Priority Programme

“Material Synthesis near Room Temperature”

Project Description – Project Proposal

ILPIN: Ionic Liquid Precursors for Multicomponent Inorganic Nanomaterials

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Summary of proposal

Ionic liquids (ILs) and ionic liquid crystals will be used as precursors for inorganic nanomaterials. ILs that can directly be transformed to inorganic or hybrid materials have previously been termed ionic liquid precursors (ILPs). The inorganic materials obtained from ILPs are promising materials for a wide range of applications, but their formation and tuning towards specific properties is so far not understood; there is thus a need to use model reactions, such as the formation of sulfides from ILPs, to in depth study and quantify the

mineral formation from ILPs. We therefore propose to investigate the details of these reactions (ILP to simple or complex metal sulfides), with a particular focus on the role of the ionic liquid precursor on the outcome of the mineral formation reaction. Key questions entail the investigation of the IL assembly, the nucleation and particle growth process, and the purification / isolation of the final reaction products from the IL matrix / template / precursor. Further work is devoted to correlating the photophysical properties of the nanomaterials with the atomic and mesoscale structure, enabling the development of a rational design approach towards functional nanomaterials synthesized from ionic liquid precursors. The team is composed of a materials synthesis group, a photochemistry and photophysics laboratory, and a group of theoretical chemists enabling the simultaneous and coordinated treatment of chemical and physical aspects along with computational treatment of the questions briefly outlined above.