Supporting Information

Stretchable and Tissue-Adhesive Zwitterionic Hydrogels as Strain Sensors for Wireless Monitoring of Organ Motions

*Xinjie Pei, Hua Zhang, Yang Zhou, Linjie Zhou and Jun Fu**

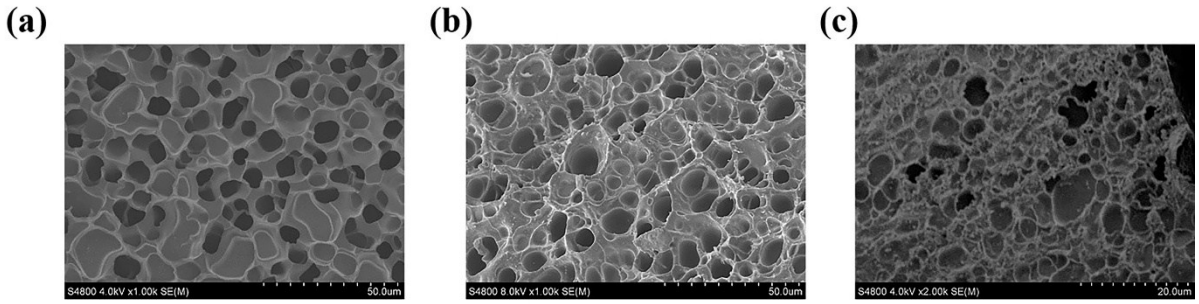

Figure S1. SEM images of (a) the PSBMA-clay hydrogel (clay = 0.02 g mL^{-1}, SBMA = 4 mol L^{-1}) and those with dopamine concentrations of (b) 1×10^{-3} mol L^{-1}, (c) 4×10^{-3} mol L^{-1}.

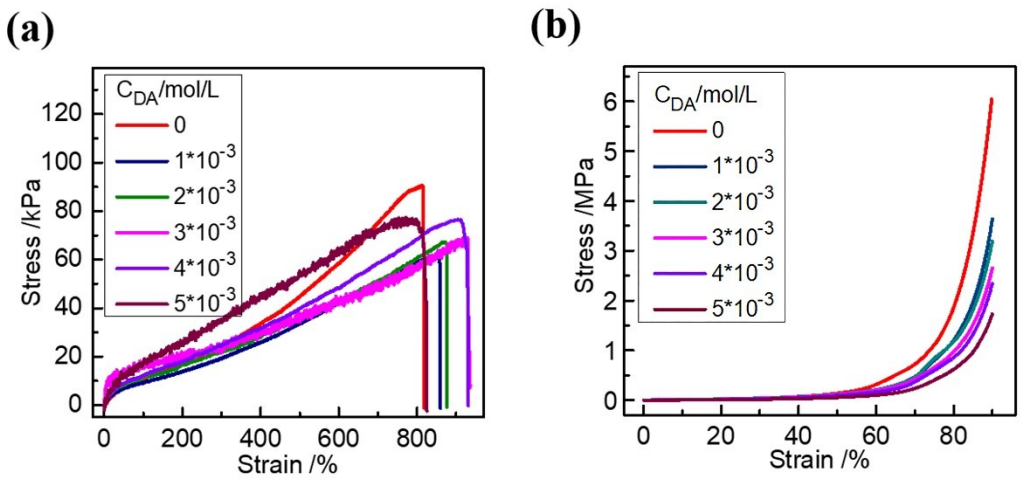

Figure S2. Representative (a) tensile and (b) compression stress−strain curves of hydrogels with different DA concentrations.

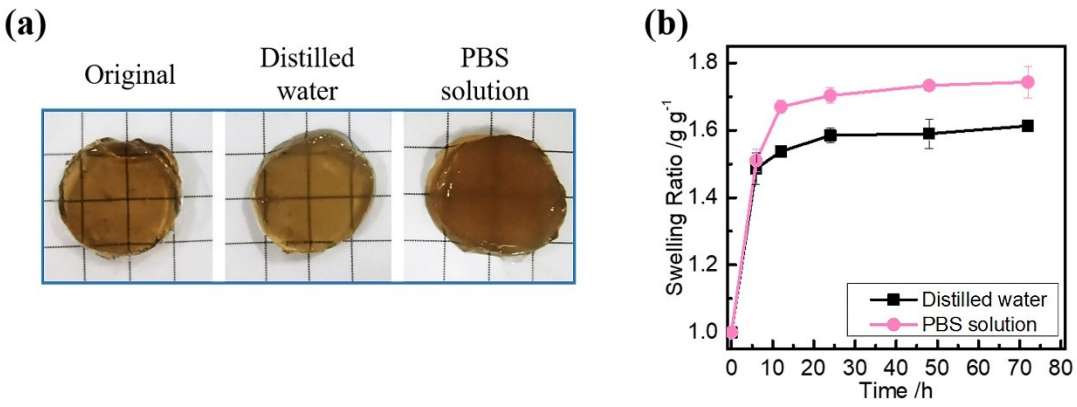

Figure S3. (a) Photos of PDA-clay-PSBMA hydrogels swollen in different environments for 72 h. (b) The swelling process in deionized water and PBS solution.

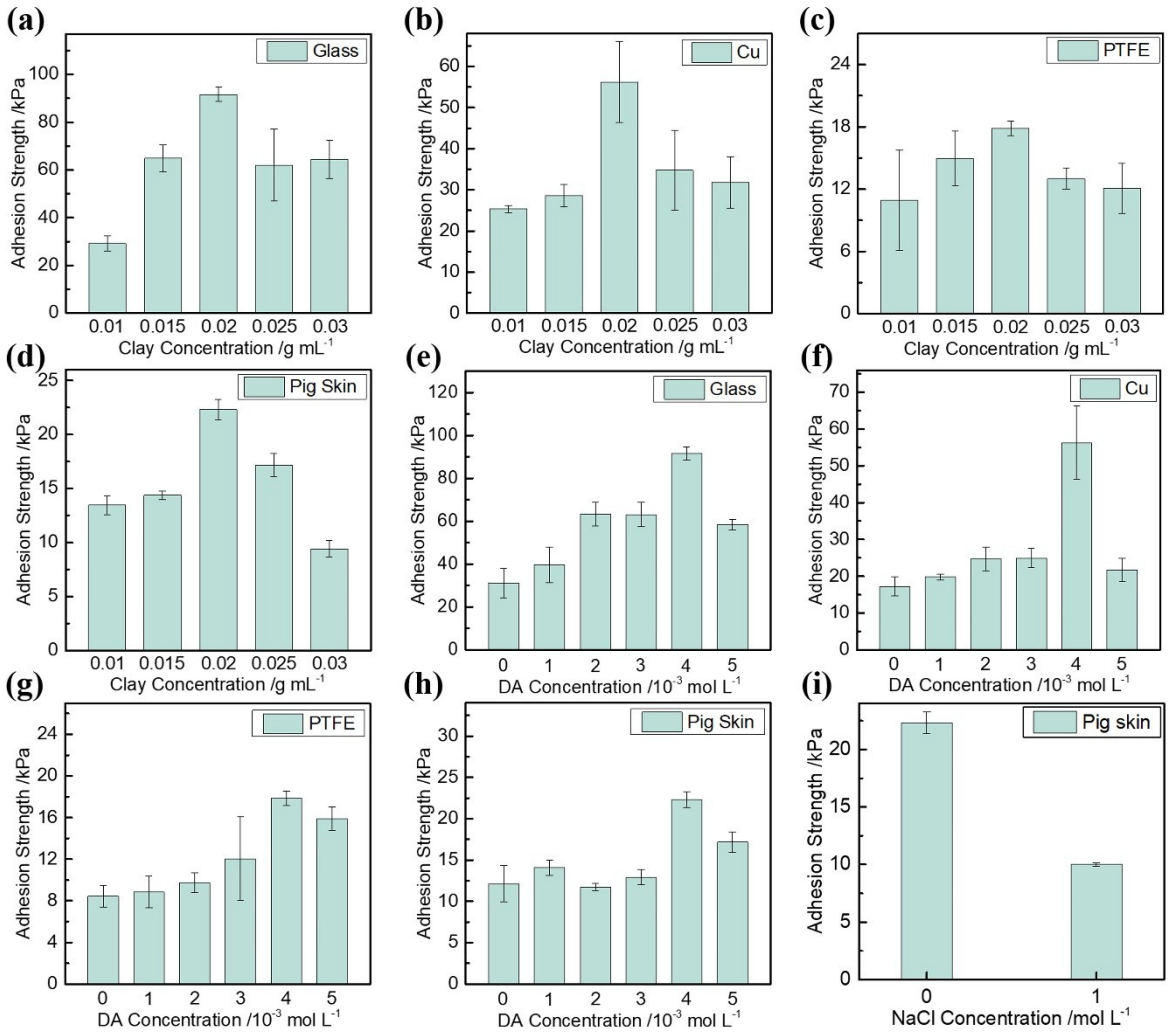

Figure S4. Adhesive property of the PDA-clay-PAM hydrogel. The effect of clay content on the adhesion strength of hydrogels to (a) glass, (b) Cu, (c) PTFE, (d) pig skin surface. The effect of DA contents on the adhesion strength of hydrogels to (e) glass, (f) Cu, (g) PTFE, (h) pig skin surface. (i) The adhesion strength of PDA-clay-PSBMA hydrogels with or without NaCl to pig skin.

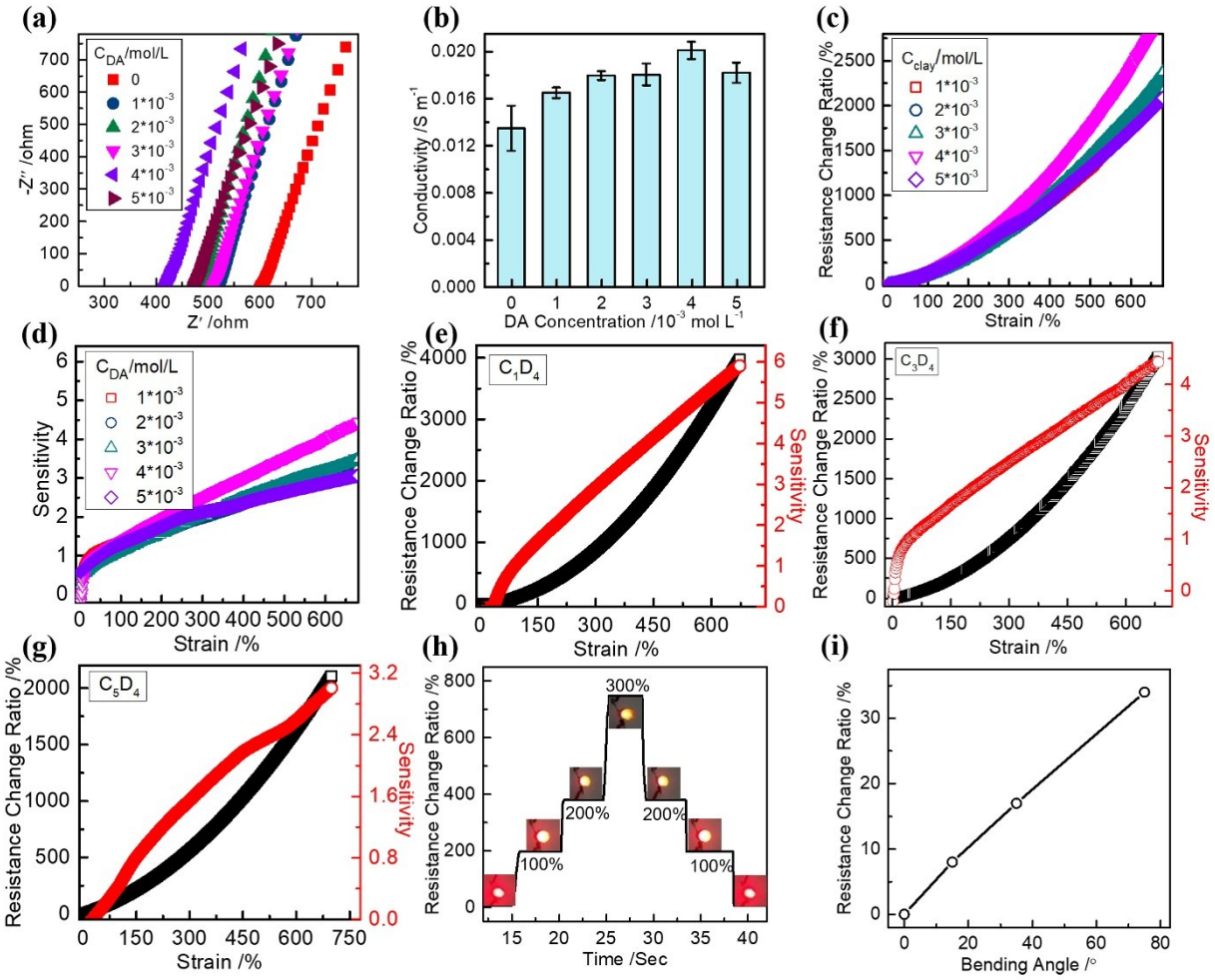

Figure S5. The effect of DA contents on (a) impedance, (b) conductivity, (c)resistance change ratio and (d) sensitivity of hydrogels. Resistance change ratio and sensitivity of hydrogel at clay concentration of (e) 0.01, (f) 0.02, (g) 0.03 g mL^{-1}. (h) Resistance resistance change rate curve of hydrogel sensor and closed-loop lamp brightness under different tensile strains. (i) Signals from hydrogel sensors as a function of bending angle.

Table S1. Blood routine examination results of mice implanted with hydrogel samples for two weeks

Program	Unit	Results				
		Gel 1	Gel 1	Gel 3	Gel 4	Control
WBC	10^9/L	8.6±1.25	8.2±1.23	7.7±1.42	8.1±1.07	7.8±1.12
LYM	10^9/L	4.81±0.91	3.78±0.62	4.42±0.83	4.91±0.74	4.84±0.62
MON	10^9/L	0.35±0.021	0.23±0.042	0.26±0.041	0.27±0.022	0.26±0.018
GRA	10^9/L	3.38±0.43	2.74±0.41	2.42±0.45	2.84±0.62	2.52±0.56
LYM%	%	49.9±0.53	49.2±0.67	46±0.56	50±0.43	48±0.49
MON%	%	6.9±0.65	6.6±0.45	7.6±2.02	7.2±1.35	7.1±1.64
GRA%	%	40.8±1.65	42.7±2.24	36.3±2.26	40.8±2.16	40.6±1.46
HGB	g/L	190.2±22.47	184±25.73	172±15.08	184±23.42	185±21.53
RBC	10^{12}/L	6.32±1.36	6.25±1.59	6.34±1.86	6.95±1.44	6.22±1.57
HCT	%	36.9±2.06	37.4±4.25	38.2±4.11	35.0±4.62	35.2±4.13
MCV	fL	51.2±3.56	52.8±5.84	52.7±6.04	52.7±6.04	51.5±6.22
MCH	pg	32.2±2.31	33.9±3.05	35.2±2.07	31.6±1.85	31.6±1.85
MCHC	g/L	548±17.52	536±16.28	547±23.05	554±28.82	544±26.02
RDWSD	Fl	28±2.34	22±2.71	26±1.06	24±1.68	22±2.82
RDWCV	%	14.6±1.44	13.1±1.39	14.8±1.47	13.4±1.62	12.8±1.31
PLT	10^9/L	235±10.48	241±15.32	254±14.48	262±13.92	246±12.77
PCT	%	0.252±0.047	0.258±0.055	0.245±0.061	0.245±0.061	0.205±0.047

Videos

Video S1. The PDA-clay-PSBMA hydrogel adheres tightly to the surface of a rabbit's heart and sustains vigorous shaking without falling.

Video S2. Adhesion properties of the PDA-clay-PSBMA hydrogel on the surface of the heart that experiences simulated beating by pumping the air into the heart.

Video S3. Adhesion properties of the PDA-clay-PSBMA hydrogel to lung in air. The lung was motivated by pumping air to simulate lung respiratory behavior.

Video S4. Adhesion properties of the PDA-clay-PSBMA hydrogel to lung in PBS solution at pH 7.2. The lung was motivated by pumping air to simulate lung respiratory behavior.

Video S5. Adhesion properties of the PDA-clay-PSBMA hydrogel at the knee joint of a volunteer jumping the rope.

Video S6. Wireless transmission curve of resistance change of a hydrogel sensor adhered on the lung experiencing simulated breathing.

Ethical statement: The pork skin was purchased from a local Wumart. The heart and lung used in **videos S1-4**, and **S6** were retreived from sacrificed experimental New Zealand white rabbits (2.5~3 kg each). The informed consent was obtained from the volunteer for the non-invasive experiments showed in **video S5**.