VAMAS

Energy Storage Systems

Incubator Project - Technical Working Area 0

Project T5

Key Metrological Parameters for Lithium-ion Cell Standardization

Quick Start Guide

You are welcome to register here for the testing campaign in which battery parameters will be tested by laboratories worldwide. Interest has already been received from Europe, North America, Asia.

Project Status and Schedule

Sample Shipment	From May 2025
Re-shipment	Until 10th Aug 2025
Data exchange	Until 20th Aug. 2025
Workshop	23/24th Sep. 2025

Participation Fee

There is no participation fee and also no funding. Cells will be distributed by BAM free of charge. Participants fund their own involvement in the project.

Participants´ contribution

Participants choose their contribution from

I) Visual inspection only
II) Electrical cycling tests
III) Impedance/DC-pulse tests
IV) Battery abuse testing

For more information:
Contact: zeteze@bam.de
Project lead: Dr. Anita Schmidt
Dr. Nils Böttcher, Dr. Tim Tichter
Federal Institute for Materials Research and Testing (BAM), Berlin, Germany

Background

R & D aims for optimization of battery and cell characteristics (power, weight, lifetime, costs, safety and sustainability, …). This leads to a large variety of cells and battery types on the market. Even when having the same format, their usage in a device may not always be possible for either functional or safety reasons. Clearly it cannot be the aim to allow only one single cell type, format or chemical composition. Nevertheless it may be advantageous to standardize a limited number of cell types, in particular for small devices such as flashlights, laptops, mobile phones, etc. To date, however, cell characteristics lack in standardization. While industry does already specify formats (e.g. the outer dimensions), it is the task of metrology to provide standardized measurement routines, performance indicators and tolerances and references.

Objective

The aim of this study is to identify, if it is possible to **define parameters** and **minimum requirements** for harmonized /standardized cell types and their testing. To this aim

- An international **round robin campaign** is initiated. Particularly, implications from shipment impacts as well as storage and use of batteries resulting in differences among laboratories will be addressed
- The aim is to develop **reference data and test protocols** for ensuring data quality, identification of tolerances, uncertainty and reproducibility data.

CALL FOR PARTICIPATION

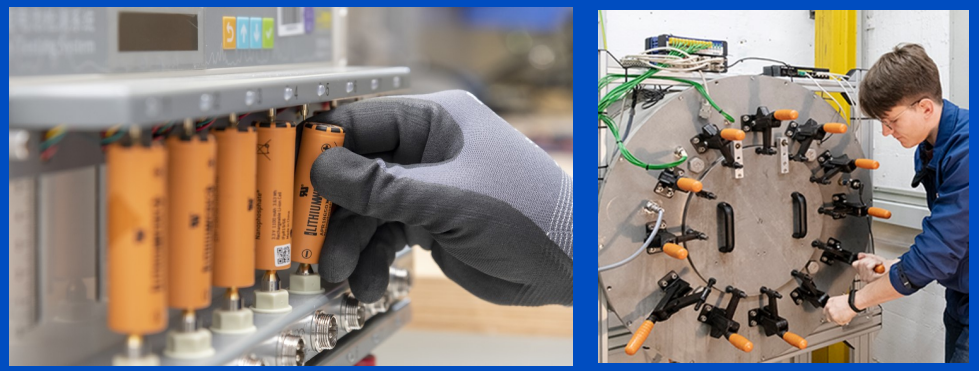

Fig. 1 Lithium-ion cells charging and discharging tests (left) and abuse tests (right)

Testing campaign

The testing campaign consists of four subjects. These are elaborated in detail in the VAMAS-battery testing protocol. Participants are free to choose their contribution.

I) Visual inspection

Comprises an assessment for obvious deviations from appearance of a normal begin-of-life (BOL) cell (cf. figure 2).

Fig. 2 Illustration of the visual inspection of a 18650 cell .

II) Electrical cycling tests

Consists of ten charge/discharge cycles and one steady-state voltage (quasi open circuit potential) measurement with a pre-defined testing protocol (cf. figure 3).

III) Impedance + DC-pulse tests

Electrochemical impedance spectroscopy at a defined state of charge of the cells and DC -pulse tests as performance indicators.

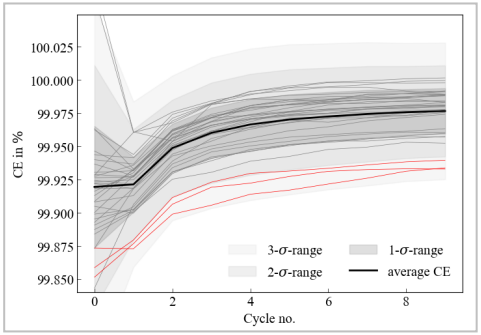

Fig. 3 Tolerances in Coulombic efficiencies of LFP-18650 cells for the VAMAS campaign.

IV) Battery abuse testing

Thermal runaway is deliberately initiated via heating. Parameters for heating rates, positioning of thermocouples, and other details are provided in the protocol.

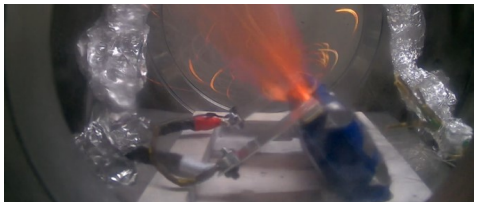

Fig. 4 A snapshot of the moment of thermal runaway failure of a Lithium-Ion cell.

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