extended

Next generation of multifunctional, modular and scalable solid state batteries system

NEWSLETTER

ISSUES NO.4 | 2026

ABOUT THE PROJECT

EXTENDED, a Horizon Europe project, is a collaborative effort bringing together 19 partners from 10 EU countries! Our mission is to design, develop, and validate the next-generation battery pack systems that will drive the mass-market adoption of electric vehicles and applications.

CONTENTS

Milestone Moments.....page 2

Voices of Impact.....page 6

Navigating Excellence.....page 8

MILESTONE MOMENTS

FORTH EDITION

6TH GENERAL ASSEMBLY MEETING

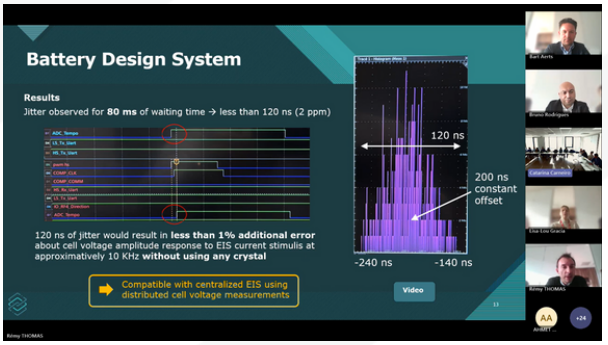
DECEMBER 2025

The 6th EXTENDED GA Meeting took place last month in Grenoble, France, hosted by CEA. The event brought together project partners to share updates and discuss next steps for sustainable energy solutions.

Discussions were led by AVESTA and supported by INOVA+, while attendees explored CEA's BATTERIES operations, gaining hands-on experience.

The event also featured the **2nd EXTENDED Workshop** on "**Pioneering Sustainable and Scalable Battery Systems**", with keynotes from **Bruno Rodrigues** (AVESTA), **Bart Aerts** (Flanders Make), and CEA's **Rémy Thomas** and **Lisa-lou Gracia**. Topics included Battery System Design, Thermal Management, and Battery Management Systems (BMS), advancing new insights into battery technology.

The workshop provided a comprehensive overview of the challenges and breakthroughs in the battery industry, with a particular focus on the EXTENDED project's contributions. Attendees gained first-hand knowledge from some of the leading voices driving innovation in energy storage and mobility.



Watch the full webinar here.

MILESTONE MOMENTS

FORTH EDITION

EXTENDED IN BATTERY INNOVATIONS AT EU MOBILITY EVENT

DECEMBER 2025

The EXTENDED participated in **Battery Innovation Days 2025** on 2-3 December in Graz, Austria, alongside the EU-INGENIOuS cluster. The project's participation highlighted its pivotal role in shaping the future of sustainable and scalable battery systems for Europe's evolving automotive sector.

At the event, **Lisa-lou Gracia**, R&D Projects Manager at CEA and partner in the project, took the stage representing the **EU-INGENIOuS cluster**. She presented key findings from the EXTENDED project during the parallel session "*Driving Change: The EU Automotive Action Plan and its Battery Breakthroughs*". Her talk addressed the challenges and innovations and how these breakthroughs are set to play a significant role in transforming the European automotive industry.

PARTICIPATION AT AN INTERNATIONAL LECTURE SERIES

NOVEMBER 2025

On 18 November, **Basit Jimoh** (CARISSMA at Technische Hochschule Ingolstadt) presented crucial insights from the EXTENDED during the International Lecture Series on Electric Mobility. His talk, titled "*Understanding Thermal Runaway in Large-Format Semi-Solid-State Battery Cells via Electrical, Thermal, and Mechanical Abuse Conditions*", delved into the safety challenges posed by thermal runaway in semi-solid-state batteries, a critical issue in the development of next-generation energy storage systems. His lecture also presented new perspectives on how electrical, thermal, and mechanical stresses can impact semi-solid-state battery cells.

MILESTONE MOMENTS

FORTH EDITION

WEBINAR IN COLLABORATION WITH EU-INGENIOUS CLUSTER

NOVEMBER 2025

On November 6, 2025, the webinar **"Next Generation Battery Systems: Smart Packing for Maximum Power"**, successfully brought together five leading EU projects to showcase breakthroughs in energy and power density at the pack level and discuss how these innovations are validated for real-world mobility applications.

Morshed Varzandeh, Mechanical & Software Engineer at Avesta Battery & Energy Engineering (AVESTA), represented the EXTENDED project. He discussed the critical balance of performance and sustainability, an essential theme in the development of future battery technologies. The event was organized by the **NEXBAT project** in collaboration with the **EU-INGENIOuS cluster**. Watch here.

EXPLORING XPS TECHNIQUE FOR SEMI-SSB RESEARCH

OCTOBER 2025

In collaboration with the **Surface Science Group at Technische Universität Darmstadt**, EXTENDED applied the XPS technique to study the chemical composition of Semi-SSB (Semi-Solid-State Batteries), which use a semi-solid electrolyte.

This research highlights the detailed measurements of battery samples inside the XPS machine. A special thank you to **Prof. Jan Philipp Hofmann**, **Yingzhu Fan**, and **Olaf Lindemann** for their support, as well as **Maximilian Mellin** (BMZ Germany GmbH) and **Basit Jimoh** (Technische Hochschule Ingolstadt) for representing the EXTENDED consortium in this exciting study.

MILESTONE MOMENTS

FORTH EDITION

5TH GENERAL ASSEMBLY MEETING

JUNE 2025

The EXTENDED consortium gathered in Germany from June 17th to 18th. The encounter included the **1st Extended Workshop** and a visit to **BMZ headquarters** in Karlstein/Main.

The exchange of knowledge during the event was crucial in furthering the objectives of the EXTENDED project, emphasizing the role of new technologies and innovations in creating sustainable solutions. As the consortium works to advance mobility and energy storage, the partnerships formed and the insights shared will play a pivotal role in ensuring the success of future endeavours.

The collective efforts of all partners are paving the way for a more sustainable and technologically advanced future.

The **1st EXTENDED Workshop on "Modular Power, Smart Systems"** at BMZ featured **Bruno Rodrigues** (AVESTA), **Maximilian Mellin** (BMZ Germany GmbH), **Carlos Micó** (Universitat Politècnica de València), **Basit Jimoh** (CARISSMA-THI), **Matthias Hessmann** (Fraunhofer IISB), and **Willar Vonk** (TechConcepts B.V.) as keynote speakers.

Their contributions sparked valuable discussions on the evolving landscape of energy solutions. This collaborative effort is helping shape the future of sustainable power systems.

Watch the full webinar here.

VOICES OF IMPACT

FORTH EDITION

In this edition, **CARISSMA-THI** selected the key figure to be interviewed.
We are proud to feature **Ifeoluwa Peter Oyekunle** from the **Department of Chemistry and Biochemistry, Florida State University, Florida, USA**. Ifeoluwa's research is directly aligned with the objectives of developing **next-generation solid-state batteries (SSBs)** to drive the adoption of **electric vehicles and other sustainable applications**.

1. What are the key factors that make Solid-state lithium batteries (SSBs) ideal energy storage solutions among the next-generation energy storage systems?

Solid-state batteries offer numerous advantages that make them ideal for next-generation energy storage systems. SSBs offer higher energy density, i.e. they provide more compact and lightweight designs, improving efficiency in applications like electric vehicles and portable electronics. Notably, they replace liquid electrolytes with solid electrolytes, significantly enhancing safety by reducing the risk of leakage, fires, and short circuits. SSBs also promise longer lifespans, faster charging, and better performance across a wider range of temperatures, all of which reduce maintenance costs and improve reliability.

Ifeoluwa Peter Oyekunle
Department of Chemistry and Biochemistry, Florida State University, Tallahassee, Florida, USA.

2. With solid electrolytes – oxides, halides, sulfides, and hybrid, which would you say could meet the current market demand based on safety, energy and power density, performance, and cost?

Mixed-anion or hybrid solid electrolytes offer the best balance to meet current market demands. These systems combine the high ionic conductivity of sulfides, the excellent thermal and chemical stability of oxides, and the cathode compatibility of halides, allowing for a more balanced solid electrolyte performance. Moreover, they offer better design flexibility and tunable compositions, which expands the material space of high-performance solid electrolytes.

3. What is the likelihood for this battery technology to be commercialised, especially for automotive and stationary applications and what could be the possible drawbacks for the end-of-life of the SSBs with sulphide for recycling plants?

Solid-state batteries have a likelihood of commercial success in both automotive and stationary storage applications within the next 5–10 years, although this timeline isn't rigid depending on technological, regulatory, and market developments. At end-of-life, sulfide-based solid-state batteries present several challenges for recycling plants. The sulfide electrolytes are highly sensitive to moisture and can release toxic hydrogen sulfide gas when exposed, posing significant safety and environmental risks. This requires recycling facilities to implement strict moisture control and specialized handling procedures, which adds complexity and cost. Additionally, current recycling infrastructure isn't yet fully adapted to process these materials efficiently, and separating the solid electrolytes from electrodes for material recovery is more difficult than with traditional batteries. Ensuring sustainable recycling will require advancements in processing techniques.

MEET IFEOLUWA OYEKUNLE

Ifeoluwa Oyekunle is a **Materials Scientist at Florida State University and the National High Magnetic Field Laboratory**. His research cuts across synthesis and characterization of novel solid electrolytes for next-generation energy storage devices; structure-property correlation of solid electrolytes for all-solid-state batteries; battery fabrication and performance testing for real-world applications; structure and performance validation with density functional theory calculation and Ab initio molecular dynamics simulations.

RESEARCH ARTICLES:

- Li3.6In7S11.8Cl: an air- and moisture-stable superionic conductor, https://doi.org/10.1039/D5SC01907A
- Modulating Lithium-Ion Transport in LiAlBr4 via S-Modified Anion Sublattice, https://doi.org/10.1002/cssc.202501192
- Li1.6AlCl3.4S0.6: a low-cost and high-performance solid electrolyte for solid-state batteries, https://doi.org/10.1039/D4SC07151D
- Dendrite formation in solid-state batteries arising from lithium plating and electrolyte reduction, https://doi.org/10.1038/s41563-024-02094-6

NAVIGATING EXCELLENCE

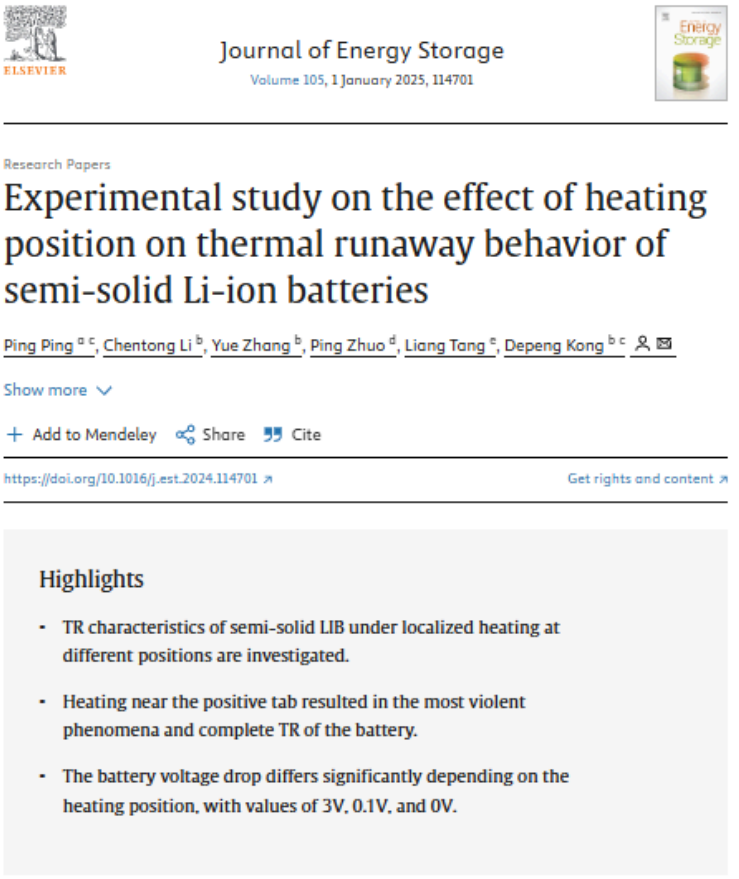
FORTH EDITION

CARISSMA
Technische Hochschule Ingolstadt

TOP PICKS FROM EXTENDED PARTNERS

In the fourth edition of the **EXTENDED** newsletter, we take great pride in presenting **Basit Jimoh (CARISSMA-THI)** top pick scientific paper

Basit Jimoh holds an MSc. in Electric Vehicle propulsion and Control from Ecole Centrale de Nantes. He joined the abuse team of CARISSMA-THI in September 2023 as a full-time scientific employee. He currently works on Battery safety research, and he has contributed to both domestic and EU funded Projects. He is the WP6 lead in the EXTENDED Project where he and his team bring innovative solutions to battery safety and general guidelines and recommendation for battery development.



ELSEVIER

Journal of Energy Storage
Volume 105, 1 January 2025, 114701

Research Papers

Experimental study on the effect of heating position on thermal runaway behavior of semi-solid Li-ion batteries

Ping Ping [a c], Chentong Li [b], Yue Zhang [b], Ping Zhuo [d], Liang Tang [e], Depeng Kong [b c]

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Highlights

- TR characteristics of semi-solid LIB under localized heating at different positions are investigated.
- Heating near the positive tab resulted in the most violent phenomena and complete TR of the battery.
- The battery voltage drop differs significantly depending on the heating position, with values of 3V, 0.1V, and 0V.

"I have picked this recently published research paper because of the findings around the behaviour of next-generation semi-solid large format cells on different heating positions. The findings of this paper were able to show that asides chemistry and battery technology, the location (positive end or middle or negative end heating) of the heat around a pouch have different responses to Thermal Runaway (TR) due to the different material bulk. Therefore, an indicator such as voltage failure (e.g., an abrupt voltage drop) alone is not a sufficient criterion to determine the safe operating state or the onset of thermal runaway in monitoring devices. Hence, other indicators like temperature, mass loss and venting should be monitored alongside voltage. The findings provide valuable insights for developing safety strategies and designing protective measures for large format."

Basit Jimoh

The **EXTENDED** newsletter is released semi-annually with the primary goal of fostering awareness about our project and its results, shedding light on the transformative impact of battery development on eco-friendly transportation.

DIVE INTO OUR WORLD!

Stay informed about our project and the dynamic field of battery development.

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