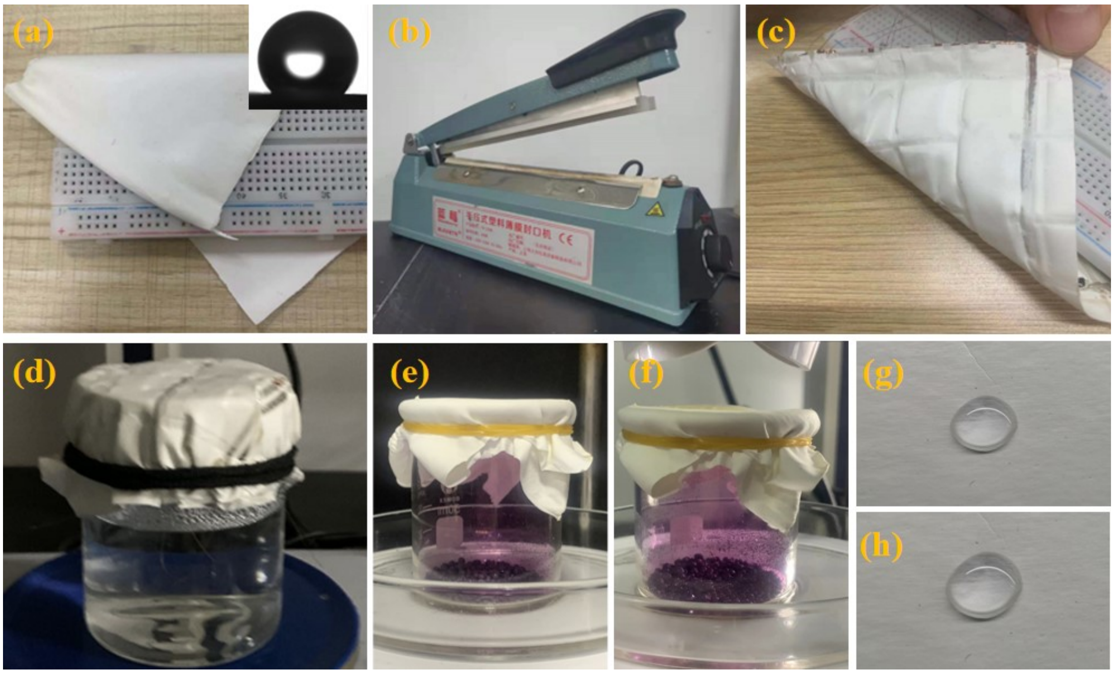


Figure S3 (a) The effect of the CNFNs on the sensitivity, (b) The effect of the Cu-CAT@CNFNs(3h) on the sensitivity, (c) The effect of the Cu-CAT@CNFNs(8h) on the sensitivity.

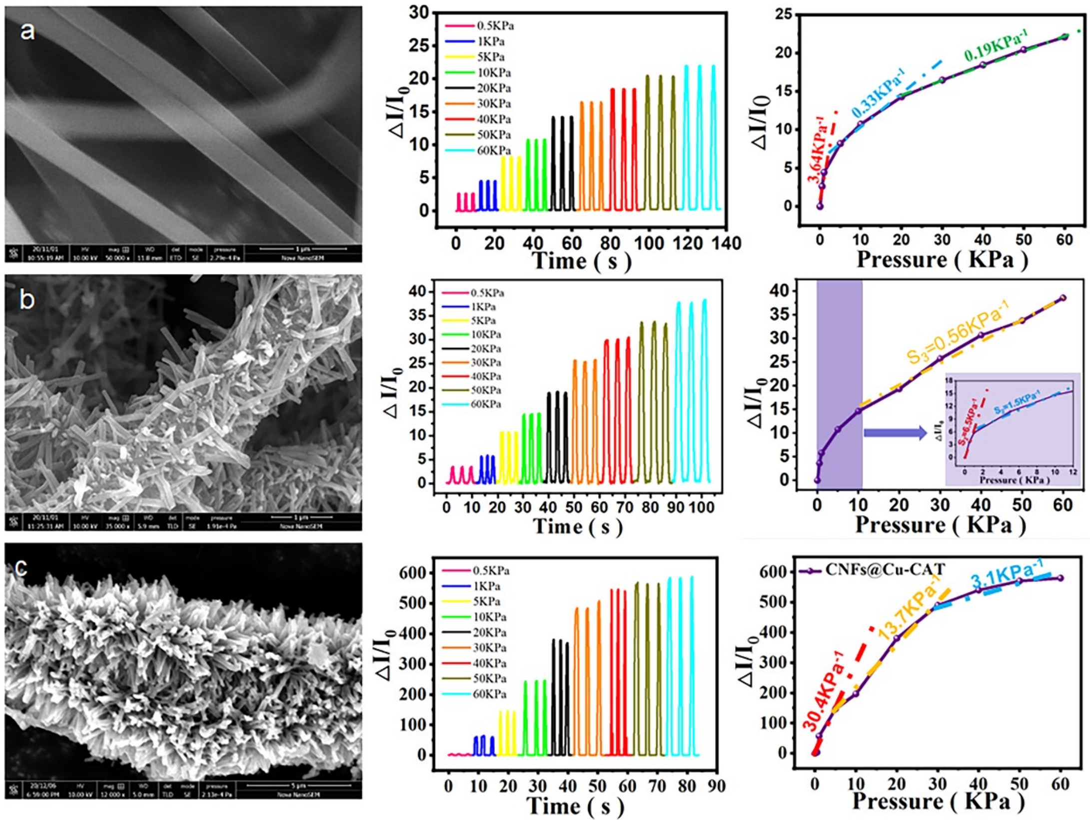
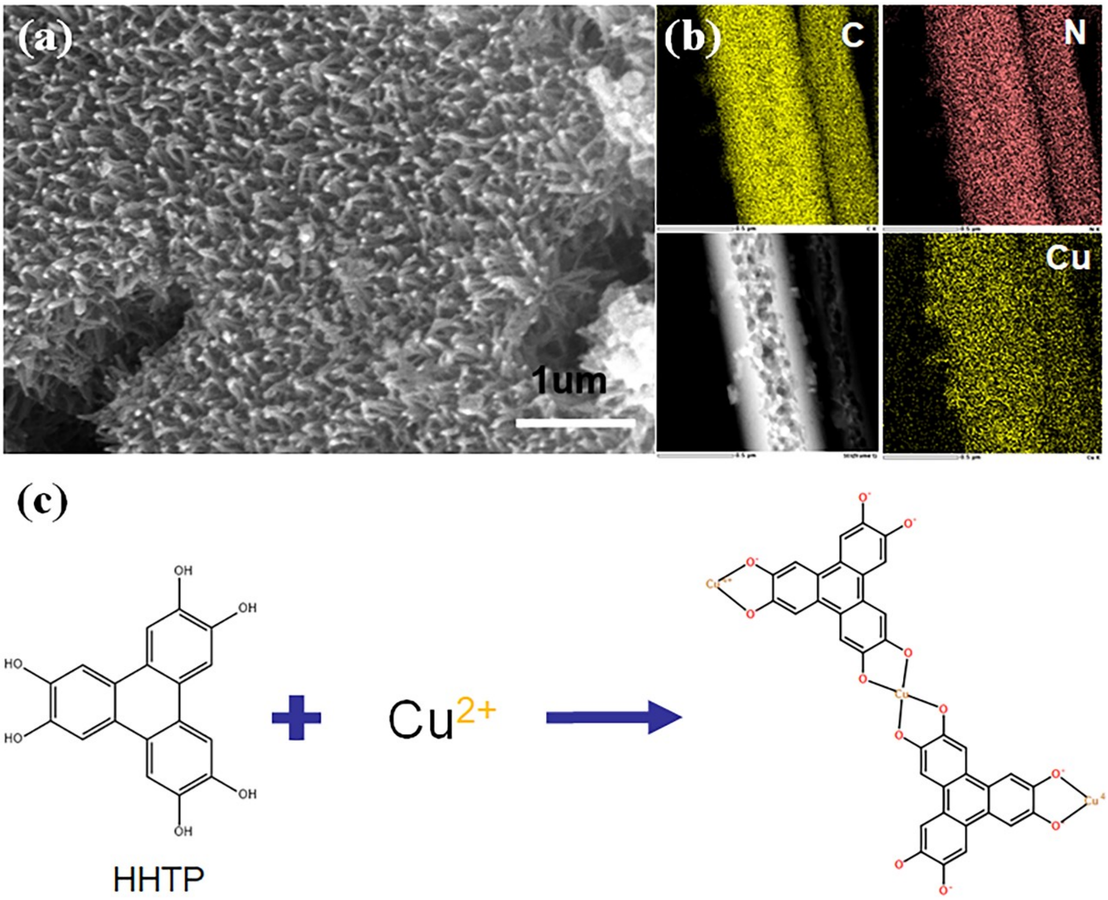


Figure. S4 The excellent sensitivity and stability pressure sensor system

Figure S5 (a) The SEM of pure Cu-CAT. (b) The TEM image of Cu-CAT@CNFNs, the mapping of the nanofiber confirmed the uniform distribution of C, N and Cu in the Cu-CAT@CNFNs nanolayer. (d) the EDS of the Cu-CAT@CNFNs.



(d) the EDS of the Cu-CAT@CNFNs

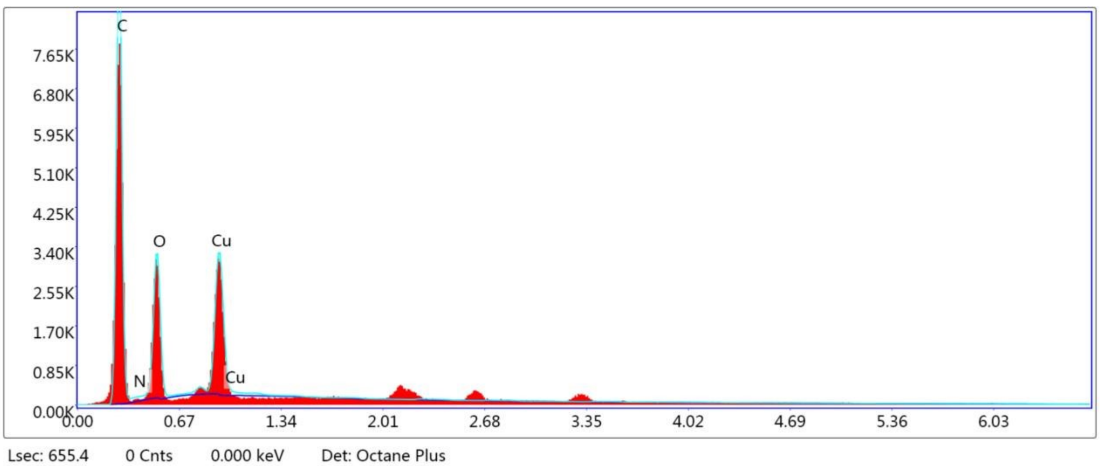


Figure S6 the stress-strain curve of the pressure sensor.

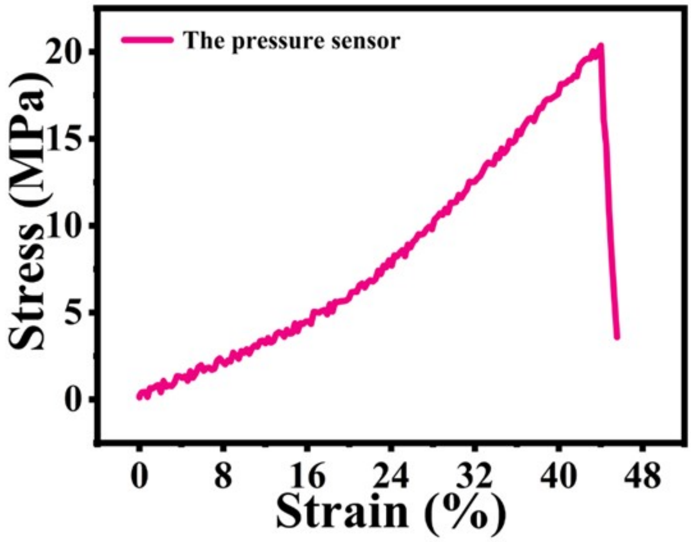


Figure S7 Analyze the working principle of the sensor from the microstructure.

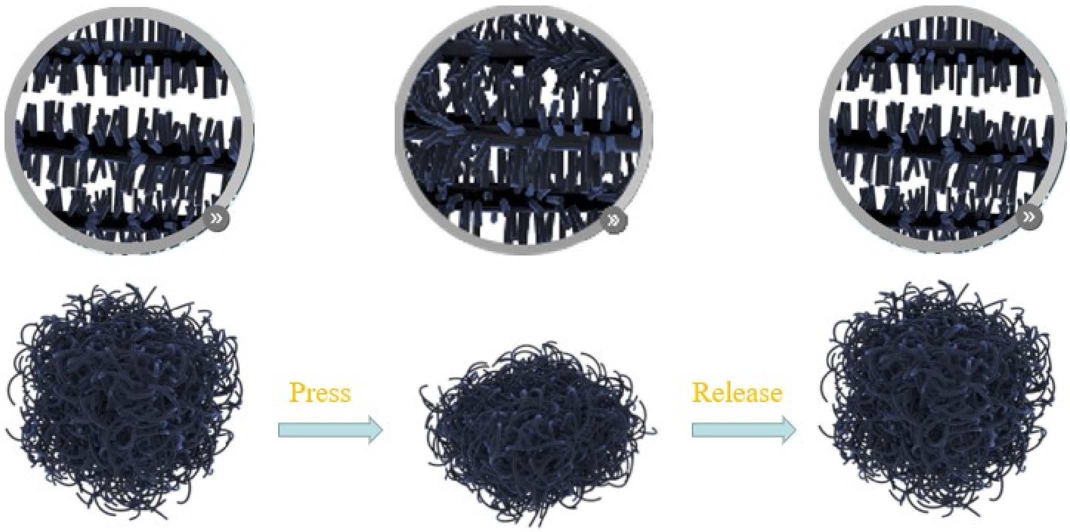


Figure S8 (a-c) CVs of carbon cloth, Cu-CAT-NWAs/CC-4h, Cu-CAT-NWAs/CC-12h white at different sweep speeds. (d) EIS of pure carbon cloth. (e-f) Galvanostatic charge and discharge curves at different current densities. (g-i) SEM images of the pure CC, Cu-CAT-NWAs/CC-4h, Cu-CAT-NWAs/CC-12h.

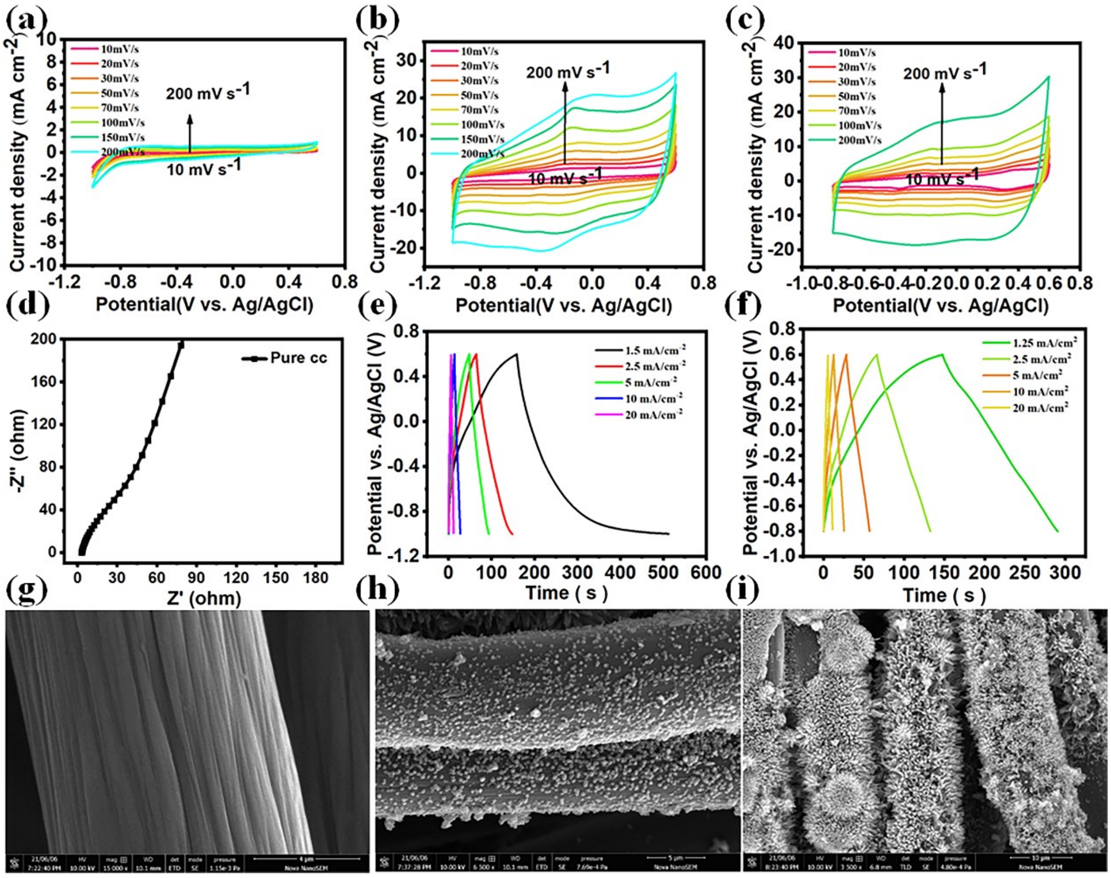
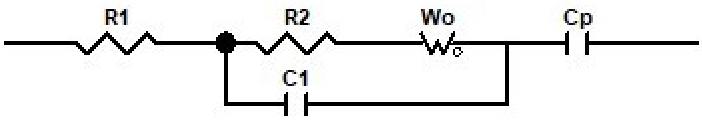


Figure. S9



R1 is the equivalent ohmic resistance, including resistance of the electrolyte and the internal resistance of the electrode. R2 is charge transfer resistance, Wo is the finite-length Warburg diffusion element, C1 is electrical double-layer capacitance, and CP is the pseudocapacitance.

Figure S10 The detailed distribution of the interdigital electrodes and the sensor array

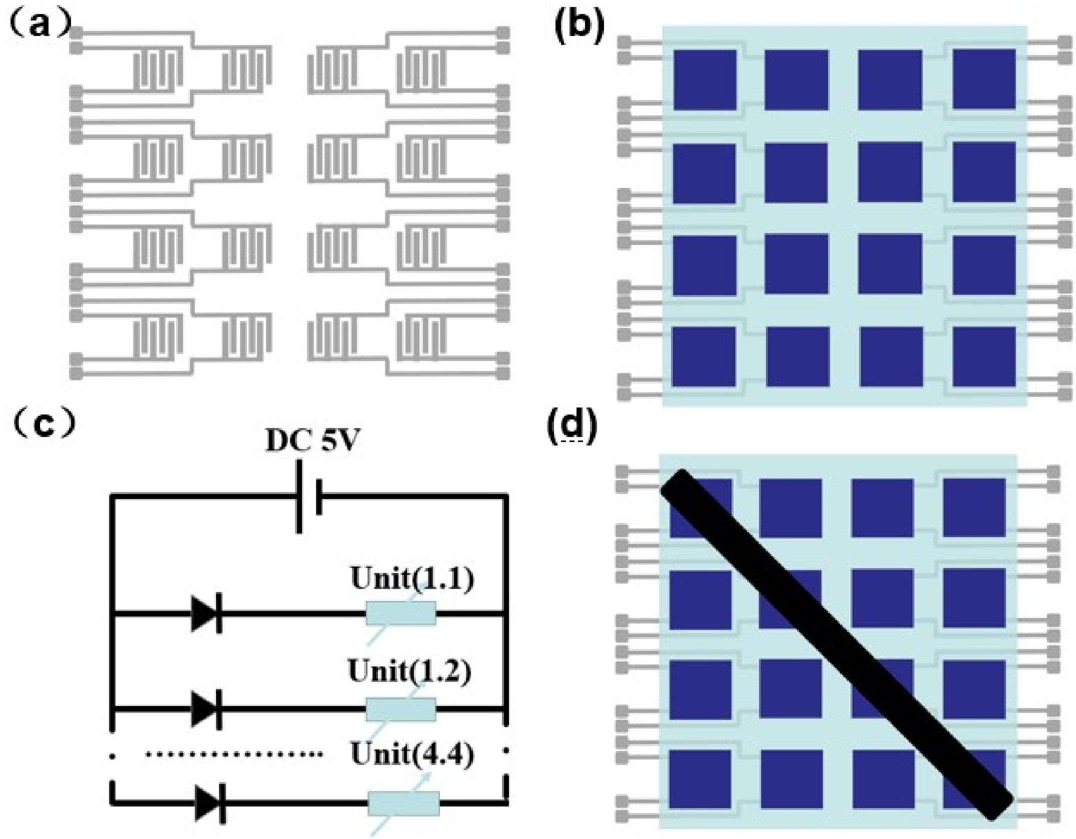


Table S1 The physical parameters of pressure sensor

Thickness of PU	Thickness of CNFNs@Cu-CAT	Thickness of Silver electrode	Weight of Flexible pressure sensor (Per cm^{-2})
0.13 mm	0.50 cm	5.00 μm	0.28 g

Table S2 The physical parameters of supercapacitor

Thickness of CC@Cu-CAT	Thickness of PVA/KCl	Thickness of Supercapacitor	Weight of Supercapacitor (Per cm^{-2})
0.2160mm	3.00mm	3.50mm	0.42g

Table S3 The physical parameters of solar panels

Operating Voltage	Working current	Short circuit current	Length	Width	Thickness	Weight
2V	0-200mA	220mA	200mm	30mm	0.5mm	About 10g

Table S4

Sensing Material	Range of Detection (Pa)	Sensitivity (Kpa^{-1})	cycles	Breathability Softness
Polydimethylsiloxane (PDMS)/carbon nanofiber (CNF)[1]	35 to 690 kPa	factors of 18.3 and 6.3	1000	No/Yes
3D carbon nanofiber networks (CNFNs)[2]	0–0.25 kPa	1.41 kPa^{-1}	0.38 kPa for 5000	No/Yes
Copper 7,7,8,8-tetracyanop-quinodimethane (CuTCNQ)[3]	0-1.5KPa	6.25 kPa^{-1}	500 Pa for 10000	No/Yes
MXene/cotton fabric (MCF)[4]	0-1.30 kPa	5.30 kPa^{-1}	----	Yes/Yes
All paper-based[5]	0.03-30.2 kPa	1.5 kPa^{-1}	----	Yes/Yes
Cotton cellulose-incorporated multi-walled carbon nanotubes (MWCNTs)[6]	0 - 20 kPa	0.0197 kPa^{-1}	100 cyclic compressive tests (ε=70%).	Yes/Yes
Nano Carbon Black-Based[7]	0–15 kPa	31.63 kPa^{-1}	15 kPa for 1500	No/Yes
3D carbon aerogels[8]	50Pa-10kPa	114.6kPa^{-1}	10 000 cycles, at 50% strain	No/Yes
blending carbon black (CB) with polydimethylsiloxane (PDMS) and Ecoflex[9]	----	----	3000 bending cycles at a strain of about 5%	No/Yes
thermoplastic polyurethane/carbon nanofibers[10]	0–60 kPa	0.14 kPa^{-1}	20 kPa for 120000	Yes/Yes
This work	0-60kPa	30.10 kPa^{-1}	5000	Yes/Yes

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