

**Abschlussarbeit Bachelor/Master:  
development and automatization of a tape casting process for fabrication of electrodes for Li ion  
batteries**

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Sprache: Deutsch/English

With the increasing demand to replace fossil fuels, electric energy storage has become an interesting alternative. Li ion batteries are one of the practical solution for this purpose. A battery cell consists of electrodes, separator, electrolyte and electron collectors. The electrodes are a compound of active material, binder and electrical conductive agent and provide Li ions which are transported in the cell during dis-/charging. This transportation plays an important role for electrochemical performance of the battery. Besides proper choice of active material and cell assembling the manufacturing of electrodes plays a crucial role in battery performance.

The goal of this thesis is the development of an automatized tape casting routine for li ion battery electrode fabrication. This routine is aimed to improve reproducibility of the casting process. The tape caster will be based on a robocaster, conventionally used in fused deposition modelling (FDM) 3D printing process. For an existing 3D printer an adaptable printing head will be developed providing feedstock supply and doctor blade. The electrode slurry parameters (composition, viscosity) and machine parameters (feed rate, slit width) will be investigated.

The evaluation of the produced electrodes will be done by material characterization methods (Porosimetry, BET, SEM) and electrochemical methods on electrodes and with the electrodes assembled coin cells (Chronopotentiometry CP, Impedance spectroscopy EIS, galvanostatic intermittent titration technique GITT).

Methods:

- ceramic processing (slurry preparation)
- **process technique (automatized tape-casting)**
- characterization (SEM/EDX, mercury porosimetry)
- **battery testing, (CP, EIS, GITT)**

The candidate will be assisted during the project, developing an experience in ceramic processing technology and characterization methods. Master students with outstanding qualifications (e.g. prior research experience, excellent grades in relevant courses) have the possibility to apply for a fellowship.