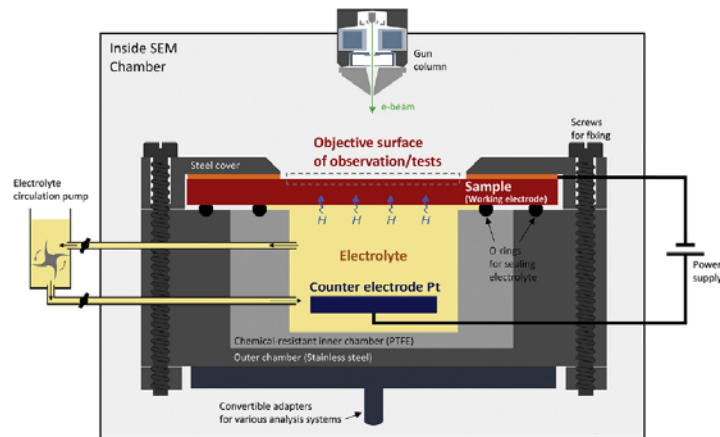


# Master Thesis

## Design of an in-situ charging/discharging device of a lithium-ion-battery cell working in a scanning electron microscope



Example of an in-situ H-charging device in a SEM [Kim J., *Int.J.HydrogenEnergy* (2019)]

### The Project / Tasks

Following the increasing requirements on the lifetime of the Lithium-ion-batteries (LIB), more and more scientific interests are turning to the study of their aging mechanisms. However, due to the extreme sensitivity of the battery components, like Li-ions, to air and moisture environment, the significant effects the intercalation/deintercalation and even the preservation of Li-ions on the aging of the electrode materials can not be easily studied. In this work, it is intended to design a device which could mimic the real state of the materials in a working LIB cell to provide most plausible insight into the aging process of the LIB components. As the measurement of the mechanical properties of the electrode materials relies on the application of the nanoindentation and the observation of the microstructural evolution requires the device to be able to work in a scanning electron microscope (SEM), the designed device should be compatible with both the commercial nanoindentation devices and the SEM chamber.

- A literature survey on pre-existing in-situ devices that work in SEMs
- Design of an in-situ device using software Solid Edge
- Build a first prototype of the designed device by working together with the institute workshop
- Test of the built device
- Write proper reports/thesis

### Requirements

- Enthusiasm for device/machine design
- Knowledge on mechanical engineering and designing tools like software Solid Edge
- Knowledge on electro-chemical reaction
- Hands-on skills of machine building

### We offer

A comprehensive training and friendly work environment. A speedy conclusion of the work is desirable and is thus supported with proper guidance from our side.

### Contact

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*Note: Hiwi / Ph.D position can be possible depending on student's performance.*