

Priority Programme

“Material Synthesis near Room Temperature”



Project Description – Project Proposal

Synthesis of intermetallic transition metal-main group metal nanoparticles in ionic liquids

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Summary of proposal

The synthesis of intermetallic, i.e. bi-metallic, nanoparticles (NPs) with transition metal/main group metal combinations TM/E (TM = Fe, Ni; E = Al, Ga, In) based on organometallic precursor chemistry will be investigated with special emphasis on the reaction control given by ionic liquids (ILs) as a non-conventional medium. The deposition of the NPs onto supports will be done. Applications in hydrogenation catalysis will be investigated.

The expected progress beyond the state of the art is seen in the specific opportunities offered by ILs for reaction control of precursor decomposition and cluster/nanoparticle growth kinetics without the need of additional stabilizers by low-temperature, fast and energy-saving hydrogenolysis or microwave heating techniques. Thereby ILs should help to overcome limitations of existing chemical strategies using conventional solvents and techniques for bottom-up nanoalloy and nanoparticle synthesis. The chemical and physical properties of IL derived nanoalloys, e.g., in catalysis, are expected to be different from similar nanoalloys obtained by conventional wet-chemical methods in the presence of additional stabilizers.