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Coordination Behavior and Electrochemical Studies of Actinide and Transition Metal Complexes in Room Temperature Ionic Liquids

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Coordination Behavior and Electrochemical Studies of Actinide and Transition Metal Complexes in Room Temperature Ionic Liquids

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Our current research efforts are centered around the behavior of actinide and transition metal complexes in room temperature ionic liquids (RTIL's). The RTIL's typically employed in our studies are based upon either cyclic or acyclic quaternary ammonium and 1, 3-dialkylimidazolium cations with the bis(trifluoromethylsulfonyl)imide anion, $[N(SO_2CF_3)_2]^-$. Previous work in our group indicated that this anion has the ability to coordinate to metal centers, since which time we have undertaken studies to learn more about the fundamental coordination chemistry of this important anion. We have found that the $[N(SO_2CF_3)_2]^-$ anion can coordinate to a metal center in both mono- and bidentate modes through oxygen and nitrogen atoms. These results will be demonstrated with single crystal structure representations of selected examples. Another aspect of our research includes electron transfer studies of metal complexes utilizing RTIL's as neat electrochemical solvents. Electrochemical experiments can provide insight into the reactivity and stability of charged species within RTIL's, an area of current fundamental importance. Results from voltammetric and bulk coulometric electron transfer studies on formal U(IV)/U(VI) complexes and transition metal systems will be presented.