Novel Metal-EDTA Ionic Liquids as Electrolytes for Redox Flow Batteries

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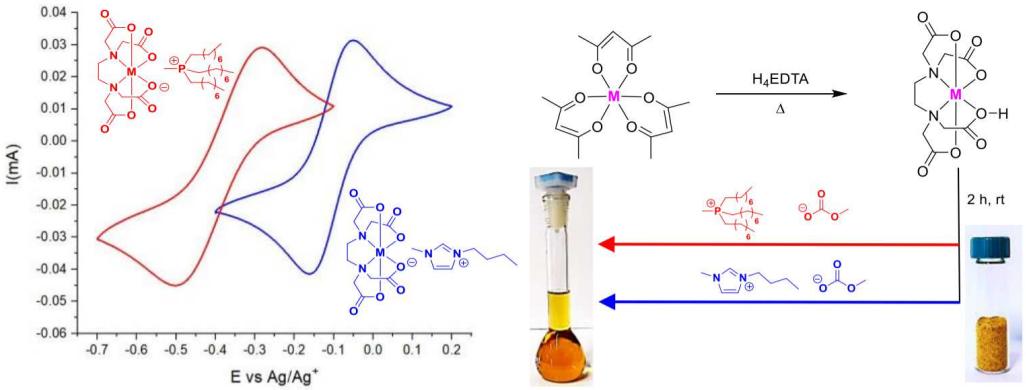
Ethylenediaminetetracetic acid (EDTA) is a well-known, formidable chelating agent able to form water soluble metal complexes with di- and trivalent cations, making its use attractive in several large scale applications. The chelation of redox active metal centers, reducing the electron transfer activation energy, appears a viable method to improve their electrochemical kinetic performances[1,2] and offers interesting perspectives from an electrochemical point of view and as innovative electrolytes for redox flow batteries.[3-5] In this context, a new simple and highly performing synthetic approach has been proposed and successfully tested for the preparation of two series of ionic liquids (ILs) consisting in metal-EDTA complex ([MEDTA]) anions and 1-butyl-3-methylimidazolium ([BMIM]) or trioctylmethylphosphonium ([TOMP]) cations. The complementary solubility characteristics imparted by the [BMIM] and the [TOMP] cations, in conjunction with the good electrochemical properties exhibited by the prepared ILs in both aqueous and non-aqueous solvents, suggest this new class of redox active ILs as promising electrolytes for both water- and organic solvent-based redox flow batteries.



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