Supporting Information for

Direct UV-Spectroscopic Measurement of Selected Ionic-Liquid Vapors

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Determination of halide content in ILs

The trace amount of halide in ILs was determined by the semi-quantitative Nessler cylinder method.[1] In a typical determination of halide content in ILs, 2.5 g [Bmim$^+$][Tf$_2$N$^-$], 30 ml ethanol, and 1 g nitric acid (65%) were added into a Nessler cylinder. Then 1 g silver nitrate (0.1 mol L^{-1}) is added, and the mixture diluted to 50 ml with deionised water. For the 10 ppm standard, 25 μl of the standard chloride solution (1 g L^{-1}), 30 ml ethanol, and 0.5 g nitric acid (65%) are combined in a Nessler cylinder. Then 1 g silver nitrate (0.1 mol L^{-1}) is added, and the mixture diluted to 50 ml with deionised water. Similarly, 20, 40, 60, 80, 100 ppm standard solutions are prepared. All solutions are allowed to stand in the dark for 0.5 hour, before comparing with the standard solutions. For example, the results for [Bmim$^+$][Tf$_2$N$^-$] show that the halide content is less than 20 ppm.

Determination of degradation of ILs

For imidazolium based ionic liquids, the byproducts including 1-methylimidazole would produce, if the degradation of ILs such as [Bmim$^+$][Tf2N$^-$] happened.[2,3] The possible 1-methylimidazole impurity was analyzed by HPLC method.[1] The following HPLC conditions for the determination of 1-methylimidazole were used. Column, Phenomenex Gemini 5 μ C18 110 A 250 × 4.6 mm 5 micron; Eluent, 30% A (acetonitrile) and 70% B (0.02 M sodium dihydrogenphosphate); Flow rate, 1.0 ml min^{-1}; Injected volume, 3.0 μl; Detection, UV 210 nm; Retention times, 1-methylimidazole, 2.23 min, [Bmim$^+$], 2.68 min. No signal at 2.23 min for used [Bmim$^+$][Tf$_2$N$^-$] indicated that no degradation happened. The detection limit for the determination of degradation of used ILs is about 0.025 wt%.
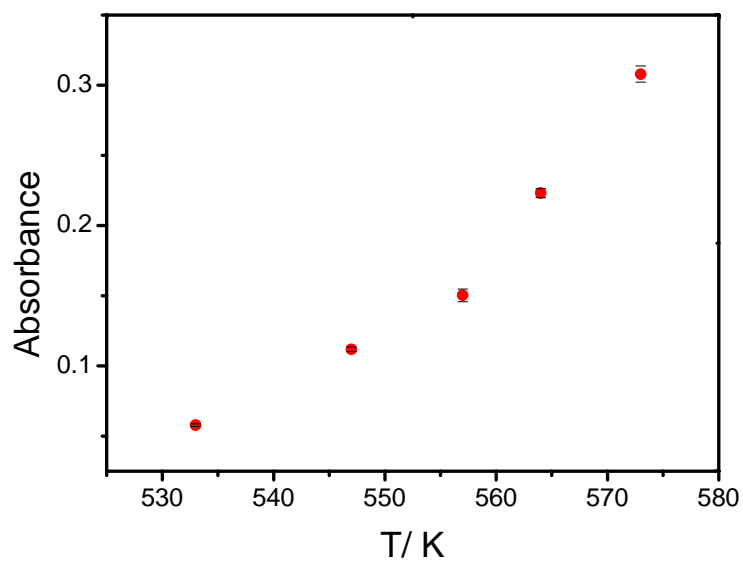
Fig. S1 The reproducibility of UV determination for [Bmim$^+$][Tf$_2$N$^-$] vapor at 211 nm.

References for Supporting Information:

(1) Stark, A.; Behrend, P.; Braun, O.; Muller, A.; Ranke, J.; Ondruschka, B.; Jastorff, B. *Green Chem.* 2008, *10*, 1152-1161.

(2) Oxley, J. D.; Prozorov, T.; Suslick, K. S. *J. Am. Chem. Soc.* 2003, *125*, 11138-11139.

(3) Huddleston, J. G.; Visser, A. E.; Reichert, W. M.; Willauer, H. D.; Broker, G. A.; Rogers, R. D. *Green Chem.* 2001, *3*, 156-164.