Supporting Information

Hetero-Network Hydrogels Crosslinked with Silica Nanoparticles for Strategic Control of Thermal Responsive Property

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Figure S1

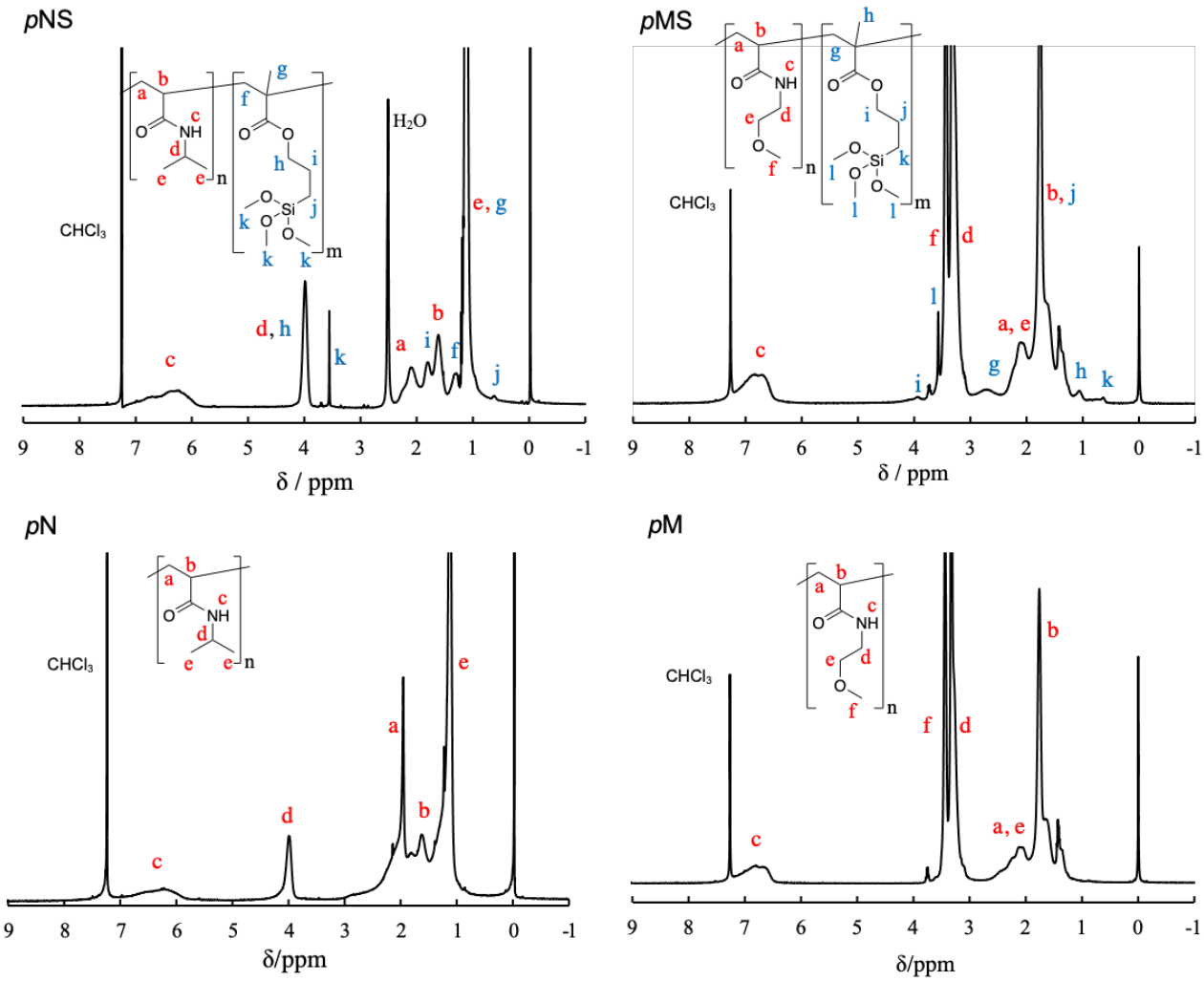

Fig. S1 ^{1}H NMR spectra of thermo-sensitive polymers (*p*N, *p*M) and co-polymers (*p*NS, *p*MS).

Figure S2

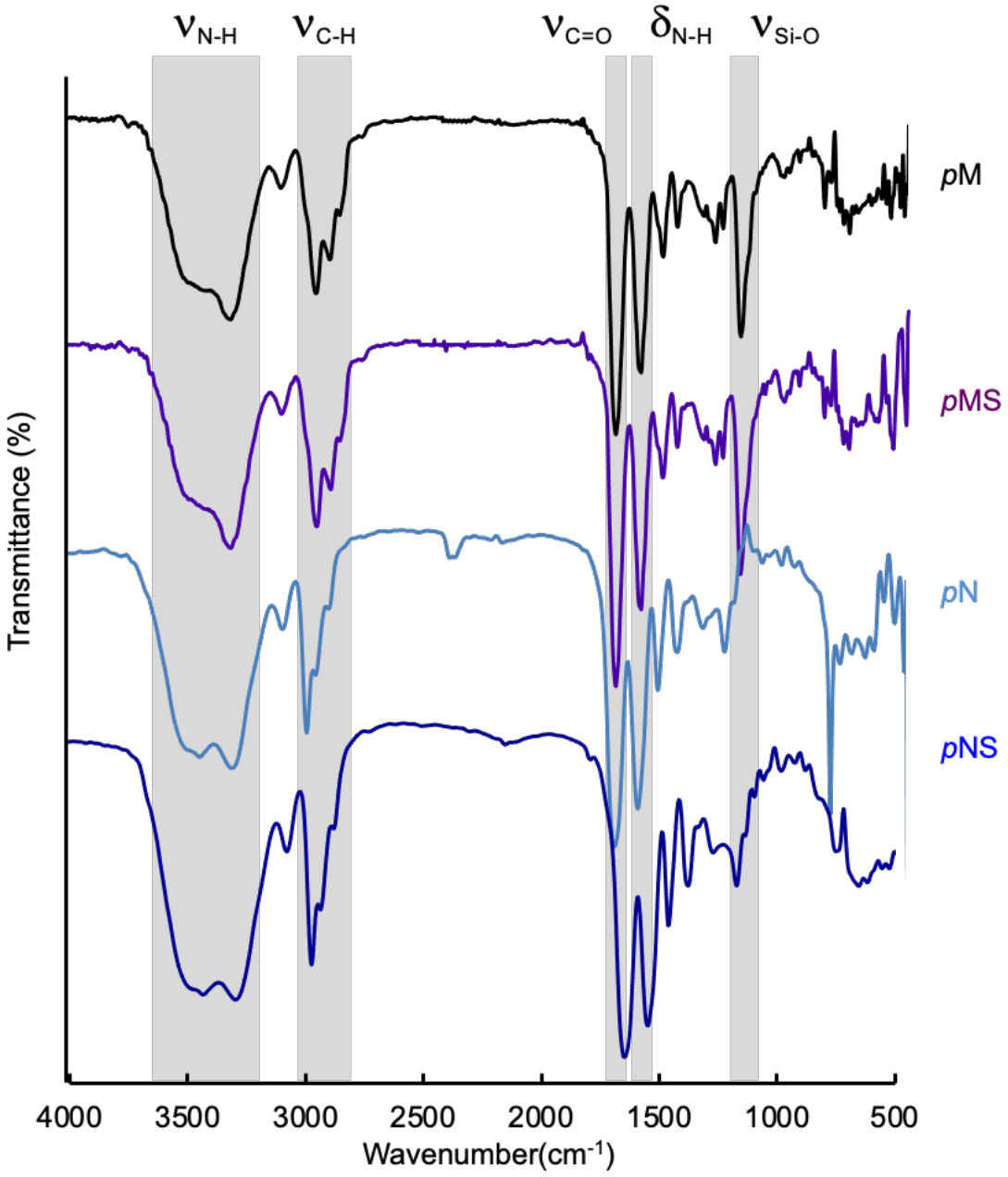

Fig. S2 FT-IR spectra of thermo-sensitive polymers (*p*N, *p*M) and co-polymers (*p*NS, *p*MS).

Table S1

Table S1. Gelation time of aqueous solutions of *p*NS, *p*MS and mixture of *p*NS and *p*MS, with Si.[a]

Si (wt.%)	*p*NS (wt%)				*p*MS (wt%)				mixture of *p*NS and *p*MS [b] (wt%)				*p*N (wt%)	*p*M (wt%)
	2	3	4	5	2	3	4	5	2	3	4	5	5	5
0.0	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG		
2.5	31.5 h	28.4 h	4.0 h	90 min	8.5 h	6.0 h	2.8 h	50 min	9.0 h	7.2 h	3.1h	80 min		
5.0	8.2 h	7.5 h	2.1 h	35 min	6.2 h	3.4 h	65 min	25 min	7.2 h	4.0 h	76 min	30 min		
10.0	5.8 h	4.5 h	70 min	22 min	4.0 h	2.1 h	30 min	13 min	4.6 h	2.8 h	40 min	16 min	NG	NG
15.0	2.7 h	1.8 h	45 min	15 min	2.2 h	78 min	20 min	7 min	2.0 h	85 min	28 min	12 min		

[a] Gelation time was measured at 25 °C by tube inversion method and Si nanoparticles size 12 nm (average diameter). NG indicates that no gelation was observed within 3 weeks. [b] Concentration were equal in mixture of *p*NS and *p*MS

Figure S3

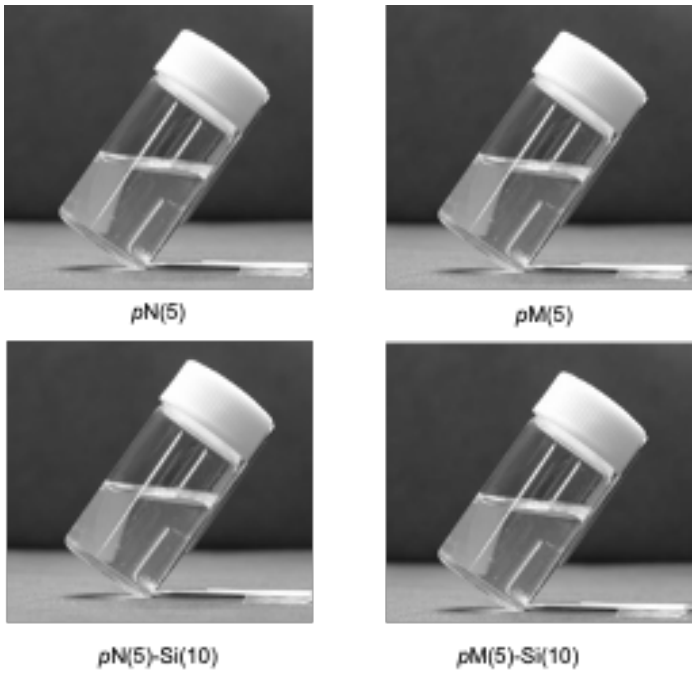

Fig. S3. Photos of aqueous solution of homo-polymers (*p*N and *p*M) with and without Si suspension at 25 °C.

Figure S4

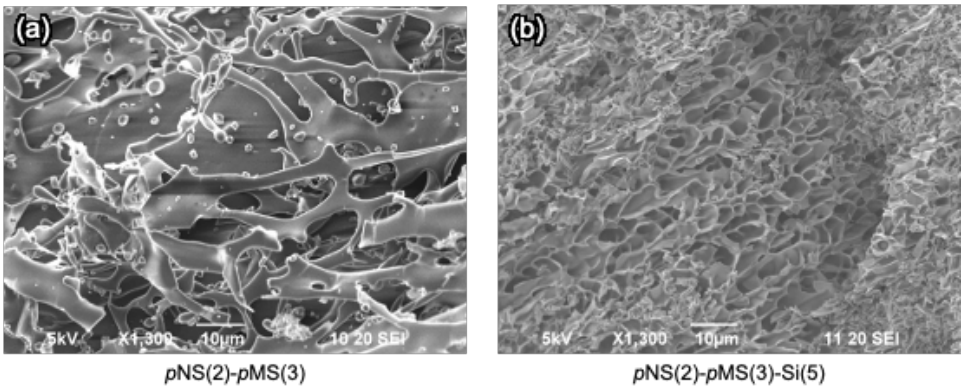

Fig. S4. FE-SEM microphotographs of cross-sectional morphology of freeze-dried (a) copolymers, *p*NS(2)-*p*MS(3) solution and (b) *p*NS(2)-*p*MS(3)-Si(5) hydrogel.

Figure S5

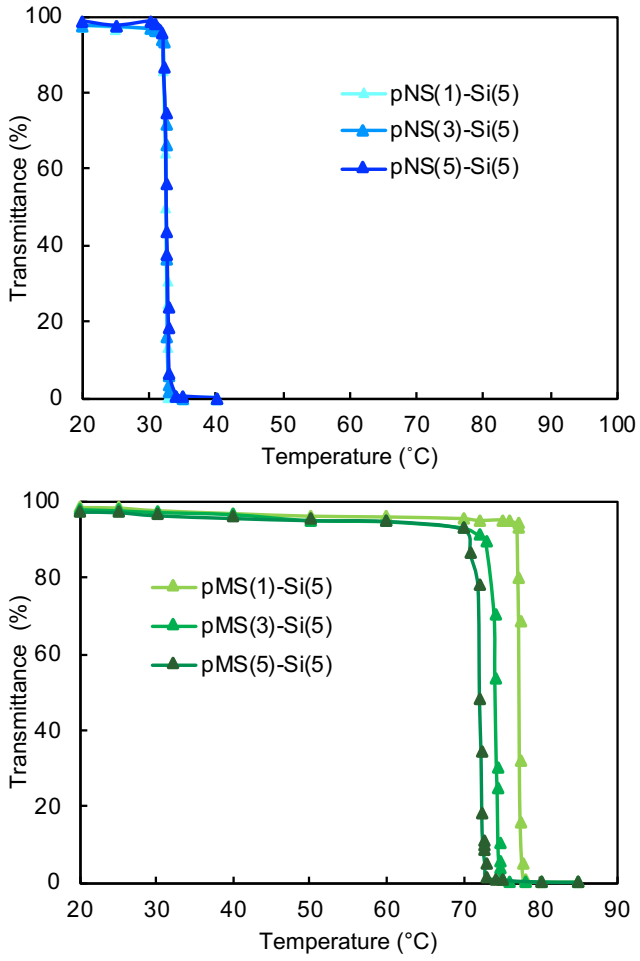

Fig. S5 Phase transition behavior of (a) *p*NS-Si and (b) *p*MS-Si in the cooling process.

Figure S6

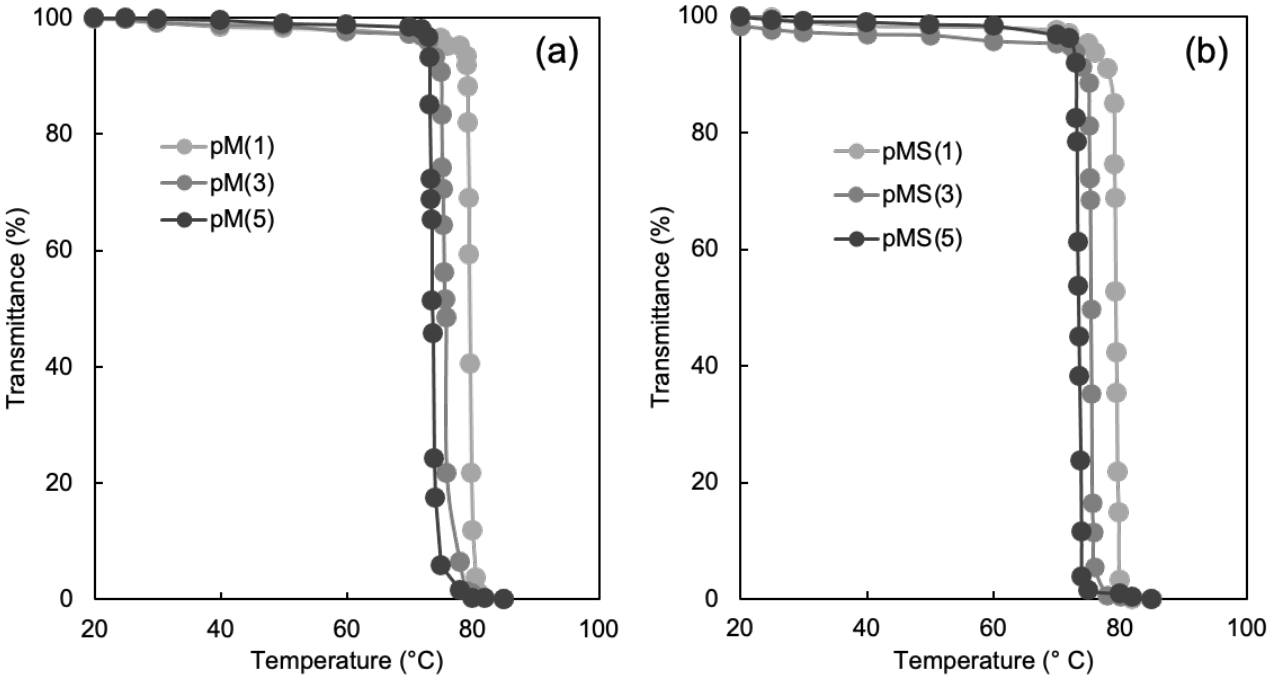

Fig. S6 Phase transition behavior of (a) *p*M and (b) *p*MS at different concentrations.

Figure S7

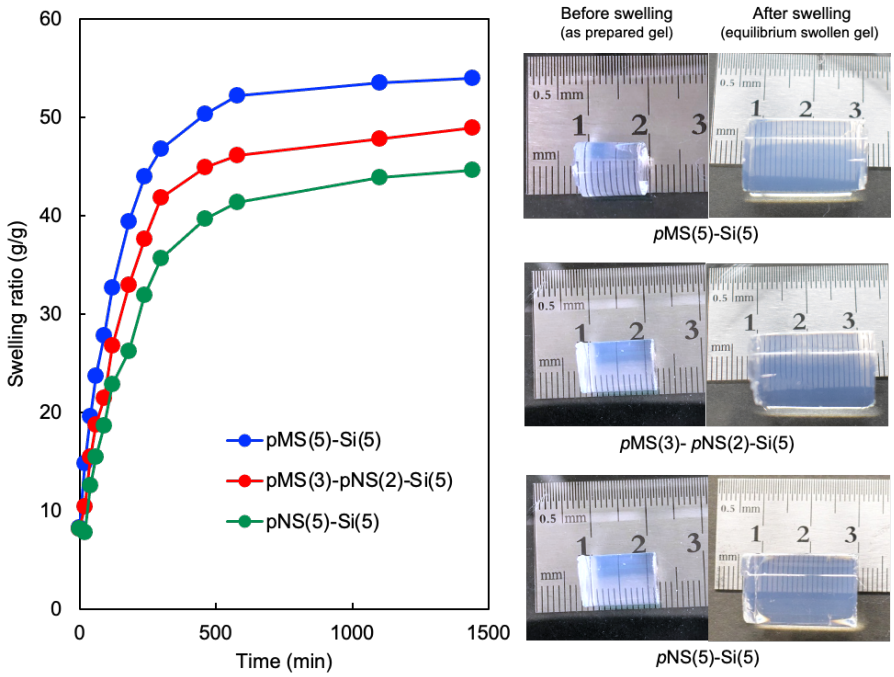

Fig. S7 Swelling profile of hydrogels in distilled water at 20 ˚C and photographs show the as prepared hydrogel and equilibrium swollen hydrogels at 20 ˚C after 24 h.

Figure S8

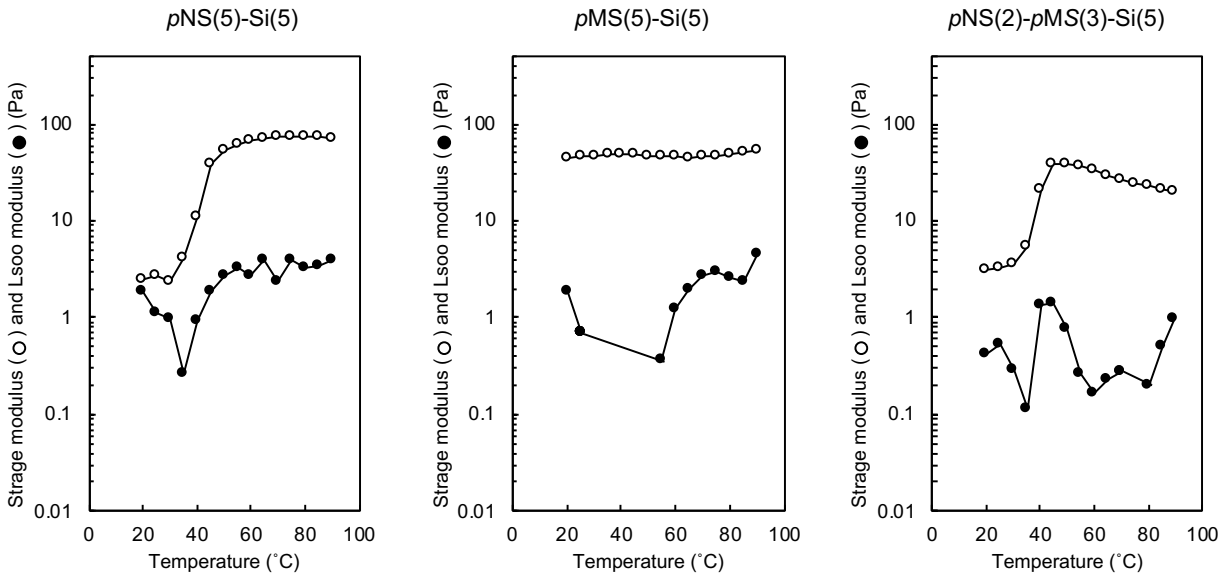

Fig. S8 Temperature dependencies of G' and G'' of the hetero-network hybrid hydrogels.