Exploring new possibilities in energy storage

"The experiment was highly useful for LIACON to explore our LIB electrolyte's characteristics in more detail. Having access to the highly specialized and sophisticated lab equipment of the company rhd instruments we were able to purposefully round out our knowledge of the limitations of our LTO-LFP cells. In the process of further cell and electrolyte development at LIACON, measurements like the ones performed and further measurements linked to these will be very helpful."

Dr. Philipp Bach, Manager Battery Development

LIACON

Industrial need

LIACON was looking for a way to determine the ionic conductivity of the battery electrolyte they were using. On the one hand, the company wanted to know how the conductivity behaves at different temperatures and, on the other hand, whether the electrolyte's conductivity reflects different ageing processes of the cells. Based on the company's needs and on the research question, LIACON proposed to carry out temperature dependent impedance spectroscopy measurements.

Experiment

The underlying observation is that cells age differently depending of the treatment applied for testing. As it was not initially clear which component of the cell was responsible for the differences in the ageing behaviour of the cells, the electrolyte was examined as the first step in an exclusion process.

Within the framework of the project, the extracted electrolyte of short term intensely stressed and long term moderately stressed cells was characterised by temperature dependent impedance spectroscopy in comparison with electrolyte extracted from fresh cells.

Figure. For the experiment, the electrolyte had to be pressed out of the cell before it could be characterized by impedance spectroscopy. LIACON developed a method to squeeze it out of the cells. The company sent the equipment to the company rhd instruments enabling the laboratory scientists to perform electrolyte extraction immediately before the experiment to avoid issues due to intense air contact.

Findings and implications

The dc ion conductivities of the electrolyte extracted from "fresh" cells were slightly lower than the values determined for the electrolyte samples collected from "aged" cells, short term intensely aged as well as long term moderately aged ones. It can therefore be concluded that the electrolyte is most likely not responsible for the observed ageing behaviour of the cells. The results obtained provide LIACON a better understanding of the temperature-dependent performance and viability of its cells, which is crucial for a company developing advanced energy storage solutions.

Analytical research facility

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