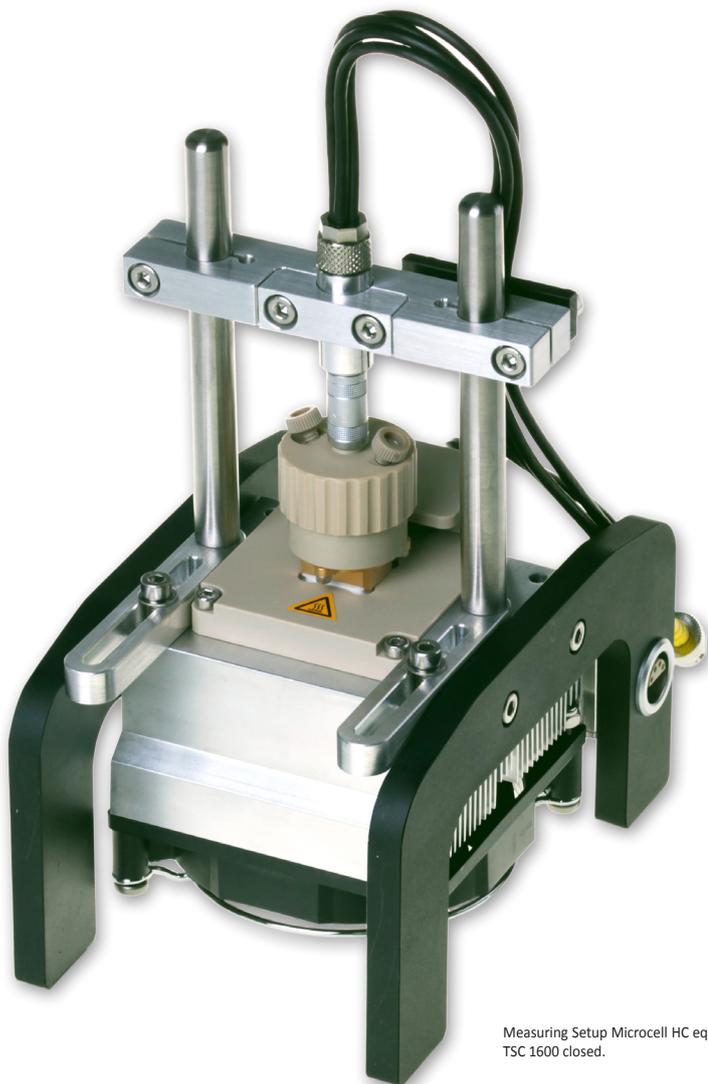


# Electrochemistry - served hot and cold



Measuring Setup Microcell HC equipped with TSC 1600 closed.

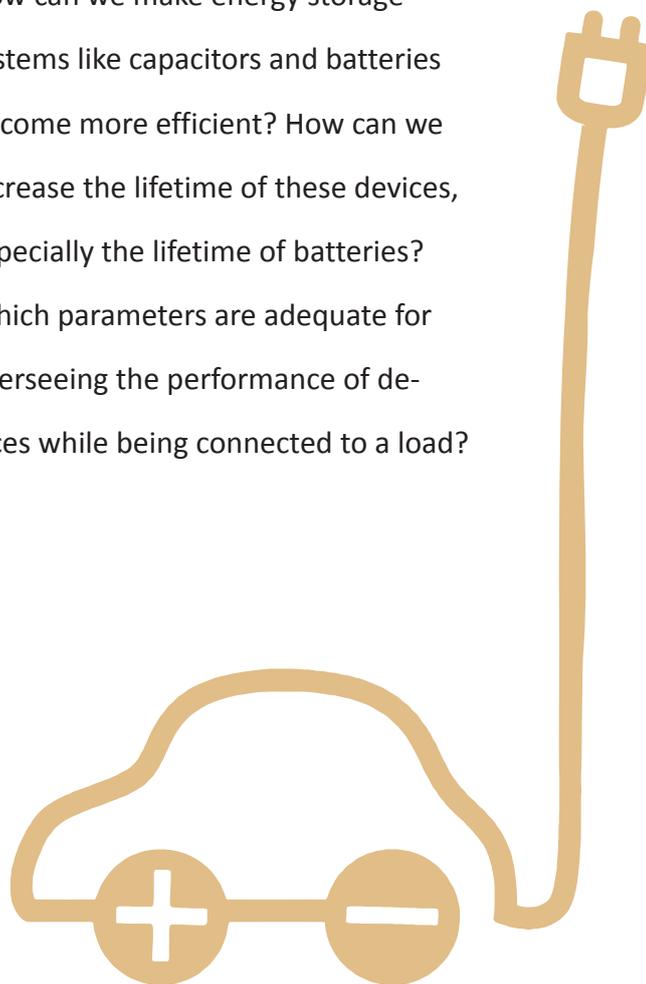
All of these questions can only be answered, if all the materials contained as single parts as well as their interplay are thoroughly studied to obtain a clear picture of all mechanisms contributing to the device's functionality. For doing so, classical and modern electrochemical analysis tools can be applied and combined with further methods like different kinds of spectroscopy.

Being part of this seminal development, **rhd instruments GmbH & Co. KG** is committed to supporting electrochemists and material scientists around the globe by designing and producing high-quality measuring setups for electrochemical material characterisation under temperature control.

Liquid, gel-like, polymeric and solid samples can be investigated as well as heterogeneous samples, like half and full cells of lithium batteries containing components of different aggregation states. In all cases, a very small amount of sample, in some cases only few milligrams, is required. Due to this small sample amount and modern peltier technique, the temperature can precisely be adjusted to the desired value within very short time.

The combination with high-quality measuring devices of **METROHM** provides the user with the unique opportunity of embedding temperature control in almost fully automated electrochemical material characterisation and can be seen as a **turn key system**.

How can we make energy storage systems like capacitors and batteries become more efficient? How can we increase the lifetime of these devices, especially the lifetime of batteries? Which parameters are adequate for overseeing the performance of devices while being connected to a load?



**rhd**  **instruments**  
flexible cell solutions

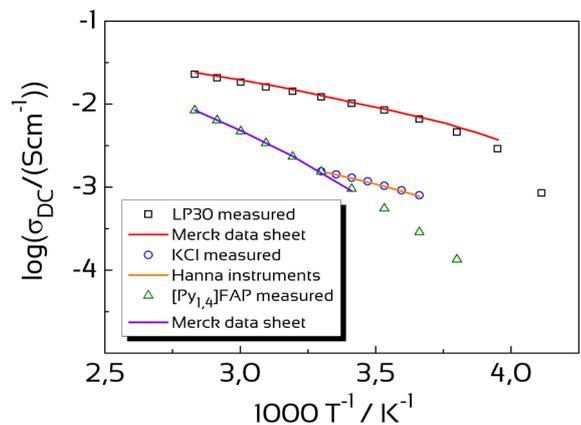
For questions, quotes and orders, please do not hesitate contact us:

**Headquarter:**

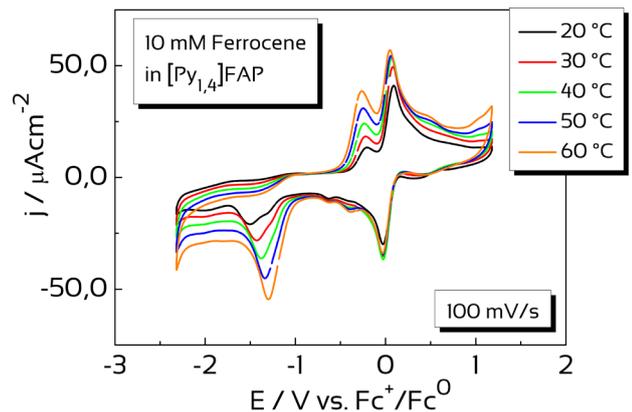
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## Main features:

- Large temperature range from -40 °C to +100 °C (depending on samples' mass and ambient conditions).
- Precise temperature control with tolerance of 0.1 °C.
- Fast temperature ramps up to 60 °C/min.
- Measurement of air- and/or moisture-sensitive samples possible (inside and outside a glovebox!).
- Small sample volumes of min. 70 µL to max. 1.6 mL (depending on measuring cell used).
- Modular and flexible concept: easy and quick switchover between different measuring cells for different applications.
- Turn key system and fully-automated measurements with METROHM Auto-lab measuring devices.



Temperature dependent dc-ion conductivity data of three different electrolytes depicted as Arrhenius plot.



Temperature dependent cyclic voltammogram of Ferrocene solved in an ionic liquid.

## Selected applications

- Determination of the temperature dependent dc-ion conductivity of battery electrolytes (fully automated!).
- Battery cycling and determination of transfer numbers.
- Investigation of separator foils (MacMullin number).
- Determination of the electrochemical window of liquid electrolytes.
- Studies of the HOMO-LUMO gap of dyes for OLEDs.
- Investigation of the temperature and potential dependent electrochemical double layer structure and dynamics.
- Corrosion studies.
- Spectro-electrochemistry (UV/Vis, transmission).



1. TSC 1600\_closed

2. TSC battery

3. TSC surface



4. TSC spectro

Different measuring cells for different applications