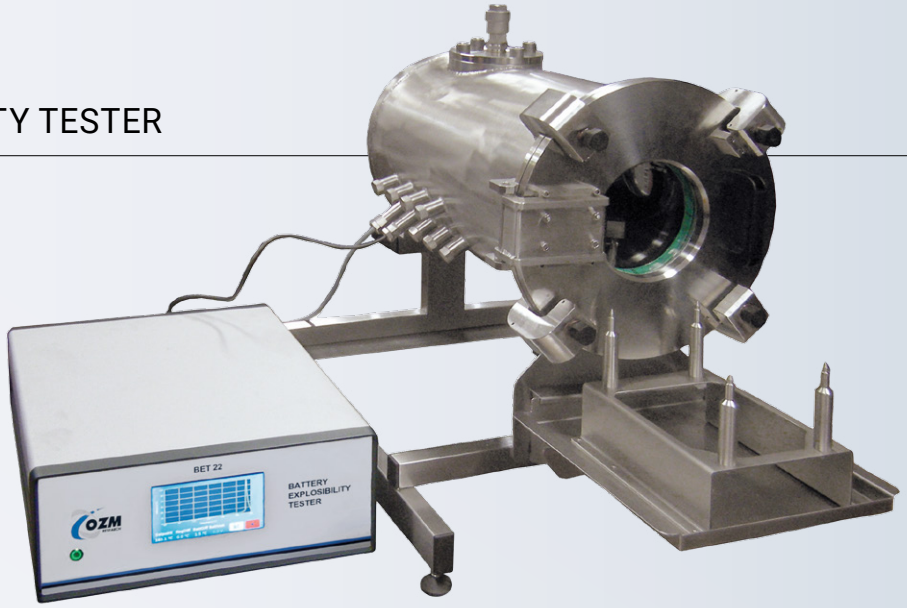
BET 22

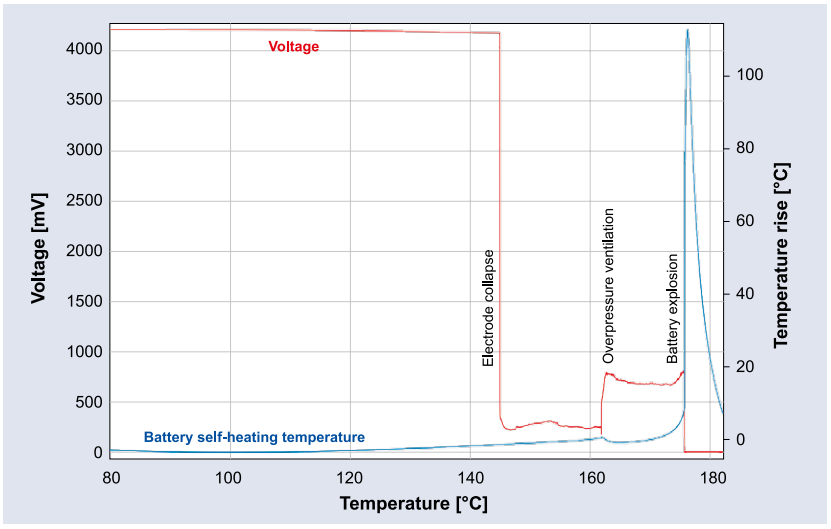
LITHIUM BATTERY EXPLOSIBILITY TESTER



The BET 22 is a unique instrument designed for safe execution of explosibility tests of lithium battery cells, with extensive characterization of their thermal stability and explosive properties. The instrument allows carrying out these experiments safely in laboratory conditions using gas-tight explosion-resistant container and extra-low voltage electrical heating block.

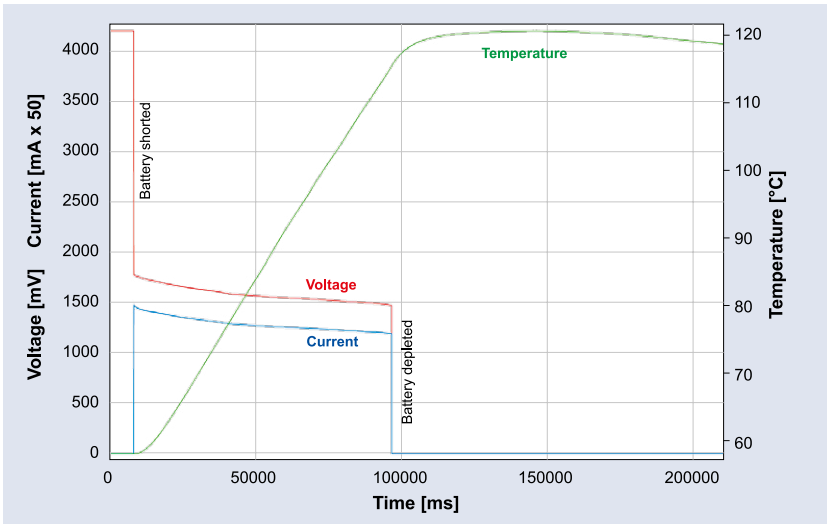
APPLICATIONS

- Comparisons of thermal stability and explosibility parameters of different battery types and chemistries
- Development of new battery compositions with higher thermal stability and reduced explosibility
- Safety qualification of battery cells for different applications
- Quality control of battery samples by thermal analysis in production and assembly
- Assessment of fire, explosion and toxicity risks for the fire prevention and extinguishing operations



Thermal analysis of a Li-ion battery cell

Interior of the container with an electrical heating block



Short-circuit behavior of a Li-ion battery cell at 57 °C

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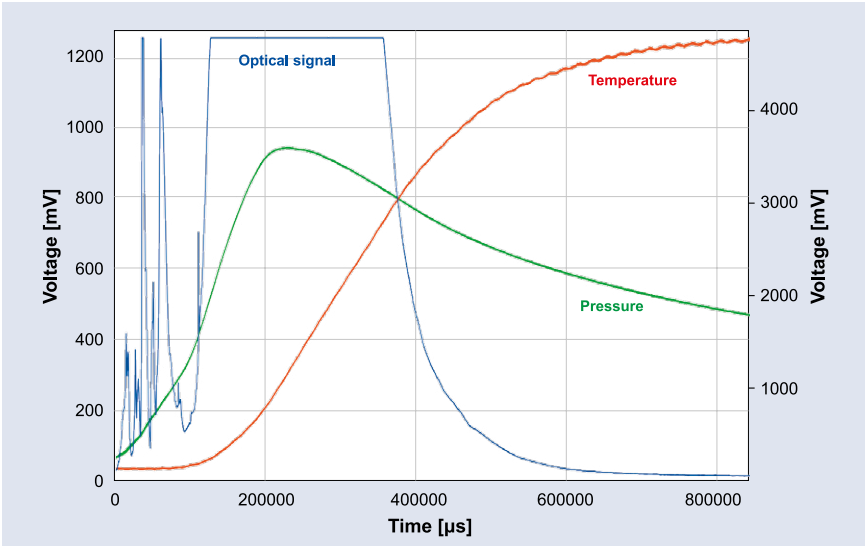
VER.1.0

Video sequence of a Li-ion battery explosion.

ADVANTAGES & FEATURES

- Safe examination of the battery cell thermal analysis, overcharging and short-circuit behavior at different temperatures, states-of-charge and gas atmospheres, with measurement of explosion parameters in a single instrument.
- Thermal analysis of the whole battery cell with constant heating rate until explosion precisely determines temperatures of the electrode separator failure, overpressure ventilation and thermal explosion, all related to the battery cell design, thermal safety and production quality.
- Characterization of the short-circuited or overcharged battery cell self-heating at elevated temperatures leading to the thermal runaway reaction to explosion.
- Multi-channel high-speed simultaneous measurement of temperatures, pressure, heat flow, optical signal, voltage and current precisely characterizes all aspects of the battery cell behavior in accidental scenarios.
- Large observation windows allow to record video sequences of the battery explosions and to overlay them with the simultaneously measured experimental data.
- The container design allows sampling of the reaction gases in all stages of the battery thermal decomposition and carrying out the experiments in defined gas atmospheres. Solid residues can be sampled as well.
- **BET 22** can simulate more realistic accident scenarios with higher temperatures than prescribed in the related international standards.



Thermal explosion reaction of a Li-ion battery cell

COMPLIANCE

BET 22 complies with and goes far beyond requirements for safety tests according to these standards:

- **UN Recommendation on the Transport of Dangerous Goods**, Manual of Tests and Criteria (2015), chapter 38.3, Test T.5 (External short circuit) and Test T.7 (Overcharge)
- **EN IEC 62133-2**, Test 7.3.1 (External short circuit), Test 7.3.4 (Thermal abuse) and Test 7.3.6 (Overcharge)
- **EN IEC 62660-2** ed.2, Test 6.3.1 (High temperature endurance) and Test 6.4.2 (Overcharge)
- **EN IEC 62660-3**, Test 6.3.1 (High temperature endurance) and Test 6.4.2 (Overcharge)

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