

Electrochemical Properties of Micro- and Nanocrystalline AB_5 -Compounds for Metal Hydride Batteries - H.A. Kronberger, M. Graf, G. Fafilek (Vienna University of Technology), J. Schuh (ECHEM - Center of Competence for Applied Electrochemistry), and C. Kolbeck (Vienna University of Technology)

Micro- and nanocrystalline AB_5 -compounds based on substituted $MMNi_5$ (MM for misch metal) were prepared by the meltspinning method. The influence of the microstructure on the thermodynamic and kinetic properties was investigated. The materials were characterised by XRD and TEM investigations. The influence of composition and microstructure on the decripitation of the metallic particles was investigated by SEM-analysis of electrodes after cycling. The decripitation of hydride electrodes is a

limiting factor for the cycle life of metal hydride batteries and is caused by periodic volume changes during charge and discharge cycles. Electrochemical investigations were carried out by discharge capacity determination, zero potential and current/potential measurements. The diffusion of atomic hydrogen in a solid state hydride is known to be one of the limiting parameters for the performance of nickel hydride batteries. The diffusion behaviour of atomic hydrogen was investigated by impedance spectroscopy. In order to match the problems resulting from decripitation and surface diffusion, the bulk diffusion experiments were carried out at microelectrodes. The experiments showed, that the stability and the kinetic properties of metal hydride materials can be greatly enhanced by modification of the microstructure