



1 Cell residues after a safety test on a battery pack made of 18650 cells.

2 Electrolyte release and fire during a thermal abuse test of a lithium ion cell.

SAFETY INVESTIGATIONS ON LITHIUM-ION BATTERIES (LIBS) FOR MILITARY APPLICATIONS

Lithium-ion batteries (LIBs) are becoming increasingly important for various applications in the Bundeswehr. They are characterized by their high energy density, but have a certain hazard potential. Practical safety tests make it possible to evaluate their behavior in the event of a malfunction fault and under operating conditions, enabling safe deployment.

Fraunhofer ICT, together with WTD 41, Department of Electrochemical Energy Storage (GF 230), conducts safety investigations and tests on various types of lithium-ion cells and batteries (LIBs) for military applications.

LIBs have become indispensable for military use and will increasingly replace other rechargeable systems (lead-acid, Ni/Cd) in the coming years. The biggest advantage is their high energy density, which cannot be achieved by any other available battery system. However, LIBs can pose a much higher risk to both people and machines.

Together with WTD 41, Fraunhofer ICT has been working intensively in recent years on identifying key hazards and countermeasures.

In the case of LIBs, specific energy density and intrinsic safety are inversely proportional to each other. The Bundeswehr uses only high-quality systems, so there have been no significant safety-related incidents during operation to date. Only bullet impact and safety tests show the potential danger of this battery technology. In the event of a malfunction, the energy stored in the cell can be released abruptly as fire (thermal runaway, TR). Under certain circumstances, a TR can spread rapidly from one cell to all other cells of a battery in a chain reaction (propagation).

We carry out practice-relevant safety tests on all currently used and also on possible future LIBs of the Bundeswehr.

Fraunhofer Institute for Chemical Technology ICT

Joseph-von-Fraunhofer-Straße 7
76327 Pfinztal (Berghausen)
Germany

Contact

Dr. Michael Holzapfel
Phone +49 721 4640-508
michael.holzapfel@ict.fraunhofer.de

Dr. Michael Abert
Phone +49 721 4640-658
michael.abert@ict.fraunhofer.de

Fritz Bruch
Telefon +497214640987
fritz.bruch@ict.fraunhofer.de

www.ict.fraunhofer.de