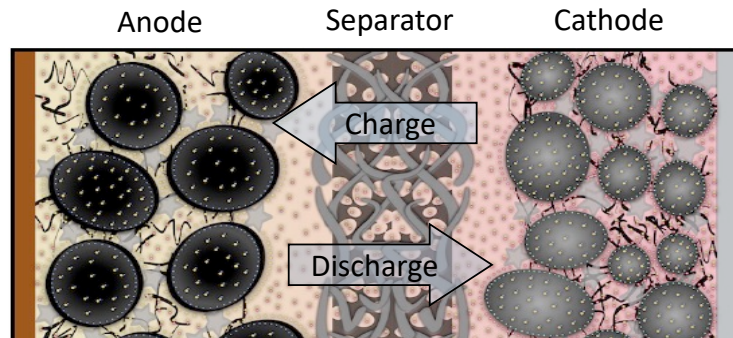


# Master Thesis

## Mechanical characterisation of the electrode materials of lithium-ion-batteries



*The geometrical structure of a Lithium-ion battery cell [Witzenhausen, H. dissertation (2017)]*

### The Project

Following the increasing requirements for the lifetime of lithium-ion-batteries (LIB), more and more scientific interest is focused on the study of their aging mechanisms. Correspondingly, the mechanical stability of the solid-state materials in LIB is quickly becoming the determining factor for achieving a long lifespan and avoiding catastrophic failure.

It is therefore necessary that the mechanical stability of the electrode materials with strongly heterogeneous microstructures should be estimated to detect mechanical flaws in advance. This requires measurements of the mechanical properties such as hardness, elastic modulus, and fracture toughness of each of the microstructural components of the electrode materials. Therefore, a local mechanical testing method, nanoindentation, will be employed in this work for the measurements of the mechanical characterization of the electrode materials.

### Tasks

- A literature survey on previous investigations of mechanical performance of electrode materials of LIB
- Establish the best preparation method of thin electrode material sheets
- Measure the hardness and elastic modulus of microstructural components in samples using nanoindentation
- Understand the influence of charging/discharging on the mechanical performance of the materials

### Requirements

- Enthusiasm for understanding the function of battery materials and making better batteries
- Knowledge of solid-state materials and mechanical properties of materials
- Conversational English knowledge

### We offer

Comprehensive training, flexible working hours and a friendly work environment.

### Contact

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