Priority Programme

“Material Synthesis near Room Temperature”

Project Description – Project Proposal

Pseudohalogen Chemistry in Ionic Liquids

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Summary of proposal

The main goal of this integrated and bilateral project is to synthesize and characterize new EN (E = element of group 15) molecules, oligo- and polymers and EX3 / [EnXm]o- species utilizing standard and functionalized ionic liquids as solvent. This project combines the syntheses of new EN species with the rational design of functionalized ionic liquids (IL) in order to prepare, stabilize and quench new EN, EX3 and [EmXn]o- species which are not accessible in standard organic/inorganic solvents. The project splits into three interacting parts:
(i) Inorganic pseudohalogen chemistry in Ionic Liquids: Preparation of EN, EX3 and [EmXn]o- species start-ing from known in our group well-established (pseudo)halogen precursors such as (Me3Si)2NECl2, EX3 (X = pseudohalogen: CN, N3, SCN etc.), or AgX, as well as HgX2 salts in standard and in our group well-established pseudohalogen functionalized ionic liquids (with Lewis basic sites such as cyano groups included as part of either the cation or anion) at ambient temperature (T < 298K) and 1 atm. Besides the synthesis of new EN/pseudohalogen compounds, special emphasis will be placed on the influence of the anion size, anion charge and functional group on the product distribution.
(ii) Separation and full characterization of the EN, EX3 and [EmXn]o- species. A special emphasis will be given the solubility problem as driving force for the product distribution.

(iii) Synthesis will be supported and accompanied by the physical characterization of the utilized ionic liquids by means of calorimetric studies to determine the solubility of starting materials and the products. This project utilizes the concept of rational IL design for main group molecule and coordination chemistry and will contribute to the understanding of the nature and influence of ILs on the synthesis of highly labile (reactive) EN species and underlying mechanisms of their formation: synthesis <-> physical characterization <-> ionic liquid <-> functionalization