

Priority Programme

“Material Synthesis near Room Temperature”



Project Description – Project Proposal

Electrochemical Synthesis of Noble Metal Functional Materials from Ionic Liquids

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Summary of proposal

This project will elucidate the potential of electrochemical methods for the preparation of novel functional compounds and morphologically defined deposits of the noble metals silver, gold, palladium, and platinum. For the syntheses the unique properties of ionic liquids will be used, especially their pronounced stability against reduction and oxidation. Three different reaction pathways shall be followed. On one hand this is the deposition of noble metal compounds directly on the surface of a noble metal electrode. This route should be used especially for the preparation of fluorides and oxides. On the other hand noble metal electrodes should be dissolved by anodic oxidation and the obtained solutions should be used in subsequent reactions. This route shall be used predominately for the preparation of sulfides and oxoanionic compounds. Both routes allow for a defined adjustment of the oxidation states of the noble metals in their compounds by variation of the electrochemical parameters. This is an option that cannot be provided by classical chemical routes. The third reaction pathway is the deposition of noble metals from an ionic liquid in a well-defined shape, e.g. as nanoparticles or thin fibers. All of the obtained compounds and deposits will be comprehensively characterized with respect to their structure, their morphology, and their physical properties. The determined properties will then lead to various functions, e.g. as electronic materials or precursors. A detailed study of the electrode reactions, especially the involved kinetics will provide further knowledge for the optimization of preparative conditions.