Priority Programme

“Material Synthesis near Room Temperature”

Project Description – Project Proposal

Thermochemical investigations of phase formation processes of elements and compounds of group 15 and 16 in IL (ionic liquid) based synthesis - Mechanism of dissolution, structure formation and precipitation

Acronym: ThermoPhIL

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Summary of proposal

Within this project, significant contributions can be made for physico-chemical investigation of reactions in ionic liquids as well as for determination of thermal stability of syntheses mixtures and thermodynamic properties of products (“low temperature materials”). In particular, the behavior of ionic liquids as molten salts at low temperature and thus their function as fluxes, rather than as conventional liquid solvents, is to emphasize. Hence, the specific characteristics of inorganic flux mixtures are to consider for ionic liquids as well (e.g. temperature dependent dissolution – exsolution). The methodical investigation of a few basic model systems of groups 15 and 16 is aspired. The chemical focus is set on differentiation of element allotropes in low temperature synthesis, formation of homoatomic and hetroatomic poly-cationic compounds, as well as realization of flux free compounds of groups 15 and 16. Studies on the mechanism of dissolution, phase formation, and precipitation can be realized using dissolution calorimetry, reaction calorimetry, and dynamic scanning calorimetry (DSC). The determination of thermodynamic standard data allows modeling using CalPhaD-methods and thus enables a comprehensive thermodynamic description of reaction pathways and phase relations of the respective chemical systems.