SUPPORTING INFORMATION

Thermal dynamics of the lithium salt mixtures of ionic liquid in water by PGSE NMR

spectroscopy

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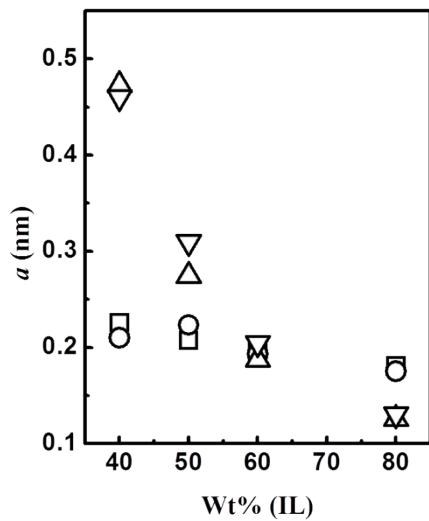
Fig. S1 The values of van der Waals radii (SE radii/hydrodynamic radii) are calculated from the SE equation. The symbols represents for the [BMIM]Br in 1.0 mol kg^{-1} of aqueous LiCl ($\square$) and LiClO$_4$ ($\bigcirc$), and [OMIM]Br in 1.0 mol kg^{-1} of aqueous LiCl ($\triangle$) and LiClO$_4$ (∇), respectively. The temperature of the medium in all the cases is kept constant as 300 K.
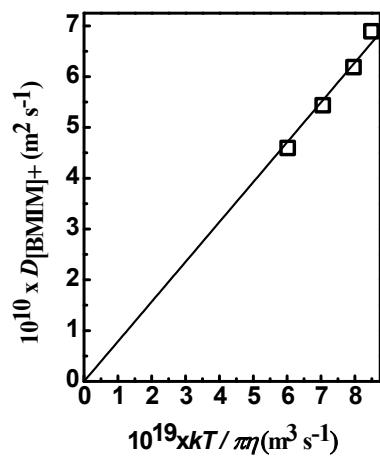
Fig. S2 Stokes-Einstein (SE) plot for the $D_{[BMIM]+}$ in the aqueous solutions of [BMIM]Br (40 % w/w). The line is of the linear fit with the correlation coefficient (r^2) value of 0.999.
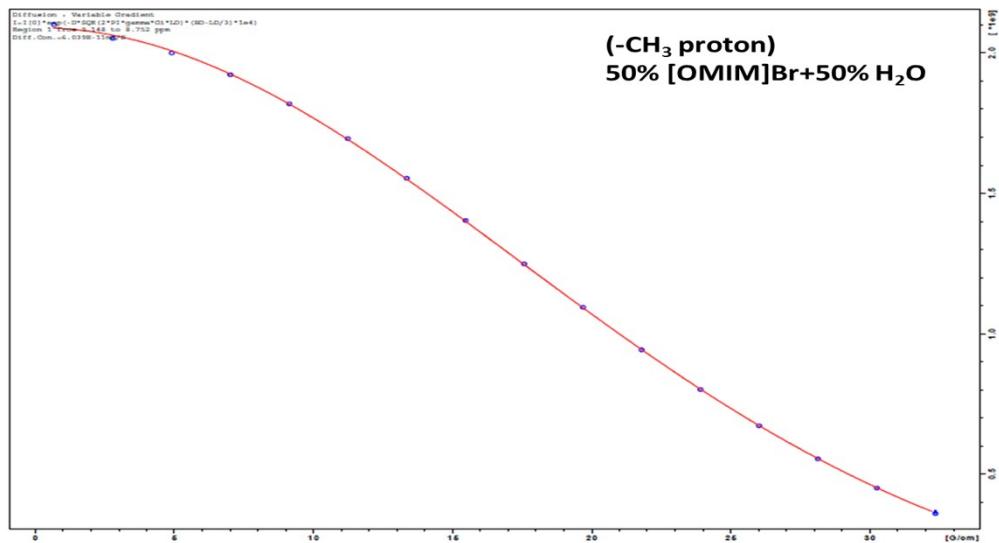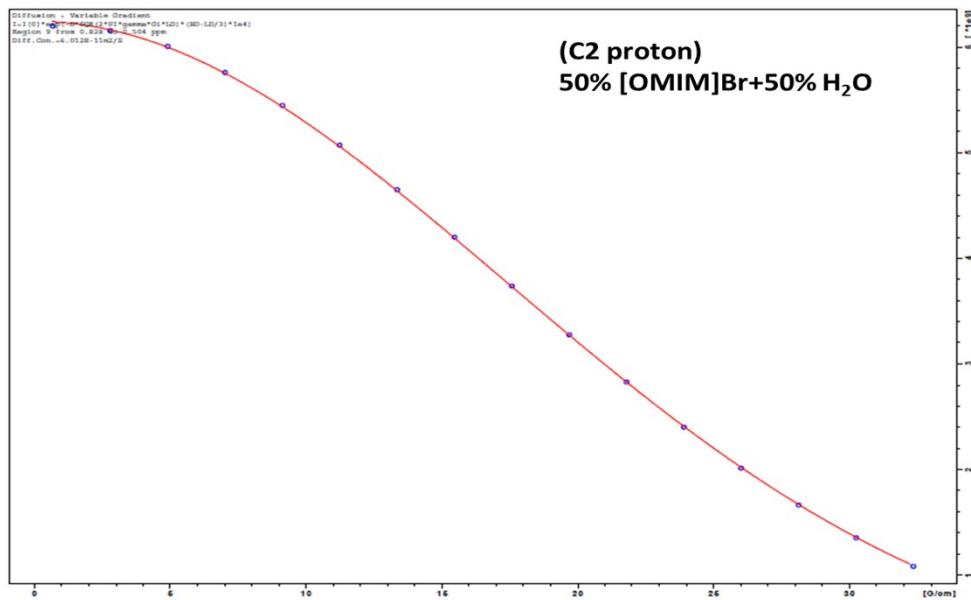
Fig. S3 The plot of intensity versus gradient strength for the C2 (top) and –CH$_3$ proton (bottom) in its 50 wt% of [OMIM]Br in water at 300 K.

Table S1. The Stokes Einstein coefficient (c) values for the H_2O molecules in its liquid-H_2O-Li^+ salt mixtures.

Ionic liquid	m/salt (w/w %)	m (1/ca)/m^{-1}	ca/nm	c (H_2O)
[BMIM]Br (40 % w/w)	60 % w/w			
	H_2O	2.40×10^9	0.42	1.48
	0.5 (LiCl)	2.07×10^9	0.48	1.71
	0.5 (LiClO$_4$)	2.50×10^9	0.41	1.45
[OMIM]Br (50 % w/w)	50 % w/w			
	H_2O	1.03×10^{10}	0.10	0.35
	0.5 (LiCl)	1.01×10^{10}	0.10	0.35
	0.5 (LiClO$_4$)	8.98×10^9	0.11	0.39

Table S2. The calculated size of hole of $[IL]^+$ in its ionic liquid-H_2O-Li^+ salt mixtures.

System (in H_2O)	T/K	$D_{[IL]^+} \times 10^{10}$/m^2 s^{-1}	η/mPa.s	ξ/pm
[BMIM]Br (50% w/w)	300	3.535	2.97	209
	305	4.271	2.57	203
	310	4.934	2.26	203
	315	5.273	2.05	213
[OMIM]Br (50% w/w)	300	0.727	11.10	271
	305	0.861	9.33	277
	310	1.134	8.48	235
	315	1.267	7.68	236

^{1}H NMR spectra of lithium salt mixtures of ionic liquids

Raju Diffusion_Data
40% Bmim Br+60%0.5m aq LiClO4
1H
300K

Raju Diffusion_Data
40% Bmim Br+60%H2O
1H
300K

8

Raju Diffusion_Data
50% Bmim Br+50%0.5m aq LiCl
1H
300K

Raju Diffusion_Data
50% Bmim Br+50%0.5m aq LiClO4
1H
300K

Raju Diffusion_Data
50% Bmim Br+50%1m aq LiCl
1H
310K

Raju Diffusion_Data
50% Bmim Br+50%1m aq LiCl
1H
315K

11

Raju Diffusion_Data
50% Bmim Br+50%1m aq LiClO4
1H
300K

Raju Diffusion_Data
50% Bmim Br+50%1m aq LiClO4
1H
305K

Raju Diffusion_Data
50% Bmim Br+50%1m aq LiClO4
1H
310K

Raju Diffusion_Data
50% Bmim Br+50%1m aq LiClO4
1H
315K

13

Raju Diffusion_Data
50% Bmim Br+50%1.5m aq LiClO4
1H
300K

Raju Diffusion_Data
50% Bmim Br+50%H2O
1H
300K

Raju Diffusion_Data
50% Bmim Br+50%H2O
1H
305K

Raju Diffusion_Data
50% Bmim Br+50%H2O
1H
310K

Raju Diffusion_Data
50% Bmim Br+50%H2O
1H
315K

Raju Diffusion_Data
60% Bmim Br+40%0.5m aq LiCl
1H
300K

Raju Diffusion_Data
80% Bmim Br+20%0.5m aq LiCl
1H
300K

Raju Diffusion_Data
80% Bmim Br+20%0.5m aq LiClO4
1H
300K

Raju Diffusion_Data
80% Bmim Br+20%H2O
1H
300K