

Ionic Liquids as Reagents and Polymers – Alkylating agents and poly-carbenes

Ionic liquids serve as a platform to design countless molecular structures with a broad range of chemical, physical, and functional properties. It is their designer nature that has led to their use in countless systems that span multiple fields of chemistry, materials science, and engineering. In their polymerized form, referred to as poly(ionic liquids), improved processability and mechanical stability are introduced and results in materials that are better able to harness the chemical utility of ionic liquids. It is this key that transition that transforms ionic liquids in to a practical and functional material. In this presentation, two novel functions for ionic liquids will be discussed that expand on these rapidly growing fields, including their use as novel alkylating agents, and as polymers for N-heterocyclic carbene chemistry. In the first section, the strategy for designing “ionic liquids that alkylate” will be presented, along with their use as a platform for creating reagent libraries with different alkylation strengths, their incorporation in to polymers, mechanism, and safety. In the second section, the use of alkaloid-derived poly(ionic liquids) for designing tunable crosslinked nanogels will be presented. Here we show that the chemistry of poly(ionic liquids) can be expanded by exploiting their carbene-forming properties to create poly(ionic liquid)/Ag/NHC hybrids. These materials are an example where metal ions are covalently immobilized within a colloidally stable matrix with exciting prospects for catalysis applications.