Assessing Industrial Electrodes During Operation

Technical Program Series

Technical Summary

Duration: April 2021 - May 2024

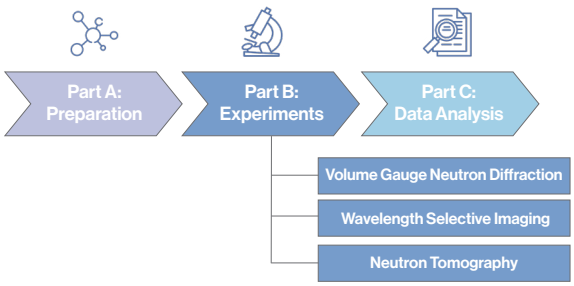
Partners: Instituto de Nanociencia y Materiales de Aragón - INMA and Exide Group

Focus: Energy storage systems

Objective: Analyze the charge and discharge processes in lead battery electrodes and provide insight into the working processes of lead batteries in energy storage applications.

Location: Spain and Germany

Work Packages



Part A: Preparation	Development of cell setup for neutron scattering experiments
Part B: Experiments	Conducting neutron scattering experiments on cells by using three different techniques: 1) volume gauge neutron diffraction 2) wavelength selective imaging 3) neutron tomography
Part C: Data Analysis	Calculation of parameters, running simulations for data evaluation

About the Project

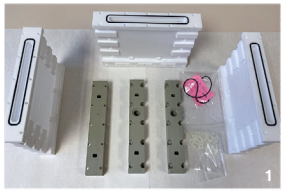
Stretching the boundaries of energy research, the team collaborating on this project made a significant step towards optimizing lead battery performance for energy storage systems (ESS), offering valuable technological insights.

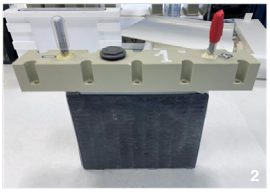
This project involved using neutron scattering experiments to study the charge and discharge processes in lead battery electrodes. By examining the atomic interactions and analyzing these processes in real-time without interrupting the batteries' operation, the initiative provided information about working processes and possible pathways for lead battery performance improvement for energy storage technologies and their future prospects.

Results and Applications

Comprehensive Analysis | Performance Evaluation | Practical Implications

Comprehensive Analysis:
Specially designed cells with industrial plates were used for neutron experiments, allowing for the detailed examination of crystalline phase changes in lead battery electrodes during operation.





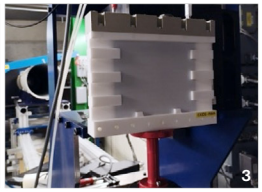


Figure 1: Cell container. Figure 2: Electrode inserted into cell. Figure 3: Cell during experiments.

Performance Evaluation:
This project marked a milestone by obtaining real-time diffraction data from operating commercial battery plates. This approach revealed the material dynamics during the charge and discharge cycles, offering a deeper understanding of how batteries operate in energy storage configurations.

Practical Implications:
The project involved wavelength-selective imaging to create detailed 2D visualizations of lead battery electrodes at different stages of operation, providing information for developing strategies to enhance lead battery performance for ESS. The research findings add to existing knowledge and will help guide the development of more efficient and reliable energy storage solutions.

Find out more
More information about the technical project and other technical projects of CBI available on our WEBSITE.

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