Salt Ionic Crystal Packing: Deconvoluting the Factors that Make Ionic Liquids Liquid

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Ionic liquids are a rapidly expanding field of research, yet the factors which govern a salt's thermal properties remain poorly understood. To determine how ion crystal packing influences the thermal properties of salts, thirty six salts with organic cations and N(SO\textsubscript{2}CF\textsubscript{3})\textsubscript{2}\textsuperscript{-} (TFSI\textsuperscript{-}), N(SO\textsubscript{2}C\textsubscript{2}F\textsubscript{5})\textsubscript{2}\textsuperscript{-} (BETI\textsuperscript{-}) and N(SO\textsubscript{2}CF\textsubscript{3})(SO\textsubscript{2}C\textsubscript{4}F\textsubscript{9})\textsuperscript{-} (FMBSI\textsuperscript{-}) anions have been synthesized and thermally characterized by DSC and XRD. Crystal structures for a number of the salts with TFSI\textsuperscript{-}, BETI\textsuperscript{-} and FMBSI\textsuperscript{-} anions have been determined and are reported.