Supporting Information

1) Synthesis of samples

[C_2mim]Br

Under a dry N_2 atmosphere, the [C_2mim]Br was synthesized by stirring the solution for 24h at room temperature after *N*-methylimidazole (1 mol) was added in dry acetonitrile, and then 1-bromoethane (1.5 mol) was slowly added in the solution cooled at 273 K. The reaction mixture was washed twice by diethylether, and dissolved in acetonitrile. After the addition of ethyl acetate, the solution was left at room temperature for 24 h, and filtered using a glass filter. Crystals were obtained by recrystallization from the acetonitrile solution.

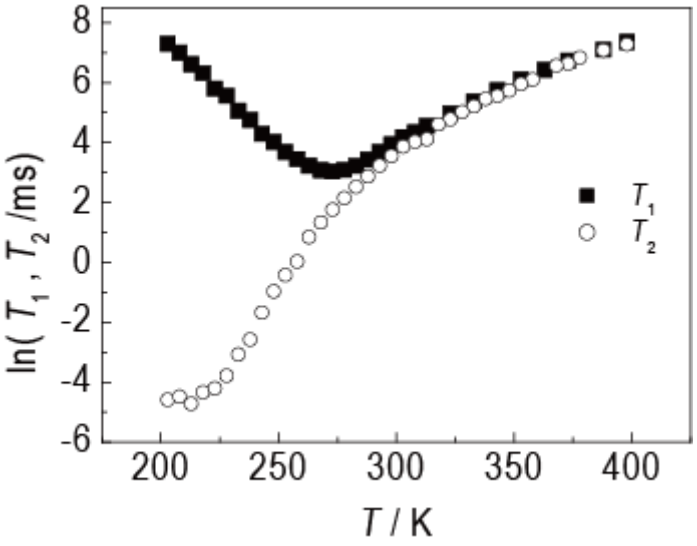
[C_3mim]Br

Under a dry N_2 atmosphere, the [C_3mim]Br was synthesized by mixing doubly distilled *N*-methylimidazole (1 mol) and 1-bromopropane (1 mol) in dry acetonitrile for 24 h at room temperature. The reaction mixture was washed three times by diethylether, and the clear solution is dried under a vacuum at room temperature for 48 h.

[C_4mim]Br

Under a dry N_2 atmosphere, the [C_4mim]Br was synthesized by mixing doubly distilled *N*-methylimidazole (1 mol) and 1-bromobutane (1 mol) in dry acetonitrile for 72 h at room temperature. The reaction mixture was washed twice by ethyl acetate, and dissolved in 75 ml acetonitrile. After the addition of 60 ml ethyl acetate, the solution was left at room temperature for 24 h, and filtered using a glass filter. Crystals were obtained by recrystallization from the acetonitrile solution.

2) The ^{1}H-T_1 and T_2 values of glycerol measured as a function of temperature using a pulsed NMR Mu-25.



3) Linewidths (Hz) of ^{13}C signals of [C$_n$mim]Br.

Errors are less than 1 Hz.

a) [C$_4$mim]Br

T	C2	C4	C5	C1″	C1′	C2′	C3′	C4′
333 K	7	6	6	5	7	5	4	4
300 K	34	31	32	11	34	31	9	7

b) [C$_3$mim]Br

T	C2	C4	C5	C1″	C1′	C2′	C3′
333 K	7	7	8	7	7	7	6
303 K	15	15	15	8	14	10	7
293 K	34	28	33	11	31	15	7
273 K	316	234	234	69.5	346	117.5	29.6

c) [C_2mim]Br

T	C2	C4	C5	C1″	C1′	C2′
333 K	<1	<1	<1	<1	<1	<1
303 K	8	8	8	6	8	6
292 K	13	12	13	8	12	7