Sub-Project 1

Modifications of nano 3d transition metal oxide composites and their influence on thermodynamics and kinetics of conversion type mechanism in LIB.

W. Gruner[a], H. Ehrenberg[b], D. Wadewitz[a]

[a] Leibniz Institute for Solid State and Materials Research Dresden (IFW Dresden), Institute for Complex Materials, D-01069 Dresden, Germany

[b] Karlsruhe Institute of Technology (KIT), Institute for Applied Materials, D-76344 Eggenstein-Leopoldshafen, Germany

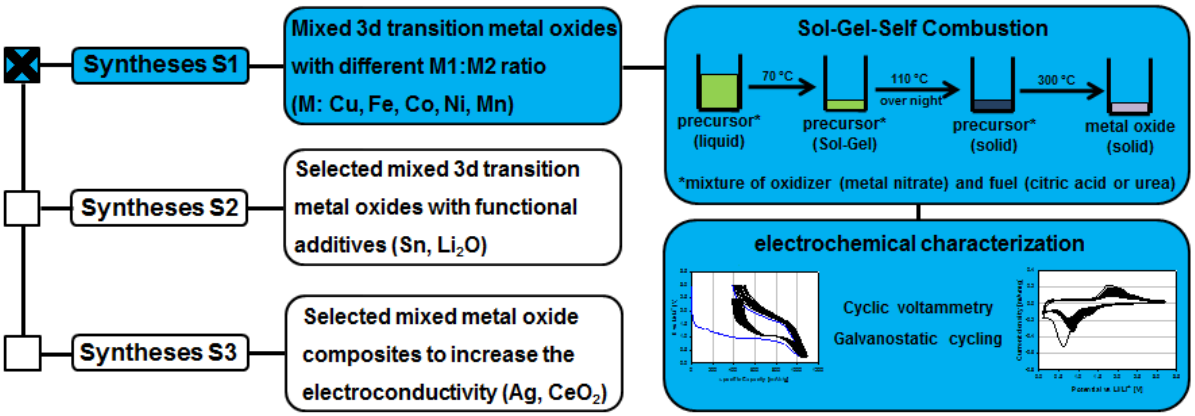
Motivation

Electrode materials, which are used in actual commercial lithium ion batteries, react according to the intercalation mechanism. Lithium ions are inserted into a host structure and, ideally, reversible re-intercalated. Therefore, the electrode behavior is limited due to the structural ability for intercalation and the stability of the host. Otherwise, some materials like 3d transition metal oxides react according to another mechanism, which is at first based on the irreversible conversion of the starting host. Later on, the electrochemical redox reactions of the metal cations in a complex state determine the electrode characteristic.

With conversion type electrodes theoretical capacities as high as 1000 mAh/g can be obtained. But, there are also some limitations like the disappointing cycling stability to overcome. The aim of our project is to develop and establish stabilization concepts improving the electrochemical performance of conversion type electrode materials.

The main challenge of this Sub-Project is the enhancement of the electrochemical performance of different ternary 3d transition metal oxides by additives with chemical and conductive interaction on the reaction mechanism.

Work packages:



Project network: