Rotational Dynamics of Imidazolium-Based Ionic Liquids: Do the Nature of the Anion and the Length of the Alkyl Chain Influence the Dynamics?

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Supporting Information

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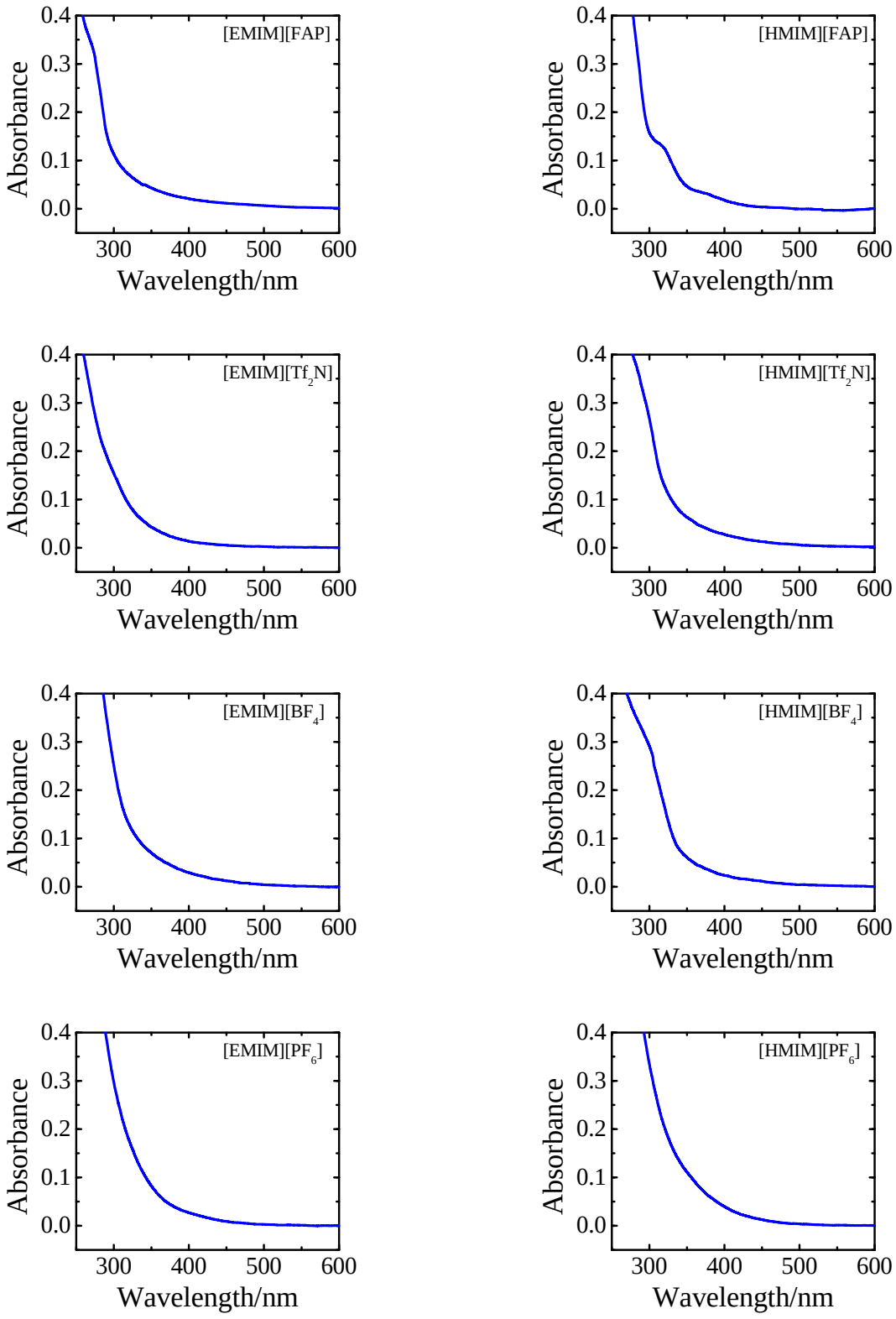

Figure 1. Absorption spectra of all the ionic liquids used in this study. All the spectra were recorded at room temperature and the sole exception is [EMIM][PF_6], whose spectrum was recorded at 338 K as it is solid at room temperature.

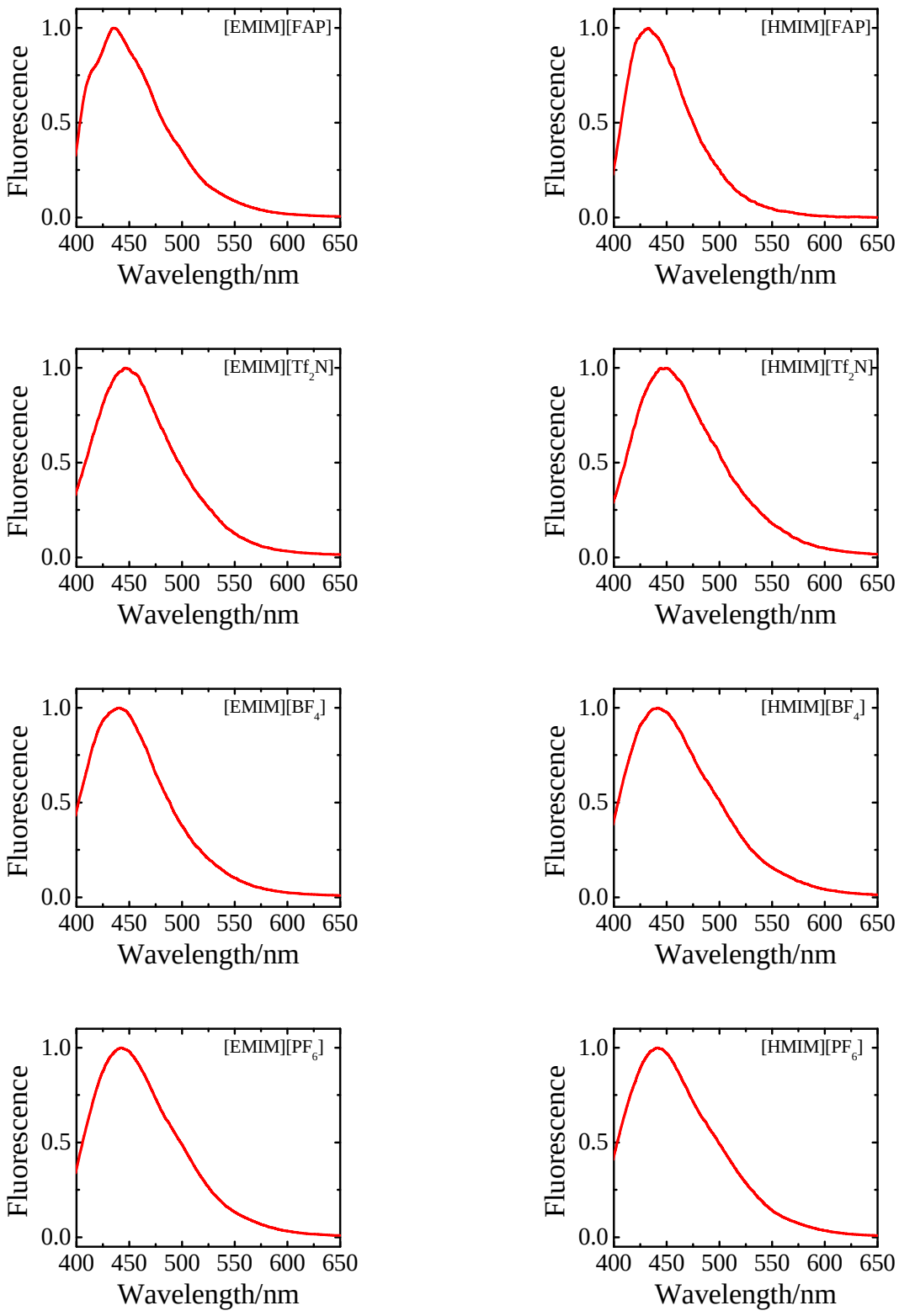

Figure 2. Normalized emission spectra of all the ionic liquids used in this study. All the spectra were recorded at room temperature and the sole exception is [EMIM][PF_6], whose spectrum was recorded at 338 K. These spectra were obtained by exciting the samples at 375 nm.

TABLE 1: Reorientation Times of 1-Ethyl-3-methylimidazolium Ionic Liquids with Different Anions as a Function of Temperature and Viscosity

	[EMIM][FAP]		[EMIM][Tf_2N]		[EMIM][BF_4]		[EMIM][PF_6]	
T / K	η / mPa s	$\tau_{r\,/}$ ns	η / mPa s	$\tau_{r\,/}$ ns	η / mPa s	$\tau_{r\,/}$ ns	η / mPa s	$\tau_{r\,/}$ ns
298	60.0	7.70	32.4	4.44	37.4	5.59	------	------
303	50.0	6.36	27.4	3.84	31.5	4.53	------	------
308	42.0	5.23	23.4	3.33	26.6	3.85	------	------
313	35.0	4.46	20.2	2.86	22.8	3.35	------	------
318	29.7	3.83	17.6	2.53	19.7	2.84	------	------
323	25.2	3.28	15.4	2.18	17.1	2.52	------	------
328	21.8	2.82	13.7	1.96	15.1	2.15	------	------
338	16.7	2.20	10.9	1.51	11.8	1.72	27.1	3.53
348	13.1	1.74	8.8	1.24	9.53	1.42	20.3	2.69
358	------	------	------	------	------	------	15.8	2.08

TABLE 2: Reorientation Times of 1-Hexyl-3-methylimidazolium Ionic Liquids with Different Anions as a Function of Temperature and Viscosity

	[HMIM][FAP]		[HMIM][Tf_2N]		[HMIM][BF_4]		[HMIM][PF_6]	
T / K	η / mPa s	$\tau_{r\,/}$ ns	η / mPa s	$\tau_{r\,/}$ ns	η / mPa s	$\tau_{r\,/}$ ns	η / mPa s	$\tau_{r\,/}$ ns
298	89.6	14.34	68.8	8.49	206	18.21	484	28.94
303	72.0	11.38	55.8	7.19	157	14.99	354	23.42
308	58.0	9.75	45.9	6.01	120	12.01	261	19.09
313	47.1	7.50	37.8	4.98	93.8	10.33	199	15.27
318	38.6	6.20	31.5	4.23	74.7	8.49	153	12.54
323	32.1	4.99	26.5	3.66	60.6	7.18	118	10.28
328	27.2	4.16	22.7	3.07	49.4	6.06	93.7	8.34
338	20.2	2.93	16.9	2.44	33.8	4.29	61.5	5.72
348	15.5	2.26	13.1	1.92	24.2	3.17	41.8	4.22