



Failure detection of Li-Ion batteries under thermal loads

Background

Li-Ion batteries in (hybrid) electric vehicles still face critical safety challenges. Due to a lack of understanding regarding the consequences of thermal loads, incurred for instance during accidents, batteries must be disposed of after such events, even without visible external changes. This has to be done due to the risk of accelerated degradation or the possible onset of the so-called thermal runaway (TR) at a later point in time. It is assumed that thermal loads influence the cell characteristic and may result in a safety degradation for continued operation. To address this sustainability and safety issue, further investigation on the battery's behavior should be done after the application of thermal loads. This thesis offers an exciting chance to dive into the dynamic research area of battery safety.



Source: www.drive.com.au

Your goal in this master's thesis is to use an experimental approach for the description and pre-detection of battery cell failures caused by thermal loads.

Tasks

- **Get familiar** with the subject of thermal abuse tests and electrical measurements methods in the field of battery safety
- **Understand** the connection of battery cell failures and their identification in electrical measurements.
- **Develop and build up** a test setup to conduct experiments.
- **Implement** your ideas to pre-detect battery cell failures during abuse tests.
- **Cooperate** with renowned industry partners in a funded EU project.

Literature

- Li et al. (2024): *Early warning method for thermal runaway of lithium-ion batteries under thermal abuse condition based on online electrochemical impedance monitoring*. In: Journal of Energy Chemistry 92, S. 74–86. DOI: 10.1016/j.jechem.2023.12.049.

Recommended as

Master thesis for technical studies (Mechanical Engineering, Mechanical Engineering and Business Economics, Electrical Engineering, Physics) interested in battery safety.

Organizational

- **Start:** anytime
- **Scholarship:** min. € 2.500,- for successful completion of thesis
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