System safety

Battery systems have to be inherently safe and may not pose a risk under all possible operating conditions. Does your system meet this requirement until end-of-life? How can you be one hundred percent sure? Battery systems are often developed in the electronics sector so that extensive consideration of Li-Ion technology (e.g. safety, ageing) as a separate area of expertise seldom takes place. In this regard we offer you the following services:

- Assessment of concepts, prototypes, pre-series and series batteries with regards to transport and functional safety
- Consulting for the implementation of safety-critical components and safety features in batteries
- Consulting for the application of current and expected standards, for tendering and evaluation of rather different offers as well as for terms of delivery, specifications, company standards and extended tests
- FMEA support especially for the battery part of the entire system
- Safety tests on prototypes, pre-series and series batteries

COMPETENCE E

Have we raised your interest?
Feel free to contact us:

Contact

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Safety First

Enhanced Safety for Lithium-Ion Batteries

COMPETENCE E

KIT – University of the State of Baden-Wuerttemberg and
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Lithium-Ion batteries can be very efficient, reliable and safe energy storage systems. They are able to compensate the fluctuations of renewable energy and are thus key elements for a safe and economically viable energy supply within the German "Energiewende". However, in practice and with regards to standardization there are critical safety loopholes in stationary storage systems, among those also PV home storage systems. There are also no standardized and sufficiently meaningful tests of the cycle life of these products.

- Do I have to provide certificates and if so, which ones?
- Where and how can I find competent partners for packaging and transport?
- How can the regulations and corresponding certification be considered during product development?

Cell safety

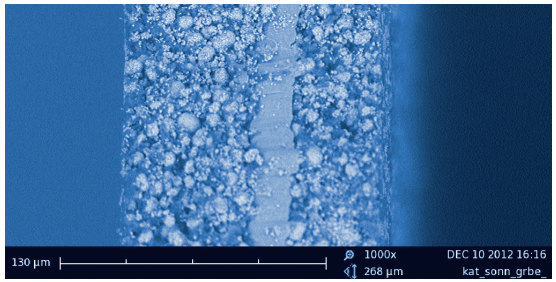
There are application-related standards and policies that require cells and modules to be tested under

cycle life and safety in our own industrially-relevant 20 Ah pouch cell format. Moreover, different materials science, chemical and physical analyses methods can be used for the examination of failure mechanisms in cells. In summary, KIT offers the following service portfolio:

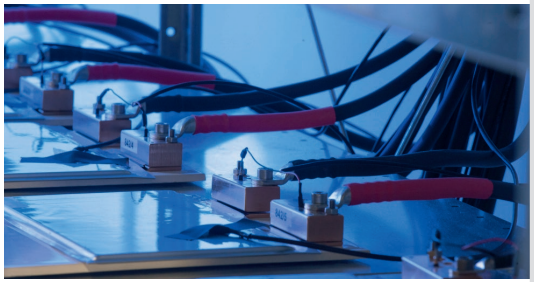
- Safety tests for single cells and battery modules up to 15 kWh
- Electrical cell characterization including long-term tests and thermal behavior

Transport label

Lithium-Ion cells



Cutting edge of a Lithium electrode



Cell testing lab

Within this scope, the Karlsruhe Institute of Technology (KIT) offers a wide service portfolio of consulting and analysis for increasing the safety of Lithium-Ion batteries.

Transport regulations

The transport of Lithium-Ion batteries is regulated by law in Germany. KIT can provide you support in answering the following questions:

- Which of the many regulations and classifications apply in my case and what does that mean for the certification and handling of my product or that of my supplier?

- electrical (e.g. overload, short-circuit, deep discharge)
- mechanical (e.g. squeezing, vibrations, shocks, nailing) and
- thermal (e.g. gradual heating, open fire, temperature change tests)

loads.

KIT can characterize cells in several different ways. Besides the above-mentioned safety tests, long-term electrical tests can be carried out and the self-heating of cells under a current load can be precisely measured with the help of calorimeters. Additionally, raw materials such as electrode materials, separators and electrolytes can be tested for

- Electron microscopy (REM, TEM) including element analysis and preparation of cutting edges
- X-ray analysis (e.g. XRD, XPS, Auger, XANES/EXAFS) for element and structure determination
- Manufacturing of large-format 20 Ah pouch cells in order to examine raw materials or intentional cell failures, for instance