

IMIDAZOLIUM DECIL SULFATE: A VERY PROMISING SELFMADE IONIC HYDROGEL

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Table 1S. Temperature dependence of the ionic conductivity for pure [EMIm][DSO₄] when cooling and when heating the sample, and for two mixtures with $x_{IL} = 0.317$ (10 wt%) and $x_{IL} = 0.075$ (39 wt%). The sample state is given by the number character; thus **italic bold** figures mean solid crystal, **bold** means liquid crystalline rigid-gel, **italic** means intermediate quasi-gel and normal is for liquid state. All measurements were performed at pressure of 101 kPa.

Pure cooling		Pure heating		Hydrated 10 wt%		Hydrated 39 wt%	
T /°C	κ /mS·cm ⁻¹	T /°C	κ /mS·cm ⁻¹	T /°C	κ /mS·cm ⁻¹	T /°C	κ /mS·cm ⁻¹
99.8	6.39	10.0	0.00012	99.8	22.3	90.0	68.6
90.0	5.1	20.0	0.00137	90.0	19.55	80.0	60.6
80.0	3.93	25.0	0.00749	80.0	16.34	70.0	52.9
70.0	2.93	27.0	0.01563	70.0	13.41	60.0	45.5
60.0	2.02	29.0	0.0339	<i>60.0</i>	<i>10.80</i>	50.0	38.3
50.0	1.38	30.0	0.0384	<i>59.0</i>	<i>10.79</i>	40.0	31.6
40.0	0.887	31.0	0.0764	<i>58.0</i>	<i>10.23</i>	35.0	28.7
35.0	0.693	33.0	0.213	57.0	10.01	30.0	25.3
30.0	0.528	<i>35.0</i>	<i>0.683</i>	56.0	9.78	<i>25.0</i>	<i>22.3</i>
25.0	0.394			55.0	9.51	<i>20.0</i>	<i>19.56</i>
20.0	0.00165			50.0	8.40	18.0	18.57
18.0	0.00096			40.0	6.45	15.0	17.03
16.0	0.00055			35.0	5.52	12.0	15.55
14.0	0.00031			30.0	4.68	10.0	14.59
				25.0	3.89	5.0	12.44
				20.0	3.21	0.0	10.47
				10.0	2.12		
				5.0	1.565		
				0.0	1.192		

$$u(T) = 0.1 \text{ }^{\circ}\text{C}, u_r(\kappa) < 3 \text{ } \%, u(P) = 2 \text{ kPa}, u(\text{wt}\%) = 0.1 \text{ } \%$$

Table S2. Temperature dependence of the viscosity (η) and density (ρ) for the pure [EMIm][DSO₄] sample when cooling at pressure of 101 kPa.

T /°C	η /mPa·s	ρ /g·cm ⁻³
90	44.057	1.0578
85	51.509	1.0609
80	60.730	1.0642
75	72.227	1.0674
70	86.675	1.0707
65	105.11	1.0739
60	128.93	1.0771
55	160.08	1.0804
50	201.40	1.0837
45	257.17	1.0870
40	333.65	1.0904
35	440.24	1.0937
30	592.92	1.0972
25	815.52	1.1007

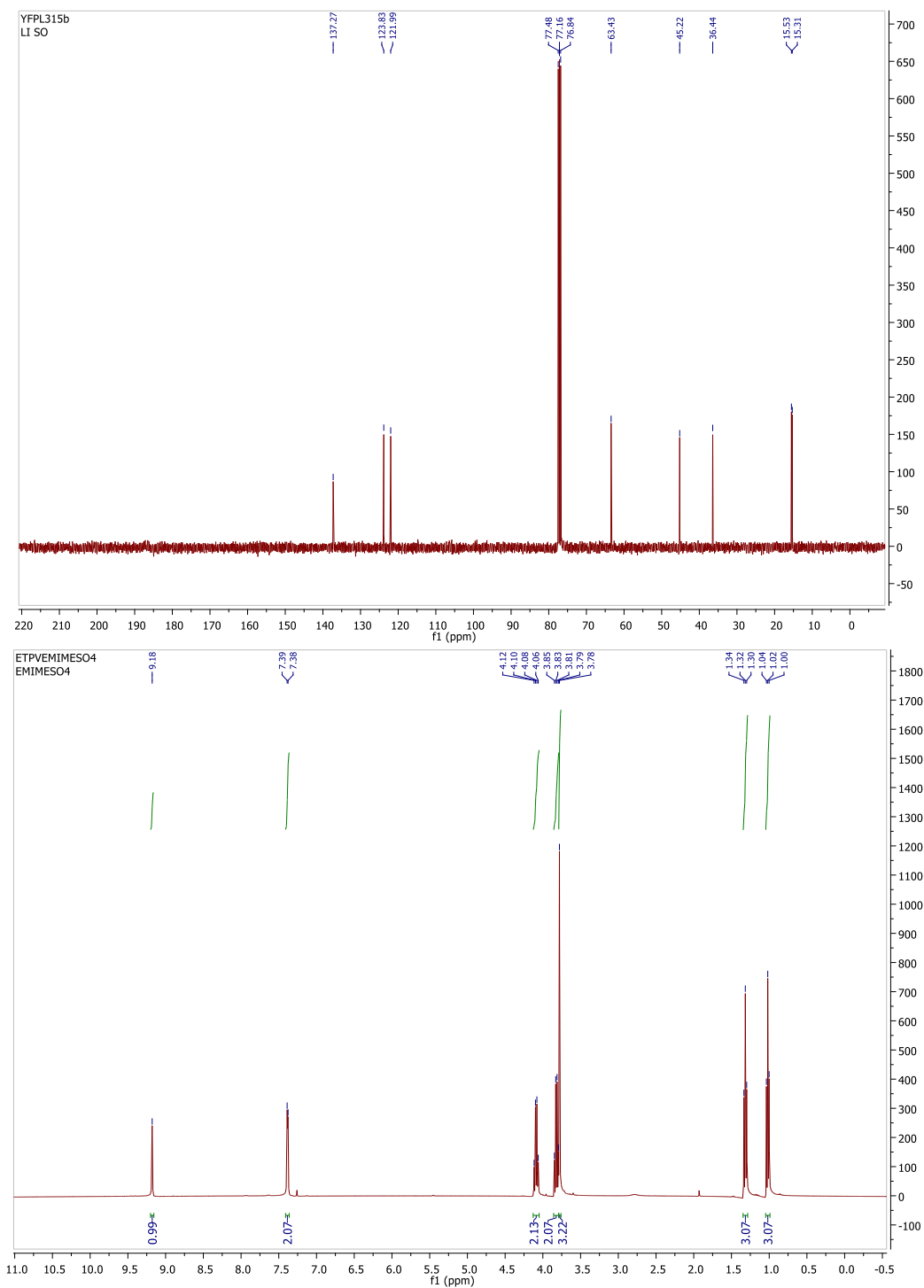
$u(T) = 0.1$ °C, $u_r(\eta) < 2$ %, , $u(\rho) = 0.001$ g·cm⁻³, $u(P) = 2$ kPa,

NMR Data

1-ethyl-3-methylimidazolium ethylsulfate [EMIm][ESO₄]

¹H NMR (400 MHz, CDCl₃, ppm): 9.18 (1H, s, 2-H), 7.38 (2H, dd, $J_1 = 3.3$ Hz, $J_2 = 1.7$ Hz, 4-H, 5-H), 4.09 (2H, q, $J = 7.3$ Hz, NCH₂CH₃), 3.82 (2H, q, $J = 7.1$ Hz, OCH₂CH₃), 3.78 (3H, s, NCH₃), 1.32 (3H, t, $J = 7.3$ Hz, NCH₂CH₃), 1.02 (3H, t, $J = 7.1$ Hz, OCH₂CH₃).

¹³C NMR (100.6 MHz, CDCl₃, ppm): 137.3 (2-C), 123.8 (5-C), 122.0 (4-C), 63.4 (OCH₂), 45.2 (NCH₂), 36.4 (NCH₃), 15.5 (NCH₂CH₃), 15.3 (OCH₂CH₃).



1-ethyl-3-methylimidazolium decylsulfate [EMIm][DSO₄]

¹H NMR (400 MHz, CDCl₃, ppm): 9.64 (1H, s, 2-H), 7.47 (1H, t, J = 1.8 Hz, 4-H*), 7.46 (1H, t, J = 1.8 Hz, 5-H*), 4.29 (2H, q, J = 7.4 Hz, NCH₂), 3.99 (5H, m, OCH₂, NCH₃), 1.62 (2H, m, OCH₂CH₂), 1.53 (3H, t, J = 7.4 Hz, NCH₂CH₃), 1.38-1.16 (14H, m, OCH₂CH₂(CH₂)₇), 0.83 (3H, t, J = 6.9 Hz, O(CH₂)₉CH₃).

¹³C NMR (100.6 MHz, CDCl₃, ppm): 137.4 (2-C), 123.8 (5-C), 121.9 (4-C), 67.9 (OCH₂), 45.2 (NCH₂), 36.4 (NCH₃), 32.0 (OCH₂CH₂), 29.7 (O(CH₂)₂CH₂), 29.7 (O(CH₂)₃CH₂), 29.6 (O(CH₂)₄CH₂), 29.5 (O(CH₂)₅CH₂), 29.4 (O(CH₂)₆CH₂), 26.0 (O(CH₂)₇CH₂), 22.8 (O(CH₂)₈CH₂), 15.5 (NCH₂CH₃), 14.2 (O(CH₂)₉CH₃)

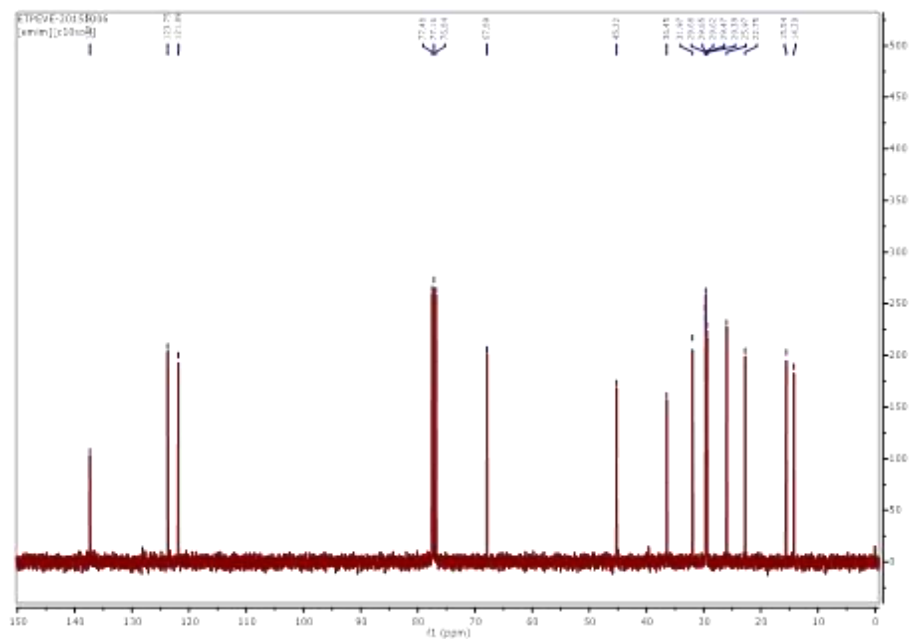
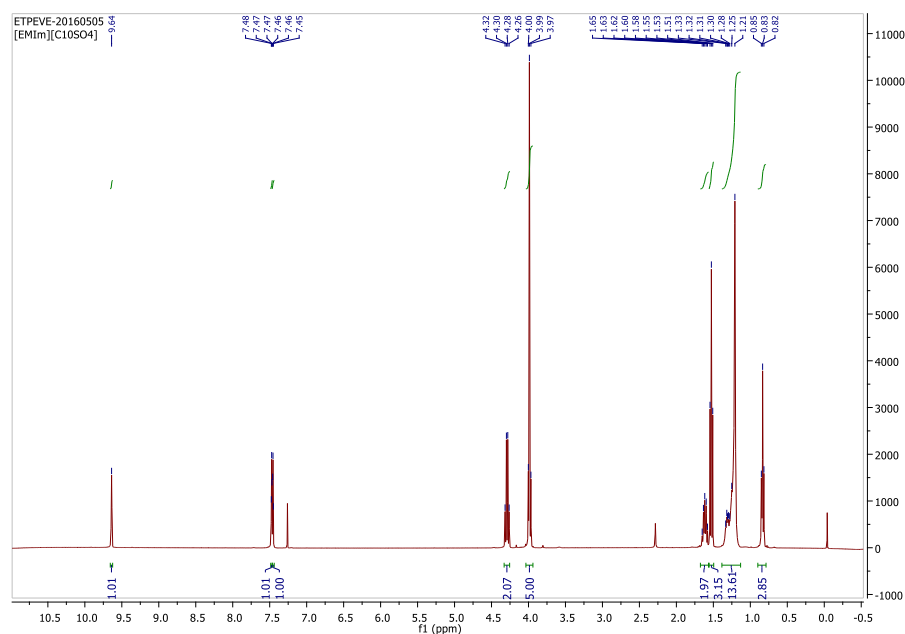


Figure S1. TGA Curve of an aqueous mixture of [EMIm][DSO₄] sample of 63,5 mg including 12 wt% of water, taken in air atmosphere and 5°C/min of temperature rate.

