Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Mechanism and regulation of LCST behavior in poly (hydroxypropyl acrylate)-based temperature-sensitive hydrogels

*Fuping Chen, Guoqiang Lu, Hengda Yuan, Ruiqi Li, Jun Nie, Yingying Zhao, Xin Shu, Xiaoqun Zhu**

State Key Laboratory of Chemical Resource Engineering, College of Materials Science and Engineering, Beijing University of Chemical Technology, Beijing 100029, P. R. China

E-mail: zhuxq@mail.buct.edu.cn

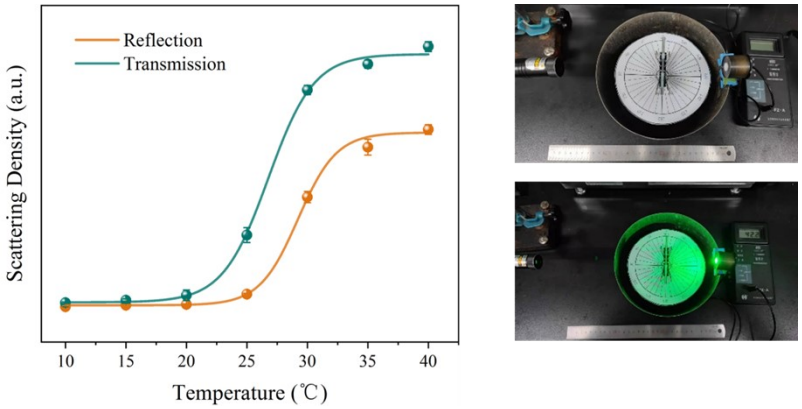

Figure S1. Variable temperature light scattering and experimental setup

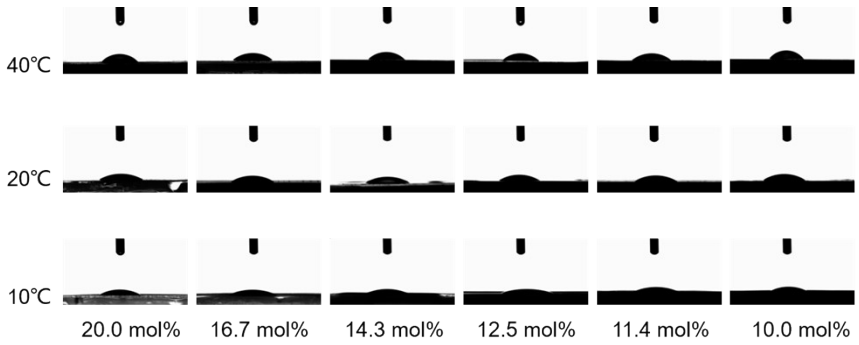

Figure S2. Photographs of the water contact angle of PHPA hydrogels with different solids contents at different temperatures.

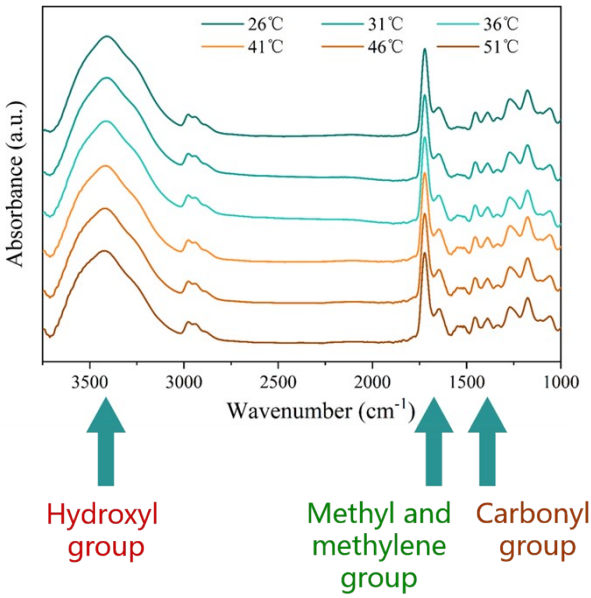

Figure S3. Variable temperature infrared spectra of PHPA hydrogels

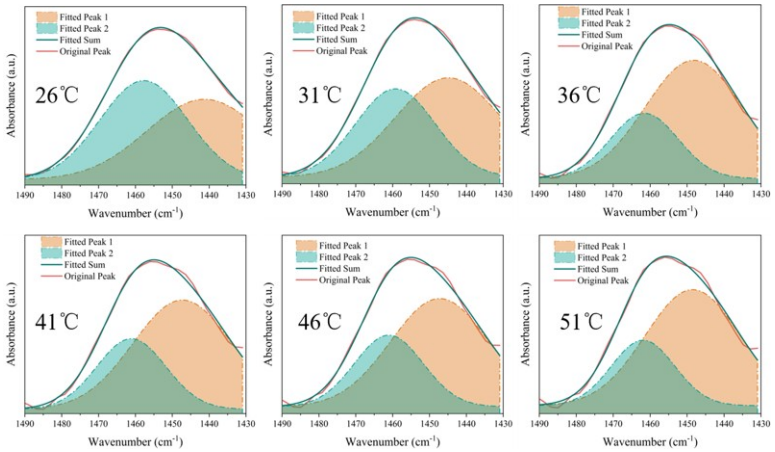

Figure S4. Infrared spectra at hydrocarbons at different temperatures

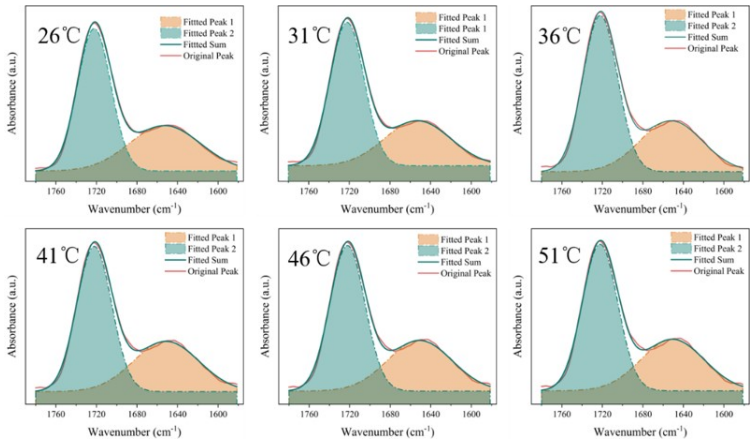

Figure S5. Infrared spectra at carbonyl groups at different temperatures

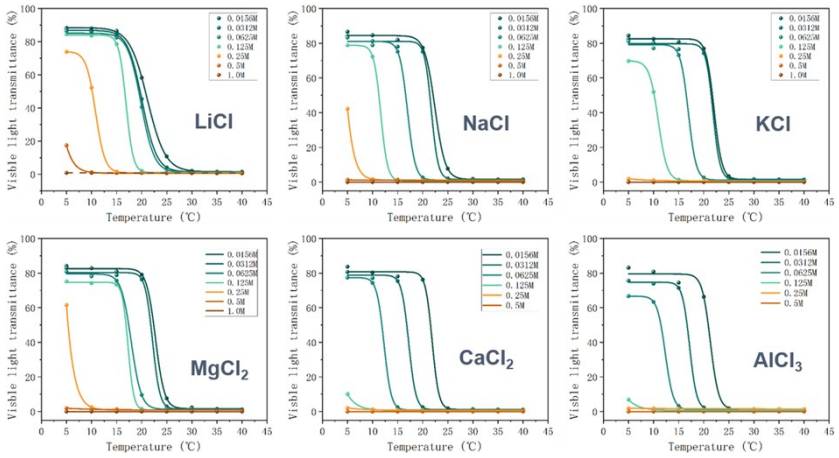

Figure S6. Permeability-temperature curves for different concentrations and different ions (cations as variables)

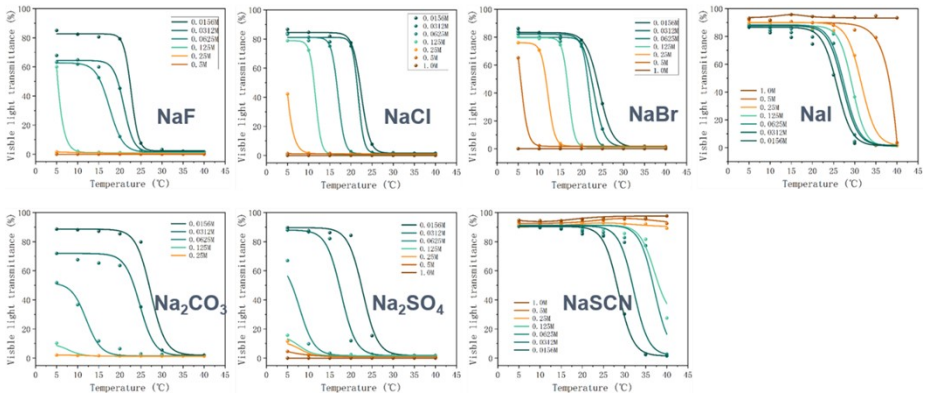

Figure S7. Permeability-temperature curves for different concentrations and different ions (anions as variable)

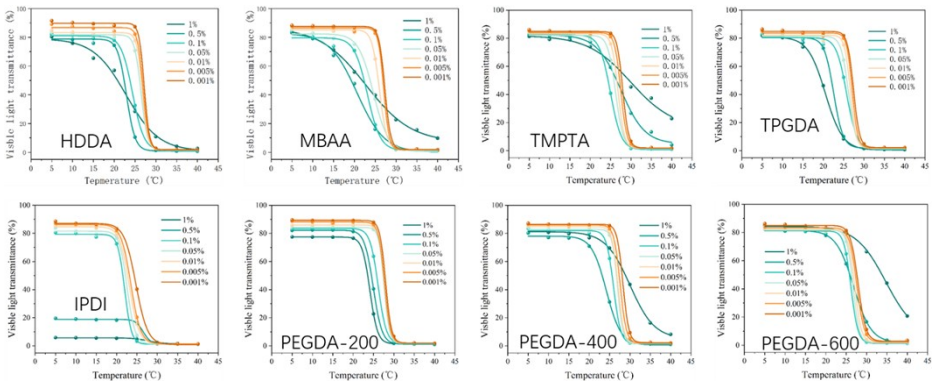

Figure S8. Transmittance-temperature curves for different concentrations and crosslinkers

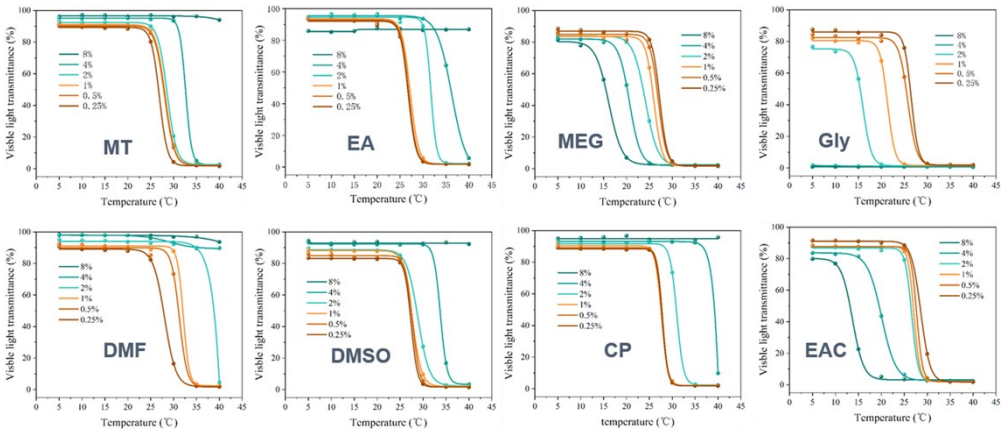

Figure S9. Permeability-temperature curves for different concentrations and co-solvents

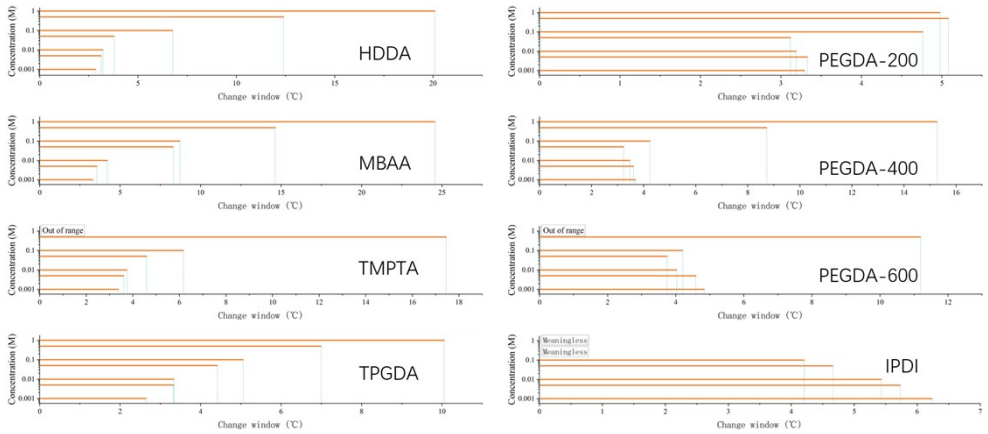

Figure S10. Transformation windows for different concentrations and different crosslinkers

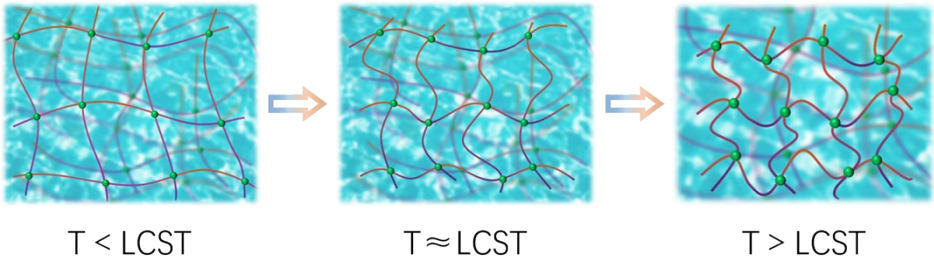

Figure S11. Variation of the crosslinking network inside the hydrogels with temperature, green balls represent double bond or hydroxyl crosslinking points

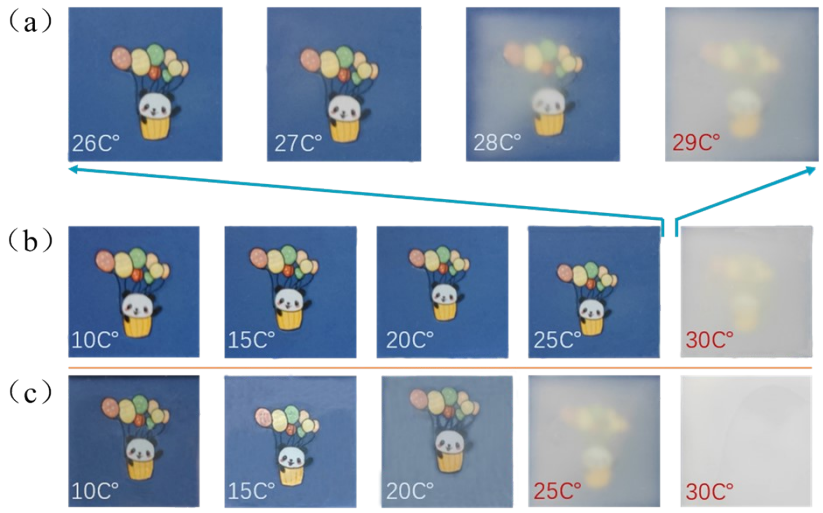

Figure S12. Digital photos of PHPA hydrogels with 0.5% MBAA (c) and the original hydrogel (b) at different temperatures; （a）is a detailed image of （b）at 25℃-30℃.

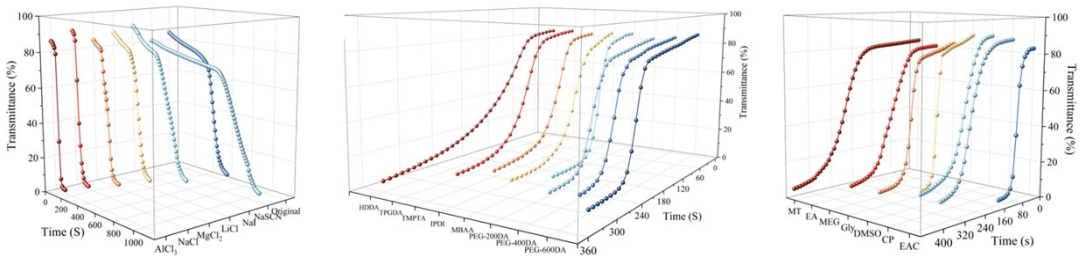

Figure S13. Shift times for different additives

Table S1. Mean and standard deviation of the water contact angle

40C°	average	40.55	46.1	48.36667	55.28333	71.55	75.41667
	standard deviations	1.0094553	1.850405	0.784007	1.144407	1.56812	1.126795
20C°	average	24.2333333	25.15	27.93333	32.4	34.76667	34.95
	standard deviations	0.68313005	0.62849	1.697842	0.669328	0.94163	1.209545
10C°	average	23.8833333	21.23333	20.21667	20.26667	20.21667	22.6
	standard deviations	1.49320684	0.67429	1.67023	1.003328	0.17224	0.876356
		20.0 mol%	16.7 mol%	14.3 mol%	12.5 mol%	11.1 mol%	10.0 mol%

Table S2. Exploring the solubility of different ions

	F^-	cl^-	Br^-	I^-	NO_3^-	SO_4^{2-}	CO_3^{2-}	SCN^-	Ac^-
Li^+	1.0 M	1.0 M	1.0 M	--	--	--	--	--	--
Na^+	0.25 M	0.5 M	0.5 M	1.0 M	--	0.25 M	0.25 M	0.25 M	0.25 M
K+	--	0.25 M	--	--	--	0.5 M	0.25 M	1.0 M	--
Ca^{2+}	/	0.25 M	--	--	1.0 M	/	/	--	--
Mg^{2+}	/	0.5 M	--	--	--	0.5 M	/	--	--
Cu^{2+}	/	0.5 M	1.0 M	/	1.0 M	0	/	--	--
Mn^{2+}	/	0.5 M	--	--	--	--	/	--	--
Zn^{2+}	/	--	--	--	--	0.25 M	/	--	1.0M
Fe^{2+}	/	0.25 M	--	--	--	0.5 M	/	--	--
Fe^{3+}	/	0	--	--	0.5 M	--	/	--	--
Co^{2+}	/	0.25 M	--	--	1.0 M	--	/	--	--
Ni^{2+}	/	0.5 M	--	--	--	0.25 M	/	--	--
Al^{3+}	--	0.25 M	--	--	--	--	/	--	--
Cd^{2+}	/	--	--	--	1.0 M	--	/	--	--

Colored and not light solid, number represents the maximum soluble amount

It can be cured by light, and the number indicates the maximum soluble amount

/ Insoluble, slightly soluble, or absent

-- Soluble but not stored in laboratory

Table S3. comparison with other temperature-sensitive materials in the literature for transition temperature and transition time

Number	Temperature-sensitive materials	Transition time（min）	Transition temperature（°C）	References
1	PHPA-$AlCl_3$	0.5	12	This Work
2	PNVCL	1	34	[1]
3	PNIPAAm-PVP	2	24	[2]
4	P(NIPAAm-co-N-MAGEL)	2	27	[3]
5	Thermochromic Ionogel	3	55	[4]
6	Ionic liquid elastomer	4	45	[5]
7	Nanocomposite Hydrogel	4	26	[6]
8	VSP microgel	4	28	[7]
9	GO+PNIPAM	5	29	[8]

10	Dual-responsive starch	5	37	[9]
11	pNIPAm-AEMA	7	32	[10]
12	PHPA-NaSCN	7	37	This Work
13	PDAPs/PNIPAm	8	36	[11]
14	PNIPAm/CNC	9	31	[12]
15	ATO/Hydrogel	10	33	[13]
16	$CsxWO_3$/PAM-PNIPA	10	30	[14]

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