Supporting Information

A "Mesh Scaffold" that Regulates Mechanical Properties and Restricts Phase Transition-induced Volume Change of PNIPAM-Based Hydrogel for Wearable Sensors

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Table S1 Formulations of prepared PSAs-MPT Gels

Sample	Comprise (g)				
	BA	AA	HEA	ZrACA	Irgacure 2959
PSAs layer	0.6	0.03	0.1	0.001	0.005
Sample	Solution A (g)				
	NIPAM	MBA	[BMIM]Cl	Irgacure 2959	Water
PSAs-MPT	2.4	0.0012	0.1	0.03	5.1
Sample	Solution B (g)				
	PVA	$Na_2B_4O_7$	Water (pH=2)		
PSAs-MPT	0.3	0.06	3.6		

Table S2 Monomer conversion of the C=C bond from MPT gels as a function of UV irradiation time

UV irradiation time (min)	Monomer conversion (%)
0	0
1	6.8
2	18.7
3	52.1
4	81.9
5	91.4
6	97.8
7	98.3
8	98.3
9	98.3
10	98.3

Table S3 Mechanical properties of prepared PSAs-MPT hydrogels soaked in alkali solutions

Sample	Mechanical properties			
	Maximum stress (KPa)	Maximum strain (%)	Toughness (KJ/m^3)	Young's modulus (kPa)
Alkaline-0	57.8 ± 0.53	396 ± 14	11.3 ± 0.8	14.96 ± 0.6
Alkaline-5	61.3 ± 0.6	356 ± 23	10.9 ± 0.5	24.67 ± 1.6
Alkaline-10	62.5 ± 0.47	264 ± 25	8.14 ± 0.6	26.89 ± 2.1
Alkaline-15	63.1 ± 0.49	222 ± 20	7.55 ± 0.4	38.0 ± 3.4
Alkaline-20	64.2 ± 0.51	205 ± 15	7.0 ± 0.54	42.3 ± 1.22
Alkaline-25	66.7 ± 0.52	200 ± 11	7.1 ± 0.8	45.3 ± 0.5

Table S4 Mechanical properties of prepared PSAs-MPT hydrogels soaked in acidic solutions

Sample	Mechanical properties			
	Maximum stress (KPa)	Maximum strain (%)	Toughness (KJ/m^3)	Young's modulus (kPa)
Acidic-0	66.7 ± 0.52	200 ± 11	7.1 ± 0.8	45.3 ± 0.5
Acidic-2	55.9 ± 0.52	229 ± 12	7.9 ± 0.5	34 ± 3.2
Acidic-4	55.0 ± 0.49	240 ± 10	8.1 ± 0.4	24.6 ± 3.6
Acidic-6	54.5 ± 0.53	324 ± 9	8.4 ± 0.8	18.3 ± 2.7
Acidic-8	54.0 ± 0.55	373 ± 7	10.5 ± 1.0	10.67 ± 3.3
Acidic-10	51.3 ± 0.42	410 ± 9	10.6 ± 0.7	6.7 ± 1.7

Table S5 Adhesion performance of PSAs-MPT hydrogels with 1.5 mm and 2.5 mm thickness for various substrates.

Sample	Adhesive strength (N)				
	Stainless steel	Glass	Aluminum	PP	PTFE
1.5 mm	18.68 ± 2.41	22.87 ± 1.52	14.65 ± 2.23	12.88 ± 3.34	3.0 ± 2.23
2.5 mm	20.61 ± 1.33	27.86 ± 2.91	16.01 ± 2.45	15.06 ± 1.22	4.03 ± 2.32

Table S6 Adhesion performance of PSAs-MPT hydrogels with 1.5 mm and 2.5 mm thickness through 8 cyclic adhesion tests on glass substrate

Sample	Adhesive strength (KPa)	
	1.5 mm	2.5 mm
Cycle 1	22.87	27.86
Cycle 2	22.5	27.6
Cycle 3	22.4	27.1
Cycle 4	22.45	26.8
Cycle 5	22.21	26.5
Cycle 6	21.9	26.4
Cycle 7	21.7	26.3
Cycle 8	21.4	26.35

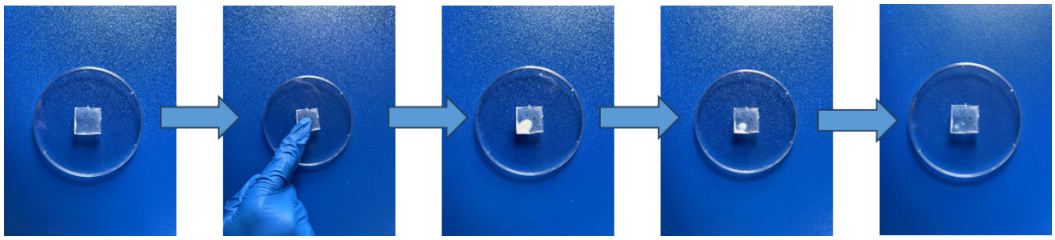

Fig. S1 (a) Response of PSAs-MPT hydrogel to human skin temperature at room temperature (around 25 ^{o}C).

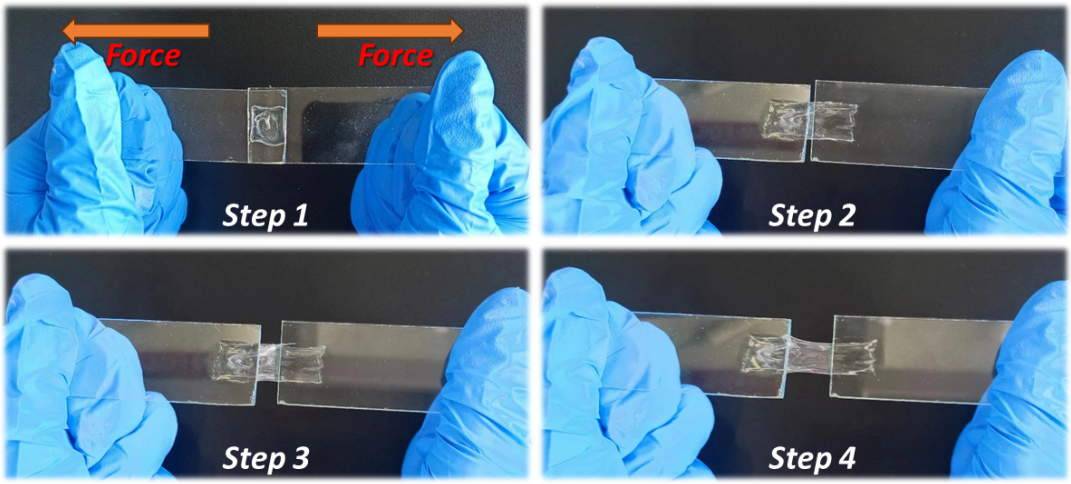

Fig. S2 Adhesion performance of PSAs-MPT hydrogel on glass substrate.

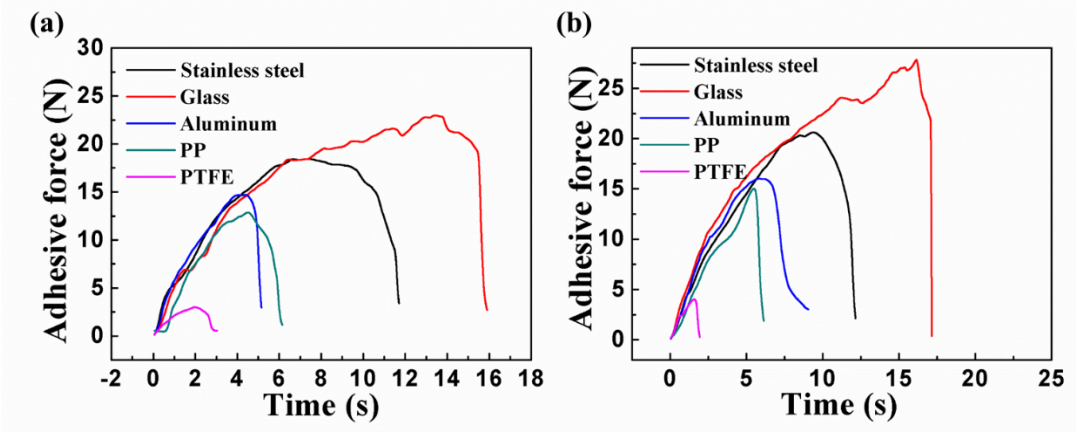

Fig. S3 Adhesion performance of PSAs-MPT hydrogel for different substrates: (a) 1.5 mm of thickness; (b) 2.5 mm of thickness.

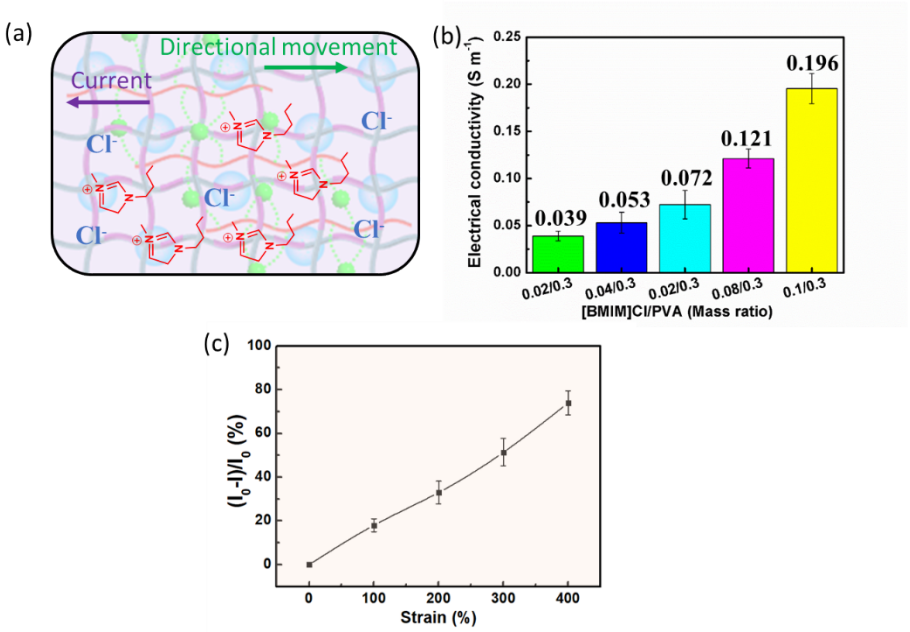

Fig. S4 Conductivity of PSAs-MPT hydrogel for different substrates: (a) the schematic diagram of the conductive hydrogel with [BMIM]Cl; (b) the conductivity of the hydrogels with [BMIM]Cl content; (b) the relative current change of the hydrogel under different strain.