

Multifunctional Ionic Liquids and their use in the formation of coordinated polymers

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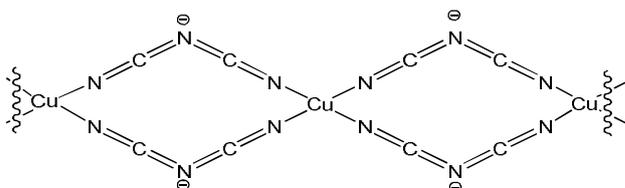


Fig1: One of the possible structures of a dicyanamide based co-ordinated polymer

We report the use of phosphonium based ionic liquids (ILs) as multifunctional systems for the formation of transition metal ion coordinated polymers. The ILs studied included a tetraalkylated phosphonium cation; $[PC_nH_{2n+1}]^+$ and the anions dicyanamide $[DCA]^-$, bis(trifluoromethanesulfonyl)amide $[NTf_2]^-$, tosylate $[TOS]^-$, and dodecylbenzenesulfonate $[DBSA]^-$. $[DCA]^-$ and other pseudohalide anions such as tricyanomethanide $[TCM]^-$ have been shown to co-ordinate to heavy metal centres¹. A survey of the literature shows many reports in which $[DCA]^-$ (as an alkali salt) has been shown to co-ordinate to these transition metals in various 2-D and 3-D topologies and most notably in structures exhibiting magnetic properties².

We have studied the IL $[P_{6,6,6,14}][DCA]$ as a *self-indicating, simultaneous, multianalyte recognition system* for heavy metal ions such as Cu^{2+} and Co^{2+} . When incorporated into a polymer membrane, this system maintains all these attractive features with the added bonus of the IL now being *self-plasticizing*. A system like this can be viewed as a building block for future chemical sensing platforms; where the system *itself* is responsive toward an analyte, thereby eliminating the need for a reactive chromophore.

Other anions mentioned are considered to be “soft” or non-coordinating. We have used heat to change the chemistry of these anions, resulting in ion coordination to previously solvating anions. These solvating anions have in common a sulfoxide moiety that can co-ordinate to a given heavy metal.³ The formation of these structures has been characterized via UV/Vis, Infrared and Raman Spectroscopy.

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