Priority Programme

“Material Synthesis near Room Temperature”

Project Description – Project Proposal

Low-Temperature Conversions of Complex Solid Precursors in Tailored Ionic Liquids: New Compounds and Insights into Reaction Principles

Participant	**Prof. Dr. Eike Brunner**
Institution	Technische Universität Dresden Fachrichtung Chemie und Lebensmittelchemie Lehrstuhl für Bioanalytische Chemie Bergstraße 66 01069 Dresden Telephone +49 351 463-32631 Fax +49 351 463-37188 E-Mail eike.brunner@chemie.tu-dresden.de
Participant	**Prof. Dr. Juri Grin**
Institution	Max-Planck-Institut für Chemische Physik fester Stoffe Nöthnitzer Straße 40 01187 Dresden Telephone +49 351 4646-4000 Fax +49 351 4646-4002 E-Mail juri.grin@cpfs.mpg.de
Participant	**Prof. Dr. Michael Ruck**
Institution	Technische Universität Dresden Fachrichtung Chemie und Lebensmittelchemie Lehrstuhl für Anorganische Chemie II Helmholtzstraße 10 01069 Dresden Telephone +49 351 463-33244 Fax +49 351 463-37287 E-Mail michael.ruck@chemie.tu-dresden.de
Participant	**Prof. Dr. Thomas Straßner**
Institution	Technische Universität Dresden Fachrichtung Chemie und Lebensmittelchemie Lehrstuhl für Physikalische Organische Chemie Bergstraße 66 01069 Dresden Telephone +49 351 463-38571 Fax +49 351 463-39679 E-Mail thomas.strassner@chemie.tu-dresden.de

Summary of proposal

Low-temperature synthesis of inorganic materials in ionic liquids (ILs) has recently been demonstrated to be a very promising route, which already led to spectacular discoveries. Examples from main-group chemistry include e.g. a new germanium allotrope, a superconducting material on the basis of aromatic tellurium rings, or large clusters and heteropolycations. One aim of the project is to discover new low-temperature or metastable compounds, mainly based on the elements of groups 13 to 16, with potentially outstanding chemical and physical properties. Complex structured, heteropolar precursor materials will be reacted under mild conditions in ILs that allow excision of structural building units, their modification in solution, and their recombination in new compounds. Thereby, the typical thermodynamic and kinetic limitations of solid state chemistry shall be overcome. All products will be fully characterized using modern methods. Since little is known about the principles of this chemistry in ILs, we also will investigate various parameters influencing dissolution, reaction, and crystallization. Besides temperature, concentration, and Lewis acidity, especially the impact of the nature of the IL shall be studied by employing tailor-made ILs. These ILs will also allow to optimize synthetic protocols and to reduce the air- and moisture sensitivity of the reaction media. Time-resolved in situ NMR spectroscopy will be applied to monitor the progress of the reaction in the IL (liquid NMR) as well as the nucleation process (solid-state NMR).