

Supporting Information

Phase-controllable polymerized ionic liquids for CO₂ fixation into cyclic carbonates

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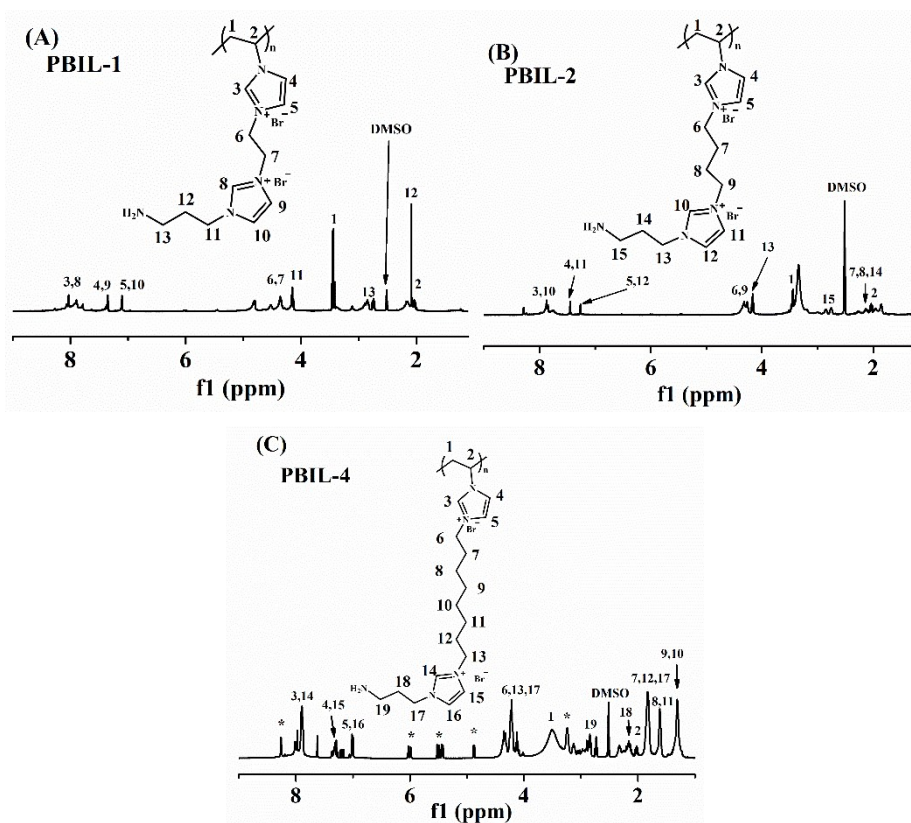


Fig. S1 ¹H NMR spectra of (A) PBIL-1, (B) PBIL-2 and (C) PBIL-4

* Impure peaks

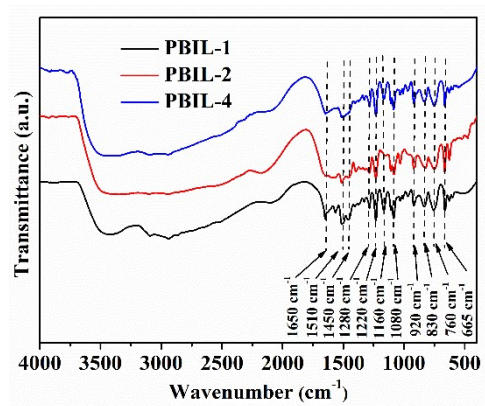


Fig. S2 FT-IR spectra of PBIL-1, PBIL-2 and PBIL-4

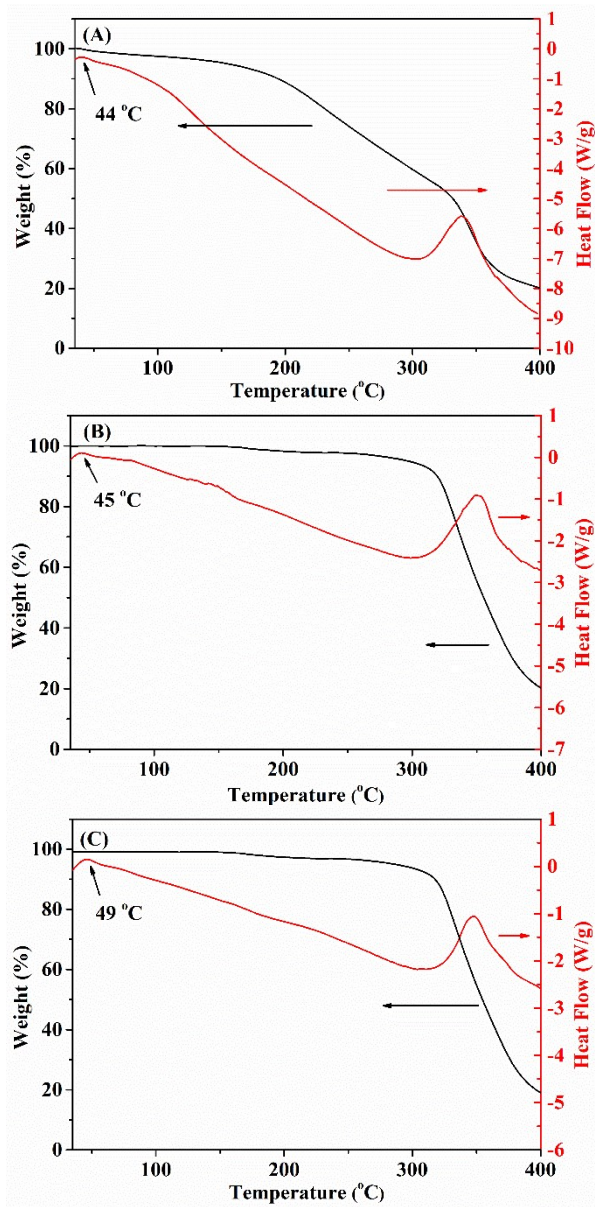


Fig. S3 TG-DSC curves of (A) PBIL-1, (B) PBIL-2 and (C) PBIL-4

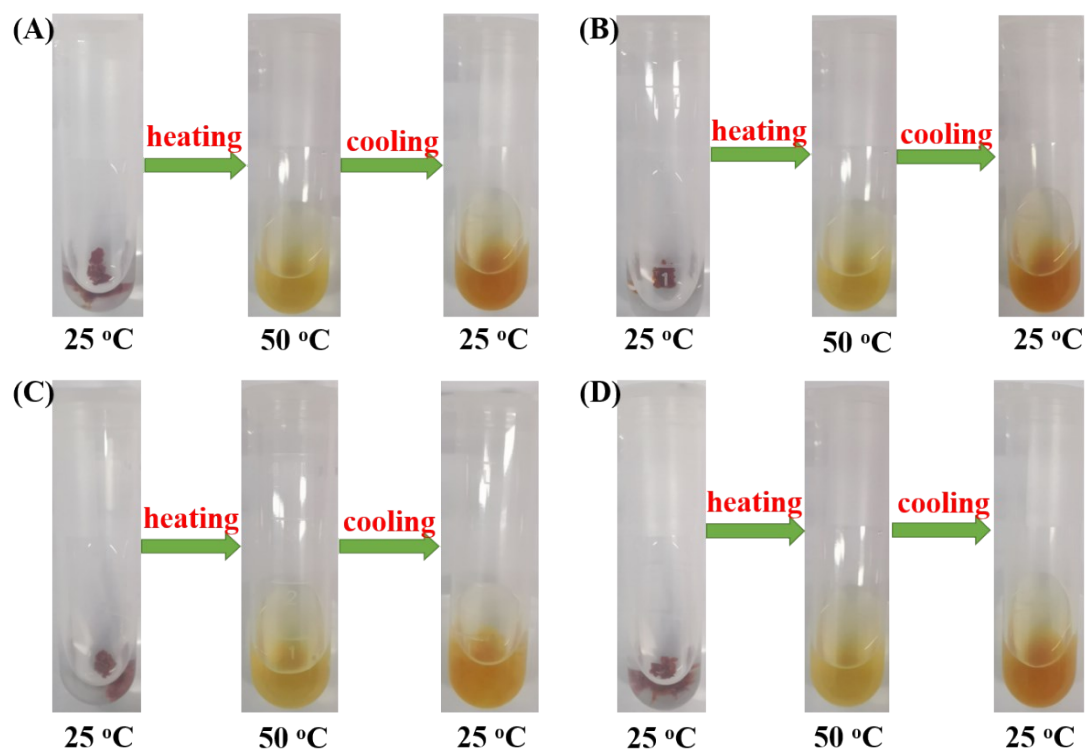


Fig. S4 Phase transition schematic of PBIL-3 in (A) 1,2-epoxybutane, (B) epichlorohydrin, (C) styrene oxide and (D) cyclohexene oxide

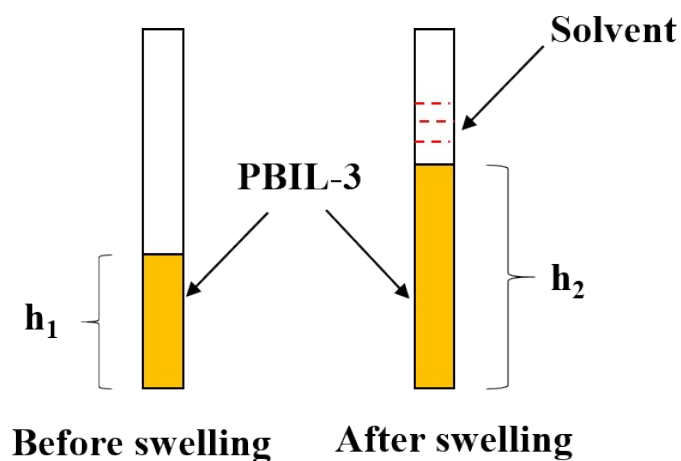


Fig. S5 Schematic of swelling ratio measurement

$$\text{Swelling ratio} = (h_2 - h_1) / h_1 * 100\% \text{ [1,2]}$$

Table S1 Swelling ratio of PBIL-3 in difference substrates (%)^a

T (°C)	PO ^b	BO ^c	ECH ^d	SO ^e	CO ^f	H ₂ O
25	< 5	< 5	< 5	0	0	170 ± 20
40	25 ± 5	25 ± 5	25 ± 5	10 ± 5	10 ± 5	220 ± 20
50	PT ^g	PT	PT	PT	PT	PT

^a PBIL-3 100 mg, swelling time was 30 min.

^b PO = propylene oxide

^c BO = 1,2-epoxybutane

^d ECH = epichlorohydrin

^e SO = styrene oxide

^f CO = cyclohexene oxide

^g PT = phase transition

References

1. S. P. Wang, F. G. He, Q. Weng, Y. Diao, P. Chen, X. B. Chen and Z. W. An, RSC Adv., 2020, **10**, 24772-24783.
2. K. Yang, J. M. Xu, T. N. Shui, Z. G. Zhang, H. Wang, Q. Liu, W. B. Chen, H. C. Shen, H. Y. Zhang, Z. Wang and H. Z. Ni, React. Funct. Polym., 2020, **151**, 104551.