Supporting Information

Density, Viscosity, and CO_2 Solubility in the Ionic Liquid Mixtures of [bmim][PF_6] and [bmim][TFSA] at 313.15 K

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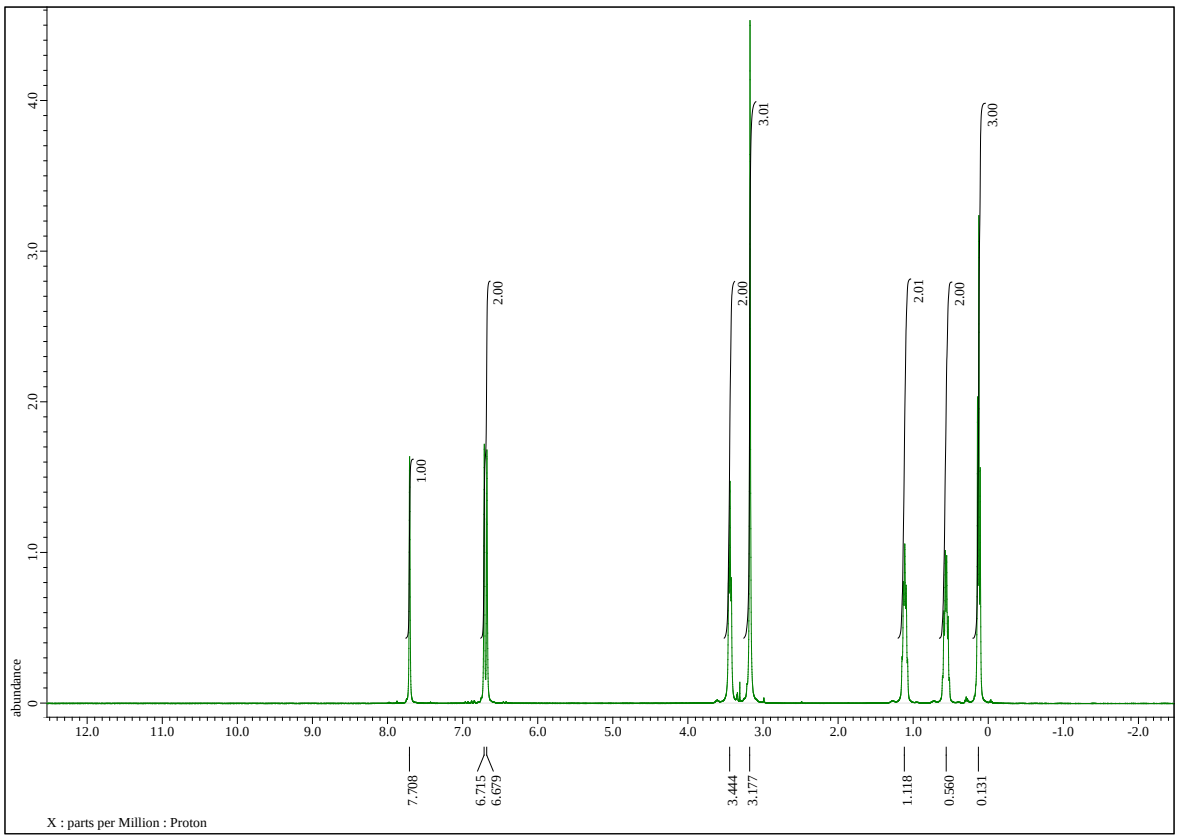

Figure S1. [bmim][PF_6] ^{1}H NMR spectra.

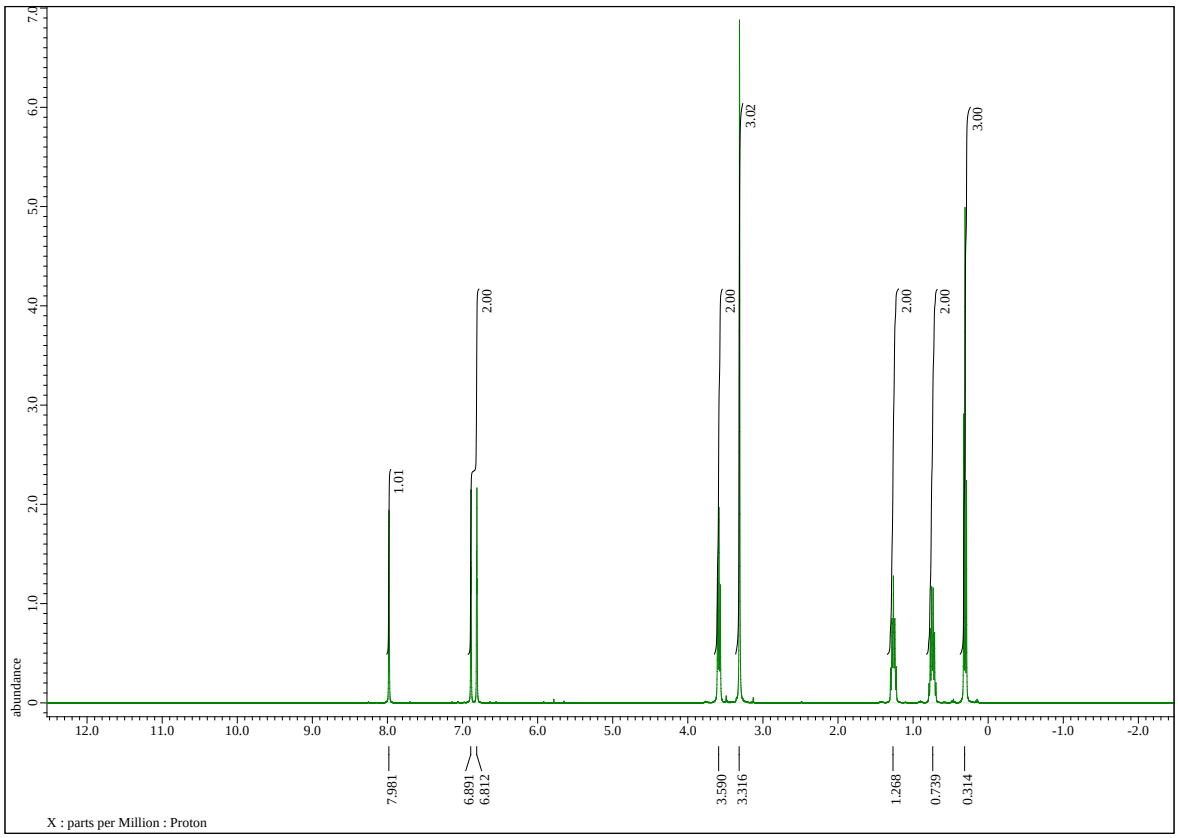

Figure S2. [bmim][TFSA] ^{1}H NMR spectra.

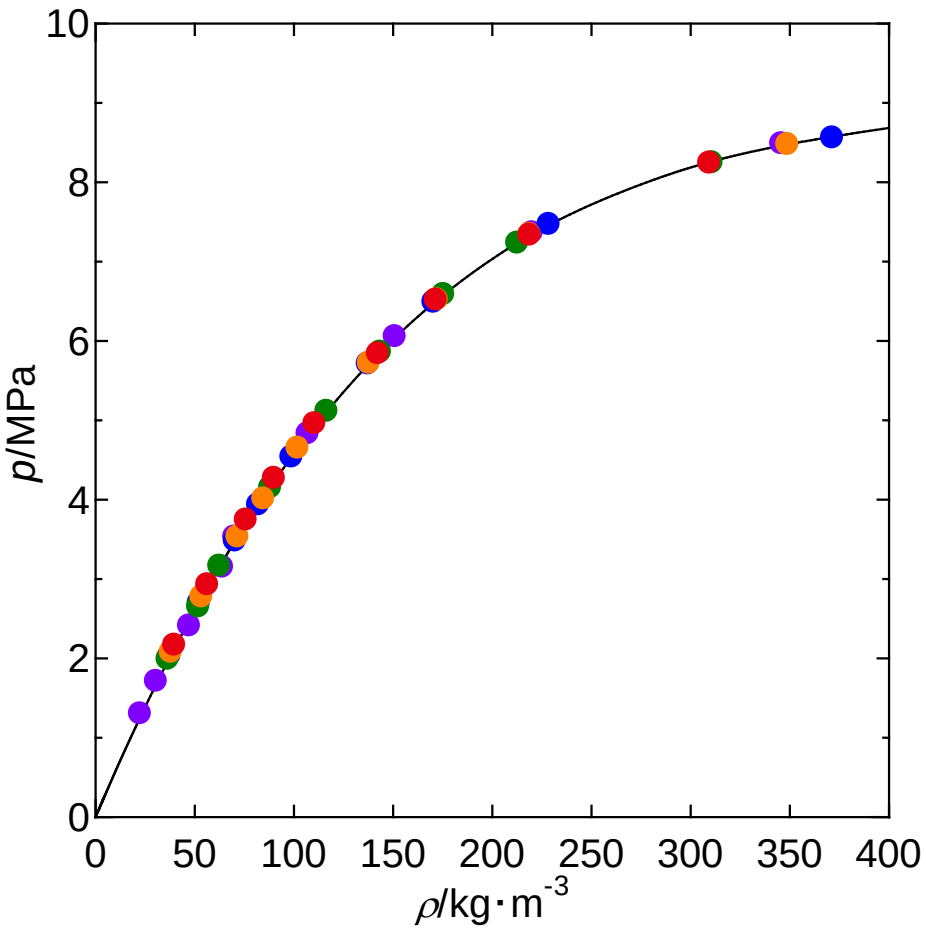

Figure S3. Expanded saturated vapor densities for CO_2 (1) in ionic liquid mixtures composed of [bmim][PF_6] (2) and [bmim][TFSA] (3) at 313.15 K. Circle (filled red), [bmim][PF_6]; circle (filled orange), [bmim][PF_6]$_{0.75}$[TFSA]$_{0.25}$; circle (filled green), [bmim][PF_6]$_{0.50}$[TFSA]$_{0.50}$; circle (filled blue), [bmim][PF_6]$_{0.25}$[TFSA]$_{0.75}$; circle (filled purple), [bmim][TFSA]; The solid line is calculated pure CO_2 density by Span-Wagner equation (ref 1).

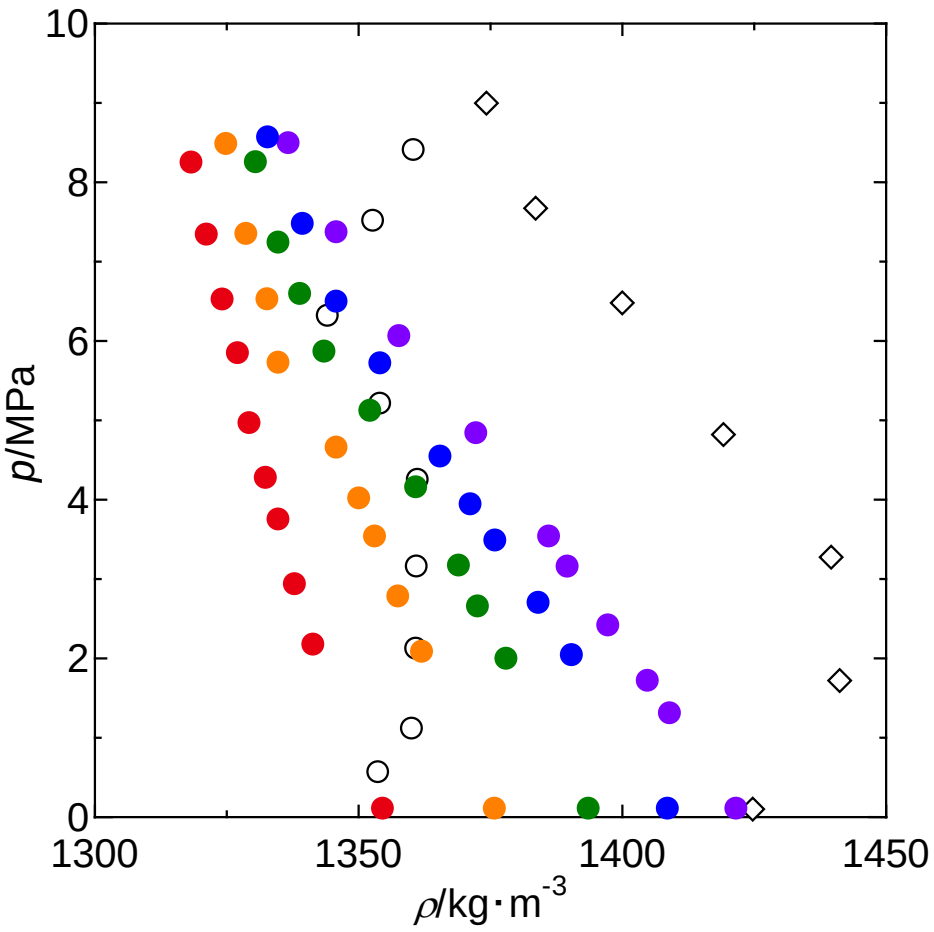

Figure S4. Expanded saturated liquid densities for CO_2 (1) in ionic liquid mixtures composed of [bmim][PF_6] (2) and [bmim][TFSA] (3) at 313.15 K. Circle (filled red), [bmim][PF_6]; circle (filled orange), [bmim][PF_6]$_{0.75}$[TFSA]$_{0.25}$; circle (filled green), [bmim][PF_6]$_{0.50}$[TFSA]$_{0.50}$; circle (filled blue), [bmim][PF_6]$_{0.25}$[TFSA]$_{0.75}$; circle (filled purple), [bmim][TFSA]; circle (opened black), [bmim][PF_6] (ref 2); diamond (opened black), [bmim][TFSA] (ref 2).

Table S1. Excess Quantity of [bmim][PF_6] (2) + [bmim][TFSA] (3) at 313.15 K.

x_2	x_1^E	ρ_L^E/kg·m^{-3}	c_1^E/mol·dm^{-3}	$\Delta V/V_{2,3}^E$ %
		p = 1.0 MPa		
0.00	0.000	0.00	0.000	0.000
0.25	0.008	3.89	-0.099	-0.795
0.50	0.008	6.02	-0.024	-0.454
0.75	0.008	5.23	-0.010	-0.322
1.00	0.000	0.00	0.000	0.000
		2.0 MPa		
0.00	0.000	0.00	0.000	0.000
0.25	0.005	3.07	-0.038	-0.273
0.50	0.007	5.38	0.003	-0.137
0.75	0.006	4.74	0.011	-0.131
1.00	0.000	0.00	0.000	0.000
		3.0 MPa		
0.00	0.000	0.00	0.000	0.000
0.25	0.003	2.30	0.004	0.108
0.50	0.006	4.61	0.029	0.151
0.75	0.005	4.16	0.030	0.055
1.00	0.000	0.00	0.000	0.000
		4.0 MPa		
0.00	0.000	0.00	0.000	0.000
0.25	0.002	1.70	0.030	0.349
0.50	0.006	3.83	0.055	0.408
0.75	0.005	3.59	0.048	0.236
1.00	0.000	0.00	0.000	0.000
		5.0 MPa		
0.00	0.000	0.00	0.000	0.000
0.25	0.002	1.26	0.037	0.449
0.50	0.007	3.03	0.080	0.636
0.75	0.006	3.02	0.065	0.412
1.00	0.000	0.00	0.000	0.000
		6.0 MPa		
0.00	0.000	0.00	0.000	0.000
0.25	0.002	0.88	0.027	0.409
0.50	0.008	2.11	0.106	0.834
0.75	0.007	2.36	0.079	0.585
1.00	0.000	0.00	0.000	0.000

(Table S1. Continued)

		7.0 MPa		
0.00	0.000	0.00	0.000	0.000
0.25	0.003	0.66	-0.001	0.229
0.50	0.010	1.17	0.131	1.002
0.75	0.009	1.70	0.093	0.752
1.00	0.000	0.00	0.000	0.000

REFERENCES

(1) Span, R.; Wagner, W. A New Equation of State for Carbon Dioxide Covering the Fluid Region from the Triple-Point Temperature to 1100 K at Pressures up to 800 MPa. *J. Phys. Chem. Ref. Data*, **1996**, *25*, 1509-1596.

(2) Aki, S. N. V. K.; Mellein, B. R.; Saurer, E. M.; Brennecke, J. F. High-Pressure Phase Behavior of Carbon Dioxide with Imidazolium-Based Ionic Liquids. *J. Phys. Chem. B*, **2004**, *108*, 20355-20365.