Supporting Information of

Thermochromic Hydrogels with Adjustable Critical Response Temperature for Temperature Monitoring and Smart Windows

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Table S1 Recipes for the micelles and hydrogels.

Sample	SDS (mM)	Inorganic salt	Inorganic salt (mM)	PTH (mM)	H_2O (mL)	PEG (wt%)	Aam (mM)	PEGDA (μL)	APS (mM)	TEMEDA (μL)
Pgel-micelle-0	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	0	0	0	0	0
Pgel-micelle-1	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	1.37	0	0	0	0
Pgel-micelle-2	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	2.70	0	0	0	0
Pgel-micelle-3	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	4.00	0	0	0	0

Pgel-micelle-4	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	6.49	0	0	0	0
Pgel-micelle-5	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	8.86	0	0	0	0
Pgel-micelle-6	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	11.10	0	0	0	0
PAAm hydrogel	0	0	0	0	12	0	28.14	17	0.18	20
Pgel-PTH-1	0.23	$AlCl_3·6H_2O$	1.04	0.55	12	8.86	28.14	17	0.18	20
Pgel-PTH-2	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	8.86	28.14	17	0.18	20
Pgel-PTH-3	0.23	$AlCl_3·6H_2O$	1.04	1.10	12	8.86	28.14	17	0.18	20
Pgel-PTH-4	0.23	$AlCl_3·6H_2O$	1.04	1.47	12	8.86	28.14	17	0.18	20
Pgel-PTH-5	0.23	$AlCl_3·6H_2O$	1.04	1.84	12	8.86	28.14	17	0.18	20
Pgel-PEG-0	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	0	28.14	17	0.18	20
Pgel-PEG-1	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	1.37	28.14	17	0.18	20
Pgel-PEG-2	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	2.70	28.14	17	0.18	20
Pgel-PEG-3	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	4.00	28.14	17	0.18	20
Pgel-PEG-4	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	6.49	28.14	17	0.18	20
Pgel-PEG-5	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	8.86	28.14	17	0.18	20
Pgel-PEG-6	0.23	$AlCl_3·6H_2O$	1.04	0.74	12	11.10	28.14	17	0.18	20
Pgel-K^+	0.23	KCl	1.04	0.55	12	8.86	28.14	17	0.18	20
Pgel-Na^+	0.23	NaCl	1.04	0.55	12	8.86	28.14	17	0.18	20
Pgel-Li^+	0.23	LiCl	1.04	0.55	12	8.86	28.14	17	0.18	20
Pgel-Mg^{2+}	0.23	$MgCl_2·6H_2O$	1.04	0.55	12	8.86	28.14	17	0.18	20
Pgel-Al^{3+}	0.23	$AlCl_3·6H_2O$	1.04	0.55	12	8.86	28.14	17	0.18	20

Table S2 Comparison of the smart window materials based on thermochromic properties.

Materials	State	Stimulation	lowest T_k (°C)	Irradiation times (s)	Temperature amplification (°C)	Ref.
ATO	Solid	Temperature	32	600	4.5	1
Gel-NaCl	Solid	Temperature/ electricity /pH	20	3600	6.1	2
PS gels	Solid	Temperature	28	/	/	3
HPC	Solid	Temperature	50	3600	13.3	4

PNIPAM	Liquid	Temperature	32	3000	11-21	5
PNIPAM-AEMA	Liquid	Temperature	32.5	1800	7.9	6
VO_2	Film	Temperature	68	350	5.8	7
VO_2/ATO	Film	Temperature	36.5	600	5.0	8
TCPs	Solid	Temperature	31	/	/	9
HPC + Glycerol	Liquid	Temperature	40	280	8.2	10
Pgels	**Solid**	**Temperature/ electricity**	**16**	**200**	**5.6**	**Ours**

Note: '/' means not mentioned**.**

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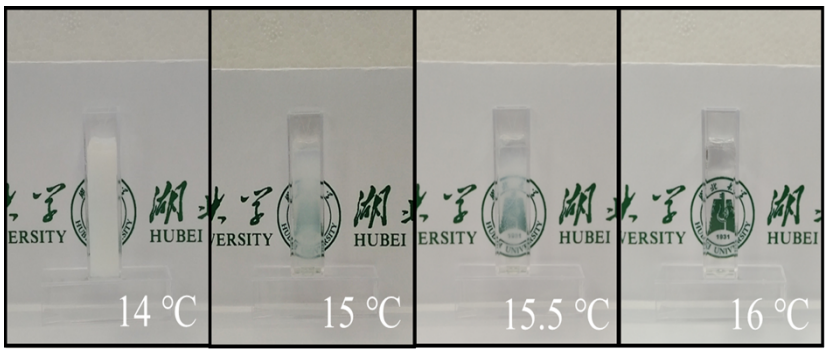

Fig. S1. Photographs of Pgel-PTH-1 hydrogel at different temperatures.

Fig. S2. Optical photographs of samples with different heating times at 550 nm.

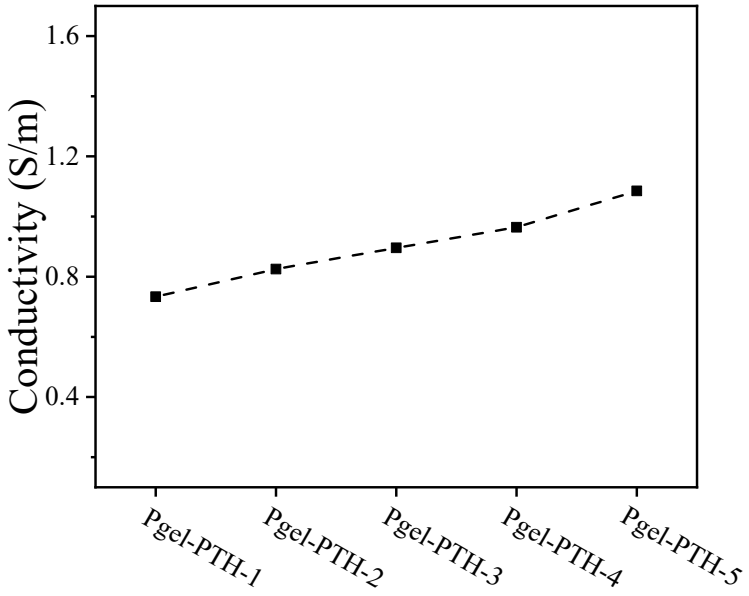

Fig. S3. The conductivity of hydrogel samples with different concentrations of PTH.

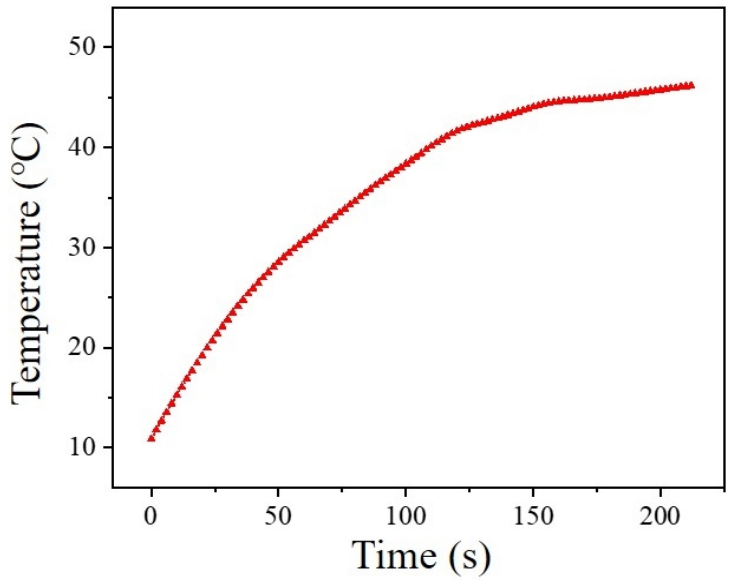

Fig. S4 The temperature of Pgel depends on the power-on time and the external voltage with 10 V.

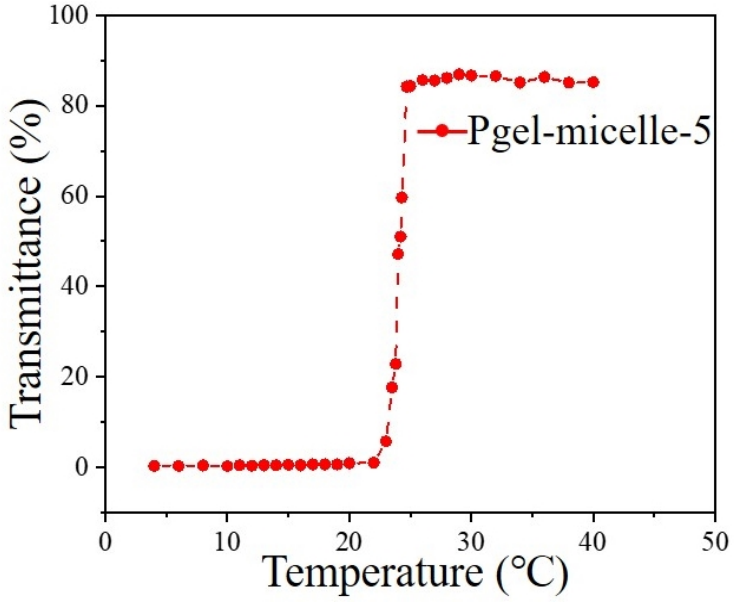

Fig S5. Relationship between temperature and light transmittance of Pgel-micelle-5.

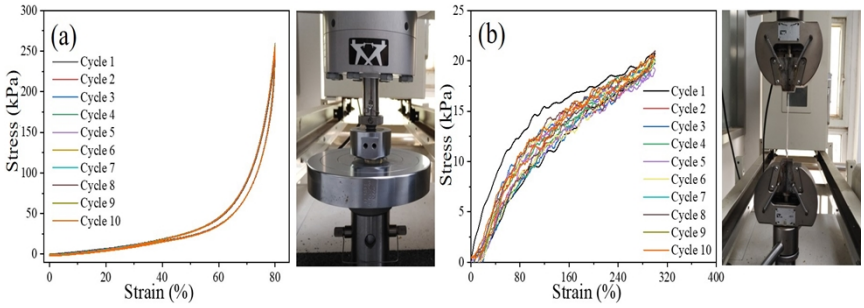

Fig. S6. (a) Ten compression stress-strain curves and (b) ten continuous tension and relaxation cycles of Pgel-PTH-2 hydrogel.

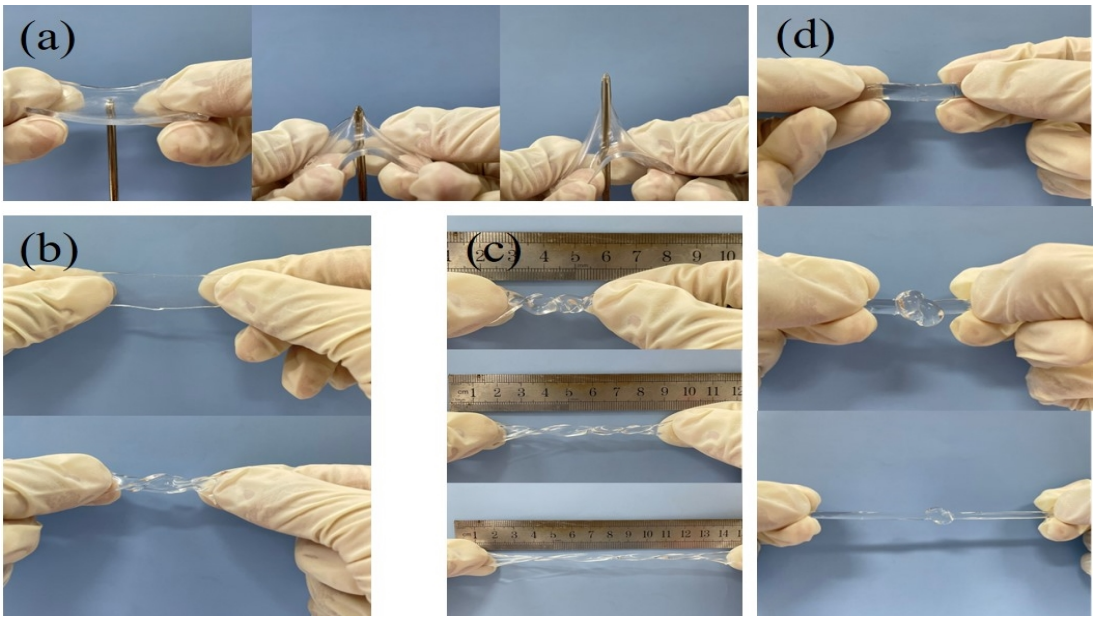

Fig. S7. Mechanical properties of Pgel-PTH-2 hydrogel: Exhibition of (a) Puncture resistance and (b) twisting of the hydrogel. Stretching of the (c) twisted and (d) knotted treated hydrogel.

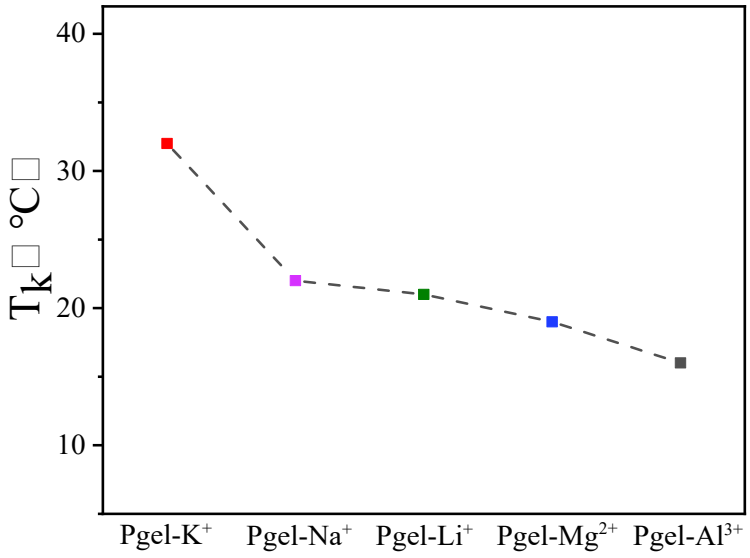

Fig. S8. T_k of hydrogels with different cations.

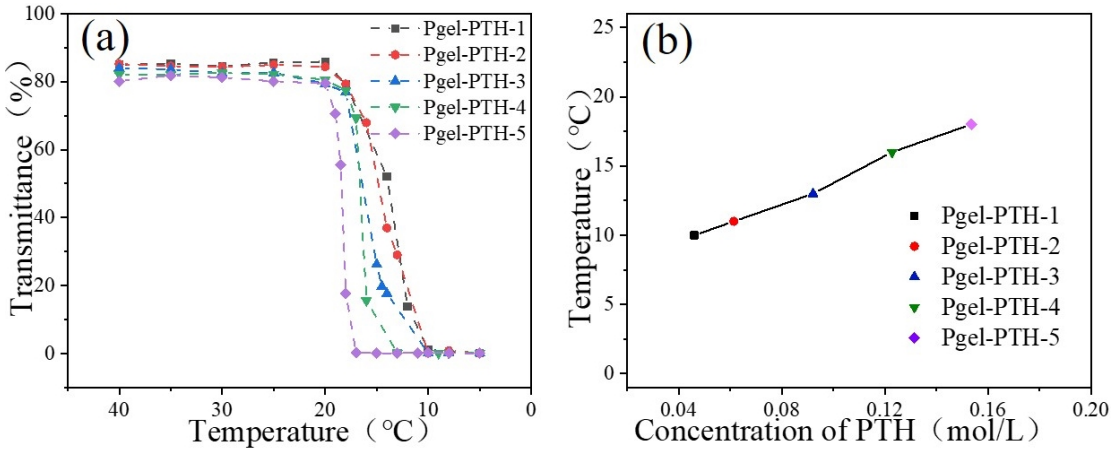

Fig. S9. (a)Transmittance and (b) temperature switching of hydrogels with different concentration of PTH during cooling.

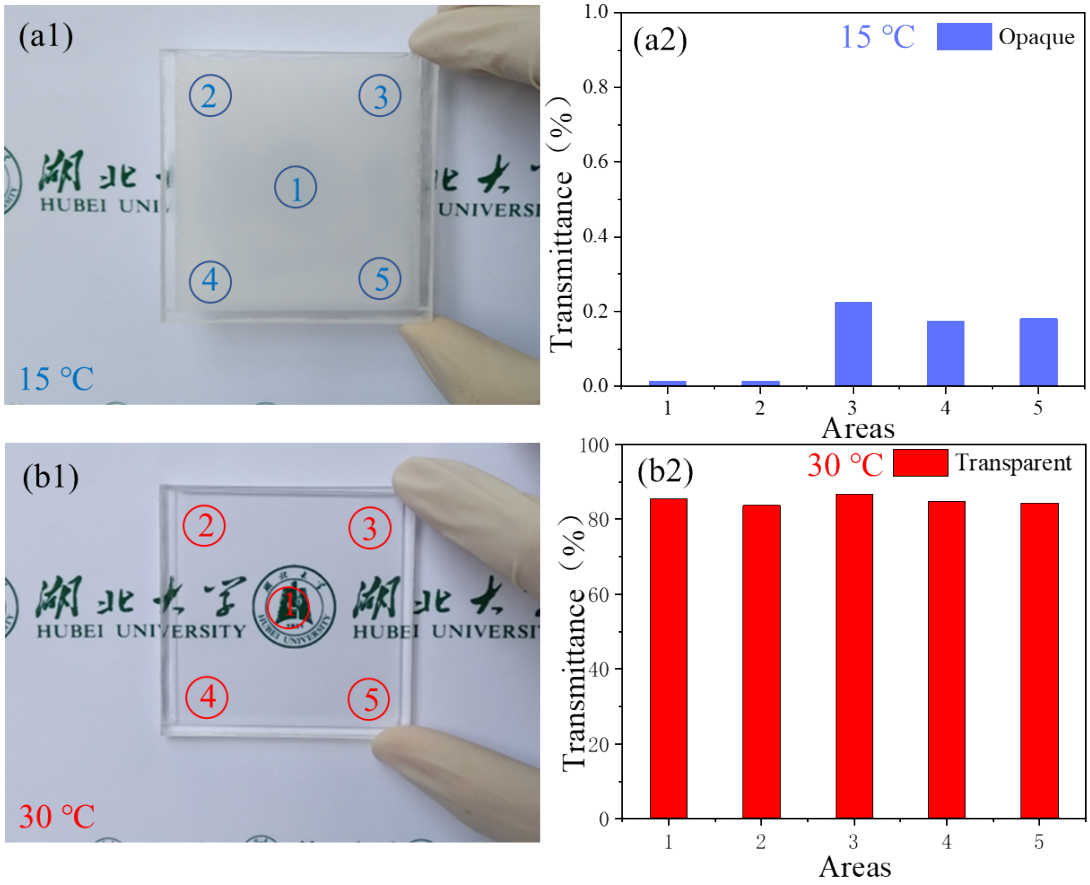

Fig. S10. Optical uniformity of hydrogels in (a1) opaque and (b1) transparent states; Transmittance of different areas of the hydrogels in (a2) opaque and (b2) transparent states.

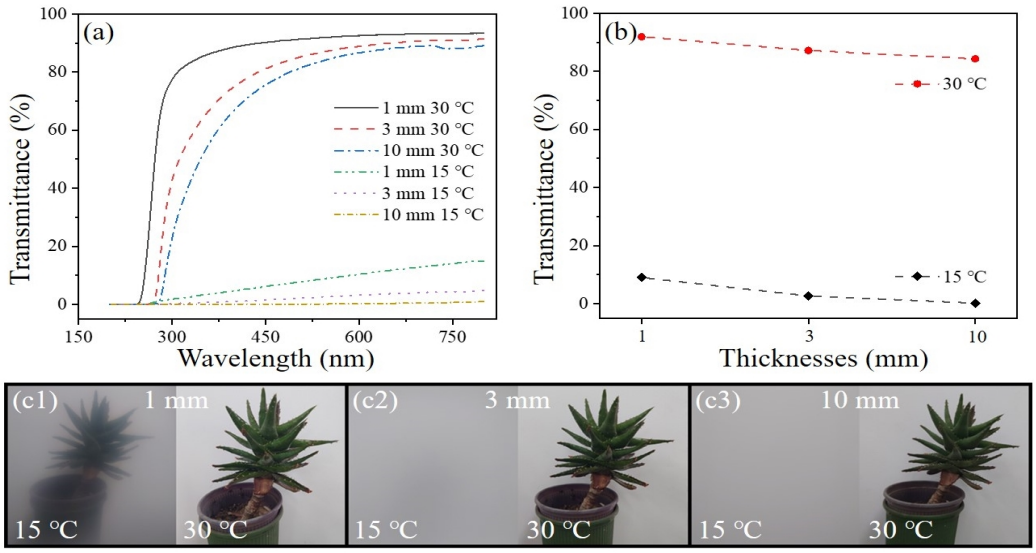

Fig. S11 (a) Transmittance of Pgel-PTH-2 for the 1 mm, 3 mm and 10 mm thickness at 15 °C and 30 °C at a wavelength of 550 nm; (b)The transmittance spectra of 1 mm, 3 mm and 10 mm at 15°C and 30°C, respectively; Optical photos for 1 mm (c1), 3 mm (c2), and 10 mm (c3) sample at 15°C and 30°C, respectively.