

# Multiphase PCL semi-interpenetrating networks exhibiting triple- and stress-free two-way shape memory effect

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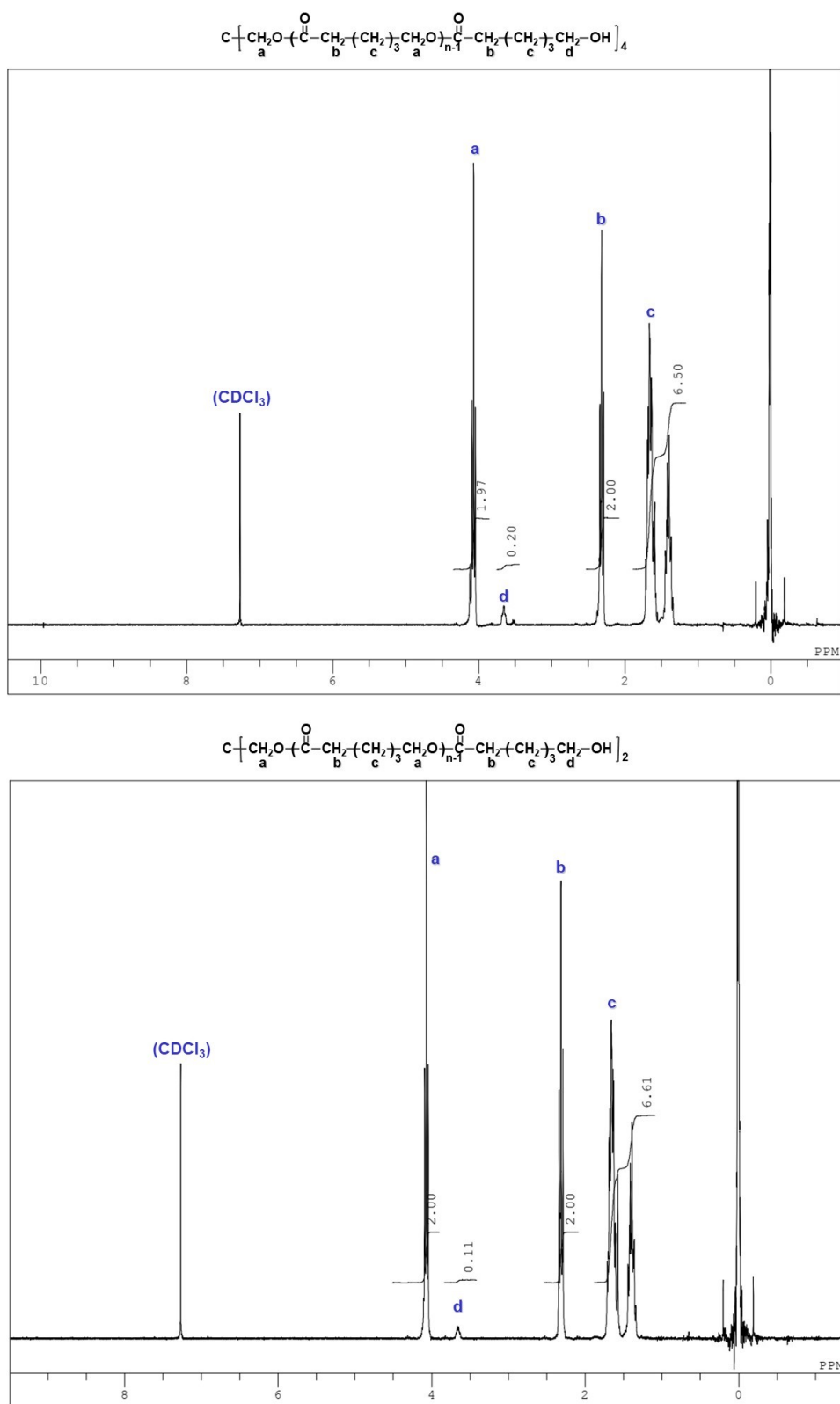
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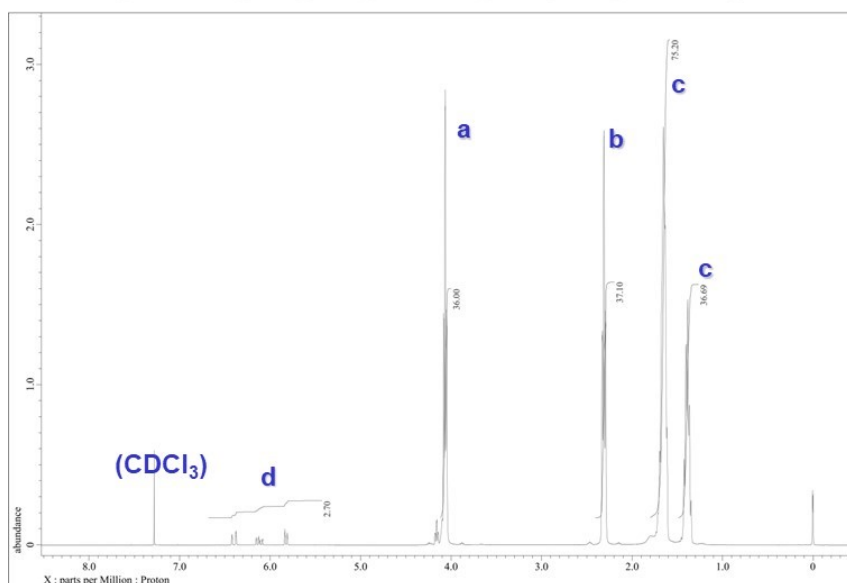
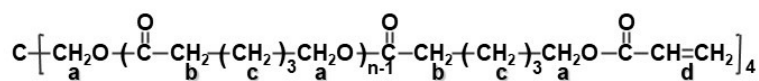
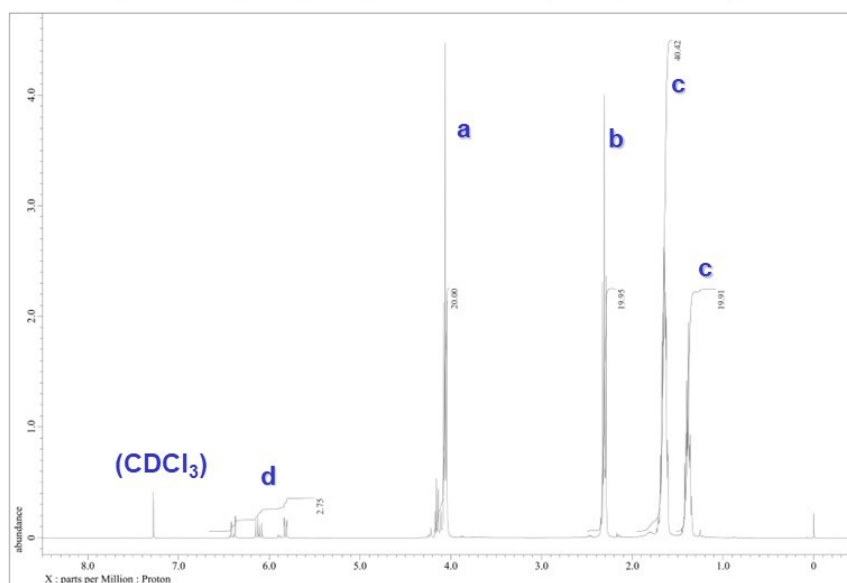
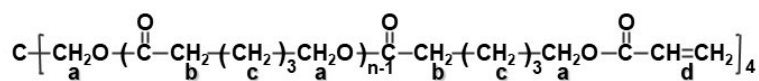
**Fig. S5** Triple-SME of cross-linked 4b10/2b20PCL without containing linear PCLs.

Quantitative thermal mechanical cycle test for (a) TSCP-I and (b) TSCP-II.

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**Fig. S1** Representative  $^1\text{H}$ -NMR spectra of 4b10 PCL (top) and 2b20PCL (bottom).



**Fig. S2** Representative <sup>1</sup>H-NMR spectra of 4b10 PCL macromonomer.

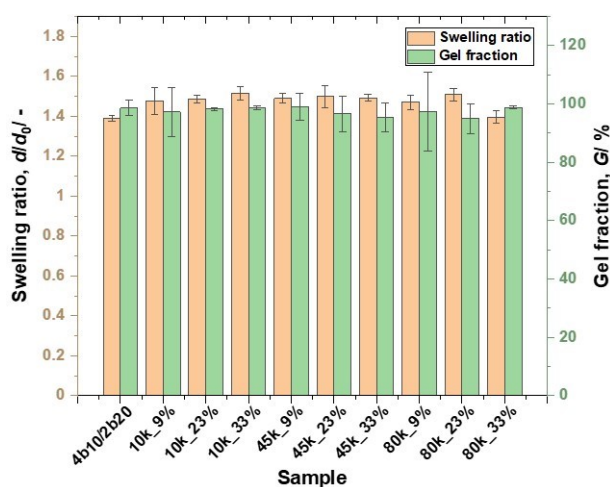
**Table S1.** Molecular weights, polydispersity indexes and degree of acrylation of 4b10PCL and 2b20PCL macromonomers.

Polymer type	Mn (Da) <sup>1)</sup>	Mn (Da) <sup>2)</sup>	Mw (Da) <sup>2)</sup>	PDI <sup>2)</sup>	D.A. (%) <sup>1)</sup>
4b10 PCL-macro	4700	4200	4600	1.1	92
2b20 PCL-macro	4250	4500	5400	1.2	90

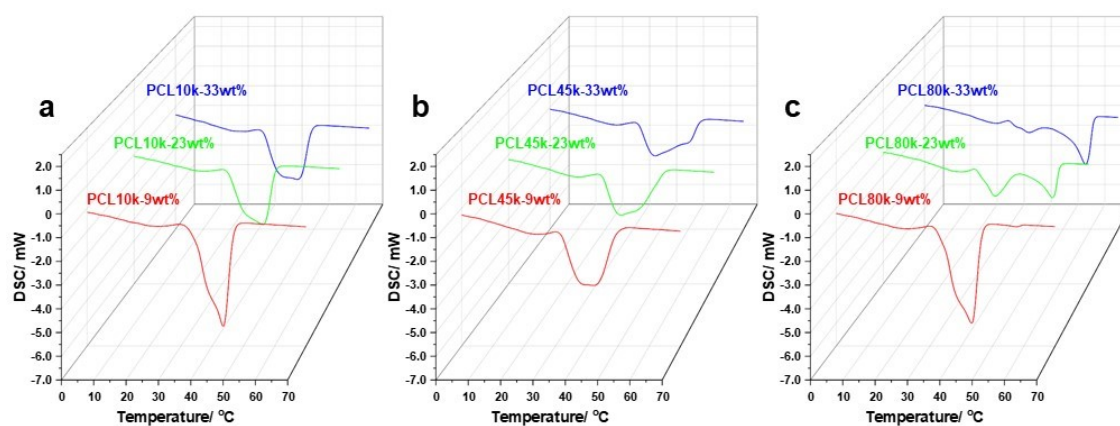
D.A.: Degree of acrylation (End group introduction rate)

1) Calculated by <sup>1</sup>H NMR; solvent: CDCl<sub>3</sub>

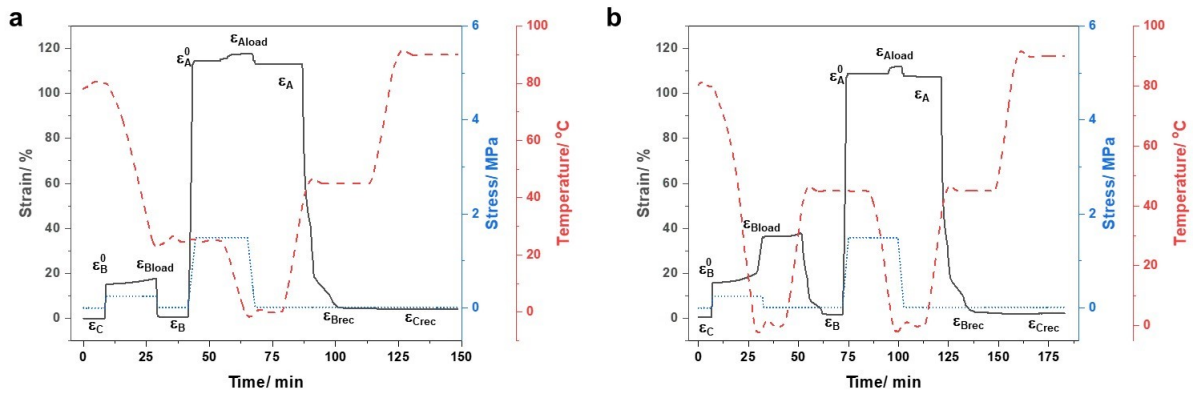
2) Measured by GPC. Solvent: DMF. Standard: PS.



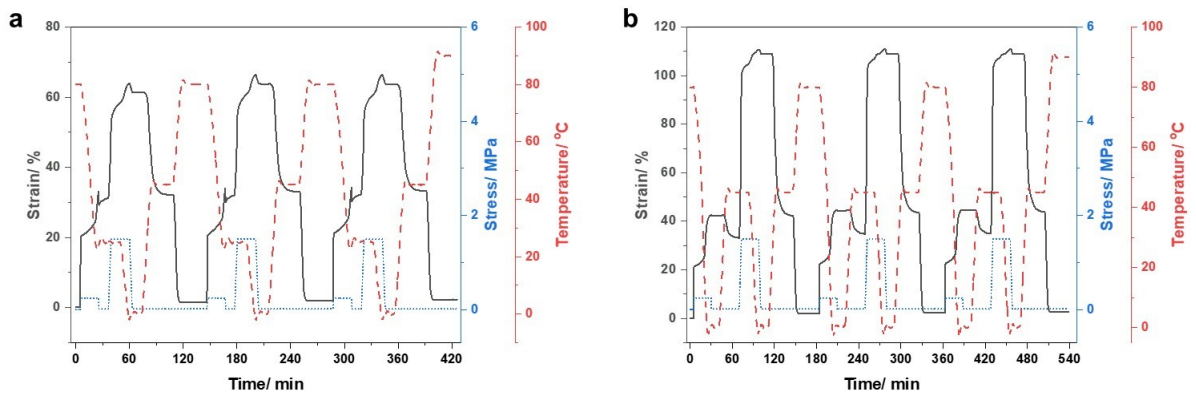
**Fig. S3** Swelling rate  $d/d_0$  and gel fraction  $G$  (%) of cross-linked 4b10/2b20 PCL and PCL semi-IPNs with molecular weights of 10k, 45k and 80k linear PCL at 9wt%, 23wt% and 33wt% content after 72 hours of DMF immersion.



**Fig. S4** Representative heating curves of PCL semi-IPNs with (a) 10k, (b) 45k, and (c) 80k of linear PCL.



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