<u>Preparation and Characterisation of High-Density Ionic Liquids Incorporating</u> <u>Halobismuthate Anions</u>

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Supporting information

Mass spectrometry

 $[C_4C_1Im][BiBr_3CI]$



Figure S1. ESI⁺ mass spectrum of $[C_4C_1Im][BiBr_3CI]$.



Figure S2. ESI⁻ mass spectrum of $[C_4C_1Im][BiBr_3CI]$.



Figure S3. LSIMS⁺ mass spectrum of $[C_4C_1Im][BiBr_3CI]$.



Figure S4. LSIMS⁻ mass spectrum of $[C_4C_1Im][BiBr_3Cl]$.



Figure S5. MALDI[–] mass spectrum of [C₄C₁Im][BiBr₃Cl].





Figure S6. ESI⁺ mass spectrum of $[C_4C_1Im][BiBr_3I]$.



Figure S7. ESI⁻ mass spectrum of $[C_4C_1Im][BiBr_3I]$.



Figure S8. LSIMS⁺ mass spectrum of $[C_4C_1Im][BiBr_3I]$.



Figure S9. LSIMS⁻ mass spectrum of [C₄C₁Im][BiBr₃I].



Figure S10. MALDI⁻ mass spectrum of $[C_4C_1Im][BiBr_3I]$.



 $[\underline{C_4}\underline{C_1}Im][\underline{Bi_2}Br_7]$

Figure S11. LSIMS⁺ mass spectrum of [C₄C₁Im][Bi₂Br₇].



Figure S12. LSIMS⁻ mass spectrum of $[C_4C_1Im][Bi_2Br_7]$.





Figure S13. LSIMS⁺ mass spectrum of $[C_4C_1Im][Bi_2BrI_6]$.



Figure S14. $[C_4C_1Im][Bi_2BrI_6]$.

X-Ray Photoelectron Spectroscopy (XPS)



Figure S15. XP spectra of [C₄C₁Im][BiBr₃Cl]: (a) survey, (b) C 1s, (c) N 1s, (d) Br 3d, (e) Bi 4f, (f) Cl 2p.



Figure S16. XP spectra of [C₄C₁Im][BiBr₄]: (a) survey, (b) C 1s, (c) N 1s, (d) Br 3d, (e) Bi 4f.



Figure S17. XP spectra of [C₄C₁Im][BiBr₃I]: (a) survey, (b) C 1s, (c) N 1s, (d) Br 3d, (e) Bi 4f, (f) I 3d.



Figure S18. XP spectra of $[C_4C_1Im][BiBr_4]_{0.67}Br_{0.33}$: (a) survey, (b) C 1s, (c) N 1s, (d) Br 3d, (e) Bi 4f, (f) O 1s.



Figure S19. XP spectra of $[C_8C_1Im]Br$: (a) survey, (b) C 1s, (c) N 1s, (d) Br 3d.