



## Improving battery performance

### Key words

HR-ICP-MS, phosphorous, lithium ion battery

### Goal

To demonstrate the versatility of HR-ICP-MS in speciation.

### MEET – Where science meets industry

Münster Electrochemical Energy Technology (MEET) is a battery research center at Münster University. It comprises an international team of around 140 scientists who are working on the research and development of innovative electrochemical energy storage devices with high energy density, longer durability and maximum safety. The aim is to improve batteries for use in electric cars and stationary energy storage systems — at the lowest possible cost.





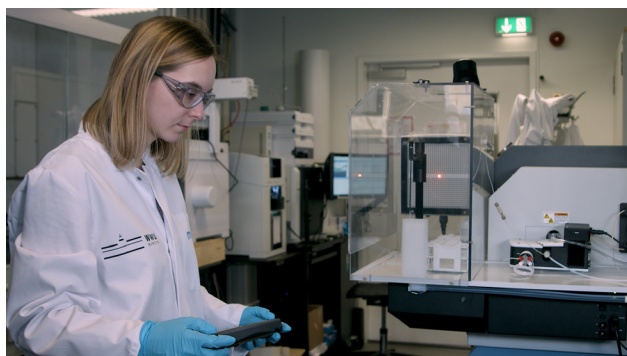
## About Sascha Nowak

Sascha Nowak is the head of division analytics and environment at the MEET battery research center. For a high resolution setup, a combination of identification and quantification, he chose the Thermo Scientific™ Element XR™ High Resolution ICP-MS.

## Focus on Lithium Ion Batteries

MEET is focusing on lithium ion batteries for electro mobility and stationary storage systems, developing new materials which will provide a longer life-time for lithium ion batteries.

It is a very young institute, and thus proud to have access to very professional equipment, which is usually not available for standard research.



One main problem of the lithium ion battery is the aging over time, and its loss of performance. MEET is investigating the aging mechanisms: how they work, which reactions take place and develop new materials and additives to stop these reactions.

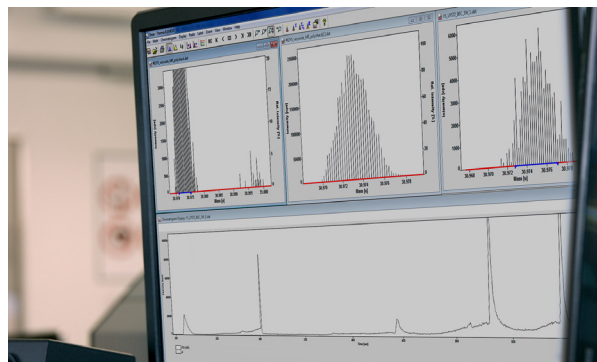
## Using high resolution ICP-MS

Most of the aging parts in the electrolyte are organic based compounds. The conducting salt is based on lithium hexa fluorophosphate. With High Resolution ICP-MS, they can now access the analyte of interest: phosphorus. When coupling the HR-ICP-MS to

chromatography system, they can also quantify unknown compounds. These unknown compounds are important when analyzing how different reaction or aging mechanisms are taking place inside the electrolyte: Are they depending on the temperature? Or on the voltage of the system?

With the higher resolution they can easily separate the analyte from the interference matrix. With only one switch, they have access to a clean spectra — to analyze the compound without any interference.

This chromatogram shows several decomposition products of a lithium ion battery electrolyte which was aged. High Resolution ICP-MS makes the analysis easy:



- You can simply switch from low, to a medium or higher resolution.
- As HR-ICP-MS does not require reactive gases, MEET does not need to develop special methods.
- This makes it easier to access the analyte – faster.

Find out more at [thermofisher.com/HR-ICP-MS](https://thermofisher.com/HR-ICP-MS)

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