

Supporting Information

Low-cost piezoresistive pressure sensor with wide strain range-featuring polyurethane
sponge @poly (vinyl alcohol)/sulfuric gel electrolyte

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Supporting videos:

Movie S1. The video showing the compressing, bending and torsional properties of
PAV/H₂SO₄@PU composite.

Movie S2. The video showing the planar extension phenomenon of PU sponge and
PVA/H₂SO₄@PU prepared by dipping 30.0 wt % gel electrolyte

Movie S3. The video showing the resistance response of a PVA/H₂SO₄@PU pressure
sensor attached to the index finger to finger bending.

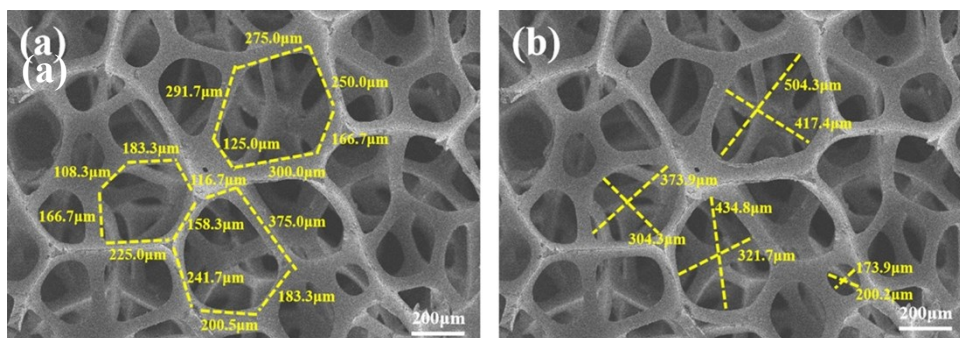


Fig. S1 Skeleton length (a) and pore size (b) of the PU sponge.

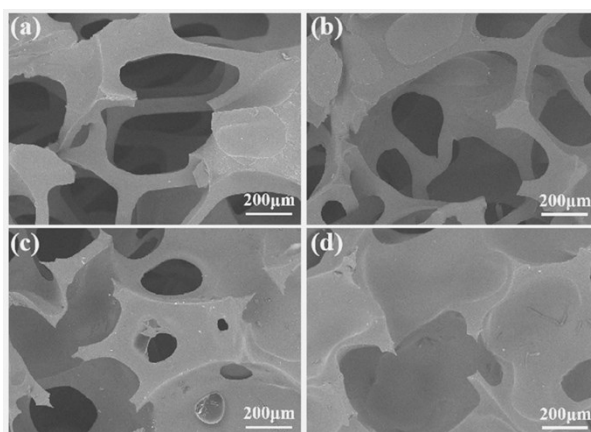


Fig. S2 SEM images of PU/PVA/H₂SO₄ composite prepared from the PAV/H₂SO₄ gel electrolyte of different concentrations (a) 40.0 wt.%, (b) 60.0wt.%, (c) 80.0 wt.%, and (d)100.0 wt. %.

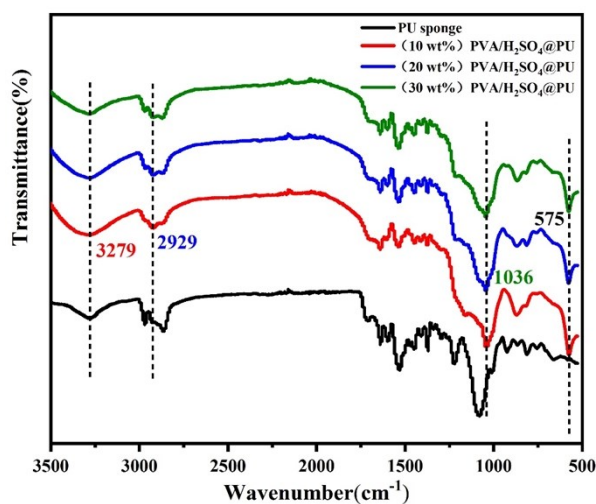


Fig. S3 FTIR spectra of the PU sponge and PVA/H₂SO₄@PU composite prepared with the PVA/H₂SO₄ gel electrolytes of different concentrations.

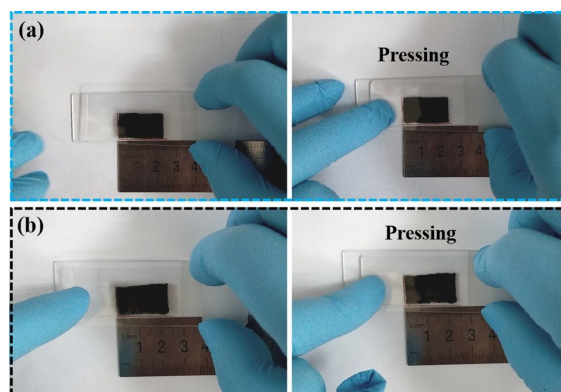


Fig. S4 Planar extension phenomenon of PU sponge (a) and PVA/H₂SO₄@PU (b)

prepared by dipping 30.0 wt % PVA/ H₂SO₄ gel electrolyte

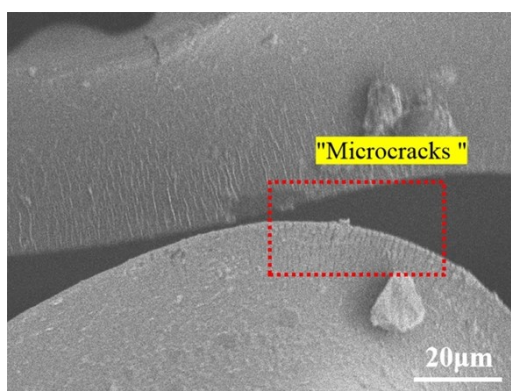


Fig. S5 SEM of PVA/H₂SO₄@PU composites prepared by dipping 30.0 wt % PVA/ H₂SO₄ gel electrolyte

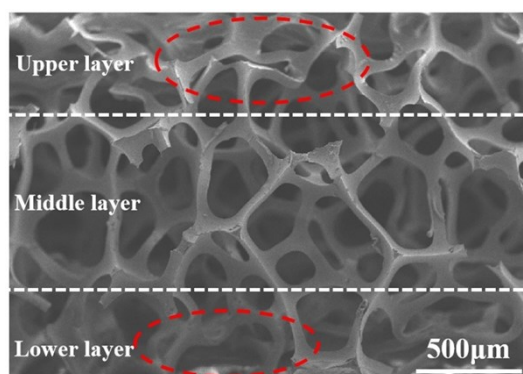


Fig. S6 SEM of PVA/H₂SO₄@PU composites prepared by dipping 10.0wt % PVA/ H₂SO₄ gel electrolyte during compression.

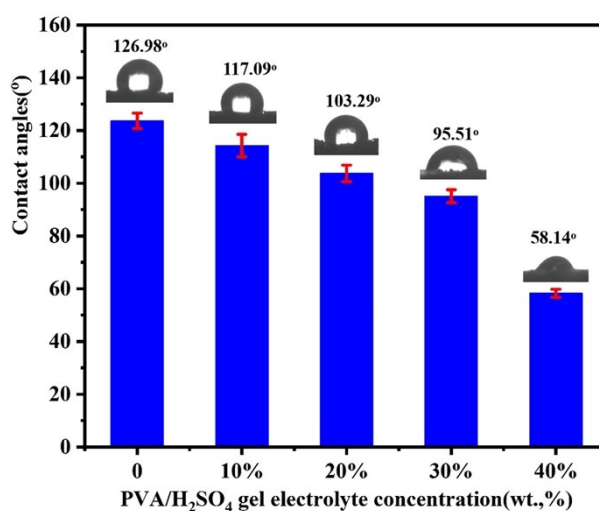


Fig. S7 Hydrophilic test PVA/H₂SO₄@PU composites by impregnating PVA/ H₂SO₄ gel electrolyte of different concentrations.

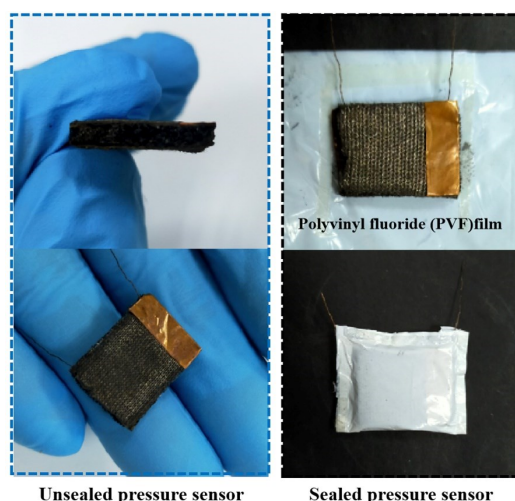


Fig. S 8 Picture of the unsealed/sealed pressure sensor

Table S 1. The conductivity of PVA/H₂SO₄@PU

Concentration of PAV/H ₂ SO ₄ gel electrolyte (wt %)	Electrical conductivity (S m ⁻¹)	Standard deviation
0	3.90806×10 ⁻⁸	±9.37625×10 ⁻⁹
10%	5.25278×10 ⁻⁴	±8.99288×10 ⁻⁵
20%	0.00126	±1.80961×10 ⁻⁴
30%	0.00233	±3.96245×10 ⁻⁴
40%	0.00431	±6.07416×10 ⁻⁴
60%	0.2282	±0.03606
80%	0.6708	±0.1777
100%	1.0092	±0.34641

Table S2. Prices of conductive materials for piezoresistive pressure sensors based on conductive PU sponge

Material	Specifications	Price (RMB,yuan)	Ref
PVA/H₂SO₄	500g+500mL	28+23	This work
rGO	500mg	800	38
CNT	5 g	250	18
MWNT-rGO	—	250-1050	39
CB	100 g	300	40,41
Au	10 mL	6000	34
PPY	500mL	54	21
Ti ₃ C ₂ T _x MXene	(5mg/mL) 20ml,	100	15