A novel multi-scale pressure sensing hydrogel for monitoring physiological signals of the long-term bedridden patients

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Supporting information

Conductivity test by the electrochemical workstation

The electrical properties of hydrogel were evaluated by the electrochemical workstation (ChI660E, CH Instruments Ins, China). The resistance of the hydrogel sensors was measured by the electrochemical impedance spectroscopy (EIS). The ionic conductivity (σ) was calculated as follows:

$$\sigma = \frac{L}{R \times S}$$

where R was the resistance value, L and S were the thickness and the sectional area of the hydrogels, respectively.

Table S1. Feed ratio of multi-scale hydrogels with different size PHMs

Sample	AM (g)	[VBIm]Br (g)	PHMs (wt%)	MBA (g)	APS (g)	H_2O (mL)
P_{16}AMV-2	3.55	0.58	1.0 (P_{16}HMs)	0.01	0.02	10
P_{9}AMV-2	3.55	0.58	1.0 (P_{9}HMs)	0.01	0.02	10
P_{5}AMV-2	3.55	0.58	1.0 (P_{5}HMs)	0.01	0.02	10

Table S2. Feed ratio of the PAM, PAMV and P_{16}AMV hydrogels with different mass percentages of P_{16}HMs

Sample	AM (g)	[VBIm]Br (g)	P_{16}HMs (wt%)	MBA (g)	APS (g)	H_2O (mL)
PAM	3.55	0	0	0.01	0.02	10
PAMV	3.55	0.58	0	0.01	0.02	10
P_{16}AMV-1	3.55	0.58	0.5	0.01	0.02	10
P_{16}AMV-2	3.55	0.58	1.0	0.01	0.02	10
P_{16}AMV-3	3.55	0.58	1.3	0.01	0.02	10

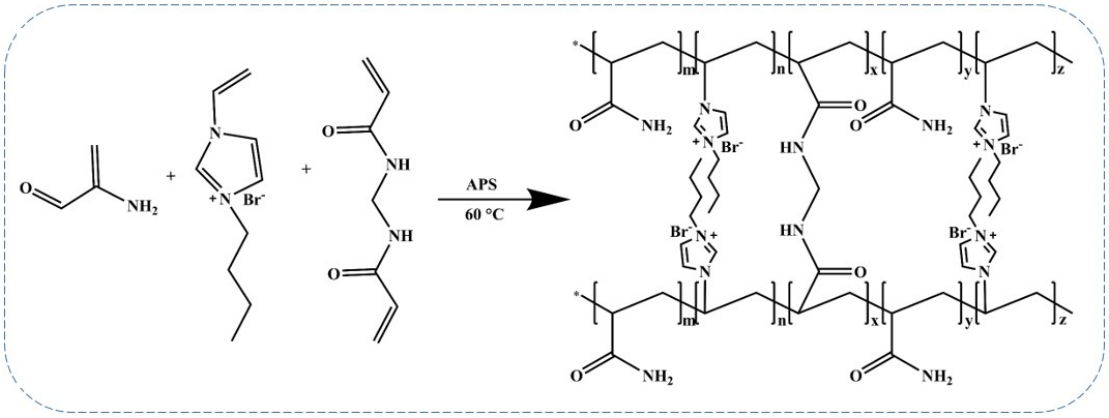

Fig. S1 The synthesis of P_{16}AMV hydrogels

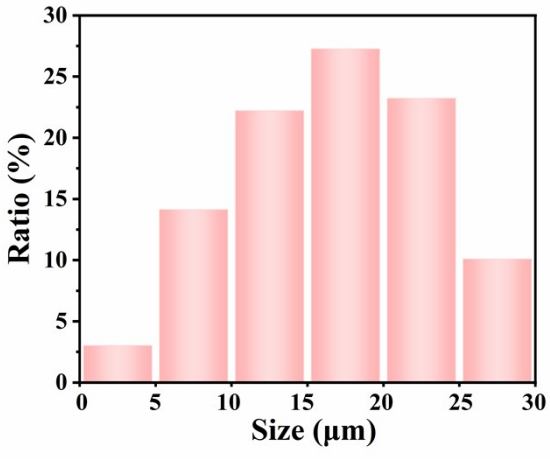

Fig. S2 Size distribution of P_{16}HM microspheres

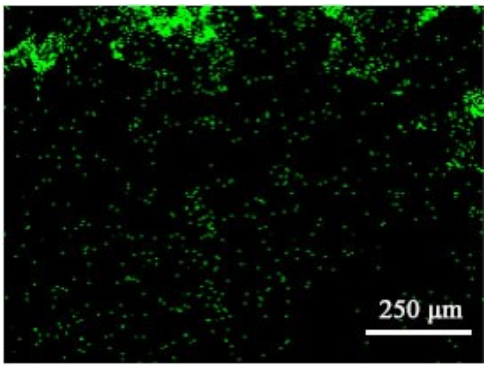

Fig. S3 EDS mapping image of the PAMV hydrogel

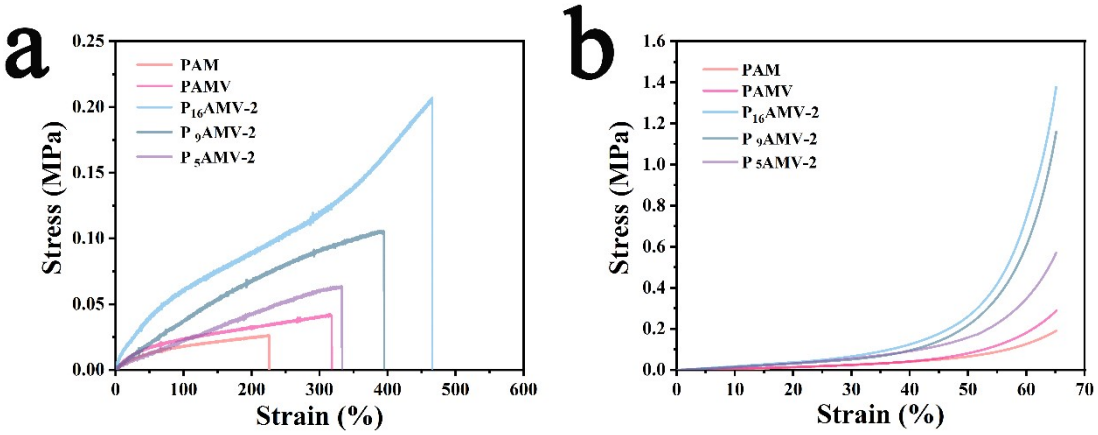

Fig. S4 (a) The tensile stress-strain curves of the PAM, PAMV and different PHMs sizes of P_{16}AMV hydrogels (n = 3); (b) the compressive stress-strain curves of the PAM, PAMV and different PHMs sizes of P_{16}AMV hydrogels (n = 3)

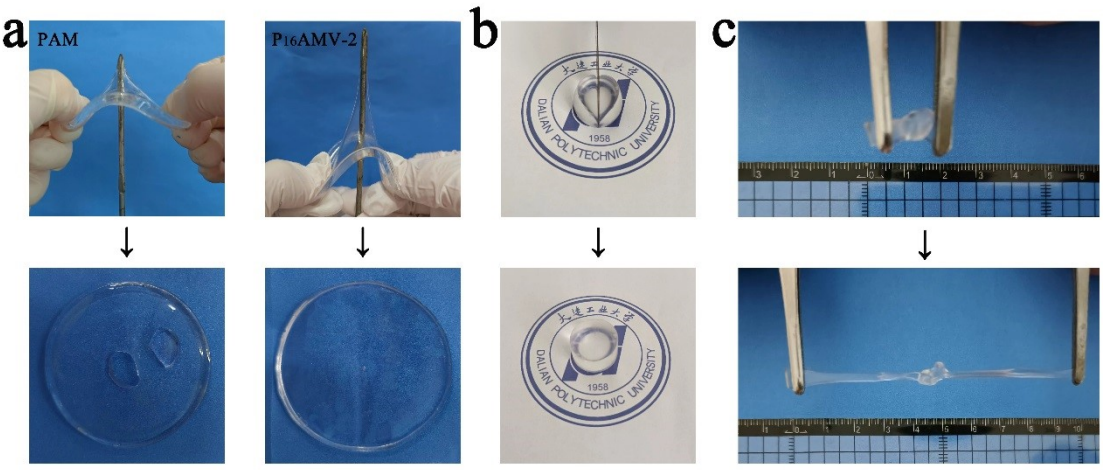

Fig. S5 The photographs of (a) poking a stretched the PAM and P_{16}AMV-2 hydrogel film with a sharp cross screwdriver; (b) cutting and releasing P_{16}AMV-2 hydrogel; (c) knotted P_{16}AMV-2 hydrogel stretching

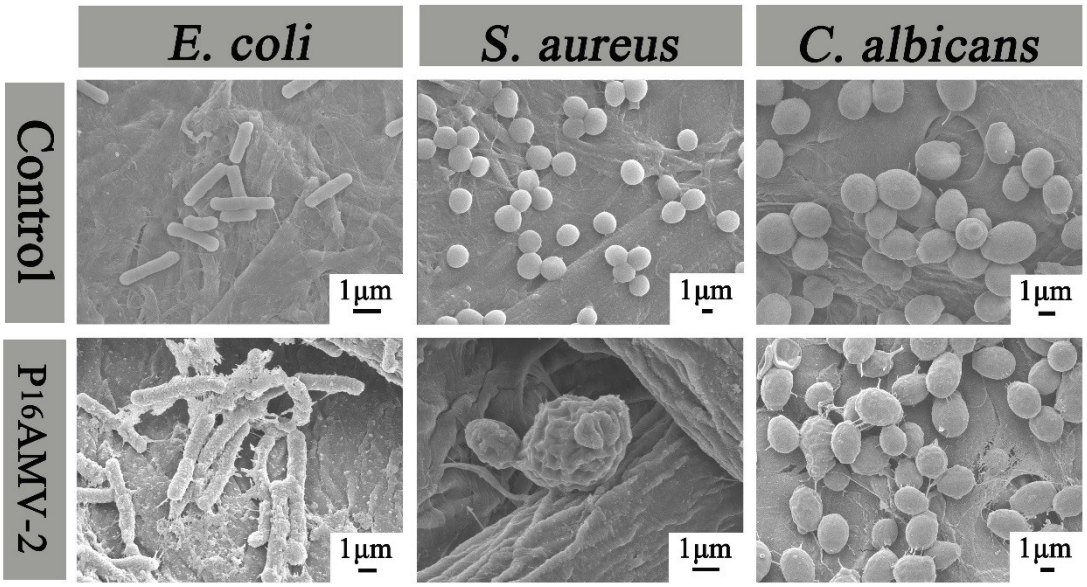

Fig. S6 The SEM images of *E. coli*, *S. aureus* and *C. albicans* before and after the P_{16}AMV-2 hydrogels treatment

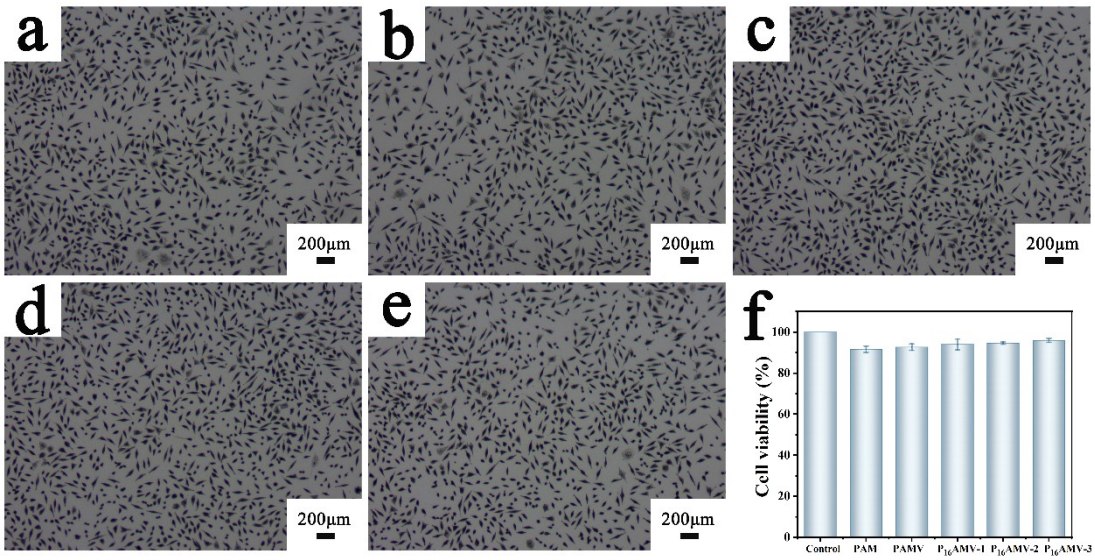

Fig. S7 The optical images of the L929 mouse fibroblasts incubated with (a) PAM, (b) PAMV(c) P_{16}AMV-1, (d) P_{16}AMV-2, (e) P_{16}AMV-3hydrogels; (f) cell viability of the PAM, PAMV and P_{16}AMV hydrogels (n = 5)

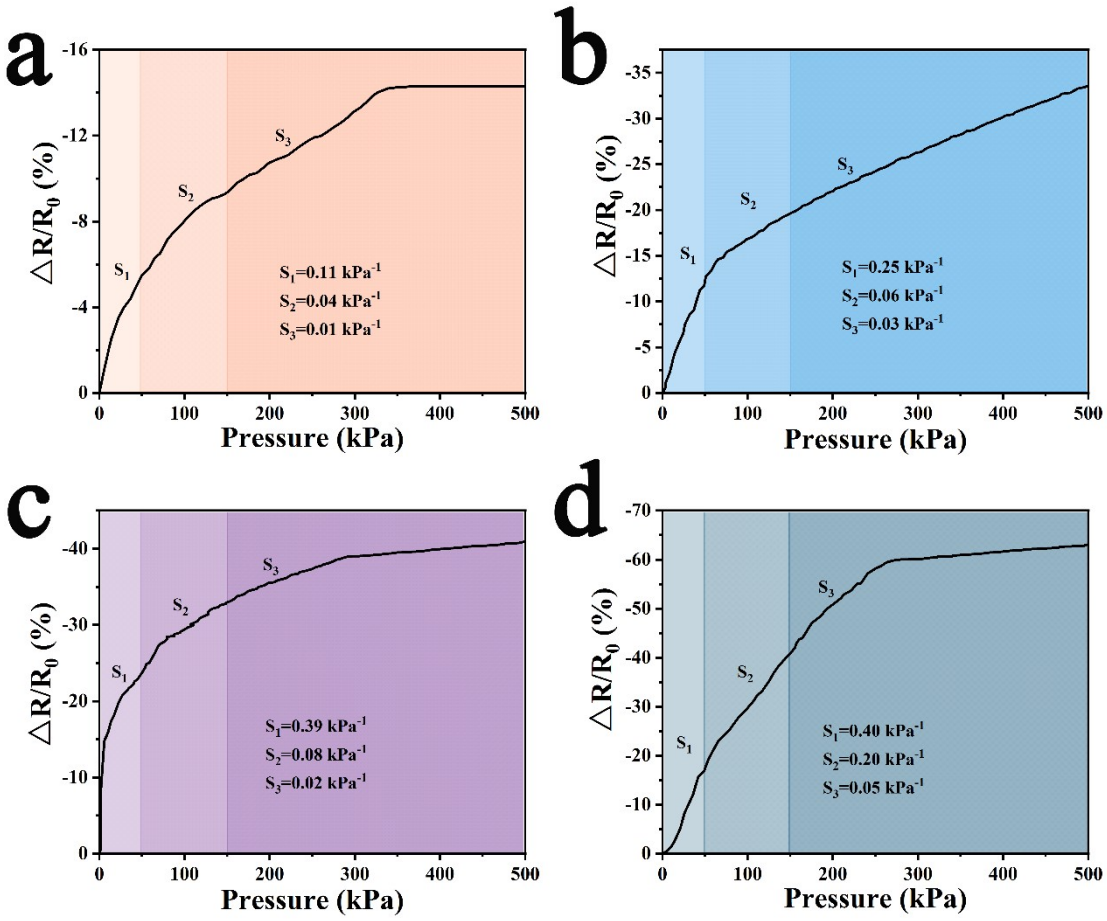

Fig. S8 The pressure sensitivity of (a) PAM, (b) PAMV, (c) P_{16}AMV-1 and (d) P_{16}AMV-3 hydrogels

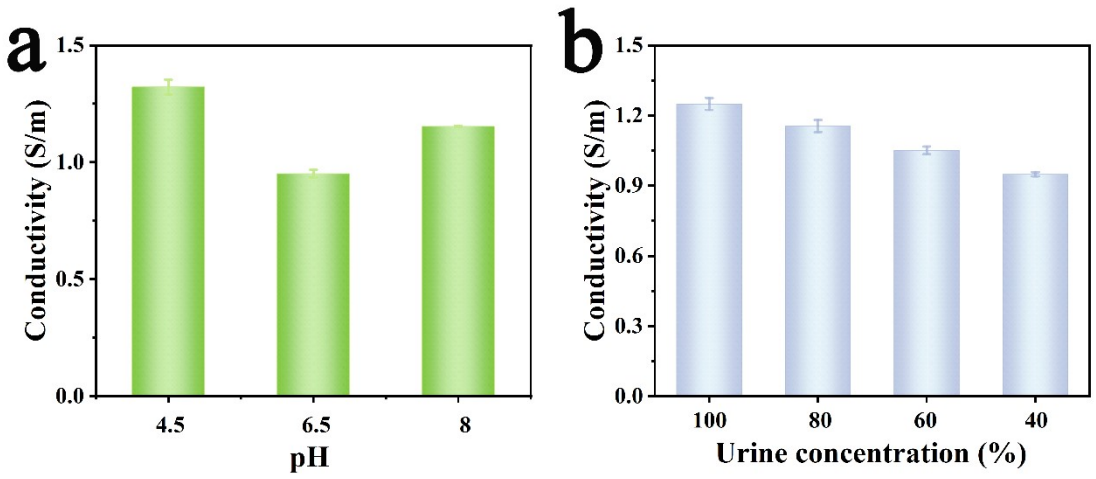

Fig. S9 (a) Conductivity of the P_{16}AMV-2 hydrogel with different pH; (b) conductivity of the P_{16}AMV-2 hydrogel with different concentrations in urine

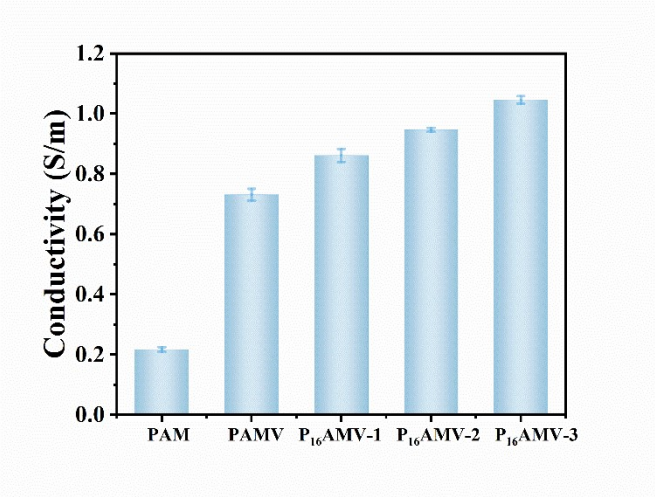

Fig. S10 Conductivity measured by electrochemical workstation