

Priority Programme

“Material Synthesis near Room Temperature”



Project Description – Project Proposal

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

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Summary of proposal

In the previous funding period, we have demonstrated that the combination of synthetic and spectroscopic techniques is extremely valuable for the evaluation of reaction mechanisms in ionic liquids (ILs). We will therefore continue the successful joint research of the Ruck group (Inorganic Chemistry) and the Brunner group (Analytical Chemistry) at TU Dresden in the second funding period and focus on the in-situ monitoring of reactions in ILs and the in-depth characterization of reaction products by advanced solid-state NMR spectroscopy. Of special importance are the following questions: Which starting material is mobilized by the IL? How is the mobilization or dissolution initiated? What is the role of supporting agents, such as Lewis acids or acidic impurities in the ILs? How does the mass transport proceed? How does product formation start at the atomic/molecular scale? How does it progress to the formation of the final product particles?

The results will contribute to a deeper understanding of the ionothermal syntheses at the atomic/molecular scale and allow the determination of parameters that crucially influence the reactions. This should allow for a more targeted approach and enable us to perform materials synthesis selectively and with high yields. In particular, we are aiming to develop a (at least crude) general strategy that is applicable for the synthesis of binary compounds of transition metals and elements of the groups 13 to 16 in ILs.