

SUPPORTING INFORMATION for Structure and ionic conductivity of liquid crystals having propylene carbonate units

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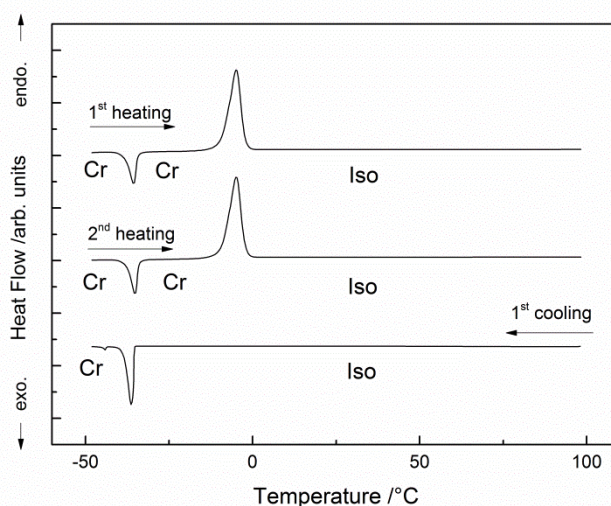


Fig. S1. DSC traces for substance **6**.

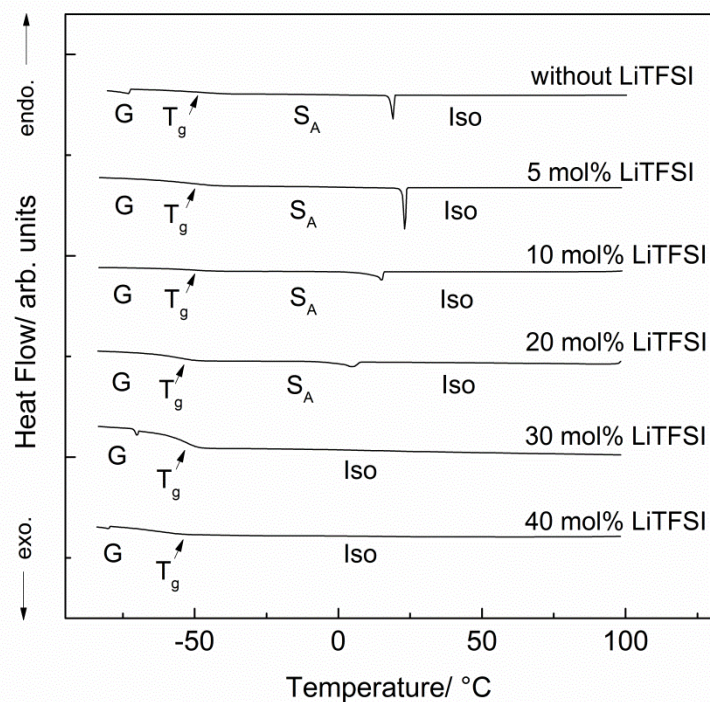


Fig. S2. DSC traces recorded during first cooling scans for the mixtures of compound **4a** with different amounts of LiTFSI.

Table S1. Thermal transitions of compound **4a** and its complexes with LiTFSI (enthalpy (J/g) in parentheses) detected by DSC from the first cooling scans.

Mol% LiTFSI	Phase transition (°C) and corresponding enthalpy changes (J/g) ^a				
0	Iso	19.8 (2.5)	S _A	-47.1	G
5	Iso	23.1 (2.3)	S _A	-49.6	G
10	Iso	17.8 (3.5)	S _A	-49.5	G
20	Iso	4.6 (1.4)	S _A	-49.2	G
30	Iso	-53.0	G		
40	Iso	-53.9	G		

^a S_A, smectic A; Iso, isotropic; G, glassy

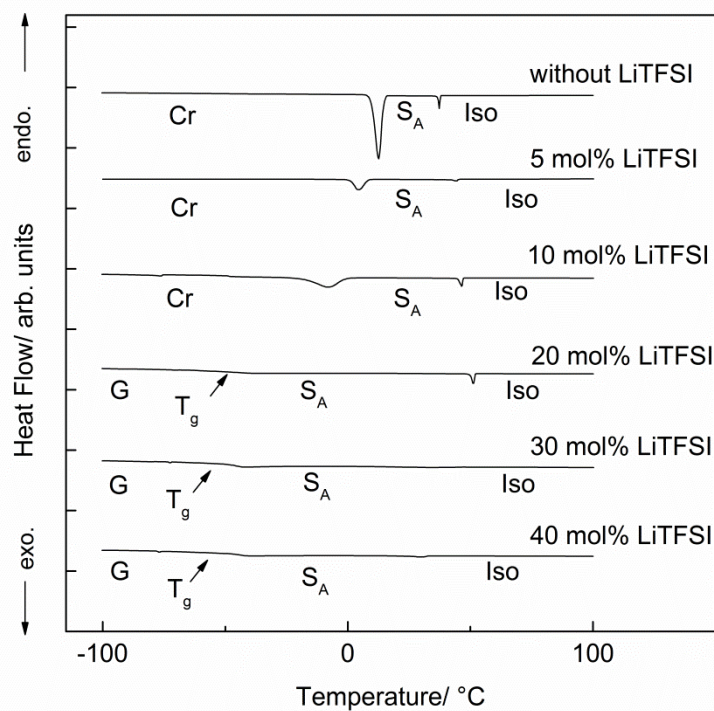


Fig. S3. DSC traces recorded during first cooling scans for the mixtures of compound **4b** with different amounts of LiTFSI.

Table S2. Thermal transitions of compound **4b** and its complexes with LiTFSI (enthalpy (J/g) in parentheses) detected by DSC from the first cooling scans.

Mol% LiTFSI	Phase transition (°C) and corresponding enthalpy changes (J/g) ^a				
0	Iso	37.3 (2.6)	S _A	12.7 (53.9)	Cr
5	Iso	43.7 (2,5)	S _A	-1.5 (40.9)	Cr
10	Iso	46.4 (2.2)	S _A	-8.2 (21.1)	Cr
20	Iso	51.3 (1.7)	S _A	-46.1	G
30	Iso	34.3 (0.8)	S _A	-45.4	G
40	Iso	29.7 (0.7)	S _A	-43.6	G

^a Cr, crystalline; S_A, smectic A; Iso, isotropic; G, glassy

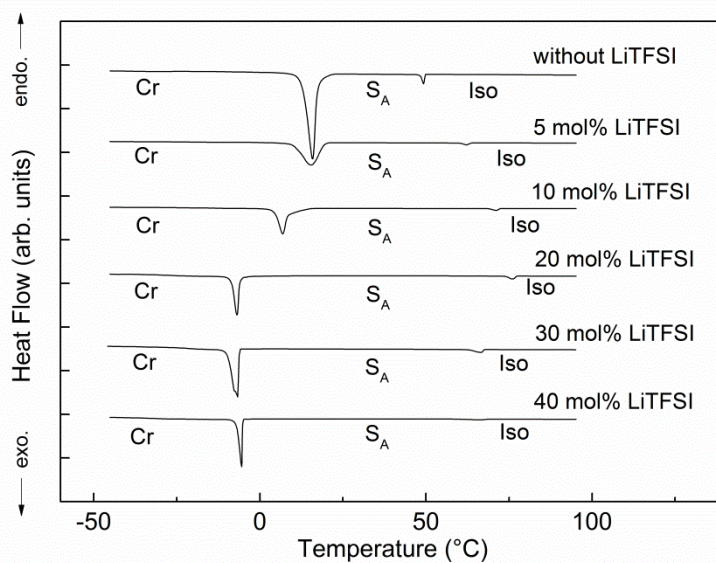


Fig. S4. DSC traces recorded during first cooling scans for the mixtures of compound **4c** with different amounts of LiTFSI.

Table S3. Thermal transitions of compound **4c** and its complexes with LiTFSI (enthalpy (J/g) in parentheses) detected by DSC from the first cooling scan.

Mol% LiTFSI	Phase transition (°C) and corresponding enthalpy changes (J/g) ^a					
0	Iso	49.2 (2.1)	S _A	15.9 (63.5)	Cr	
5	Iso	62.1 (1.8)	S _A	15.9 (62.8)	Cr	
10	Iso	71.1 (1.7)	S _A	6.8 (40.6)	Cr	
20	Iso	75.9 (1.7)	S _A	-6.9 (21.8)	Glassy	-26.3 Cr
30	Iso	66.6 (1.5)	S _A	-6.7 (20.2)	Glassy	-20.6 Cr
40	Iso	64.9 (1.1)	S _A	-5.5 (20.6)	Glassy	-33.0 Cr

^a Cr, crystalline; S_A, smectic A; Iso, isotropic

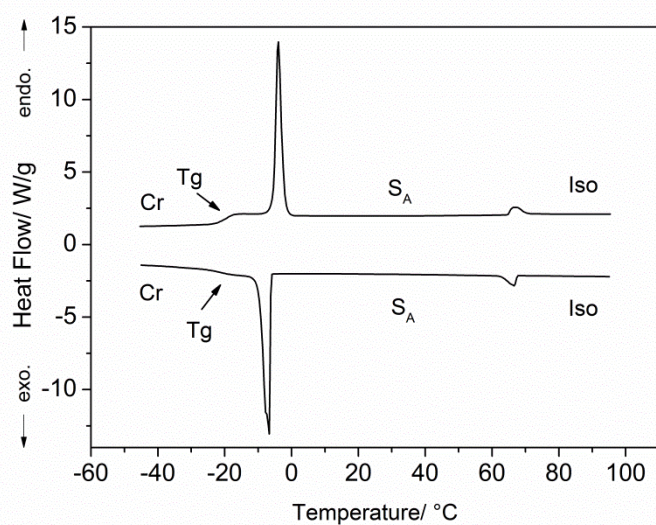


Fig. S5. DSC traces for substance **4c** mixed with 30 mol% LiTFSI on the heating and cooling scan showing the formation of an enantiotropic mesophase.

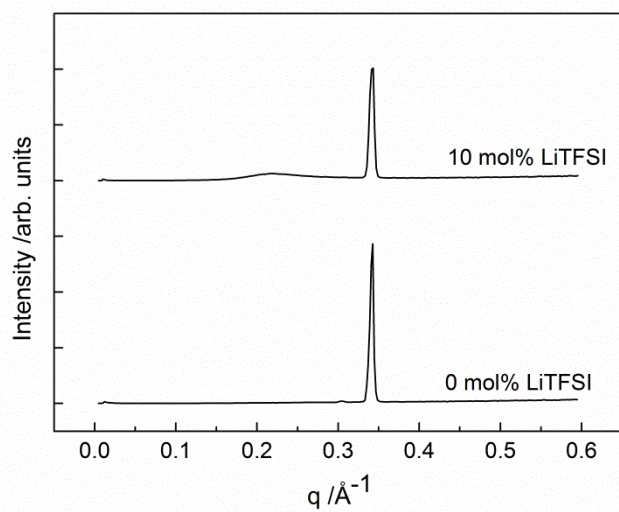


Fig. S6 SAXS curves of compound **4a** with various amounts of LiTFSI. The curves were shifted vertically for clarity.

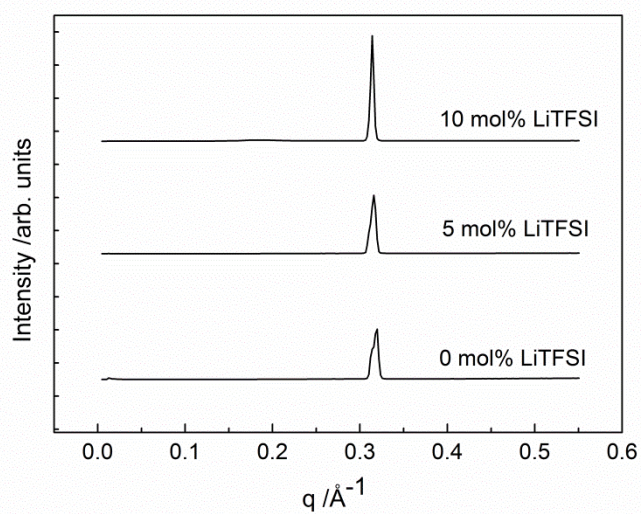


Fig. S7 SAXS curves of compound **4b** with various amounts of LiTFSI. The curves were shifted vertically for clarity.

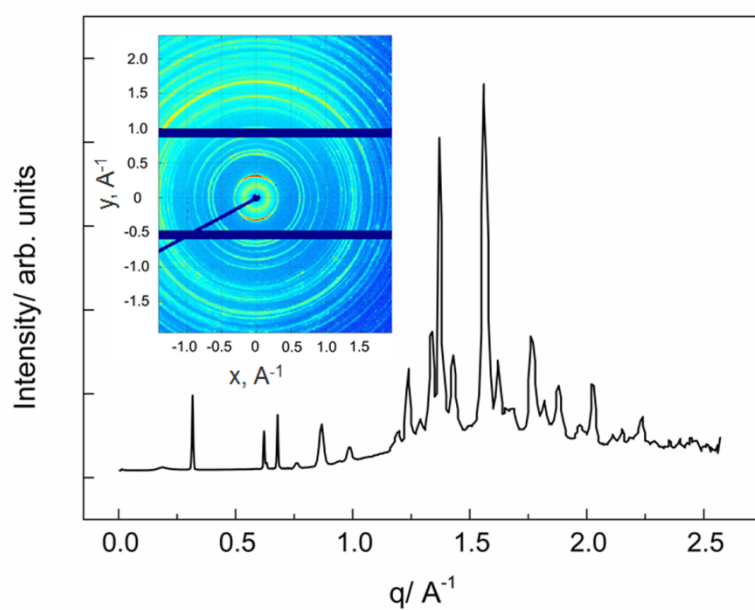


Fig. S8. WAXS and SAXS curves for **4b** mixed with 10 mol% LiTFSI at room temperature. The inset shows the 2D WAXS image of the compound.

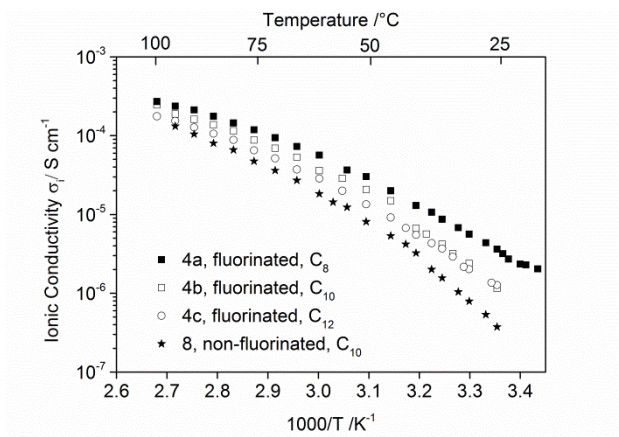


Fig. S9. Arrhenius plots of ionic conductivity ($\sigma_{i\parallel}$) for the compounds **4a**, **4b**, **4c** and **8** with 10 mol% LiTFSI measured on cooling with cell A.

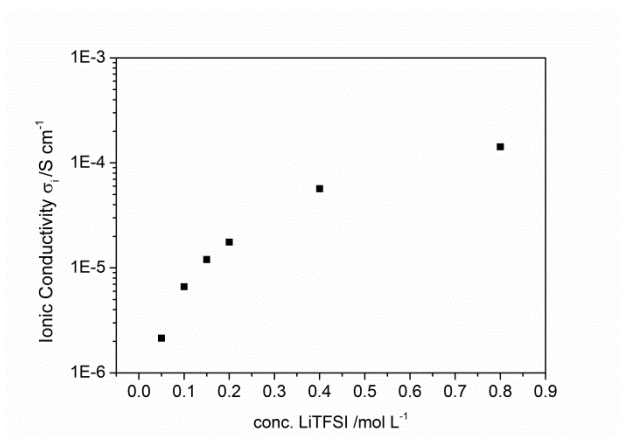


Fig. S10. Ionic conductivity (σ_i) of **6** at $T = 30^\circ\text{C}$ with various amounts of LiTFSI.

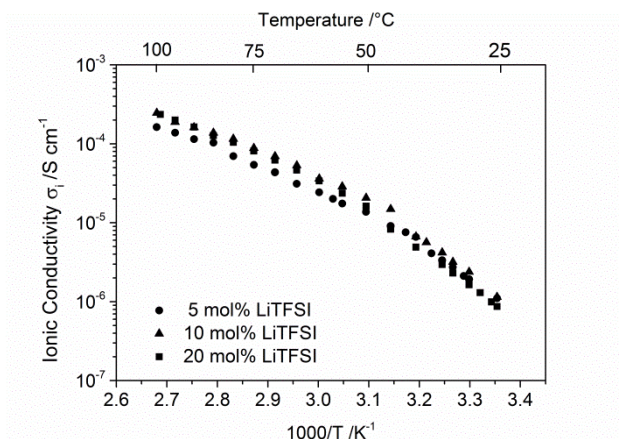


Fig. S11. Ionic conductivity (σ_i) of **4b** with various amounts of LiTFSI measured on cooling with cell A.

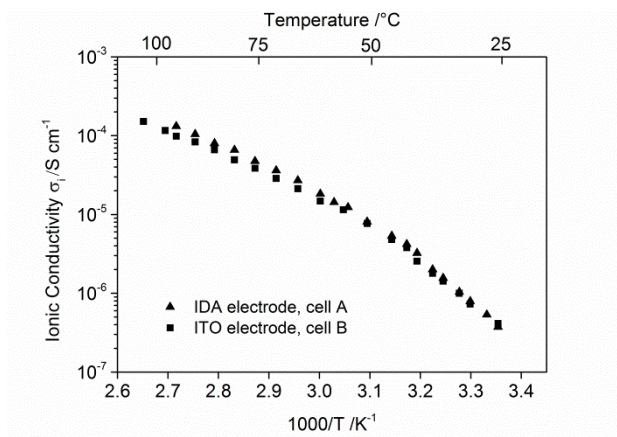


Fig. S12. Arrhenius plots of ionic conductivity for the compounds **8** with 10 mol% LiTFSI measured on cooling with cell A and cell B.

Table S4 Molecular weight, mass density and salt concentration C of the compounds **4a**, **4b** and **6** with 10 mol% LiTFSI.

Compound	M_w (g/mol)	ρ (g/cm ³)	C (mol/cm ³)
4a/10 mol% LiTFSI	422.4	1.15	3.3×10^{-4}
4b/10 mol% LiTFSI	450.4	1.18	2.7×10^{-4}
6/10mol% LiTFSI	554.7	1.20	1.9×10^{-4}

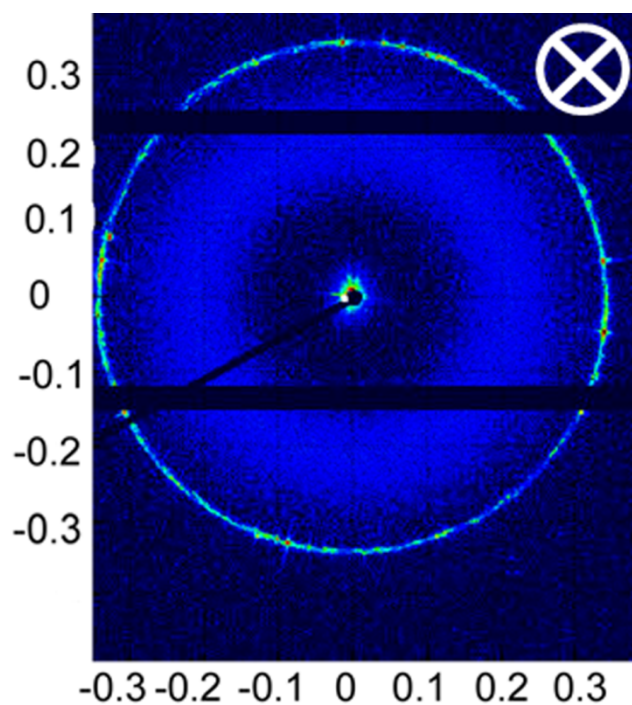


Fig. S13. 2D SAXS image of **4a** with 10 mol% LiTFSI after treatment in a magnetic field. The smectic layer plane is oriented perpendicular to the surface in direction of the magnetic field. The cross indicates the direction of the applied magnetic field.

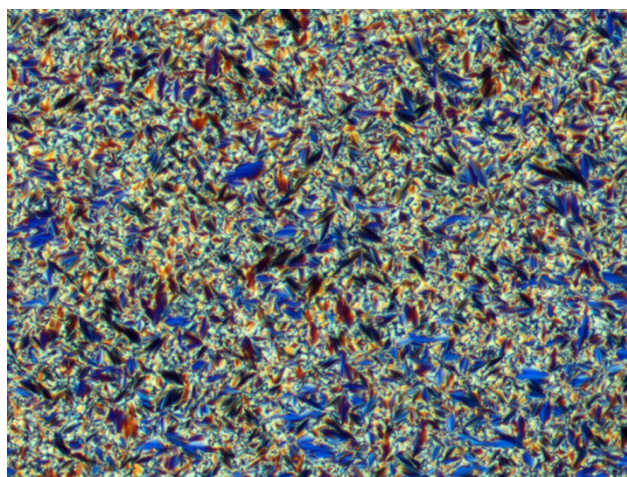


Fig. S14. POM picture of substance **4b** mixed with 10 mol% LiTFSI on cooling from isotropic melt. Substance forms polydomains.

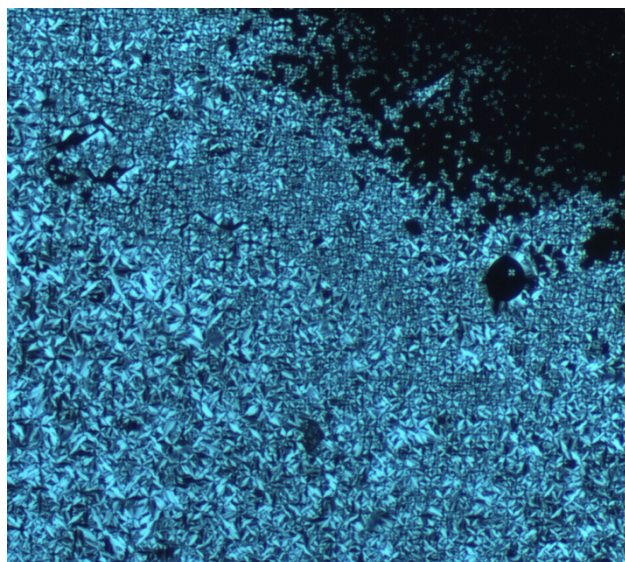


Fig. S15. POM picture of substance **8** on cooling from isotropic melt. Right up: Formation of focal conic texture; Left down: Formation of fan-shaped texture. Both textures are an indication for the formation of a S_A mesophase.

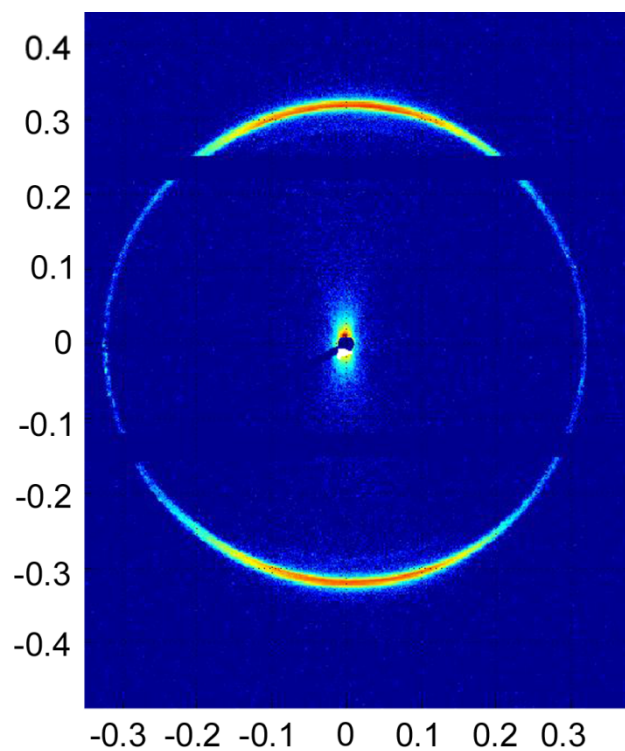


Fig. S16. 2D SAXS image of **4b** without LiTFSI.

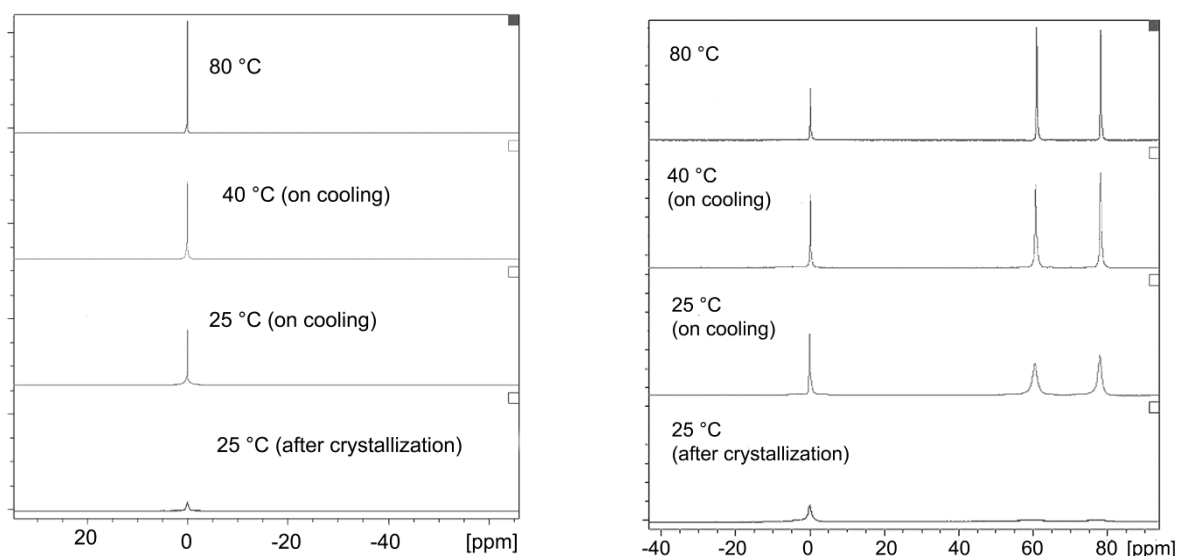


Fig. S17. Right: ${}^7\text{Li}$ spectra of **4a** mixed with 10 mol% LiTFSI observed on cooling from 80 °C. Left: ${}^{19}\text{F}$ NMR spectra of **4a** mixed with 10 mol% LiTFSI observed on cooling from 80 °C. Besides the ${}^{19}\text{F}$ of LiTFSI (0.0 ppm), the ${}^{19}\text{F}$ spectra showed also two ${}^{19}\text{F}$ resonances from the perfluorinated aromatic core.

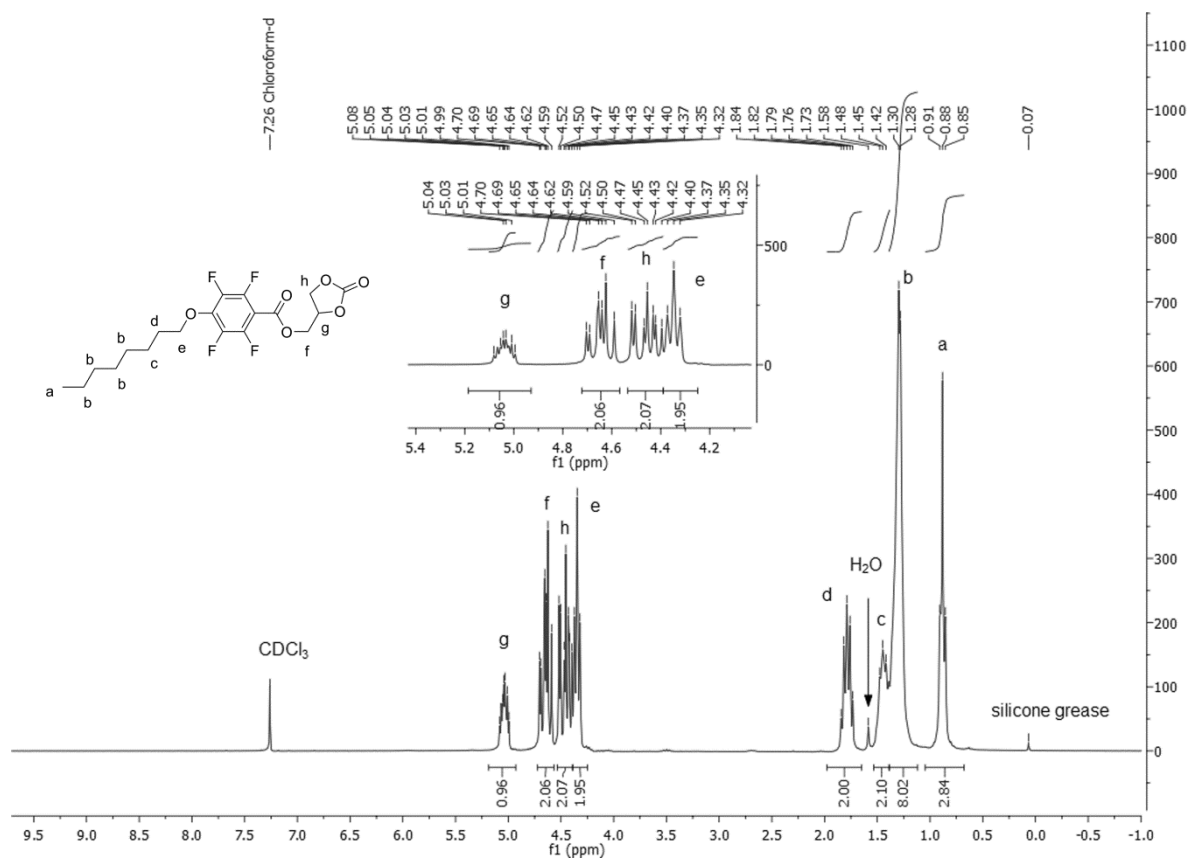


Fig. S18. ${}^1\text{H}$ NMR spectrum of substance **4a**.

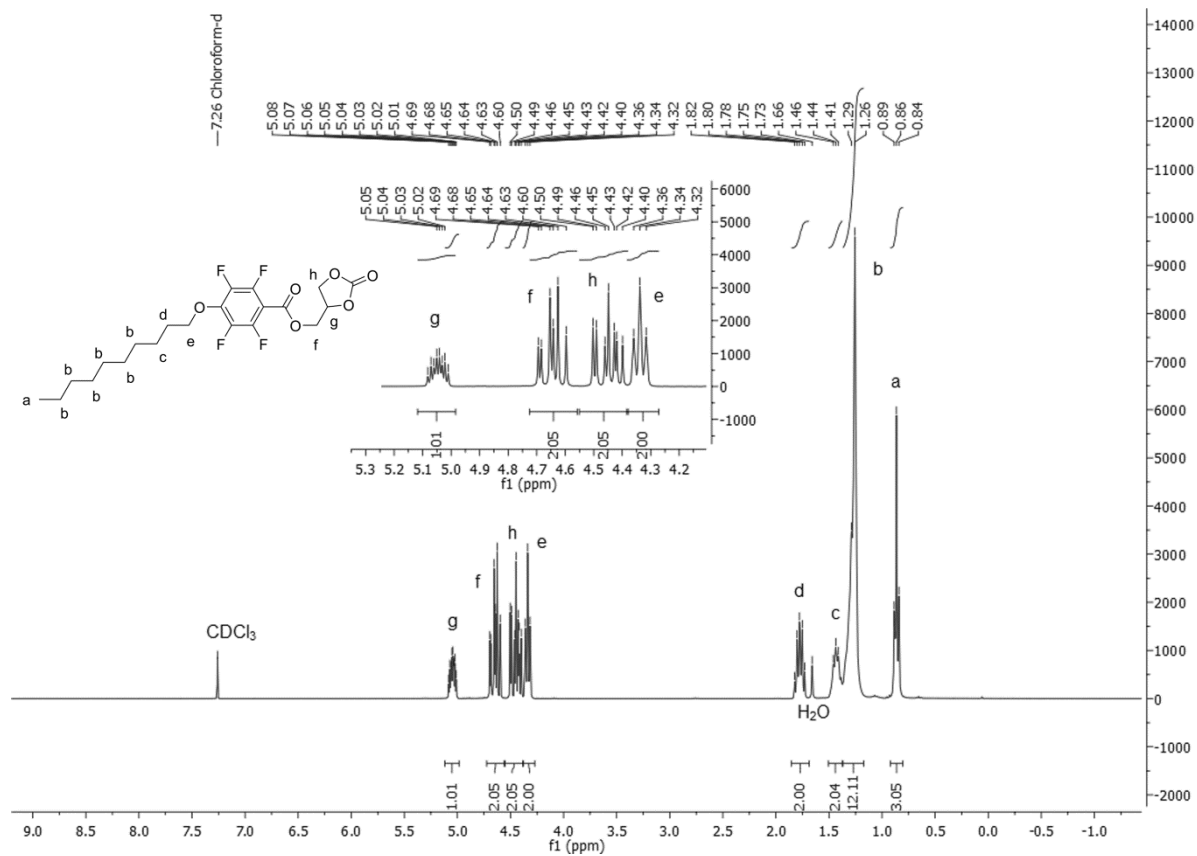


Fig. S19. ¹H NMR spectrum of substance **4b**.

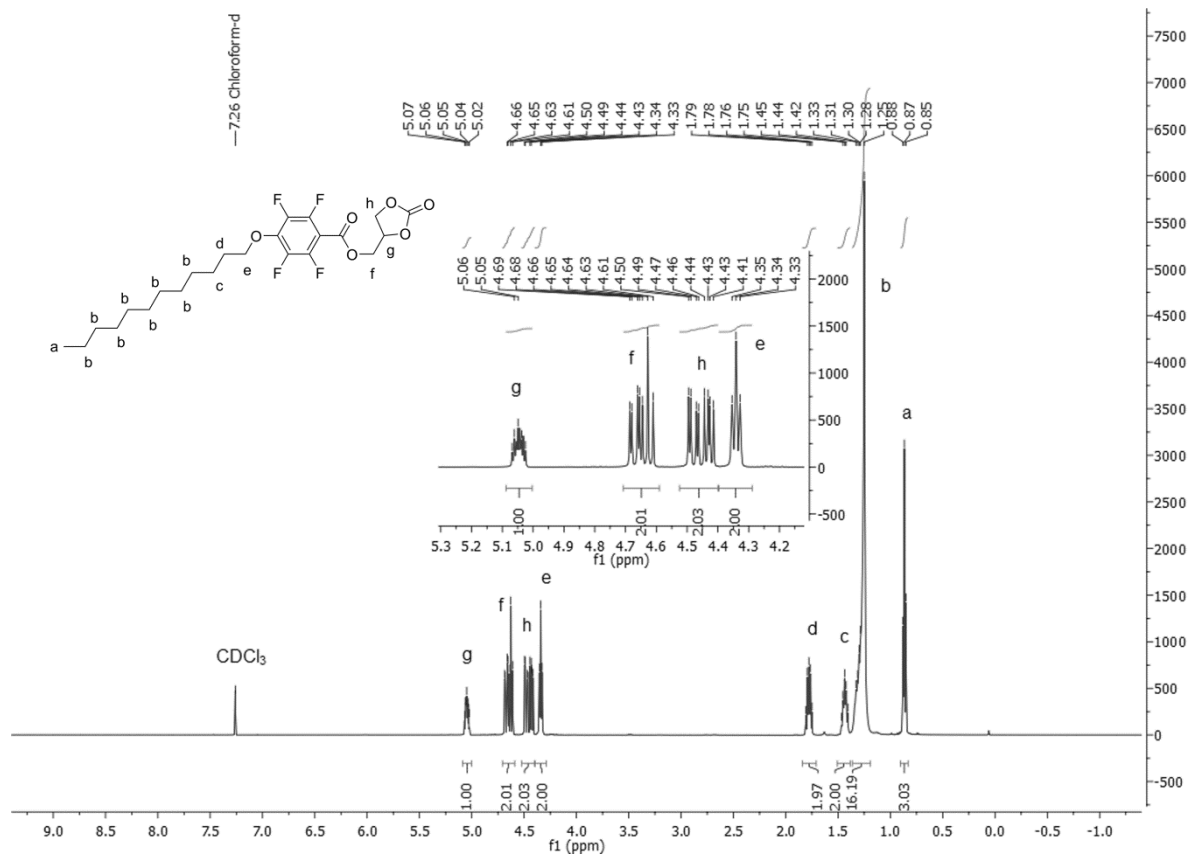


Fig. S20. ¹H NMR spectrum of substance **4c**.

