Columnar Thermotropic Mesophases formed by Dimeric Liquid-Crystalline Ionic Liquids Exhibiting Large Mesophase Ranges

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Synthesis of 1,1'-(1,6-hexanediyl)bis{3-[3,4,5-tris(octyloxy)benzyl]imidazolium} chloride (2-8,6)

Compound 2-8,6 was produced from IM-6-IM and 3,4,5-tris(octyloxy)benzyl chloride in a manner similar to that employed in the synthesis of 2-8,4, but with a different scale. Yield = 2.22 g (89.6%) as a white solid. $^1$H NMR (400 MHz): $\delta =$ 10.99 (s, 2H), 7.65 (t, 2H), 6.99 (t, 2H), 6.60 (s, 4H), 5.39 (s, 4H), 4.41 (t, 4H), 3.96-3.90 (m, 12H), 2.03 (t, 4H), 1.78-1.68 (m, 12H), 1.51-1.24 (m, 64H), 0.88-0.85 (m, 18H). $^{13}$C NMR (100 MHz): $\delta =$ 153.9, 139.0, 137.6, 127.7, 122.9, 121.1, 107.6, 73.5, 69.5, 53.9, 49.6, 32.0, 31.9, 30.4, 29.6, 29.5, 29.4, 26.6, 26.2, 22.8, 14.2.

Synthesis of 1,1'-(1,8-octanediyl)bis{3-[3,4,5-tris(octyloxy)benzyl]imidazolium} chloride (2-8,8)

Compound 2-8,8 was produced from IM-8-IM and 3,4,5-tris(octyloxy)benzyl chloride in a manner similar to that employed in the synthesis of 2-8,4, but with a different scale. Yield = 3.50 g (55.2%) as a white solid. $^1$H NMR (400 MHz): $\delta =$ 10.99 (s, 2H), 7.53 (t, 2H), 7.14 (t, 2H), 6.62 (s, 4H), 5.42 (s, 4H), 4.34 (t, 4H), 3.95-3.89 (m, 12H), 2.02 (t, 4H), 1.79-1.67 (m, 12H), 1.45-1.25 (m, 64H), 0.87-0.84
\[ \delta = 153.8, 138.9, 137.6, 127.9, 122.5, 121.4, 107.6, 73.5, 69.5, 53.9, 49.9, 32.0, 31.9, 30.4, 29.6, 29.5, 29.4, 27.7, 26.2, 25.4, 22.8, 14.2 \]

Synthesis of 1,1'-\((1,4\text{-butanediyl})\)bis\{3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium\} chloride (2-12,4)

Compound 2-12,4 was produced from IM-4-IM and 3,4,5-tris(dodecyloxy)benzyl chloride in a manner similar to that employed in the synthesis of 2-8,4. Yield = 5.72 g (74.2%) as a white solid. $^1$H NMR (400 MHz): $\delta = 10.57$ (s, 2H), 7.86 (t, 2H), 7.04 (t, 2H), 6.59 (s, 4H), 5.30 (s, 4H), 4.54 (t, 4H), 3.95-3.90 (m, 12H), 2.18 (t, 4H), 1.80-1.67 (m, 4H), 1.48-1.24 (m, 64H), 0.87-0.84 (m, 18H). $^{13}$C NMR (100 MHz): $\delta = 154.0, 139.1, 137.4, 127.1, 123.1, 121.0, 107.5, 73.6, 69.5, 53.9, 49.6, 32.0, 31.4, 30.4, 29.9, 29.8, 29.7, 29.6, 29.5, 26.3, 26.2, 22.8, 14.2.

Synthesis of 1,1'-\((1,6\text{-hexanediyl})\)bis\{3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium\} chloride (2-12,6)

Compound 2-12,6 was produced from IM-6-IM and 3,4,5-tris(dodecyloxy)benzyl chloride in a manner similar to that employed in the synthesis of 2-8,4, but with a different scale. Yield = 2.84 g (90.1%) as a white solid. $^1$H NMR (400 MHz): $\delta = 10.88$ (s, 2H), 7.73 (t, 2H), 7.09 (t, 2H), 6.60 (s, 4H), 5.37 (s, 4H), 4.40 (t, 4H), 3.94-3.89 (m, 12H), 2.02 (t, 4H), 1.79-1.66 (m, 12H), 1.48-1.23 (m, 64H), 0.87-0.83 (m, 18H). $^{13}$C NMR (100 MHz): $\delta = 153.9, 138.9, 137.8, 127.6, 122.4, 121.0, 107.6, 73.6, 69.6, 54.0, 49.5, 32.0, 30.4, 29.9, 29.8, 29.7, 29.6, 29.5, 29.2, 26.2, 24.5, 22.8, 14.2.

Synthesis of 1,1'-\((1,8\text{\text{octanediyl})}\)bis\{3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium\} chloride (2-12,8)
Compound 2-12,8 was produced from IM-8-IM and 3,4,5-tris(dodecyloxy)benzyl chloride in a manner similar to that employed in the synthesis of 2-8,4. Yield = 7.80 g (97%) as a white solid. \(^1\)H NMR (400 MHz): \(\delta = 11.06\) (s, 2H), 7.51 (t, 2H), 7.13 (t, 2H), 6.62 (s, 4H), 5.42 (s, 4H), 4.34 (t, 4H), 3.95-3.89 (m, 12H), 1.97 (t, 4H), 1.79-1.67 (m, 12H), 1.47-1.24 (m, 64H), 0.87-0.84 (m, 18H). \(^{13}\)C NMR (100 MHz): \(\delta = 153.8, 138.9, 137.7, 127.8, 122.3, 121.3, 107.6, 73.5, 69.5, 53.9, 49.9, 32.0, 30.4, 29.9, 29.8, 29.7, 29.6, 29.5, 27.6, 26.2, 25.3, 22.8, 14.2.

**Synthesis of 1,1'-(1,6-hexanediyl)bis{3-[3,4,5-tris(octyloxy)benzyl]imidazolium} tetrafluoroborate (3-8,6)**

Compound 3-8,6 was produced from 2-8,6 and AgBF\(_4\) in a manner similar to that employed in the synthesis of 3-8,4, but with a different scale. Yield = 0.97 g (87.4%) as a white solid. \(^1\)H NMR (500 MHz): \(\delta = 8.92\) (s, 2H), 7.35 (t, 2H), 7.14 (t, 2H), 6.60 (s, 4H), 5.21 (s, 4H), 4.17 (t, 4H), 3.97-3.90 (m, 12H), 1.90 (t, 4H), 1.80-1.68 (m, 12H), 1.48-1.26 (m, 64H), 0.88-0.84 (m, 18H). \(^{13}\)C NMR (100 MHz): \(\delta = 153.9, 138.9, 135.8, 128.9, 127.6, 122.5, 121.8, 107.5, 73.5, 69.3, 54.1, 49.6, 32.0, 31.9, 30.4, 29.6, 29.5, 29.4, 29.0, 26.2, 24.3, 22.8, 14.2. ESI-MS (methanol, m/z): 1343.9987 (1344.00 calculated [M]+ C\(_{74}\)H\(_{128}\)B\(_2\)F\(_8\)N\(_4\)O\(_6\)).

**Synthesis of 1,1'-(1,8-octanediyl)bis{3-[3,4,5-tris(octyloxy)benzyl]imidazolium} tetrafluoroborate (3-8,8)**

Compound 3-8,8 was produced from 2-8,8 and AgBF\(_4\) in a manner similar to that employed in the synthesis of 3-8,4, but with a different scale. Yield = 2.30 g (83.9%) as a white solid. \(^1\)H NMR (500 MHz): \(\delta = 8.99\) (s, 2H), 7.26 (t, 2H), 7.15 (t, 2H), 6.62 (s, 4H), 5.24 (s, 4H), 4.18 (t, 4H), 3.96-3.90 (m, 12H), 1.97 (t, 4H), 1.80-1.68 (m, 12H), 1.48-1.26 (m, 72H), 0.88-0.84 (m, 18H). \(^{13}\)C NMR (100 MHz): \(\delta = 153.9, 138.9, 136.0, 127.7, 122.1, 121.8, 107.6, 73.5, 69.3, 54.0, 49.9, 32.0, 30.4, 29.6, 29.5,
29.4, 29.2, 27.3, 26.1, 26.2, 24.8, 22.8, 14.2. ESI-MS (methanol, m/z): 1372.0300 (1372.03 calculated [M]+ C_{76}H_{132}B_2F_8N_4O_6).

Synthesis of 1,1’-(1,4-butanediyl)bis[3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium} tetrafluoroborate (3-12,4)

Compound 3-12,4 was produced from 2-12,4 and AgBF_4 in a manner similar to that employed in the synthesis of 3-8,4, but with a different scale. Yield = 2.14 g (64.8%) as a white solid. ^1H NMR (500 MHz): δ = 8.82 (s, 2H), 7.40 (t, 2H), 7.10 (t, 2H), 6.57 (s, 4H), 5.17 (s, 4H), 4.23 (t, 4H), 3.96-3.90 (m, 12H), 1.99 (t, 4H), 1.80-1.68 (m, 12H), 1.48-1.25 (m, 112H), 0.88-0.85 (m, 18H). ^13C NMR (100 MHz): δ = 154.0, 139.0, 135.6, 127.2, 122.8, 121.7, 107.5, 73.6, 54.2, 49.3, 32.0, 30.4, 29.9, 29.8, 29.7, 29.6, 29.5, 26.2, 22.8, 14.2. ESI-MS (methanol, m/z): 1352.3416 (1352.34 calculated [M]+ C_{96}H_{172}B_2F_8N_4O_6).

Synthesis of 1,1’-(1,6-hexanediyl)bis[3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium} tetrafluoroborate (3-12,6)

Compound 3-12,6 was produced from 2-12,6 and AgBF_4 in a manner similar to that employed in the synthesis of 3-8,4, but with a different scale. Yield = 1.21 g (85.9%) as a white solid. ^1H NMR (500 MHz): δ = 8.91 (s, 2H), 7.33 (t, 2H), 7.12 (t, 2H), 6.59 (s, 4H), 5.20 (s, 4H), 4.16 (t, 4H), 3.95-3.89 (m, 12H), 1.89 (t, 4H), 1.76-1.67 (m, 12H), 1.46-1.24 (m, 112H), 0.86 (m, 18H). ^13C NMR (100 MHz): δ = 153.9, 139.0, 135.9, 127.5, 122.4, 121.8, 107.5, 73.5, 69.4, 54.1, 49.7, 32.0, 30.5, 29.9, 29.8, 29.7, 29.6, 29.5, 28.9, 26.3, 26.2, 24.3, 22.8, 14.2. ESI-MS (methanol, m/z): 1680.3729 (1680.37 calculated [M]+ C_{98}H_{176}B_2F_8N_4O_6).

Synthesis of 1,1’-(1,8-octanediyl)bis[3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium} tetrafluoroborate (3-12,8)
Compound 3-12,8 was produced from 2-12,8 and AgBF₄ in a manner similar to that employed in the synthesis of 3-8,4. Yield = 2.81 g (82.4%) as a white solid. ¹H NMR (500 MHz): δ = 9.03 (s, 2H), 7.25 (t, 2H), 7.15 (t, 2H), 6.61 (s, 4H), 5.25 (s, 4H), 4.18 (t, 4H), 3.96-3.90 (m, 12H), 1.89 (t, 4H), 1.79-1.68 (m, 12H), 1.48-1.25 (m, 120H), 0.88-0.85 (m, 18H).¹³C NMR (100 MHz): δ = 153.9, 138.9, 136.1, 127.2, 122.0, 121.8, 107.6, 73.5, 69.4, 54.0, 49.9, 32.0, 30.4, 29.9, 29.8, 29.7, 29.6, 29.5, 29.2, 27.2, 26.2, 24.8, 22.8, 14.2. ESI-MS (methanol, m/z): 1708.4042 (1708.40 calculated [M]+). C₁₀₀H₁₈₀B₂F₈N₄O₆.

Synthesis of 1,1’-(1,8-octanediyl)bis{3-[3,4,5-tris(octyloxy)benzyl]imidazolium} bis(trifluoro-methyIsulfonyl)imide (4-8,8)

Compound 4-8,8 was produced from 2-8,8 and LiTf₂N in a manner similar to that employed in the synthesis of 4-8,4. Yield = 0.71 g (80.6%) as a very viscous liquid. AgBF₄ test shows no Cl⁻ existing. ¹H NMR (500 MHz): δ = 8.86 (s, 2H), 7.30 (t, 2H), 7.17 (t, 2H), 6.55 (s, 4H), 5.17 (s, 4H), 4.16 (t, 4H), 3.94-3.91 (m, 12H), 1.86 (t, 4H), 1.80-1.68 (m, 12H), 1.48-1.26 (m, 120H), 0.88-0.84 (m, 18H).¹³C NMR (100 MHz): δ = 154.0, 138.9, 135.3, 127.2, 122.5, 122.0, 121.5, 107.4, 73.6, 69.3, 54.1, 50.2, 32.0, 31.9, 30.4, 29.6, 29.5, 29.4, 27.7, 22.8, 14.2.

Synthesis of 1,1’-(1,4-butanediyl)bis{3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium} bis(trifluoromethylsulfonyl)imide (4-12,4)

Compound 4-12,4 was produced from 2-12,4 and LiTf₂N in a manner similar to that employed in the synthesis of 4-8,4. Yield = 0.87 g (85.4%) as a white solid. AgBF₄ test shows no Cl⁻ existing. ¹H NMR (500 MHz): δ = 8.82 (s, 2H), 7.41 (t, 2H), 7.11 (t, 2H), 6.52 (s, 4H), 5.14 (s, 4H), 4.26 (t, 4H), 3.94-3.90 (m, 12H), 2.02 (t, 4H), 1.80-1.68 (m, 12H), 1.46-1.24 (m, 120H), 0.88-0.84 (m, 18H).¹³C NMR (100 MHz):
\[ \delta = 154.1, 139.2, 135.2, 126.7, 123.0, 122.0, 121.4, 107.5, 73.6, 69.4, 54.4, 49.4, 32.0, 32.0, 30.4, 29.9, 29.8, 29.7, 29.5, 29.4, 27.2, 26.2, 22.8, 22.8, 14.2. \]

**Synthesis of 1,1’-(1,8-octanediyl)bis{3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium} bis(tri-fluoromethylsulfonyl)imide (4-12,8)**

Compound 4-12,8 was produced from 2-12,8 and LiTf2N in a manner similar to that employed in the synthesis of 4-8,4. Yield = 0.86 g (81.1%) as a white solid. AgBF4 test shows no Cl− existing. \(^1\)H NMR (500 MHz): \[ \delta = 8.88 (s, 2H), 7.29 (t, 2H), 7.15 (t, 2H), 6.55 (s, 4H), 5.18 (s, 4H), 4.17 (t, 4H), 3.94-3.91 (m, 12H), 1.87 (t, 4H), 1.80-1.68 (m, 12H), 1.46-1.24 (m, 120H), 0.88-0.84 (m, 18H). \(^1\)3C NMR (100 MHz): \[ \delta = 154.0, 139.1, 135.4, 127.1, 122.4, 121.9, 121.5, 121.4, 118.3, 107.5, 73.6, 69.4, 54.0, 50.2, 32.0, 32.0, 30.4, 29.9, 29.8, 29.8, 29.7, 29.5, 29.4, 27.6, 22.8, 22.8, 14.2. \]

**Synthesis of 1-methyl-3-[3,4,5-tris(octyloxy)benzyl]imidazolium chloride (5-8)**

The compound was produced according to the previous paper.\(^{SI}\) \(^1\)H NMR (500 MHz): \[ \delta = 0.86 (t, 9H), 1.26-1.49 (m, 30H), 1.69-1.81 (m, 6H), 3.94 (t, 6H), 4.06 (s, 3H), 5.39 (s, 2H), 6.61 (s, 2H), 7.046 (t, 1H), 7.049 (t, 1H), 11.23 (s, 1H). \(^1\)3C NMR (100 MHz): \[ \delta = 14.2, 22.8, 26.2, 29.4, 29.5, 29.6, 30.4, 31.9, 32.0, 36.8, 54.1, 69.6, 73.6, 107.7, 121.1, 123.0, 127.4, 154.0. \]

**Synthesis of 1-methyl-3-[3,4,5-tris(decyloxy)benzyl]imidazolium chloride (5-10)**

The compound was produced in a manner similar to that employed in the synthesis of 1-methyl-3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium chloride (5-12) reported before.\(^{SI}\) The difference is that 1-bromodecane was used as instead. \(^1\)H NMR (500 MHz): \[ \delta = 0.86 (t, 9H), 1.26-1.49 (m, 42H), 1.69-1.81 (m, 6H), 3.94 (t, 6H), 4.06 (s,
3H), 5.39 (s, 2H), 6.61 (s, 2H), 7.046 (t, 1H), 7.049 (t, 1H), 11.24 (s, 1H). \(^{13}\)C NMR (100 MHz): \(\delta = 14.2, 22.8, 26.2, 29.5, 29.7, 29.8, 30.4, 32.0, 36.8, 54.1, 69.6, 73.6, 107.7, 121.1, 122.6, 127.4, 130.1, 139.1, 154.0.

**Synthesis of 1-methyl-3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium chloride (5-12)**

The compound was produced according to the previous paper.\(^1\)H NMR (500 MHz): \(\delta = 0.86 (t, 9H), 1.26-1.49 (m, 54H), 1.69-1.81 (m, 6H), 3.94 (t, 6H), 4.06 (s, 3H), 5.39 (s, 2H), 6.61 (s, 2H), 7.03 (t, 1H), 7.06 (t, 1H), 11.29 (s, 1H). \(^{13}\)C NMR (100 MHz): \(\delta = 14.2, 22.8, 26.2, 29.5, 29.7, 29.8, 30.4, 32.0, 36.7, 53.9, 69.5, 73.5, 107.6, 121.4, 123.0, 127.7, 138.4, 139.0, 153.9.

**Synthesis of 1-Methyl-3-[3,4,5-tris(tetradecyloxy)benzyl]imidazolium chloride (5-14)**

The compound was produced in a manner similar to that employed in the synthesis of 5-12 reported before.\(^1\) The difference is that 1-bromotetradecane was used as instead. \(^1\)H NMR (400 MHz): \(\delta = 0.86 (t, 9H), 1.24-1.48 (m, 54H), 1.67-1.88 (m, 6H), 3.93 (t, 6H), 4.07 (s, 3H), 5.40 (s, 2H), 6.62 (s, 2H), 7.08 (t, 1H), 7.13 (t, 1H), 11.07 (s, 1H). \(^{13}\)C NMR (100 MHz): \(\delta = 14.2, 22.8, 26.2, 29.5, 29.7, 29.8, 30.4, 32.0, 36.8, 54.0, 69.6, 73.6, 107.7, 121.2, 122.7, 127.4, 138.9, 154.0.

**Synthesis of 1-methyl-3-[3,4,5-tris(octyloxy)benzyl]imidazolium tetrafluoroborate (6-8)**

The compound was produced according to the previous paper.\(^1\)H NMR (500 MHz): \(\delta = 0.86 (t, 9H), 1.26-1.49 (m, 30H), 1.69-1.81 (m, 6H), 3.94-3.90 (m, 9H), 5.17 (s, 2H), 6.58 (s, 2H), 7.14 (t, 1H), 7.17 (t, 1H), 8.84 (s, 1H). \(^{13}\)C NMR (100 MHz): \(\delta = \)
Synthesis of 1-methyl-3-[3,4,5-tris(decyloxy)benzyl]imidazolium tetrafluoroborate (6-10)

The compound was produced in a manner similar to that employed in the synthesis of 6-8 or 3-8.4. $^1$H NMR (500 MHz): $\delta = 0.86$ (t, 9H), 1.26-1.49 (m, 42H), 1.69-1.81 (m, 6H), 3.94-3.90 (m, 9H), 5.18 (s, 2H), 6.58 (s, 2H), 7.11 (t, 1H), 7.14 (t, 1H), 8.93 (s, 1H). $^{13}$C NMR (100 MHz): $\delta = 14.2, 22.8, 26.2, 29.4, 29.5, 29.7, 29.8, 30.4, 32.0, 36.6, 54.2, 69.5, 73.6, 107.6, 121.7, 123.1, 127.1, 137.0, 139.2, 154.0.

Synthesis of 1-methyl-3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium tetrafluoroborate (6-12)

The compound was produced according to the previous paper. $^{31}$ $^1$H NMR (500 MHz): $\delta = 0.86$ (t, $J = 6.8$ Hz, 9H), 1.26-1.49 (m, 54H), 1.69-1.81 (m, 6H), 3.94-3.90 (m, 9H), 5.17 (s, 2H), 6.58 (s, 2H), 7.12 (s, 1H), 7.14 (s, 1H), 8.90 (s, 1H). $^{13}$C NMR (100 MHz): $\delta = 14.2, 22.8, 26.2, 29.5, 29.6, 29.7, 29.8, 30.4, 32.0, 36.5, 54.1, 69.5, 73.5, 107.6, 121.7, 123.2, 127.2, 137.0, 139.1, 154.0.

Synthesis of 1-methyl-3-[3,4,5-tris(tetradecyloxy)benzyl]imidazolium tetrafluoroborate (6-14)

The compound was produced in a manner similar to that employed in the synthesis of 6-8 or 3-8.4. $^1$H NMR (500 MHz): $\delta = 0.87$ (t, 9H), 1.24-1.48 (m, 54H), 1.68-1.79 (m, 6H), 3.94-3.90 (m, 9H), 5.17 (s, 2H), 6.59 (s, 2H), 7.16 (s, 1H), 7.18 (s, 1H), 8.84 (s, 1H). $^{13}$C NMR (100 MHz): $\delta = 14.22, 22.79, 26.24, 29.5, 29.6, 29.7, 29.8, 29.9, 30.4, 32.0, 36.5, 54.0, 69.4, 73.5, 107.5, 121.8, 123.3, 127.4, 136.7, 139.0, 154.0.
Synthesis of 1-methyl-3-[3,4,5-tris(octyloxy)benzyl]imidazolium bis(trifluoromethylsulfonyl)imide (7-8)

The compound was produced according to the previous paper.\textsuperscript{S2} \textsuperscript{1}H NMR (500 MHz): \(\delta = 0.86\) (t, 9H), 1.26-1.49 (m, 30H), 1.69-1.81 (m, 6H), 3.93-3.90 (m, 9H), 5.28 (s, 2H), 6.55 (s, 2H), 7.15 (s, 1H), 7.17 (s, 1H), 7.18 (s, 1H), 8.82 (s, 1H). \textsuperscript{13}C NMR (100 MHz): \(\delta = 14.2, 22.7, 22.8, 26.1, 26.2, 29.3, 29.4, 29.6, 30.4, 31.9, 32.0, 36.6, 54.2, 69.4, 73.6, 107.6, 121.9, 123.4, 126.8, 136.3, 139.3, 154.1.\)

Synthesis of 1-methyl-3-[3,4,5-tris(decyloxy)benzyl]imidazolium bis(trifluoromethylsulfonyl)imide (7-10)

The compound was produced in a manner similar to that employed in the synthesis of 7-8 or 4-8.4. \textsuperscript{1}H NMR (500 MHz): \(\delta = 0.86\) (t, 9H), 1.26-1.49 (m, 42H), 1.69-1.81 (m, 6H), 3.93-3.90 (m, 9H), 5.18 (s, 2H), 6.55 (s, 2H), 7.14 (s, 1H), 7.16 (s, 1H), 8.84 (s, 1H). \textsuperscript{13}C NMR (100 MHz): \(\delta = 14.2, 22.8, 26.1, 26.2, 29.4, 29.5, 29.7, 29.8, 30.4, 32.0, 36.7, 54.3, 69.5, 73.6, 107.7, 121.9, 123.3, 126.7, 136.4, 139.3, 154.1.\)

Synthesis of 1-methyl-3-[3,4,5-tris(dodecyloxy)benzyl]imidazolium bis(trifluoromethylsulfonyl)imide (7-12)

The compound was produced according to the previous paper.\textsuperscript{S1} \textsuperscript{1}H NMR (500 MHz): \(\delta = 0.87\) (t, 9H), 1.25-1.46 (m, 54H), 1.69-1.81 (m, 6H), 3.95-3.92 (m, 9H), 5.19 (s, 2H), 6.56 (s, 2H), 7.16 (t, 1H), 7.18 (t, 1H), 8.83 (s, 1H). \textsuperscript{13}C NMR (100 MHz): \(\delta = 14.2, 22.8, 26.2, 29.4, 29.5, 29.7, 29.8, 32.0, 36.6, 54.2, 69.4, 73.6, 107.6, 121.9, 123.4, 126.8, 136.3, 139.2, 154.1.\)

Synthesis of 1-methyl-3-[3,4,5-tris(tetradecyloxy)benzyl]imidazolium
bis(trifluoromethylsulfonylimide) (7-14)

The compound was produced in a manner similar to that employed in the synthesis of 7-8 or 4-8,4. $^1$H NMR (500 MHz): $\delta$ = 0.87 (t, 9H), 1.25-1.46 (m, 54H), 1.68-1.80 (m, 6H), 3.95-3.91 (9H), 5.19 (s, 2H), 6.57 (s, 2H), 7.17 (t, 1H), 7.19 (t, 1H), 8.95 (s, 1H).

$^{13}$C NMR (100 MHz): 14.2, 22.8, 26.2, 29.5, 29.7, 29.8, 30.4, 32.0, 36.6, 54.2, 69.4, 73.6, 107.6, 121.9, 123.4, 126.9, 136.4, 139.2, 154.1.

Table S1: Elemental analytical data for all compounds

<table>
<thead>
<tr>
<th>Compound</th>
<th>C</th>
<th>H</th>
<th>N</th>
<th>$x$H$_2$O $^\dagger$</th>
</tr>
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<td>10.34</td>
<td>4.46</td>
<td>2.4</td>
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<tr>
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<td>69.03</td>
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<td>4.35</td>
<td>2.6</td>
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<td>10.51</td>
<td>4.26</td>
<td>2.5</td>
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<tr>
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<td>73.06</td>
<td>11.19</td>
<td>3.55</td>
<td>1.6</td>
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<td>2.1</td>
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<tr>
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<td>4.09</td>
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<tr>
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</table>
The water content of all compounds was measured by Karl Fischer and it was found that the chlorides easily absorb water from the air. The lower values for compounds 5-7 shows the effect of drying under vacuum. Where non-zero values are given for $x$ (degree of hydration), the values of $x$ were obtained by Karl Fischer titration.

Reference:
