

# Challenges in the development of a (micro)electrochemical cell for single particle investigations, Part II

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## Abstract

State-of-the-art electrodes for lithium ion batteries are generally composites of an active material, conductive agents and polymer binder, casted on a thin metal foil. However, electrochemical investigations on electrode active materials are afflicted with this composition, as the overall electrochemical behavior is influenced by the matrix as well as by the active material. Therefore an electrochemical cell setup ought to be developed which allows the investigation of single particles of active material. Within the scope of ENano an appropriate setup, based on the electrochemical micro-capillary technique, is developed. Nevertheless, the application of micro-capillary cells on lithium ion battery materials (small particles, organic electrolytes, handling in argon atmosphere) is faced with a number of challenges.

One main issue is the handling of single active material particles, which are the objective of investigation. The particles have to be separated and fixed on an electrochemically inert substrate. Furthermore, they have to be electrically contacted and also must come into touch with the electrolyte. Different experimental approaches which fulfill these conditions are compared in this presentation.

Besides these experimental challenges, suitable routines for measurement as well as data analysis and interpretation have to be found. For this purpose a number of measurement routines are applied on battery materials. The fundamentals of these experiments as well as the interpretation of the obtained data will be presented.