

Supporting Information

Fatty Acid Ionic Liquids as Environmentally Friendly Lubricants for Low Friction and Wear

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Figure S1

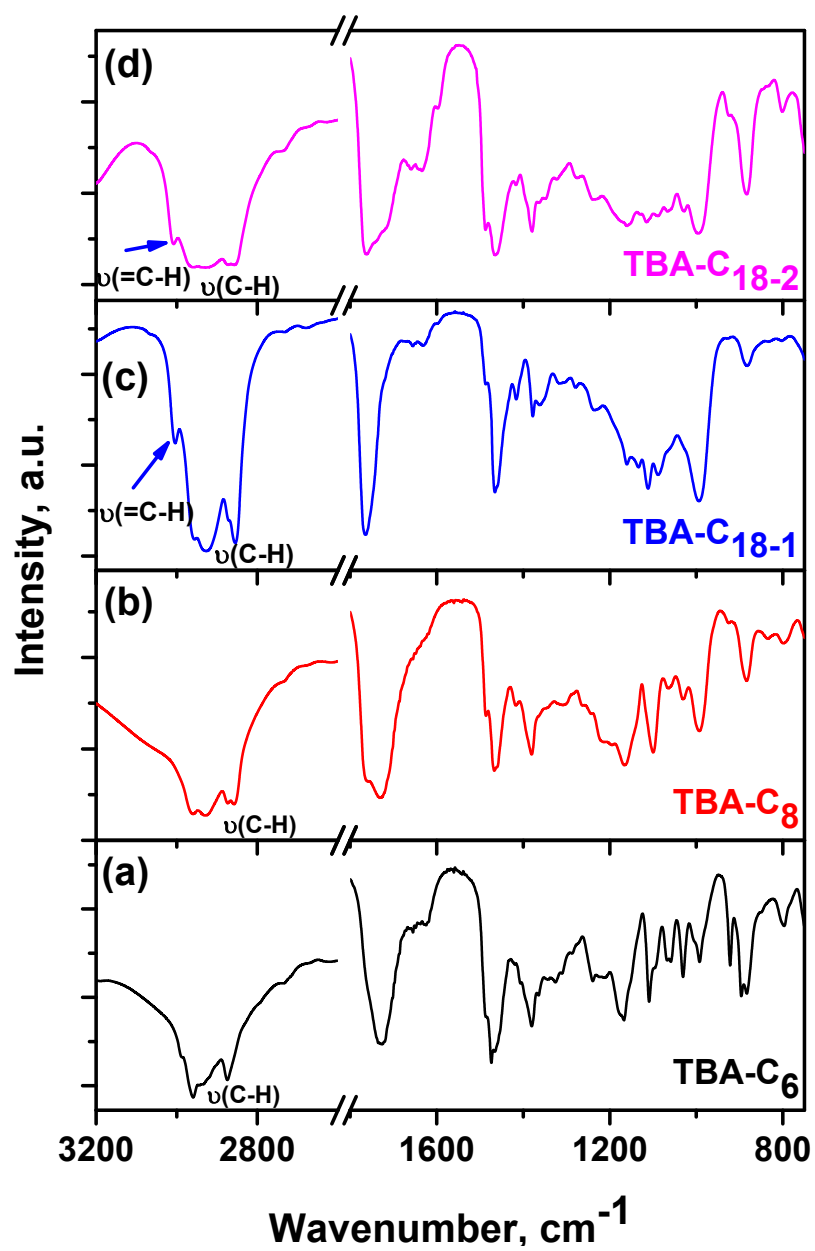


Figure S1. FTIR spectra of (a) TBA-C₆, (b) TBA-C₈, (c) TBA-C₁₈₋₁ and (d) TBA-C₁₈₋₂ ionic liquids.

Table 1: ^1H NMR shifts (δ , ppm, 500 MHz) for fatty acids ionic liquids

Ionic Liquids	H _a , ppm	H _b , ppm	H _c and H _f , ppm	H _d , ppm	H _e , ppm	H _g , ppm	H _h and H _i , ppm	H _i , ppm	H _j , ppm	H _k , ppm
TBA-C ₆	3.24-3.28t, 8H	1.47-1.49m, 8H	1.17-1.36m, 12H	0.86-1.00t, 12H	0.75-0.85t, 3H	-	-	-	1.50-1.59m, 2H	2.23-2.26t, 2H
TBA-C ₈	3.33-3.36t, 8H	1.57-1.61m, 8H	1.25-1.48m, 16H	0.98-1.01t, 12H	0.86-0.88t, 3H	-	-	-	1.64-1.70m, 2H	2.34-2.36t, 2H
TBA-C ₁₈₋₁	3.34-3.37t, 8H	1.62-1.68m, 8H	1.27-1.35m, 24H	0.87-0.89t, 12H	0.87-0.89t, 3H	1.37-1.41m, 4H	2.72-2.81m, 4H	5.22-5.36m, 2H	1.99-2.03q, 2H	2.34-2.37t, 2H
TBA-C ₁₈₋₂	3.32-3.35t, 8H	1.61-1.64m, 8H	1.26-1.30m, 18H	0.98-1.01t, 12H	0.86-0.88t, 3H	1.41-1.48m, 4H	2.61-2.68m, 6H	5.30-5.42m, 4H	1.94-2.08q, 2H	2.34-2.37t, 2H

Figure S2

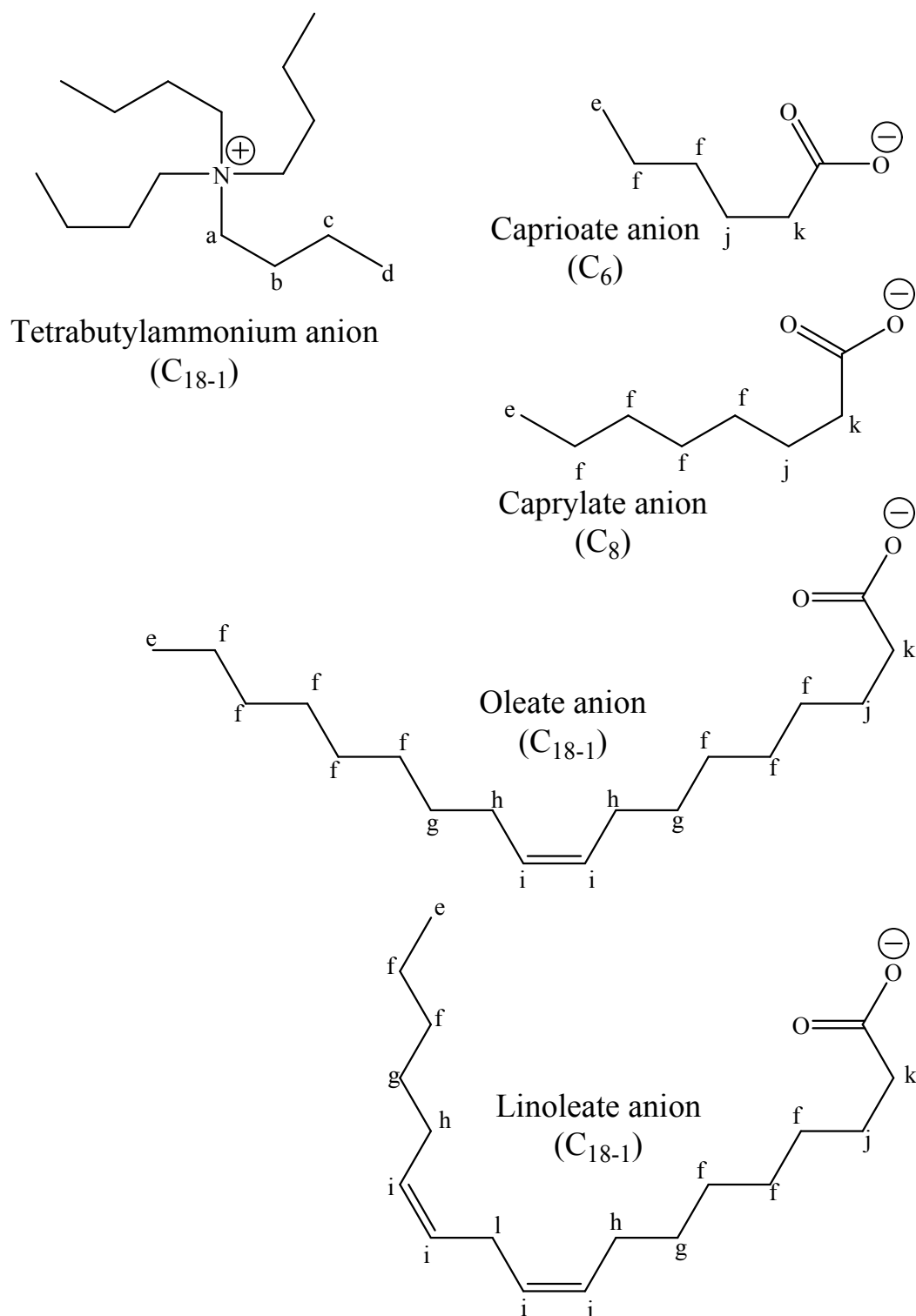


Figure S2. Chemical structure of tetrabutylammonium (TBA) cation and fatty acid anions: caproate (C_6), caprylate (C_8), oleate (C_{18-1}) and linoleate (C_{18-2}) along with highlighted positions based on ^1H NMR.

Figure S3

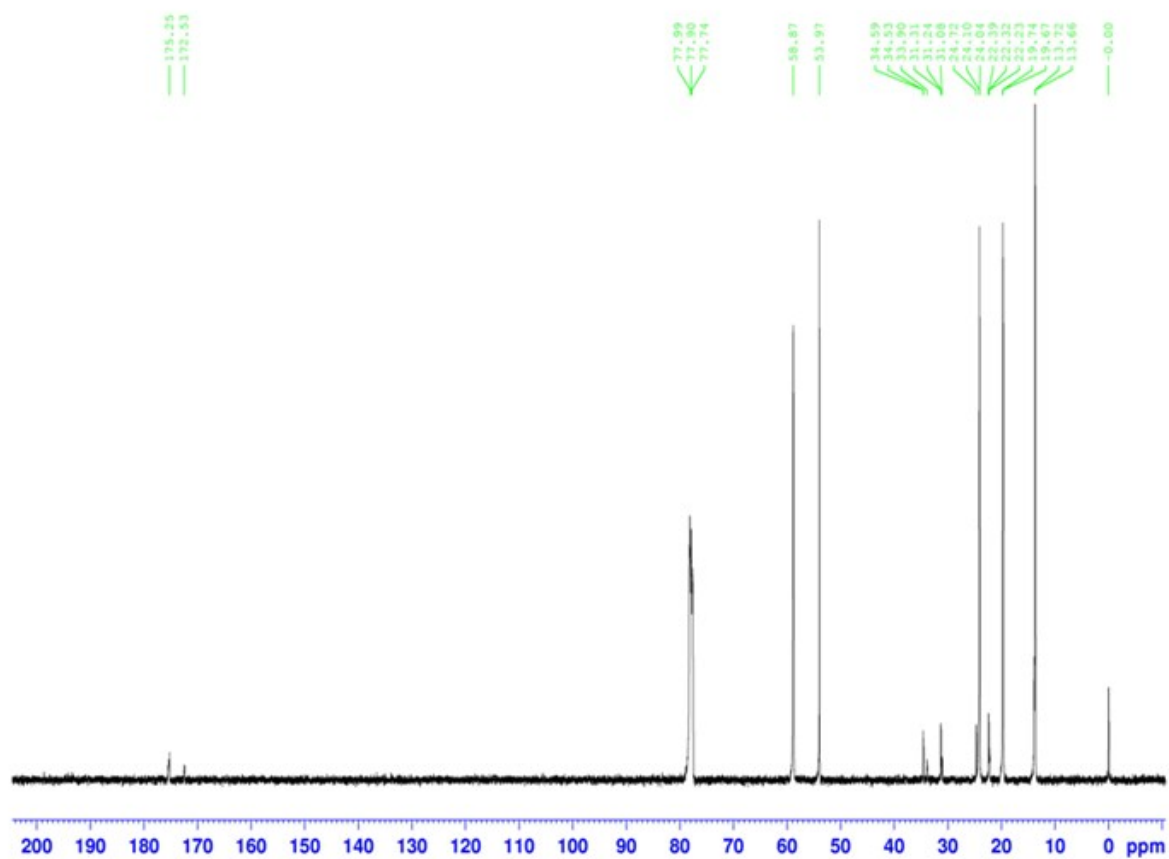


Figure S3. ^{13}C NMR spectrum of tetrabutylammonium caproate (TBA- C_6) ionic liquid

Figure S4

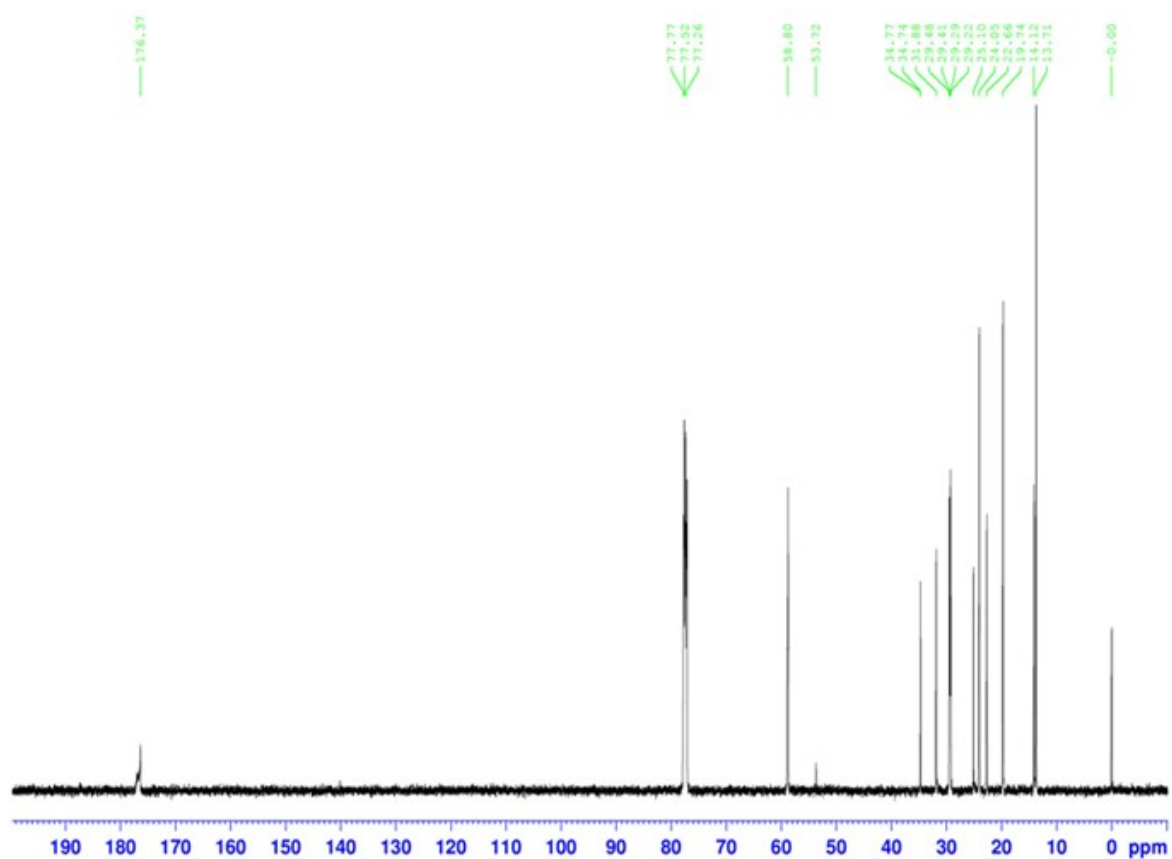


Figure S4. ^{13}C NMR spectrum of tetrabutylammonium caprylate (TBA- C_8) ionic liquid

Figure S5

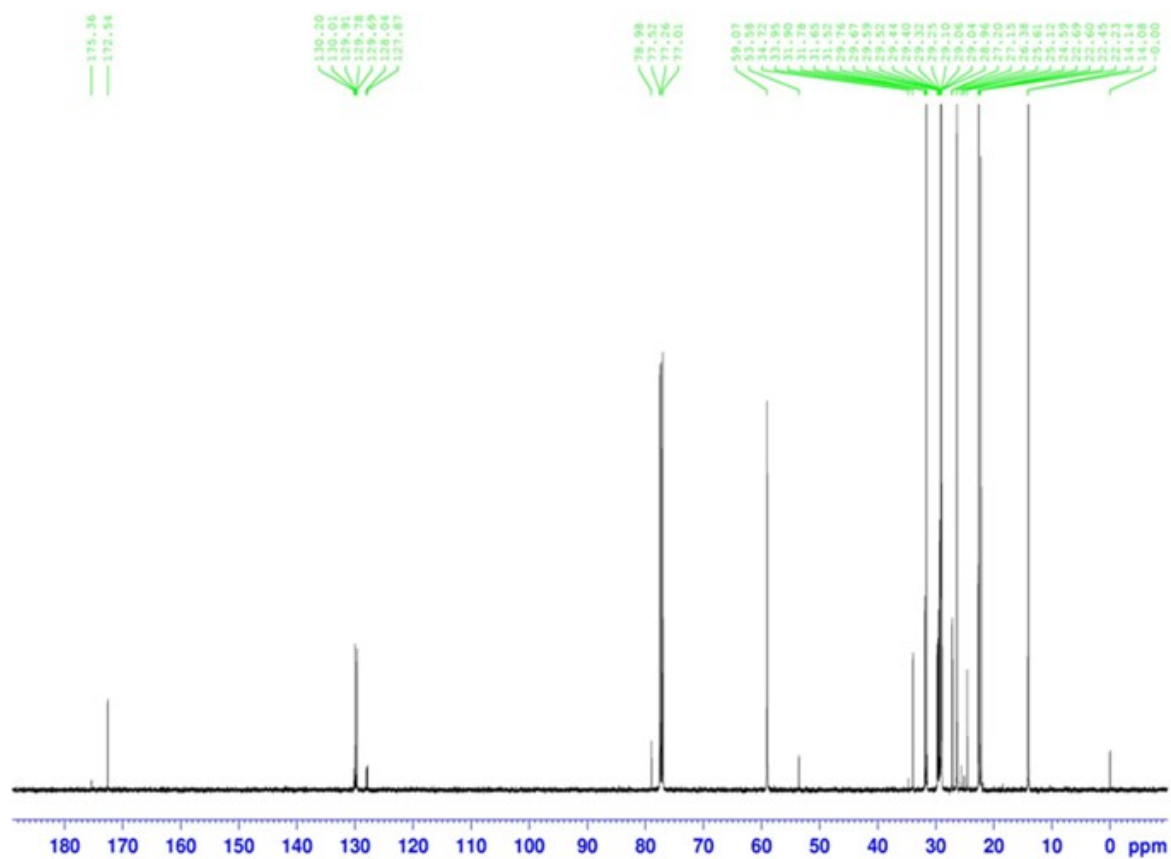


Figure S5. ^{13}C NMR spectrum of tetrabutylammonium oleate (TBA- C_{18-1}) ionic liquid

Figure S6

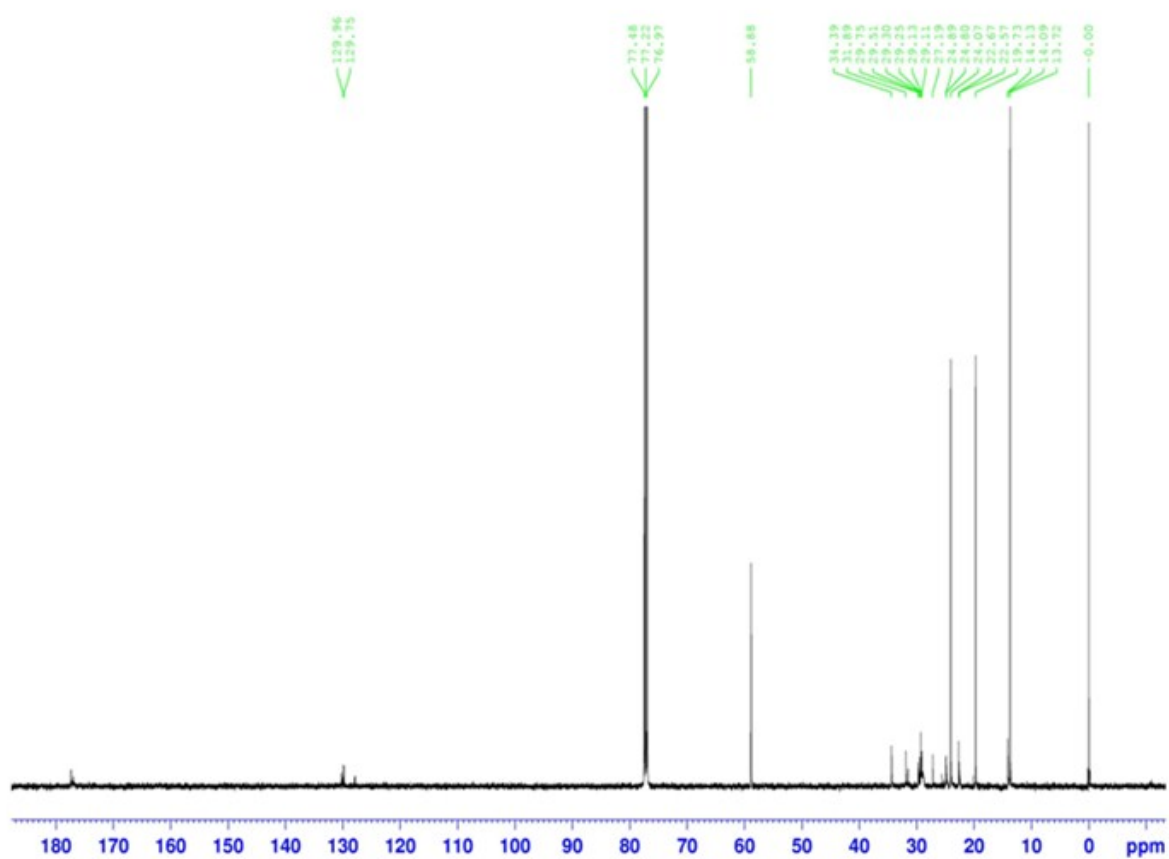


Figure S6. ^{13}C NMR spectrum of tetrabutylammonium linoleate (TBA- C_{18-2}) ionic liquid