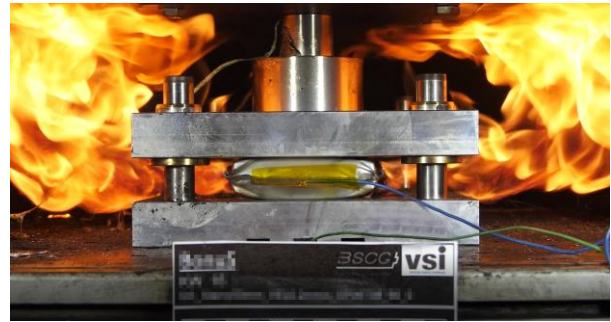




# Sensitivity analysis of electrical parameters of Li-Ion batteries under mechanical pressure

## Background

Li-ion battery cells in automotive systems are typically assembled in a module under external mechanical pressure. The mechanical pressure increases during cycling due to swelling effect of battery cells. The changes of the mechanical status of battery cells may be harmful to battery performance and even trigger a safety threshold. The electrochemical impedance spectroscopy (EIS) would be a promising approach to detect mechanical status of a battery cell by electrical parameters measurements. Therefore, a study about the relationship between mechanical pressure and electrical parameters sensitivity of a battery cell is needed.



Source: VSI/TU Graz

**Your goal** in this master's thesis is to describe the influence of mechanical pressure on the electrical parameters of a battery cell by EIS and electrical parameter measurement.

## Tasks

- **Get familiar** with the subject electro-mechanical characterization of battery cells.
- **Understand** the connection of mechanical behavior of battery cells and electrical parameters sensitivity.
- **Plan and conduct** calibration experiments.
- **Implement your ideas** by extending existing electro-mechanical battery models.
- **Cooperate** with renowned industry partners in a funded EU project.

## Literature

- Müller et al. (2019): *Study of the influence of mechanical pressure on the performance and aging of Lithium-ion battery cells*. In: Journal of Power Sources, Volume 440,2019,227148, DOI: 10.1016/j.jpowsour.2019.227148.

## Recommended as

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

## Organizational

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