

## High energy lithium-ion cells - test and characterization

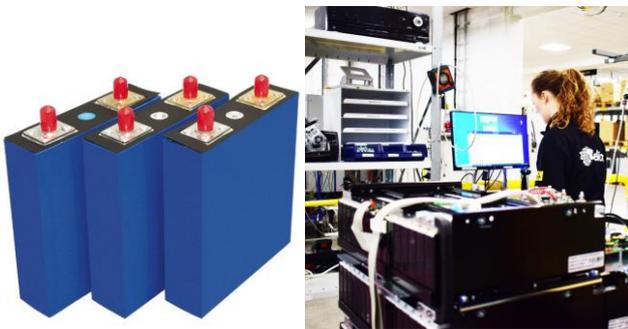
### Background

High energy lithium ion batteries (Li-ion) are important for the development of a sustainable society. The possibility to carry large amounts of energy in relatively compact form allows for electrification of vehicles as well as portable or transportable devices.

Few studies have been made on the characterization of abused high energy Li-ion cells, although needed in order to obtain the high safety standards that are required.

Extending the classic abuse tests to these batteries implies several issues about the location and the necessary protection and offer a new panorama of investigation methods.

The study will be done in cooperation with a prominent Swedish lithium-ion battery industry, Alelion Energy Systems AB.



High energy Li-ion cells and industrial environment electrical characterisation.

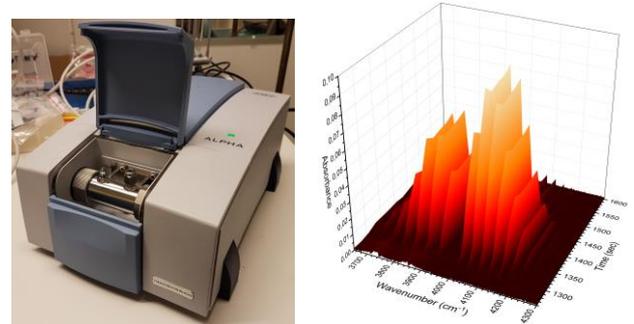
A single high energy cell has about 50 Ah capacity, which means 10 times more energy than in a normal telephone battery cell. The cells are of metal-prismatic type and will be characterized and tested under e.g. overcharge using electric and dielectric measurements, while thermal analysis and FT-IR spectroscopy will be used for the electrolyte, electrodes, separator and for the eventually emitted gases.

The emissions from abused cells will be analyzed with remote equipment in a safe and controlled environment for the operator. The aim of the study is characterizing the limit of safe utilization of the batteries and monitor the first indicators of failure.



<https://alelion.com/>

Logo and web-address of Alelion Energy Systems AB



Infrared (FT-IR) gas analysis of emitted HF

### Requirements:

Study background in physics, chemistry or environmental science and sustainable development.

### Experimental measurements:

Potentiostatic measurements, broadband dielectric spectroscopy, XRD, UV-vis-NIR and FT-IR spectroscopy. DSC and thermogravimetric analysis.

Different methods of testing and disassembling cells will be used, characterizing also the single components.

### Contact persons:

Maurizio Furlani [f6bmauri@chalmers.se](mailto:f6bmauri@chalmers.se)

Ingvar Albinsson - [ingvar.albinsson@physics.gu.se](mailto:ingvar.albinsson@physics.gu.se)

Bengt-Erik Mellander - [f5xrk@chalmers.se](mailto:f5xrk@chalmers.se)

### Location:

Fysik forskarhus, room F6413 and nearby laboratories.