

## Electronic Supplementary Information

### Structure, hydrogen bond dynamics and phase transition in a model ionic liquid electrolyte.

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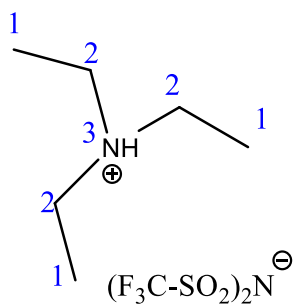
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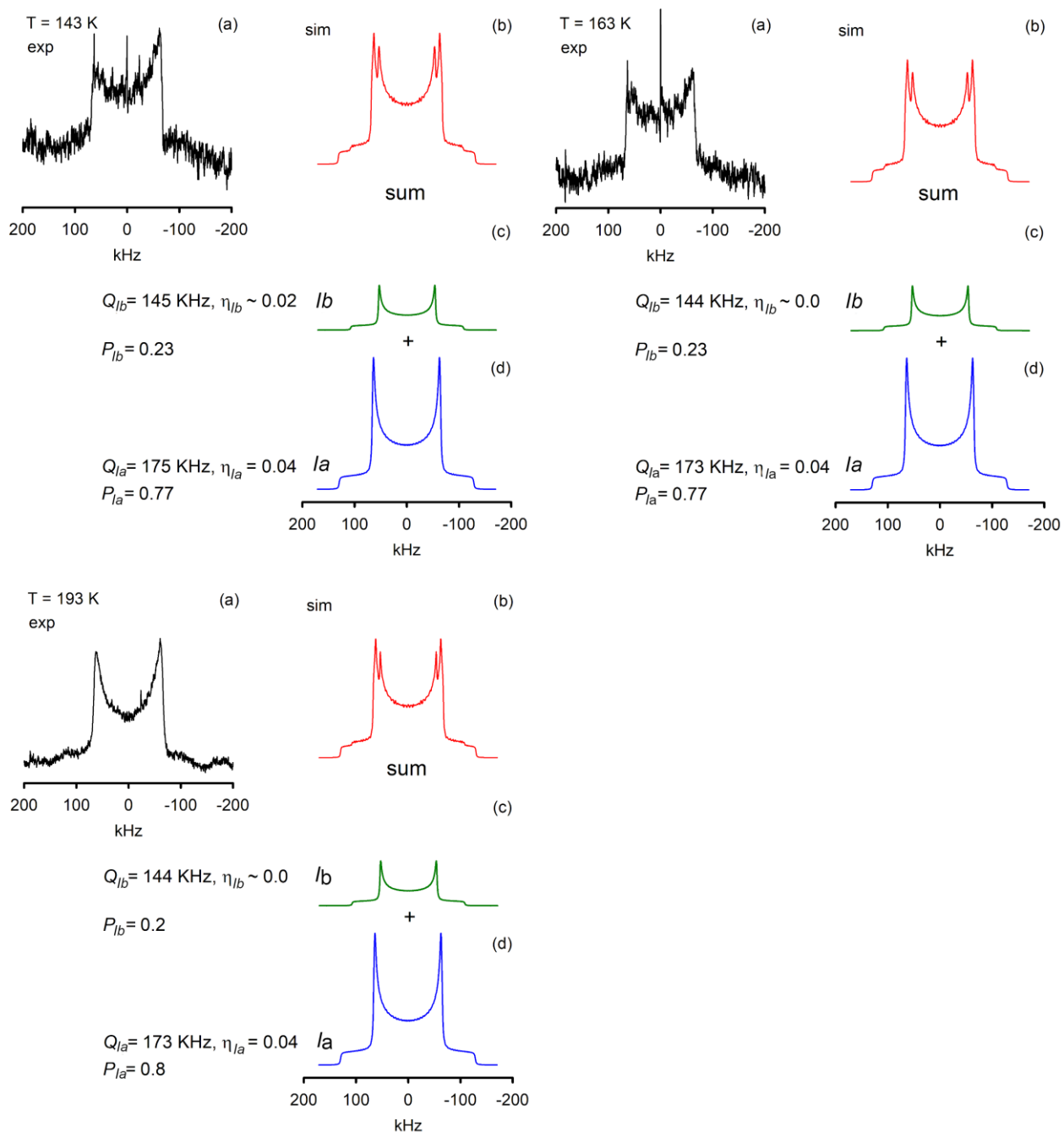
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# NMR of [TEA][NTf<sub>2</sub>]

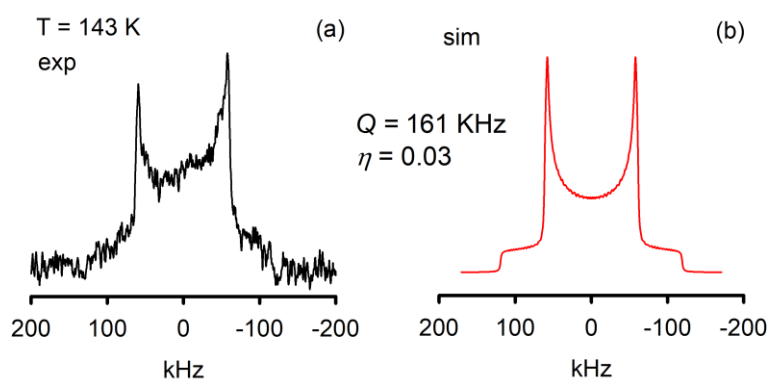


N°	δ(ppm)	Signal	Integration
3	8.84	S	1
2	3.10	Q	6
1	1.17	T	9

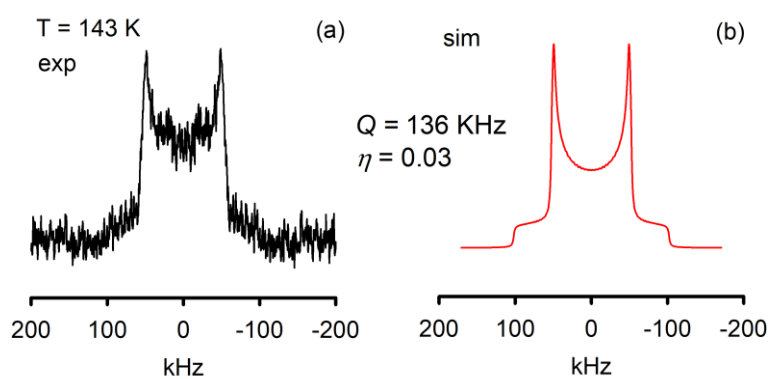
**Solid state NMR spectra of [TEA][NTf<sub>2</sub>], [TEA][OTf] and [TEA][OMs]**



**Figure S1.** <sup>2</sup>H NMR spectra of [TEA][NTf<sub>2</sub>] at 143 K, 163 K and 193 K: For each temperature we show the (a) experimental, (b) simulated and (c-d) the deconvoluted spectra.

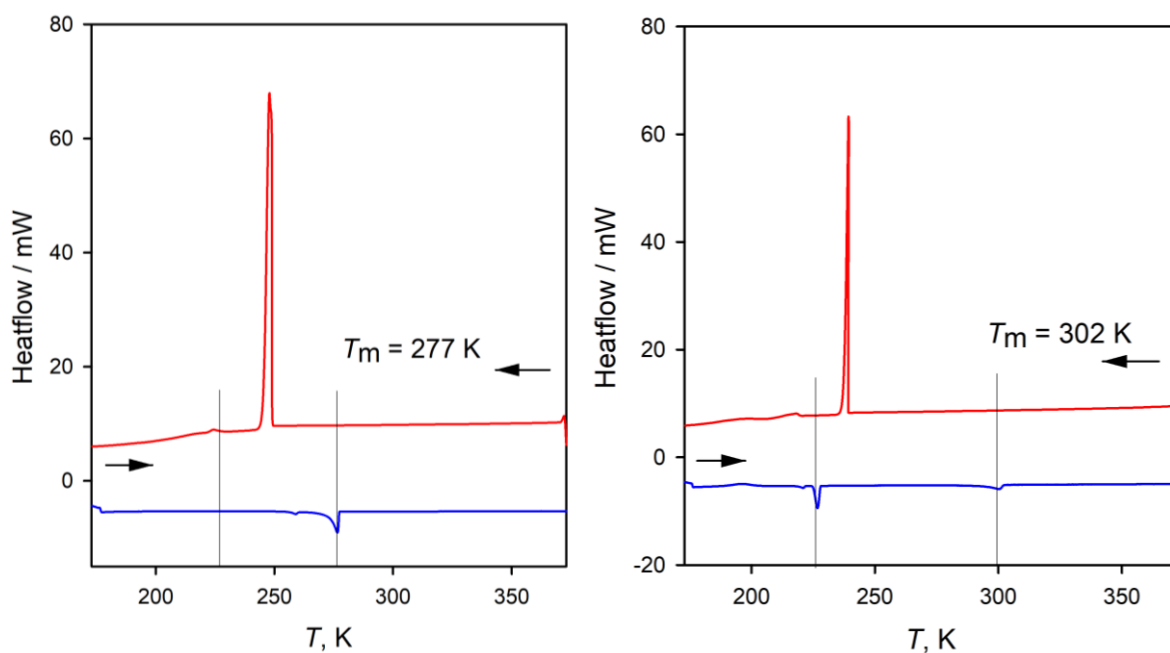


**Figure S2.**  $^2\text{H}$  NMR spectra of [TEA][OTf] at 143 K: (a) experimental, (b) simulated spectra.

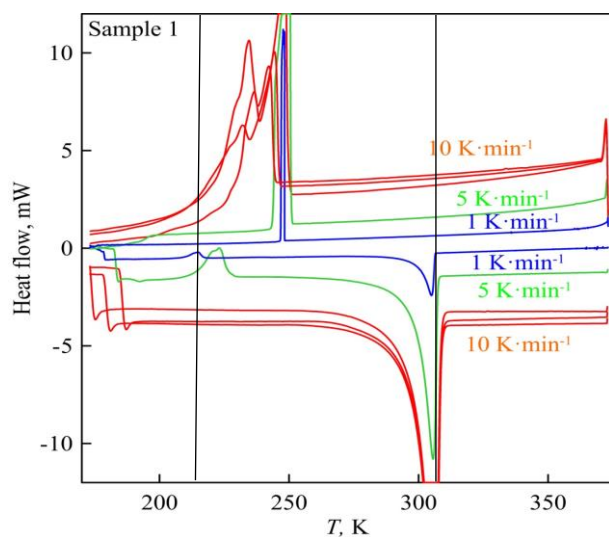


**Figure S3.**  $^2\text{H}$  NMR spectra of [TEA][OMs] at 143 K: (a) experimental, (b) simulated spectra.

### DSC profiles of [TEA][NTf<sub>2</sub>], [TEA][OTf] and [TEA][OMs]



**Figure S4** The DSC profile for [TEA][NTf<sub>2</sub>] (left) and [TEA][OTf] samples: the heating rate was 1 K·min<sup>-1</sup>.



**Figure S5.** The DSC profile for [TEA][OMS] samples; blue line is cooling and heating with 1 K·min<sup>-1</sup>, green lines corresponds to cooling and heating with 5 K·min<sup>-1</sup>, red line - 10 K·min<sup>-1</sup>. The curves with the same heating or cooling rate are shifted for 0.1 mW for better illustration.