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SUPPLEMENTARY MATERIAL

The microheterogeneity in ionic liquid mixtures: hydrogen bonding, dispersed ions and dispersed ion clusters

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^{1}H-NMR spectra of neat ionic liquids.

Figure S1.^{1}H-NMR of [C_4C_1IM]Cl.

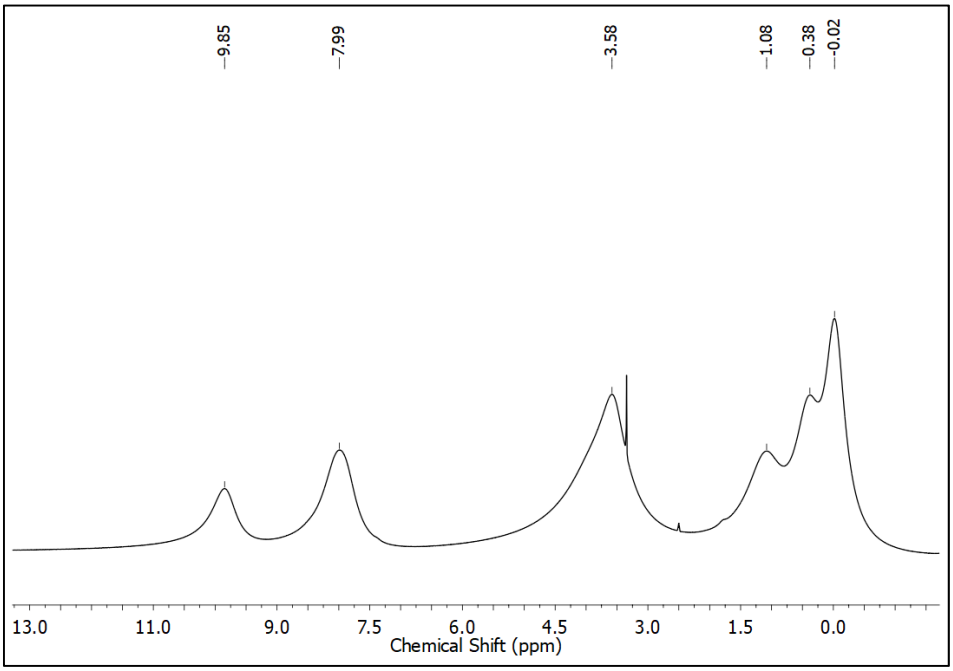

Figure S2.^{1}H-NMR of [C_4C_1IM]Br.

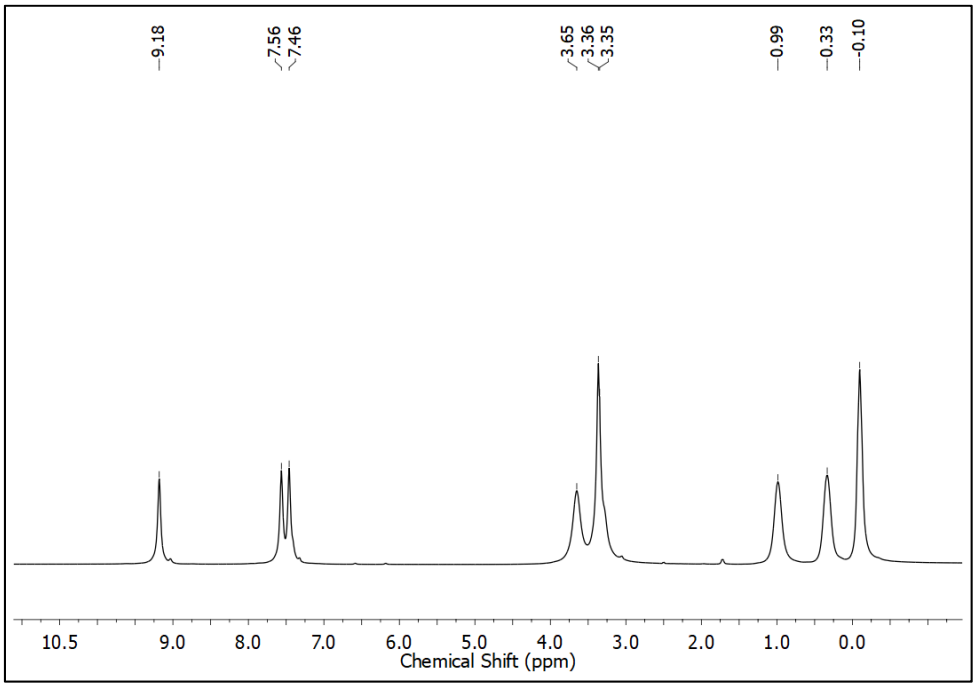

Figure S3.[1]H-NMR of $[C_8C_1IM]Cl$.

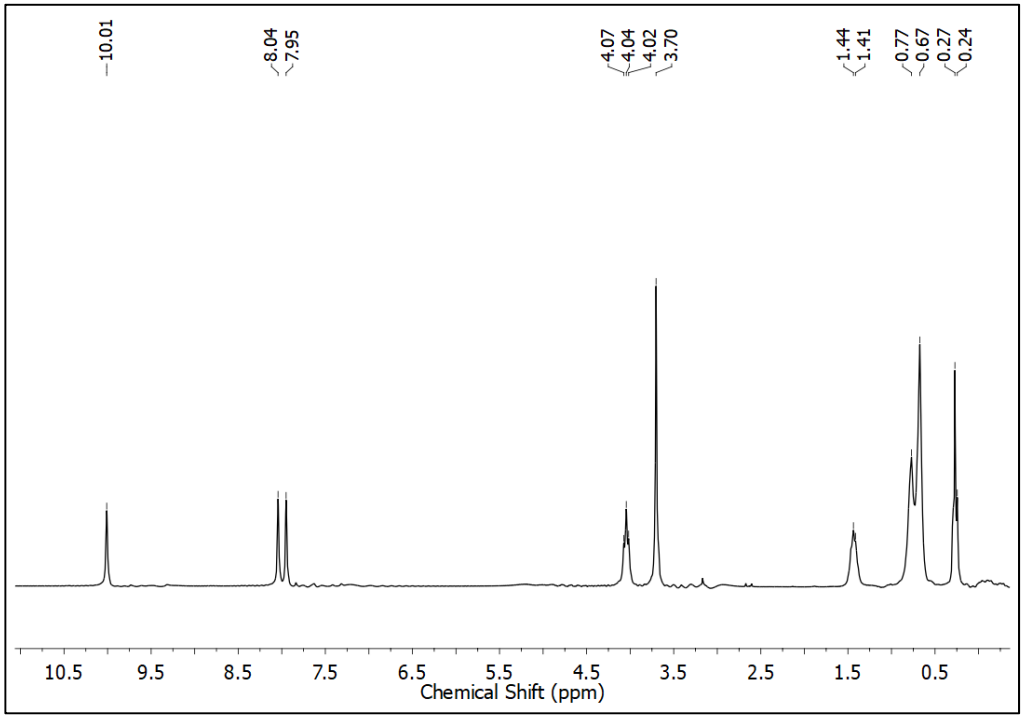

Figure S4.[1]H-NMR of $[C_4C_1IM]Tf_2N$.

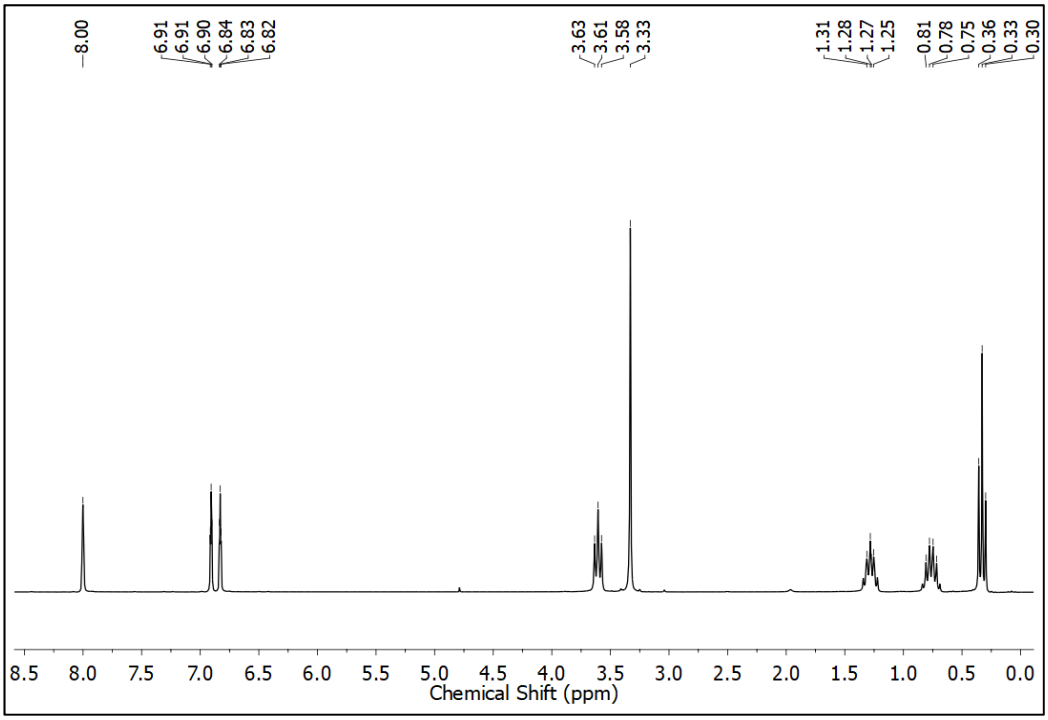

Figure S5.^{1}H-NMR of $[C_4C_1IM]PF_6$.

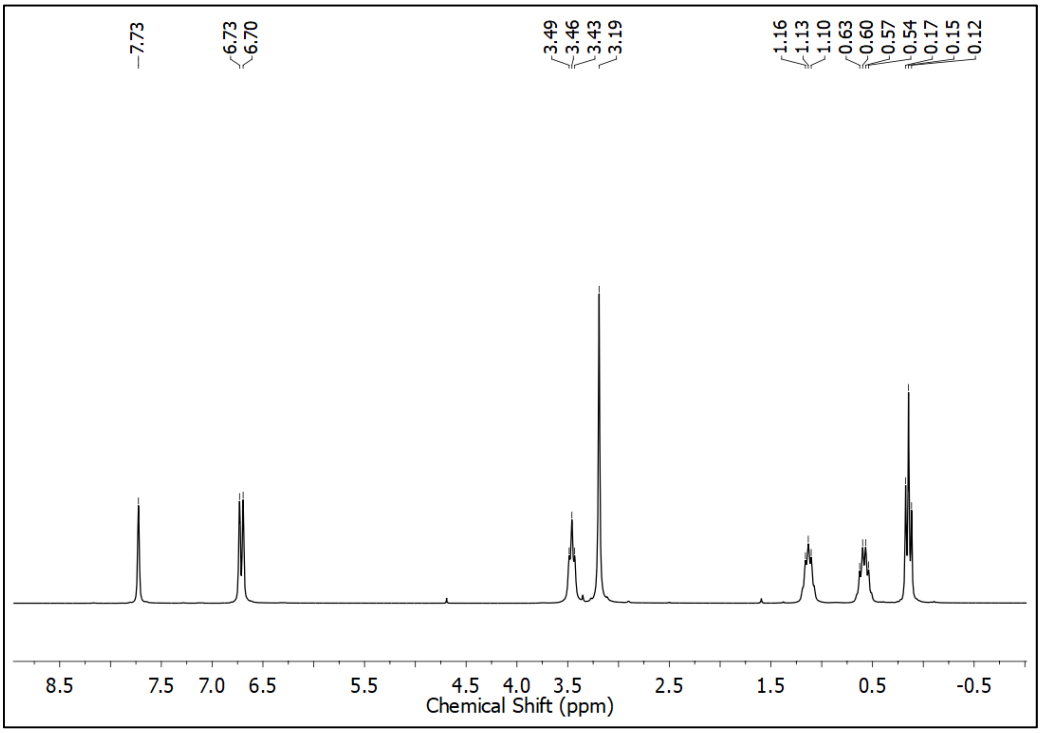

Figure S6.1H-NMR of $[C_8C_1IM]$ Tf_2N.

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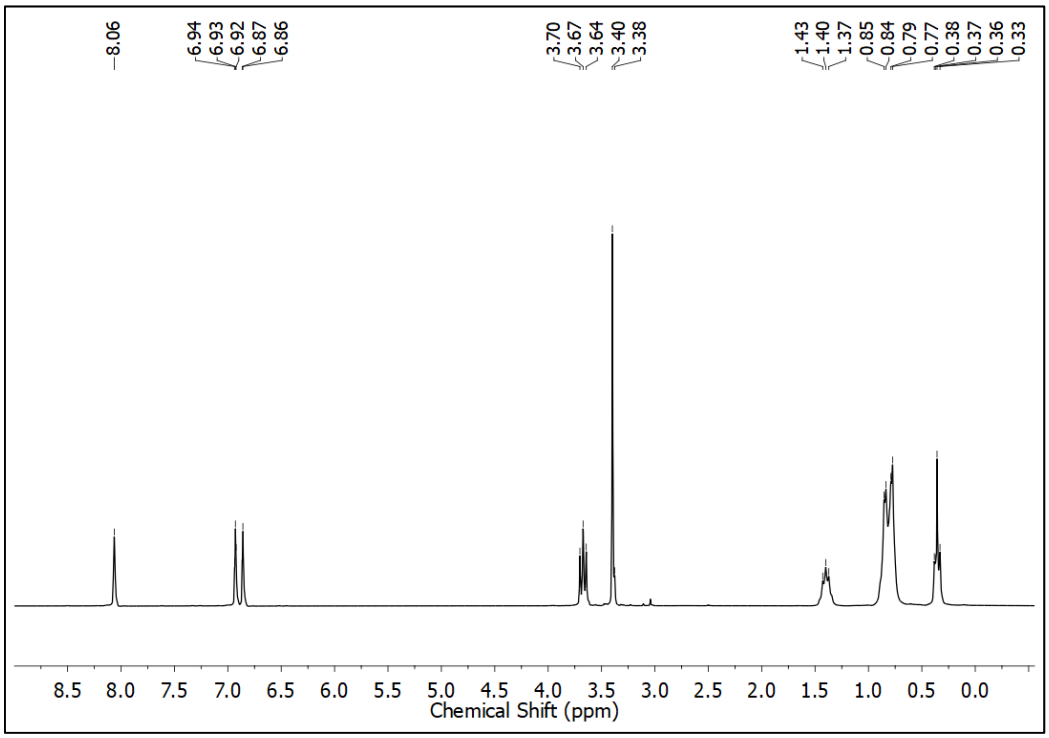

^{1}H-NMR table of mixtures

Table S1: ^{1}H NMR chemical of $[C_4C_1IM][Tf_2N]_{1-x}Cl_x$ mixtures.

χ_{Cl}	H^2 ppm	H^4 ppm	H^5 ppm
0	8.001	6.909	6.834
0.0127	8.044	6.921	6.846
0.0221	8.073	6.931	6.847
0.0736	8.242	6.986	6.909
0.104	8.345	7.031	6.943
0.146	8.463	7.068	6.985
0.227	8.697	7.158	7.071
0.377	9.018	7.314	7.207
0.509	9.288	7.469	7.371
0.705	9.576	7.712	7.597
0.847	9.721	7.867	7.751
0.955	9.808	7.858	7.858
1	9.847	7.987	7.987

Table S2: ^{1}H NMR chemical of $[C_4C_1IM][Tf_2N]_{1-x}Br_x$ mixtures.

χ_{Br}	H^2 ppm	H^4 ppm	H^5 ppm
0	8.001	6.907	6.829
0.0107	8.024	6.918	6.841
0.0195	8.046	6.932	6.854
0.0619	8.143	6.974	6.881
0.0942	8.224	6.997	6.918
0.133	8.303	7.028	6.941
0.193	8.416	7.092	6.998
0.321	8.613	7.172	7.073
0.452	8.800	7.264	7.174
0.658	8.998	7.389	7.296
0.818	9.110	7.483	7.391
0.945	9.177	7.541	7.442
1	9.216	7.557	7.451

Table S3: ^{1}H NMR chemical of $[C_4C_1IM][PF_6]_{1-x}Cl_x$ mixtures.

χ_{Cl}	H^2 ppm	H^4 ppm	H^5 ppm
0.0000	7.727	6.726	6.697
0.0094	7.760	6.737	6.704
0.0210	7.796	6.746	6.709
0.0550	7.899	6.778	6.749
0.0965	8.022	6.821	6.784
0.134	8.135	6.863	6.818
0.183	8.281	6.908	6.872
0.332	8.644	7.071	7.008
0.455	8.943	7.186	7.118
0.659	9.337	7.517	7.407
0.815	9.567	7.714	7.601
0.945	9.754	7.891	7.784
1	9.847	7.987	7.987

Table S4: ^{1}H NMR chemical of $[C_8C_1IM][Tf_2N]_{1-x}Cl_x$ mixtures

χ_{Cl}	H^2 ppm	H^4 ppm	H^5 ppm
1	10.016	8.061	8.051
0.947	9.924	7.991	7.984
0.827	9.816	7.843	7.8209
0.654	9.581	7.662	7.595
0.470	9.392	7.505	7.431
0.344	9.113	7.337	7.254
0.191	8.714	7.171	7.097
0	8.087	6.954	6.873

Additivity parameters

Table S5. Additivity parameters of mixtures

$C_4C_1IM\ PF_6$->Cl			$C_8C_1IM\ Tf_2N$->Cl			$C_4C_1IM\ Tf_2N$ -> Br			$C_4C_1IM\ Tf_2N$ -> Cl		
χ	725-925	2800-3200	χ	725-925	2800-3200	χ	725-925	2800-3200	χ	725-925	2800-3200
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.13	0.07	0.05	0.19	0.04	0.35	0.19	0.11	0.32	0.15	0.08	0.32
0.18	0.09	0.02	0.34	0.02	0.10	0.32	0.14	0.20	0.23	0.10	0.30
0.33	0.09	0.02	0.47	0.02	0.16	0.45	0.18	0.17	0.38	0.15	0.22
0.46	0.14	0.04	0.65	0.03	0.14	0.66	0.23	0.19	0.51	0.18	0.19
0.66	0.13	0.03	0.83	0.04	0.24	0.82	0.29	0.26	0.70	0.25	0.31
0.82	0.10	0.03	0.95	0.02	0.20	0.95	0.33	0.12	0.85	0.29	0.39
1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.96	0.31	0.14

Thermal gravimetric analysis (TGA) of mixtures

Figure S1: Temperature-ramped TGA for ionic liquids mixtures. Upper:$[C_4C_1IM][Tf_2N]_{1-x}Cl_x$; middle: $[C_4C_1IM][Tf_2N]_{1-x}Br_x$,; lower: $[C_8C_1IM][Tf_2N]_{1-x}Cl_x$.

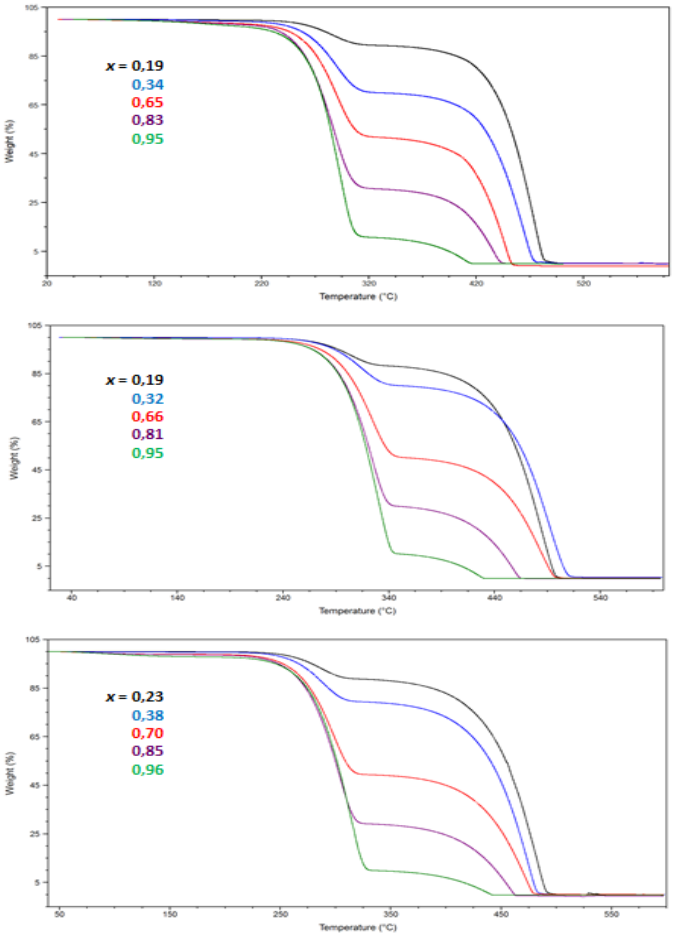

Figure S2: T_{peak} of mixtures of upper:$[C_4C_1IM][Tf_2N]_{1-x}Cl_x$; middle: $[C_4C_1IM][Tf_2N]_{1-x}Br_x$,; lower: $[C_8C_1IM][Tf_2N]_{1-x}Cl_x$.