Other ILs examined by the direct probe approach

[bmim][PF_6]

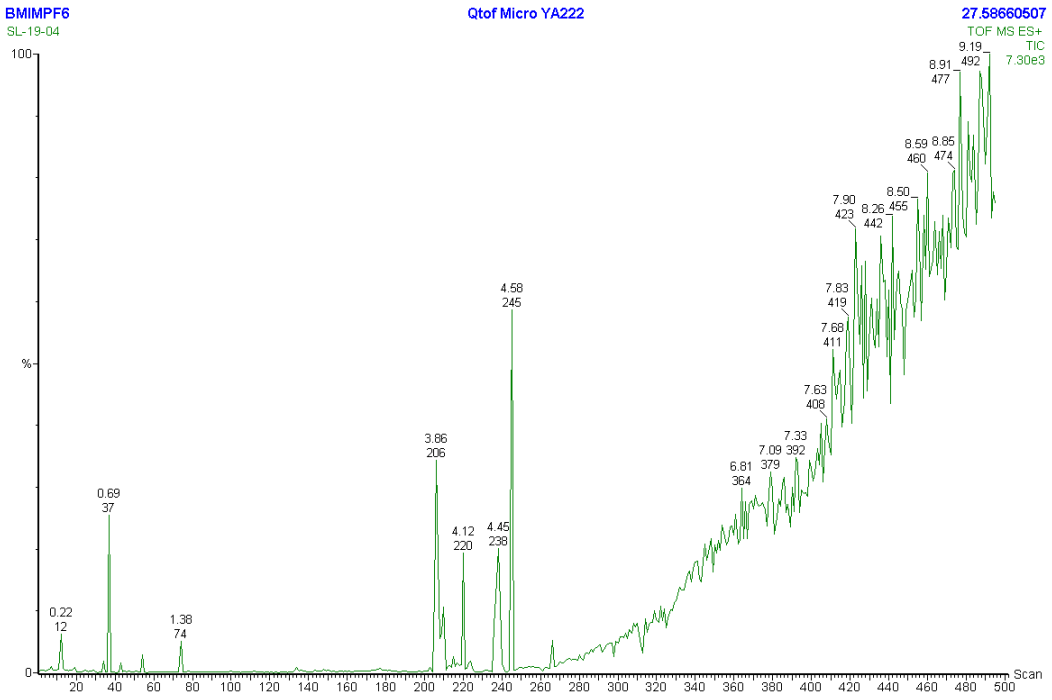


Figure SI.1. Chromatogram, scan no. approximates T. Note the low abundance of peaks in the low T range (region A), likely due to this IL being particularly free from molecular solvent. Some ion evaporation occurs in region B, and copious decomposition occurs at T above ~300°C.

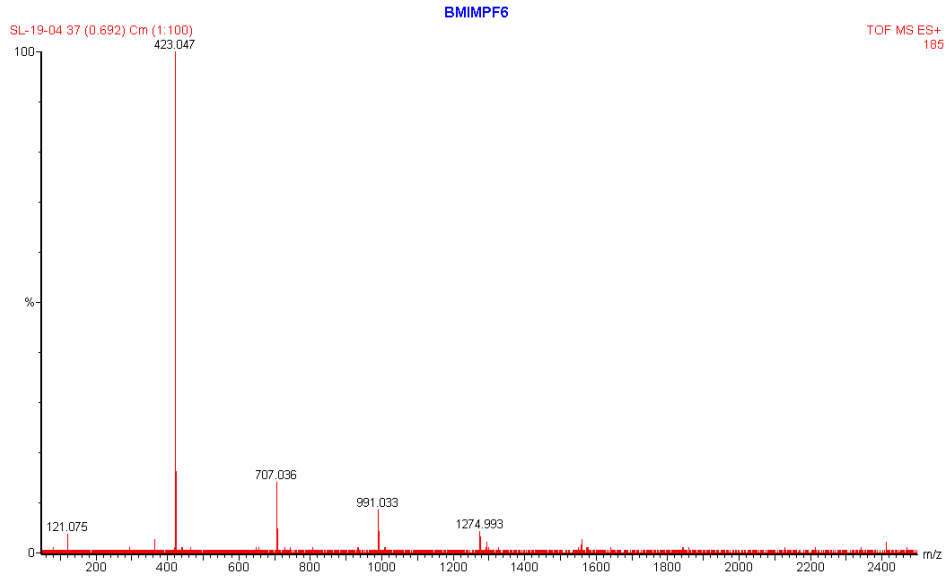


Figure SI.2. Spectrum from region A, showing aggregates of the form $[(bmim)_n(PF_6)_{n-1}]^+$.

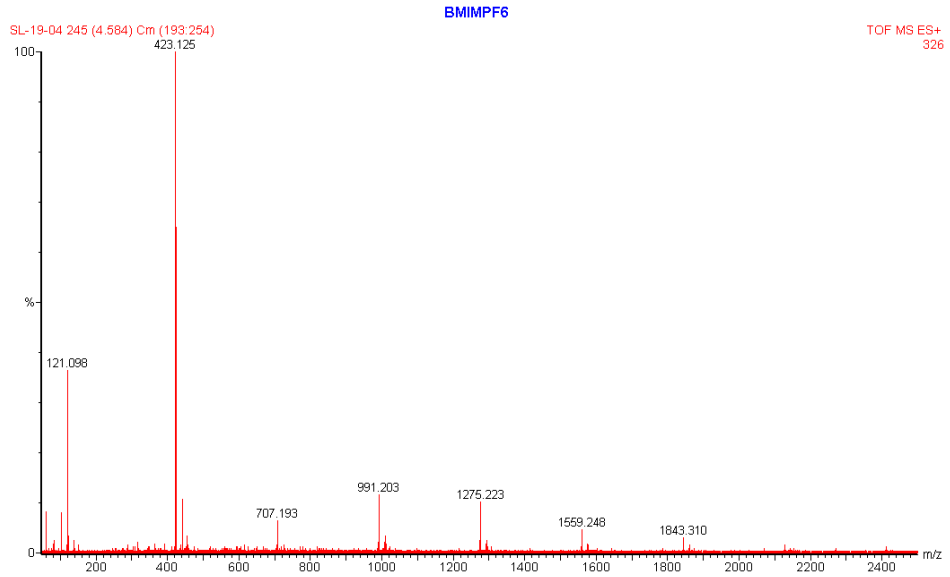


Figure SI.4. Spectrum from region B, showing aggregates of the form $[(bmim)_n(PF_6)_{n-1}]^+$.

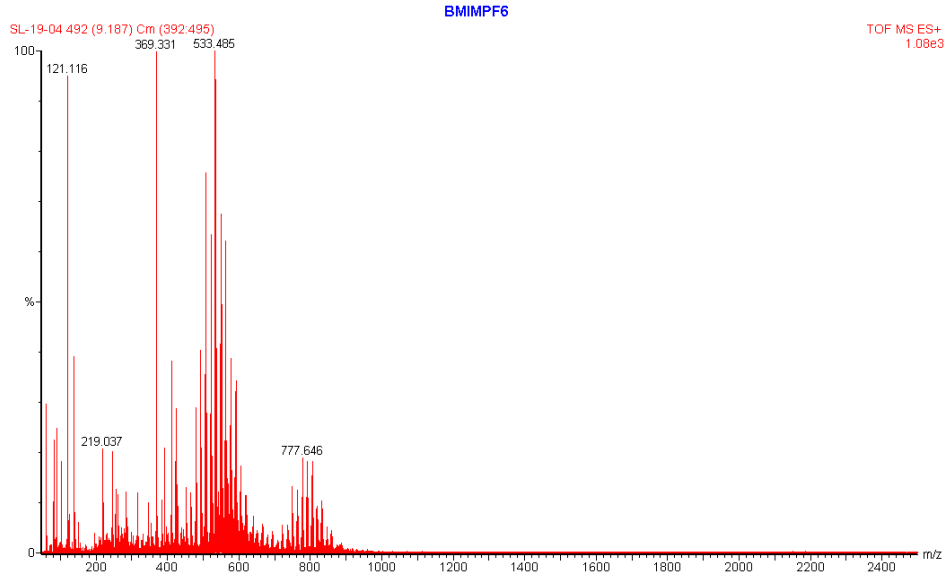
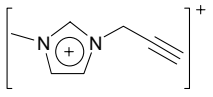


Figure SI.4. Spectrum from region B, showing extensive decomposition products.



[Tf$_2$N]$^-$

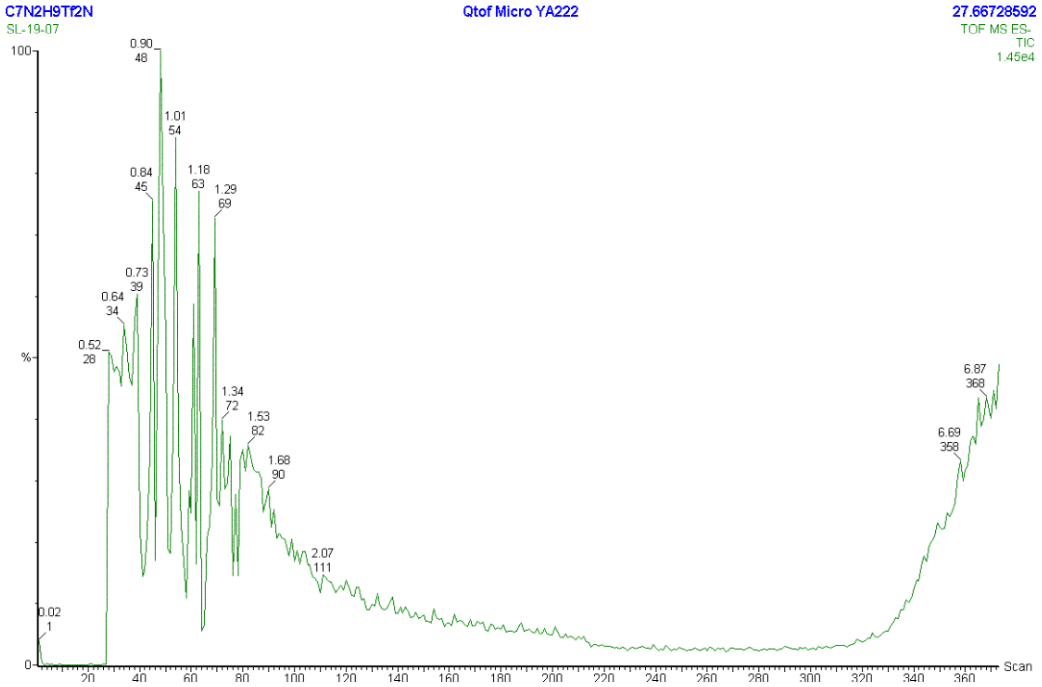


Figure SI.5. Chromatogram, scan no. approximates T. Note the near-absence of ion current in region B (ion evaporation). Decomposition occurs at T above ~300°C. The negative-ion version showed a similar pattern.

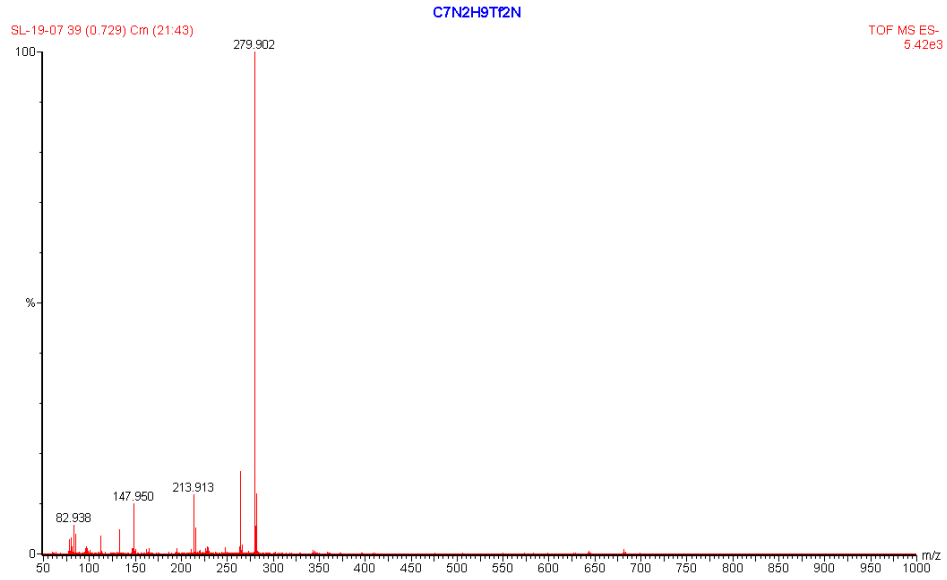


Figure SI.6. Negative-ion mass spectrum from region A, showing mostly [Tf$_2$N]$^-$.

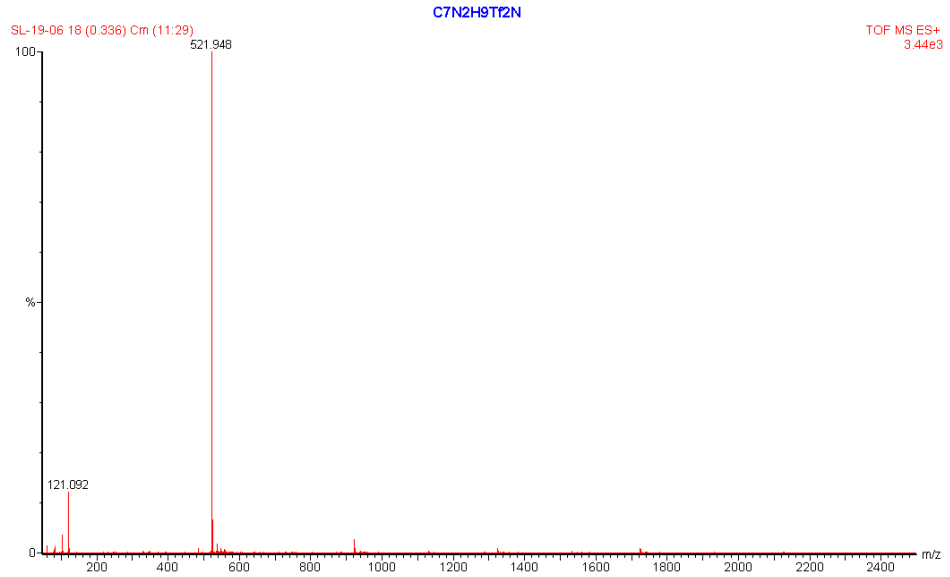


Figure SI.7. Positive-ion mass spectrum from region A, showing aggregates of the form $[(C_7N_2H_9)_n(Tf_2N)_{n-1}]^+$ (though mostly $[(C_7N_2H_9)_2Tf_2N]^+$).

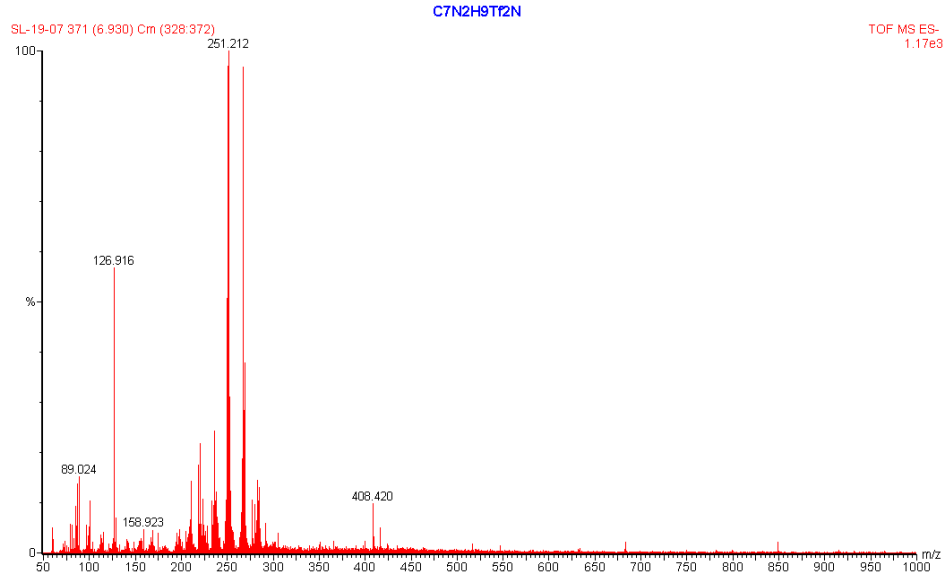


Figure SI.8. Negative-ion mass spectrum from region C, showing extensive decomposition products.