polymers

MDPI

Supplementary Material

Ionic Liquid-Based Surfactants: Recent advances in their syntheses, solution properties, and applications

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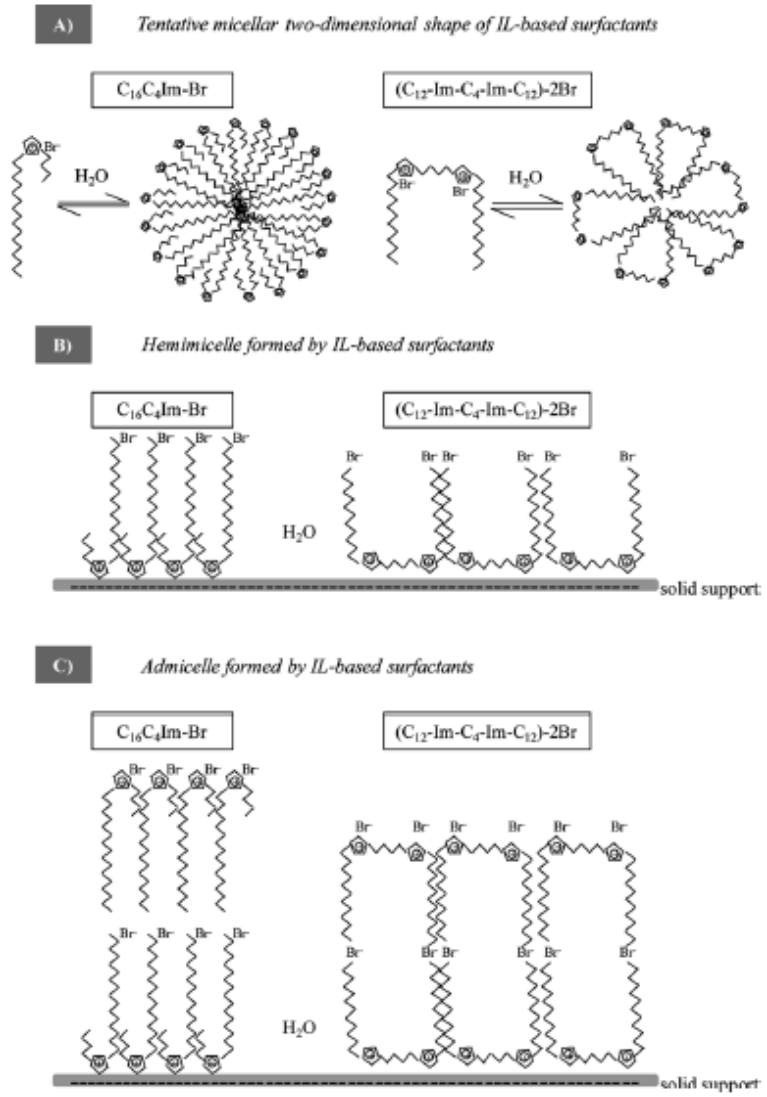


Figure S1. Scheme of A) micellar two-dimensional shape, B) hemimicelle, and C) admicelle of monocationic and gemini ILBSs [1].

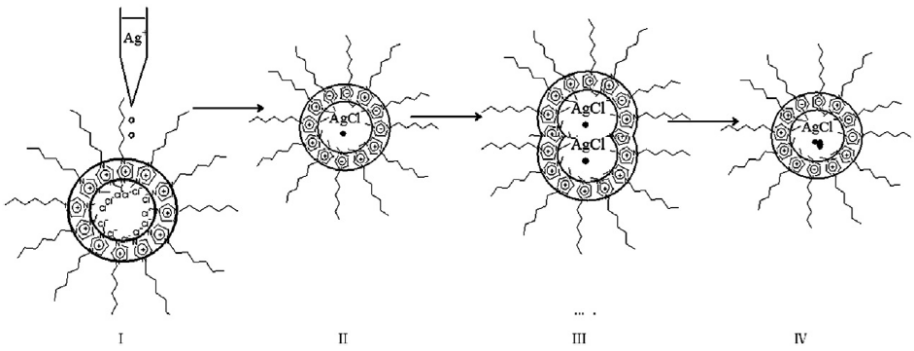


Figure S2. Schematic representation of the formation of NP core (AgCl) in the poly(MMA-co-AM) shell. Addition of aqueous $AgNO_3$ solution to the $C_{12}C_1ImCl$-based μE leads to formation of AgCl [2].

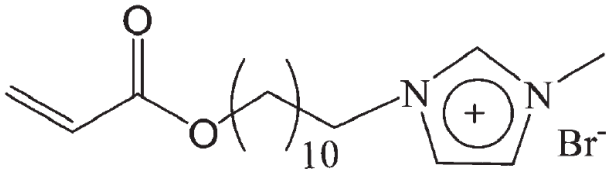


Figure S3. The molecular structure of 1-(2-acryloyloxyundecyl)-3-methylimidazolium bromide (ILBS-b) [3].

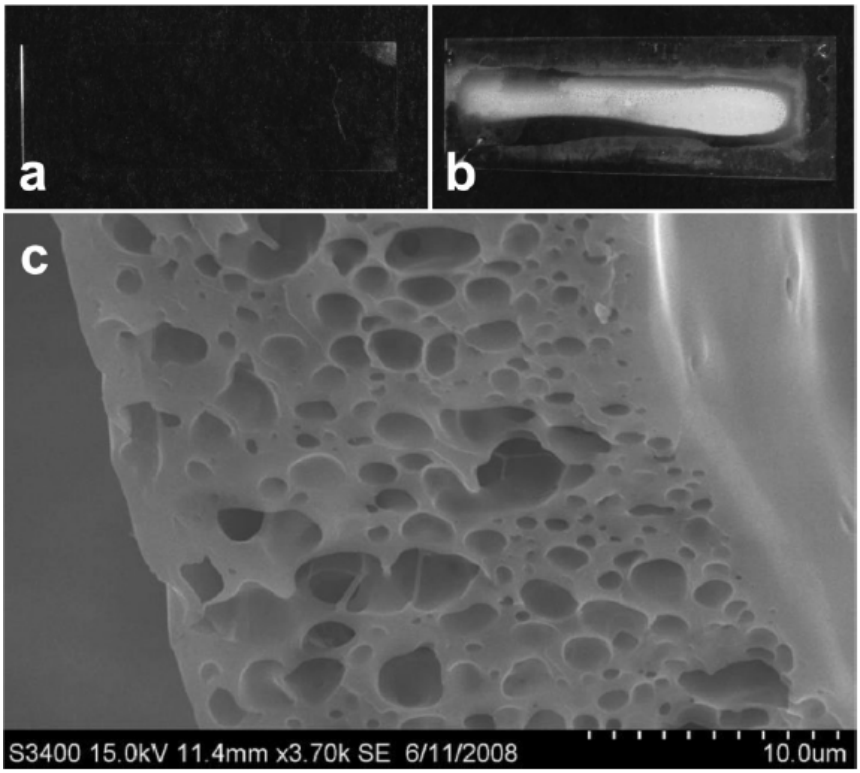


Figure S4. SEM of 4% ILBr undialyzed nanolatex coating on a glass slide before (a) and after (b) treatment with 0.1 mol L^{-1} KPF_6; (c) SEM image of film shaving fracture surface [4].

Table S1. Literature data of ionic liquid-based surfactants aqueous solutions at 25 °C. Parameters calculated using *techniques other than surface tension*.

Entry	Cation[1]	Anion[1]	cmc x 10^3 (mol L^{-1}) – Cond.[2]	cmc x 10^3 (mol L^{-1}) – Fluor.[3]	cmc x 10^3 (mol L^{-1}) – Other[4]	α_{mic} Frahm[5]	ΔG^0_{mic} (kJ mol^{-1})[6]	ΔH^0_{mic} (kJ mol^{-1}) – Cond.[7]	ΔH^0_{mic} (kJ mol^{-1}) – ITC[8]	N_{agg}[9]
Cationic ILBSs										
1	$C_8C_1Im^+$	Cl^-	101.2 [5], 205 [6], 107.8 [7], 174.2 [8], 150 [9], 210 [10], 179 [11]	184.8 [8], 210 [10], 234 [12]	90[10] [5], 100.8[11] [7], 240[12] [10]	0.410 [5], 0.65 [6], 0.56 [7], 0.34 [8], 0.664 [9], 0.37 [10]	-22.0 [5], -18.7 [6], -22.3 [7], -20.9 [8], -22.4 [10]	-1.56 [5]		39 [10], 23 [12]
2		Br^-	150.0 [5], 160 [10], 160 [13], 137.4 [14], 130 [15]	130 [13], 190 [10]	180[12] [10], 177[10] [13], 210[11] [15], 149[14] [16]	0.630 [5], 0.34 [10], 0.43 [13], 0.49 [14], 0.47 [15]	-24.8 [5], -23.6 [10], -20.7 [13], -22.5 [14], -23.0 [15]	-1.79 [5]		53 [10]
3		I^-	149.8 [5]			0.644 [5]	-26.0 [5]	-1.57 [5]		
5		$C_4SO_3^-$		155 [17]						
6	$C_9C_1Im^+$	Cl^-	130 [9], 76.1 [18]			0.528 [9], 0.51 [18]	-15.99 [18]	26.64 [18]		
7		Br^-	73.9 [18]			0.25 [18]	-18.66 [18]	0 [18]		
8	$C_{10}C_1Im^+$	Cl^-	78 [6], 59.9 [9], 48.7 [11], 57.3 [18], 40.47 [19], 53.81 [20], 58.80 [21], 58.0 [22], 58.5 [23], 33.5 [24], 54.6 [25]	53.8 [12], 40.52 [19], 57 [23], 33.4 [24]	39.0[14] [24], 41.3[15] [24]	0.54 [6], 0.572 [9], 0.52 [18], 0.51 [20], 0.57 [21], 0.53 [23], 0.52 [25]	-23.8 [6], -14.84 [18], -31.14 [19], -25.61 [20], -24.0 [21], -23.12 [23], -30.28 [23], -26.12 [25]	6.22 [18], 5.00 [21], -1.70 [25], -1.70 [28]		32 [12], 40 [19], 22 [23]
9		Br^-	42 [13], 34.0 [15], 41.2 [18], 40.8 [26], 28.9 [27], 46.48 [28], 42.4 [29]	25 [13]	39[10] [13], 39.7[11] [15], 45[13] [16], 42.1[16] [26], 43.3[12] [26]	0.67 [13], 0.40 [15], 0.27 [18], 0.332 [26], 0.321 [27]	-29.7 [13], -28.9 [15], -15.94 [18], -29.83 [26], -37.44 [27], -12.76 [28], -10.4 [29]	-9.99 [26], -8.28 [27], -0.44 [28], -1.78 [18]	-0.57 [15]	43 [28]

Entry	Cation[1]	Anion[1]	cmc x 10^3 (mol L^{-1}) – Cond.[2]	cmc x 10^3 (mol L^{-1}) – Fluor.[3]	cmc x 10^3 (mol L^{-1}) – Other[4]	α_{mic} Frahm[5]	ΔG^0_{mic} (kJ mol^{-1})[6]	ΔH^0_{mic} (kJ mol^{-1}) – Cond.[7]	ΔH^0_{mic} (kJ mol^{-1}) – ITC[8]	N_{agg}[9]
10		$C_1SO_3^-$		65 [17]						
11	$C_{11}C_1Im^+$	Cl^-	30.2 [9]			0.463 [9]				
12	$C_{12}C_1Im^+$	Cl^-	15.1 [9], 13.4 [11], 13.47 [19], 19.96 [20], 12.1 [24], 14.6 [30], 14.53 [31], 15.26 [32], 9.46 [33]	16.1 [12], 14.0 [19], 12.0 [24], 13.15 [32]	12.8^{17} [19], 15.0^{14} [24], 12.0^{15} [24], 9.09^{18} [33], 14.56^{11} [33]	0.461 [9], 0.44 [20], 0.44 [30], 0.43 [31], 0.352 [32]	-36.51 [19], -30.65 [20], -29.31 [30], -29.1 [31], -33.50 [32]	-2.62 [20], -1.17 [30], -7.16 [32]		51 [12], 58 [19], 40 [32]
13		Br^-	10 [13], 9.78 [15], 10.1 [27], 10.6 [30], 10.29 [31], 9.02 [29], 9.97 [34], 9.63 [35], 9.00 [36]	7.0 [13], 12.00 [36], 11.2 [37]	8.0^{10} [13], 9.10^{11} [15], 10^{13} [16], 10.24^{13} [31], 9.56^{11} [38], 10.79^{16} [39], 10.02^{16} [39], 10.11^{12} [39]	0.74 [13], 0.34 [15], 0.321 [27], 0.25 [30], 0.70 [31], 0.213 [34], 0.250 [35], 0.22 [36]	-37.2 [13], -35.9 [15], -43.17 [27], -20.4 [29], -37.12 [30], -36.2 [31], -38.21 [34], -37.44 [35], -37.2 [36]	-35.96 [27], -4.88 [30]	-2.86 [15], -3.51 [38]	37 [37], 81 [36]
14		I^-	5.2 [30], 5.19 [31]		4.12^{13} [31]	0.15 [30], 0.84 [31]	-42.51 [30], -42.3 [31]	-16.60 [30]		
15		$C_1SO_3^-$		19 [17]						
16	$C_{13}C_1Im^+$	Cl^-	7.50 [9]			0.408 [9]				
17	$C_{14}C_1Im^+$	Cl^-	4.26 [9], 3.68 [19], 2.80 [24], 3.47 [40], 3.64 [41]	3.2 [12], 3.65 [19], 2.80 [24]	3.52^{17} [19], 3.30^{14} [24], 5.00^{15} [24], 3.69^{11} [41]	0.430 [9], 0.36 [40]	-42.91 [19], -39.26 [40], -24.0 [41]	-14.84 [40]		60 [12], 79 [19]
18		Br^-	2.5 [13], 2.68 [15], 2.47 [28], 2.46 [29], 2.50 [35], 2.80 [42], 2.4 [43], 2.34 [44]	1.8 [13], 2.9 [37]	1.4^{10} [13], 2.78^{11} [15], 2.52^{11} [38]	0.74 [13], 0.33 [15], 0.265 [35], 0.63 [42], 0.27 [43]	-43.1 [13], -41.0 [15], -25.92 [28], -25.8 [29], -42.90 [35], -23.76 [42], -43 [43]	-6.77 [28]	-4.01 [15], -4.18 [38]	59 [28], 48 [37], 66 [42]
19	$C_{16}C_1Im^+$	Cl^-	1.4 [11], 0.86 [19],	1.30 [19]	0.92^{17} [19], 0.98^{11} [41]	0.55 [20], 0.45 [45]	-49.68 [19], -38.45 [20],	-7.15 [20]		99 [19], 118^{20}

Entry	Cation[1]	Anion[1]	cmc x 10^3 (mol L^{-1}) – Cond.[2]	cmc x 10^3 (mol L^{-1}) – Fluor.[3]	cmc x 10^3 (mol L^{-1}) – Other[4]	α_{mic} Frahm[5]	ΔG^0_{mic} (kJ mol^{-1})[6]	ΔH^0_{mic} (kJ mol^{-1}) – Cond.[7]	ΔH^0_{mic} (kJ mol^{-1}) – ITC[8]	N_{agg}[9]
			1.25 [20], 1.05 [41], 0.882 [45], 0.91 [46]				-30.0 [41], -48.63 [46]			[19], 54 [45]
20		Br^-	0.59 [15], 0.611 [27], 0.56 [29], 0.65 [46]	0.84 [37]	0.61[11] [15], 0.64[11] [38]	0.33 [15], 0.316 [27], 0.283 [46]	-47.3 [15], -56.61 [27], -31.6 [29], -52.59 [46]	-33.36 [27], -4.43 [38]	-4.90 [15]	64 [37]
21	$C_{18}C_1Im^+$	Cl^-	0.37 [11], 0.44 [20]			0.601 [20]	-40.72 [20]	-7.50 [20]		
23	$C_{16}C_2Im^+$	Cl^-	0.58 [46]				-49.10 [46]			
24		Br^-	0.52 [46], 0.27 [47]	0.29 [47]	0.26[13] [47]	0.344 [46]	-53.09 [46], -50.70 [47]			
25	$C_{10}VnIm^+$	Br^-	33.22 [47]	24.13 [47]	26.86[13] [47]		-30.34 [47]	-4.87 [47]		
26	$C_{12}VnIm^+$	Br^-	8.17 [47]	11.33 [47]	8.75[13] [47]		-37.33 [47]	-8.83 [47]		
27		I^-	4.20 [48]		5.50[14] [48]					
28	$C_{14}VnIm^+$	Br^-	2.06 [47]	1.86 [47]	1.85[13] [47]		-43.59 [47]	-10.19 [47]		
29	$C_{16}VnIm^+$	Br^-	0.52 [46], 0.49 [47]	0.41 [47]	0.40[13] [47]	0.338 [46]	-53.01 [46], -50.02 [47]	-11.53 [47]		
31	$C_{16}C_3Im^+$	Cl^-	0.46 [46]				-49.37 [46]			
32		Br^-	0.41 [46]			0.440 [46]	-53.41 [46]			
33	$C_{16}AlIm^+$	Br^-	0.48 [46]			0.366 [46]	-52.98 [46]			
34	$C_8C_4Im^+$	Br^-	94.2 [49]	109.8 [49]	80.0[10] [49], 80.4[11] [49]		-23.2 [49]		18.3 [49]	53 [49], 60[10] [49]
36	$C_{12}C_4Im^+$	Br^-	5.1 [49]	4.2 [49]	5.5[10] [49], 5.0[11] [49]		-35.6 [49]		-2.5 [49]	46 [49], 54[10] [49]
37	$C_{16}C_4Im^+$	Cl^-	0.51 [46]				-49.52 [46]			
38		Br^-	0.30 [46]			0.498 [46]	-54.30 [46]			
39	$C_{16}C_5Im^+$	Cl^-	0.39 [46]				-49.90 [46]			
42	$C_{10}C_1C_1Im^+$	Br^-			45.2[12] [50]					
43	$C_{12}C_1C_1Im^+$	Cl^-	13.0 [51]	12.90 [51]			-35.84 [51]	-6.65 [51]		60 [51]
44	$C_{10}C_1C_{10}Im^+$	Cl^-	0.49 [52]	0.40 [52]	0.4[13] [52], 0.4[10] [52]		-27.01 [53]			
45	C_8Py^+	Cl^-	180 [54]		180[10] [54], 250[11] [55], 230[11] [56]	0.564 [54]	-20.4 [54]	-1.49 [54]	5.14 [55], 5.4 [56]	
46		Br^-	190 [13], 250 [57]		183[10] [13], 190[11] [55]	0.54 [13], 0.42 [57]	-20.5 [13]		1.32 [55]	

Entry	Cation[1]	Anion[1]	cmc x 10^3 (mol L^{-1}) – Cond.[2]	cmc x 10^3 (mol L^{-1}) – Fluor.[3]	cmc x 10^3 (mol L^{-1}) – Other[4]	α_{mic} Frahm[5]	ΔG^0_{mic} (kJ mol^{-1})[6]	ΔH^0_{mic} (kJ mol^{-1}) – Cond.[7]	ΔH^0_{mic} (kJ mol^{-1}) – ITC[8]	N_{agg}[9]
47		I^-			94[11] [58]				-5.5 [58]	
48	$C_{10}Py^+$	Cl^-	63.8 [59], 64.5 [60], 63.3 [61]		60[11] [55], 57[11] [56]	0.330 [60]	-26.2 [60]	-16.0 [60]	4.08 [55], 4.5 [56]	
49		Br^-	48 [13], 54 [57], 44 [62]		45[10] [13], 30[11] [55]	0.33 [13], 0.37 [57], 0.38 [62]	-29.2 [13]		0.31 [55]	
50	$C_{11}Py^+$	Br^-	21 [62]		18.6[11] [62]	0.36 [62]			2.3 [62]	
51	$C_{12}Py^+$	Cl^-	17.7 [60], 17.5 [61], 10 [62], 16.2 [63]		15[11] [55], 16[11] [56]	0.479 [60], 0.491 [63]	-31.2 [60]	-20.0 [60]	2.44 [55], 1.7 [56]	
52		Br^-	12 [13], 12.1 [57], 11.17 [63]	10 [13]	9.3[10] [13]	0.26 [13], 0.307 [57], 0.34 [62], 0.265 [63]	-36.4 [13]			
53	$C_{13}Py^+$	Br^-	5.3 [62]		4.6[11] [62]	0.34 [62]			5.4 [62]	
54	$C_{14}Py^+$	Cl^-	3.49 [60], 4.18 [63]			0.518 [60], 0.422 [63]	-37.5 [60]	-14.0 [60]		
55		Br^-	2.8 [13], 2.9 [57], 2.7 [62], 2.77 [63]	2.4 [13]	1.5[10] [13], 2.7[11] [62]	0.26 [13], 0.303 [57], 0.31 [62], 0.253 [63]	-42.9 [13]		6.9 [62]	
56	$C_{15}Py^+$	Br^-	1.3 [62], 1.36 [63]		1.3[11] [62]	0.31 [62], 0.275 [63]			8.3 [62]	
57	$C_{16}Py^+$	Cl^-	0.971 [63], 1.2 [64], 0.836 [65]	1.3 [64]		0.417 [63], 0.43 [64], 0.582 [65]	-6.03 [64], -43.25 [65]	-8.08 [65]		
58		Br^-	0.72 [44], 0.64 [62], 0.725 [63], 0.9 [64]	1.2 [64]		0.31 [62], 0.312 [63], 0.40 [64]	-44.41 [44], -6.0 [64]			
59	C_8-(*o*-C_1)Py^+	Cl^-	165 [54]			0.510 [54]	-21.5 [54]	-1.54 [54]		
60	C_{10}-(*o*-C_1)Py^+	Br^-	46.0 [66]				-35.2 [66]	0.92 [66]		
61	C_{12}-(*o*-C_1)Py^+	Br^-	10.2 [66]				-42.7 [66]	-3.4 [66]		
62	C_{14}-(*o*-C_1)Py^+	Br^-	2.6 [66]				-49.4 [66]	-6.3 [66]		
63	C_8-(*m*-C_1)Py^+	Cl^-	170 [54]		170[10] [54]	0.520 [54]	-21.2 [54]	-1.64 [54]		
64		Br^-	350 [67]							
65	C_{10}-(*m*-C_1)Py^+	Cl^-		44 [68]						

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66	C_{12}-(*m*-C_1)Py^+	Cl^-		13.5 [68]	12.5[10] [68]					
67		Br^-	9.74 [69]		10.04[13] [69]		-37.12 [69]	-4.472 [69]		
68	C_{14}-(*m*-C_1)Py^+	Cl^-		3.1 [68]	3.2[10] [68]					
69		Br^-	2.40 [69]		2.33[13] [69]		-42.46 [69]	-6.237 [69]		
70	C_{16}-(*m*-C_1)Py^+	Cl^-		0.77 [68]	0.9[10] [68]					
71		Br^-	0.567 [69]		0.52[13] [69]		-48.50 [69]	-3.653 [69]		
72	C_{18}-(*m*-C_1)Py^+	Cl^-		0.23 [68]	0.25[10] [68]					
73	C_8-(*p*-C_1)Py^+	Cl^-	175 [54]		175[10] [54]	0.539 [54]	-20.8 [54]	1.59 [54]		
74		Br^-	160 [10]	130 [10]	170[12] [10]	0.32 [10]	-24.6 [10]			46 [10]
75	C_{12}-(*p*-C_1)Py^+	I^-	2.50 [70]							
76	C_{12}-(*p*-C_2)Py^+	I^-	2.21 [70]							
77	C_{12}-(*p*-C_3)Py^+	I^-	1.91 [70]							
78	C_{12}-(*p*-C_4)Py^+	I^-	1.54 [70]							
84	$C_8C_1Pyrro^+$	Br^-	200 [10]	200 [10]	240[12] [10]	0.42 [10]	-21.9 [10]			74 [10]
85	$C_{10}C_1Pyrro^+$	Br^-	55.5 [71]	60.1 [71], 56.7 [72], 56.3 [72]		0.322 [71]				
86	$C_{12}C_1Pyrro^+$	Cl^-		18.16 [73]						
87		Br^-	13.6 [71], 13.5 [74]	16.6 [71], 14.0 [72], 13.5 [72], 15 [75]	15.03[11] [15], 10[10] [75], 15.3[11] [75]	0.259 [71], 0.248 [74], 0.23 [75]	-35.6 [15], -35.9 [75], -36.12 [74]	-10.60 [74]	-1.28 [15], -1.78 [75]	49 [74]
88	$C_{14}C_1Pyrro^+$	Br^-	3.30 [71], 3.30 [74]	3.03 [71], 4.1 [72], 3.2 [72]	3.83[11] [15]	0.277 [71], 0.242 [74]	-41.8 [15], -42.38 [74]	-8.659 [74]	-2.54 [15]	55 [74]
89	$C_{16}C_1Pyrro^+$	Br^-	0.83 [71], 0.83 [72], 0.856 [74]	0.66 [71], 0.10 [72]	0.95[11] [15]	0.241 [71], 0.246 [74]	-47.6 [15], -48.15 [74]	-17.07 [74]	-2.80 [15]	59 [74], 69 [76]
90	$C_{18}C_1Pyrro^+$	Cl^-	0.42 [20]			0.528 [20]	-43.01 [20]	-8.16 [20]		
91		Br^-	0.25 [71]	0.22 [71], 0.33 [72]		0.466 [71]				
92	$C_8C_4Pyrro^+$	Br^-		150 [75]	120[10] [75], 144.7[11] [75]	0.51 [75]	-21.9 [75]		7.23 [75]	
93	$C_{12}C_4Pyrro^+$	Br^-			5[10] [75], 6.1[11] [75]	0.40 [75]	-36.1 [75]		2.57 [75]	
94	C_8Pip^+	Cl^-			280[12] [77]					
95	$C_{12}Pip^+$	Cl^-			14[12] [77]					
96	$C_8C_1Pip^+$	Cl^-			310[12] [77]					

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97	$C_{10}C_1Pip^+$	Cl^-			70[12] [77]					
98	$C_{12}C_1Pip^+$	Cl^-	19.93 [78]	19.50 [78]	20[12] [77], 17.5[11] [78]	0.47 [78]	-30.08 [78]	-2.32 [78]	-0.97 [78]	66 [78], 86[10] [78]
99		Br^-					-35.84 [79]	-0.26 [79]		
100	$C_{14}C_1Pip^+$	Br^-					-42.03 [79]	-9.81 [79]		
101	$C_{16}C_1Pip^+$	Br^-	0.76 [76]				-47.47 [79]	-4.29 [79]		53 [76]
102	$C_{18}C_1Pip^+$	Cl^-				0.565 [20]	-41.69 [20]	-7.67 [20]		
103	$C_{16}C_1Aze^+$	Br^-	0.67 [76]							54 [76]
104	$C_{16}C_1Azo^{+\,35°C}$	Br^-	0.63 [76]							
106	$C_{12}C_1Mor^+$	Cl^-		22.66 [73]	25[11] [80]				-4.2 [80]	
108	$C_{14}C_1Mor^+$	Br^-	4.37 [81]		3.8[13] [82]	0.27 [81]	-15.5 [81]			61 [81]
109	$C_{16}C_1Mor^+$	Br^-	1.00 [81]		0.57[10] [83]	0.34 [81]	-9.6 [81], -19.3 [84]			58 [81]
111	C_8Gu^+	Cl^-	68 [85]	44.6 [86]		0.14 [85]	-33.8 [85]			
112	$C_{10}Gu^+$	Cl^-	20 [85], 26 [87]		2.84[11] [87]	0.06 [85], 0.29 [87]	-39.3 [85], -22.3 [87]		-4.5 [87]	
113	$C_{12}Gu^+$	Cl^-	5.8 [85], 6.2 [87], 6.0 [88]		6.2[11] [87]	0.04 [85], 0.26 [87]	-45.4 [85], -28.3 [87]		-7.8 [87]	
114	$C_{14}Gu^+$	Cl^-	1.8 [87]		1.5[11] [87], 0.13[13] [89]	0.28 [87]	-33.6 [87]		-17.5 [87]	
115	$C_8C_1C_1Gu^+$	Cl^-	7.6 [85]			0.34 [85]	-44.1 [85]			
116	$C_{10}C_1C_1Gu^+$	Cl^-	2.7 [85]			0.33 [85]	-49.2 [85]			
117	$C_{12}C_1C_1Gu^+$	Cl^-	0.72 [85]			0.18 [85]	-55.8 [85]			
118	$C_8Ph_3P^+$	Br^-	30 [90]		27[13] [90]					
119		I^-	22 [91]							
120	$C_{10}Ph_3P^+$	Br^-	5.6 [90], 7.21 [92], 7.54 [93]		5.6[14] [90], 2.3[10] [90], 6.2[13] [90], 7.26[11] [92], 5.3[13] [94]	0.867 [92], 0.52 [93]	-25.1 [92], -32.43 [93]	-4.47 [93]	3.97 [92]	74[19] [94]
121		I^-	19 [91]							
122	$C_{12}Ph_3P^+$	Br^-	1.7 [90], 1.82 [92], 1.81 [93], 1.75 [95], 2.20 [96]	1.8 [97]	1.6[10] [90], 2.1[13] [90], 1.80[11] [92], 1.15[13] [94], 1.2[13] [97]	0.604 [92], 0.56 [93], 0.64 [95], 0.40 [96]	-35.7 [92], -37.12 [93], -43.4 [95], -40.4 [96]	-6.19 [93]	1.15 [92]	90[19] [94]
123	$C_{14}Ph_3P^+$	Br^-	0.40 [90],	0.38 [97],	0.81[14] [90],	0.559 [92],	-39.9 [95],	-15.86 [93],	-5.96	107[19]

Entry	Cation[1]	Anion[1]	cmc x 10^3 (mol L^{-1}) – Cond.[2]	cmc x 10^3 (mol L^{-1}) – Fluor.[3]	cmc x 10^3 (mol L^{-1}) – Other[4]	α_{mic} Frahm[5]	ΔG^0_{mic} (kJ mol^{-1})[6]	ΔH^0_{mic} (kJ mol^{-1}) – Cond.[7]	ΔH^0_{mic} (kJ mol^{-1}) – ITC[8]	N_{agg}[9]
			0.77 [92], 0.55 [93], 0.57 [95], 0.83 [98], 0.69 [99]	0.71 [100], 0.71 [101]	0.41[10] [90], 0.30[13] [90], 0.35[13] [94], 0.33[13] [97], 0.59[13] [98], 0.80[11] [100]	0.61 [93], 0.62 [95], 0.499 [98], 0.54 [99]	-15.96 [98], -39.14 [93], -39.8 [100]	-20.13 [98]	[100]	[94]
124	$C_{16}Ph_3P^+$	Br^-	0.10 [90], 0.14 [92], 0.16 [93], 0.20 [95], 0.16 [96], 0.12 [102], 0.194 [104]	0.18 [97], 0.12 [100], 0.12 [101], 0.20 [104]	0.15[14] [90], 0.062[10] [90], 0.11[13] [90], 0.10[13] [94], 0.16[13] [97], 0.115[11] [100]	0.692 [92], 0.62 [93], 0.68 [95], 0.35 [96], 0.50 [102], 0.39 [104]	-46.24 [93], -41.7 [95], -52.5 [96], -42.4 [100], -36.5 [102], -31.8 [103], -50.1 [104]	-14.13 [93], -22.2 [104]	-19.90 [100]	159[19] [94], 18 [104]
125	$C_{18}Ph_3P^+$	Br^-			0.02[14] [90], 0.017[10] [90]					
Anionic ILBSs										
126	$(CH_3)_4N^+$	$C_{12}SO_4^-$	5.4 [105]	5.9 [106], 5.1 [106]		0.20 [105]	-41.2 [105]			64 [105]
127		AOT^-	2.90 [107]				-30.8 [107]	-27.2 [107]		55 [94]
128	$(C_2H_5)_4N^+$	$C_{12}SO_4^-$	3.7 [105]			0.21 [105]	-42.6 [105]			63 [105]
129		AOT^-	2.50 [107]				-32.5 [107]	-12.3 [107]		78[10] [94]
130	$(C_3H_7)_4N^+$	$C_{12}SO_4^-$	2.20 [105]			0.20 [105]	-45.2 [105]			57 [105]
131		AOT^-	0.95 [107]				-36.6 [107]	-8.8 [107]		131[10] [94]
134	$(C_4H_9)_4N^+$	$C_{12}SO_4^-$	1.15 [105]			0.17 [105]	-48.9 [105]			57 [105]
135		$C_{14}SO_4^-$	0.21 [108]							
136		AOT^-	0.80 [107]				-34.4 [107]	15.2 [107]		139[10] [94]
137	C_4Py^+	DBS^-			1.16[11] [109]		-36.07 [109]		-3.51 [109]	
138	$C_4C_1Pyrro^+$	$C_{12}SO_4^-$	3.8 [110]			0.43 [110]	-37.27 [110]	-3.96 [110]		
139	$C_4C_1Im^+$	$C_8SO_3^-$		130 [17]						
140		$C_{12}SO_3^-$	4.70 [111]			0.39 [111]	-34.06 [111]	-0.71 [111]		
141		$C_8SO_4^-$	34.6 [7], 32.8 [8], 35.8 [112], 36.0 [113], 36.4 [114],	29.9 [8], 31.0 [113], 37.7 [114], 33 [119]	34.8[11] [7], 37.0[10] [117], 20[13] [118], 40[10] [120], 54.9[11] [120]	0.30 [7], 0.64 [8], 0.29 [112], 0.39 [113], 0.45 [114],	-30.9 [7], -32.2 [8], -31.28 [112], -30.1 [113], -28.2 [114],	0.26 [112], -11.0 [113], -16.3 [114]		27[20] [115], 19 [116], 27[10] [117]

Entry	Cation[1]	Anion[1]	cmc x 10^3 (mol L^{-1}) – Cond.[2]	cmc x 10^3 (mol L^{-1}) – Fluor.[3]	cmc x 10^3 (mol L^{-1}) – Other[4]	α_{mic} Frahm[5]	ΔG^0_{mic} (kJ mol^{-1})[6]	ΔH^0_{mic} (kJ mol^{-1}) – Cond.[7]	ΔH^0_{mic} (kJ mol^{-1}) – ITC[8]	N_{agg}[9]
			32.4 [115], 30.5 [116], 36 [117], 30.0 [118]			0.31 [115], 0.63 [116], 0.63 [118]	-30.0 [117], -18.95 [118]			
142		$C_{10}SO_4^-$	8.4 [121]	11.0 [121]		0.48 [121]	-33.09 [121]	-5.69 [121]		
143		$C_{12}SO_4^-$	2.1 [110], 2.6 [112], 2.24 [122]	2.27 [122]		0.35 [110], 0.31 [112], 0.356 [122]	-41.71 [110], -41.66 [112], -41.23 [122]	-5.05 [110], -2.65 [112], -5.50 [122]		27 [122]
144		$C_{14}SO_4^-$	0.5 [121]	0.6 [121]		0.45 [121]	-44.61 [121]	-14.64 [121]		
145		DBS^-			1.47[11] [109]		-34.95 [109]		-2.79 [109]	
148	$C_5C_1Im^+$	$C_{12}SO_4^-$	1.6 [123]	1.6 [123]		0.399 [123]	-41.62 [123]	-13.94 [123]		134 [123]
149		DBS^-	0.36 [124]	0.33 [124]	0.35[13] [124]	0.687 [124]	-38.93 [124]	37.38 [124]		
150	$C_6C_1Im^+$	$C_8SO_4^-$	22.2 [112], 19.5 [115]			0.12 [112], 0.22 [115]	-36.49 [112]	0.59 [112]		77[20] [115]
151		$C_{12}SO_4^-$	0.9 [112], 0.9 [121]	1.3 [121]		0.18 [112], 0.35 [121]	-49.76 [112], -44.51 [121]	3.88 [112], -5.52 [121]		
152	$C_7C_1Im^+$	DBS^-	0.13 [124]	0.18 [124]	0.19[13] [124]	0.394 [124]	-51.54 [124]	6.75 [124]		
Biamphiphilic ILBSs										
153	$C_8C_1Im^+$	$C_8SO_3^-$		17 [17]						
154		$C_8SO_4^-$	5.6 [112]			0.06 [112]	-44.32 [112]	4.04 [112]		
155		$C_{12}SO_4^-$	0.4 [112], 0.3 [121]	0.4 [121]		0.16 [112], 0.32 [121]	-54.31 [112], -50.47 [121]	45.31 [112], -5.84 [121]		
156	$C_{10}C_1Im^+$	$C_{12}SO_4^-$	0.09 [121]			0.25 [121]	-57.80 [121]			
159	$C_8(CH_3)_3N^+$	$C_8SO_4^-$	7.64 [125]							
160		$C_{10}SO_4^-$	1.72 [125]							
161		$C_{12}SO_4^-$	0.46 [125]							

[1] Abbreviations and acronyms of the cations and anions are those given in Table 1. [2] Critical micelle concentration (cmc) from conductivity measurements. [3] Critical micelle concentration (cmc) from fluorescence measurements. [4] Critical micelle concentration (cmc) obtained by other. [5] Degree of counter-ion dissociation calculated with Frahm's approximation. [6] Gibbs free energy of micellization. [7] Enthalpy of micellization calculated indirectly by the van't Hoff treatment. [8] Enthalpy of micellization calculated directly by isothermal titration calorimetry. [9] Average micellar aggregation number from fluorescence measurements and other techniques. [10] Data determined by nuclear magnetic resonance spectroscopy (NMR). [11] Data determined by isothermal titration calorimetry (ITC). [12] Data determined by apparent molar volume. [13] Data determined by ultraviolet–visible spectroscopy (UV-Vis). [14] Data determined by potentiometry. [15] Data determined by differential pulse voltammetry (DPV). [16] Data determined by apparent molar adiabatic compressibility. [17] Data determined by electromagnetic field (EMF). [18] Data determined by turbidity. [19] Data determined by small-angle neutron scattering (SANS). [20] Data determined by light scattering.

Table S2. Literature data of gemini ionic liquid-based surfactants aqueous solutions at 25 °C. Parameters calculated using techniques other than surface tension. All surfactants have two bromides as counterions, except for entries 54 and 55, that have three bromide counterions.

Entry	Cation [1]	cmc x 10^3 (mol L^{-1}) – Cond.	cmc x 10^3 (mol L^{-1}) – Fluor.	α_{mic} Frahm	ΔG^0_{mic} (kJ mol^{-1})	ΔH^0_{mic} (kJ mol^{-1}) – Cond.	N_{agg}
2	$(C_{16}Im)_2C_2)^{2+}$		0.0341 [126] [2]				
3	$(C_{16}Im)_2C_3)^{2+}$		0.0048 [126] [2]				
4	$(C_{10}Im)_2C_4)^{2+}$	5.07 [127]		0.33 [127]	-26.96 [127], -28.7 [128]	-2.84 [127]	
5	$(C_{12}Im)_2C_4)^{2+}$	0.73 [127], 1.04 [129]		0.30 [127], 0.40 [129]	-33.41 [127], -43.09 [129], -33.7 [128]	-5.77 [127], -12.62 [129]	
6	$(C_{14}Im)_2C_4)^{2+}$	0.12 [127]		0.43 [127]	-34.58 [127], -36.52 [128]	-13.78 [127], -10.92 [128]	
7	$(C_{16}Im)_2C_4)^{2+}$		0.0222 [126] [2]				398 [126] [2]
8	$(C_{16}Im)_2C_5)^{2+}$		0.0269 [126] [2]				
10	$(C_{16}Im)_2C_6)^{2+}$		0.0501 [126] [2]				
12	$(C_{16}Im)_2C_8)^{2+}$		0.0512 [126] [2]				
15	$(C_{16}Im)_2C_{10})^{2+}$		0.0607 [126] [2]				
16	$(C_4Im)_2C_{12})^{2+}$	58.6 [130]	58.5 [130]				547 [130]
17	$(C_{10}Im)_2C_{12})^{2+}$	0.66 [130]	1.04 [130]				4.7 [130]
18	$(C_{16}Im)_2C_{12})^{2+}$	0.19 [130]	0.21 [130], 0.0619 [126] [2]				99.5 [130]
19	$((C_{12}SMeIm)_2C_2)^{2+}$	0.40 [131]		0.37 [131]	-33.14 [131]		
20	$((C_{14}SMeIm)_2C_2)^{2+}$	0.10 [131]		0.46 [131]	-34.08 [131]		
21	$((C_{16}SMeIm)_2C_2)^{2+}$	0.022 [131]		0.33 [131]	-42.72 [131]		
22	$((C_{12}SMeIm)_2C_3)^{2+}$	0.35 [131]		0.37 [131]	-33.52 [131]		
23	$((C_{14}SMeIm)_2C_3)^{2+}$	0.085 [131]		0.48 [131]	-33.83 [131]		
24	$((C_{16}SMeIm)_2C_3)^{2+}$	0.021 [131]		0.34 [131]	-42.49 [131]		
25	$((C_{12}SMeIm)_2C_4)^{2+}$	0.31 [131]		0.42 [131]	-32.36 [131]		
26	$((C_{14}SMeIm)_2C_4)^{2+}$	0.071 [131]		0.47 [131]	-34.62 [131]		
27	$((C_{16}SMeIm)_2C_4)^{2+}$	0.020 [131]		0.35 [131]	-42.26 [131]		
28	$((C_{12}OHIm)_2C_3)^{2+}$	1.37 [132]		0.25 [132]	-32.85 [132]		
29	$((C_{12}OHIm)_2C_4)^{2+}$	1.40 [132]		0.30 [132]	-31.63 [132]		
30	$((C_{12}OHIm)_2C_5)^{2+}$	1.47 [132]		0.16 [132]	-35.21 [132]		
31	$((C_{12}OHIm)_2C_6)^{2+}$	1.57 [132]		0.26 [132]	-32.31 [132]		
32	$((C_{12}OHIm)_2C_8)^{2+}$	1.59 [132]		0.30 [132]	-31.14 [132]		
33	$((C_{12})_3N)_2C_2)^{2+}$				-15.14 [133]		
34	$((C_{12})_3N)_2C_3)^{2+}$				-15.76 [133]		

35	$((C_{12})_3N)_2C_6)^{2+}$				-15.93 [133]		
51	$(C_{10}Pyrro)_2C_4)^{2+}$	4.7 [134]	4.5 [134]	0.36 [134]	-26.48 [134]	-16.60 [134]	
52	$(C_{12}Pyrro)_2C_4)^{2+}$	0.57 [134]	0.59 [134]	0.47 [134]	-29.31 [134]	-18.27 [134]	
53	$(C_{14}Pyrro)_2C_4)^{2+}$	0.106 [134]	0.078 [134]	0.37 [134]	-36.87 [134]	-24.02 [134]	
54	$((C_8Im)_3Am)^{3+}$	4.15 [130]	5.13 [130]				24.7 [130]
55	$((C_8Im)_3Bn)^{3+}$	1.87 [130]	2.30 [130]				98.6 [130]

[1] Abbreviations are those given in Table 2. [2] Measurements done at 30 °C.

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