1st FULL-MAP Clustering Event Agenda

The Battery Ecosystem Summit: Fostering Cross-Project Collaboration

Date: 09-10-2025 Time: 14:00 – 17:30 (3.5 hours, online)

14:00 – 14:05 Welcome & Introduction – Leonor de la Cueva

Session 1 – Platforms, Interfaces & Understanding Fundamentals

14:05 – 14:15	FULL-MAP – Mesfin Haile Mamme
14:15 – 14:25	ULTRABAT – Ivano Eligio Castelli
14:25 – 14:35	OPINCHARGE – Kristina Kolarova
14:35 – 14:55	Roundtable Discussion (20 min) *Exploring synergies on platforms, characterisation, and predictive interface design.*
14:55 – 15:10	Comfort Break (15 min)

Session 2 – Safety, Smart Functionalities & Advanced Chemistries

15:10 – 15:20	SAFELOOP – Ulla Lassi
15:20 – 15:30	SAGELi – Colin Jean-François
15:30 – 15:40	INERRANT – Spyros Yannopoulos
15:40 – 15:50	SALAMANDER – Samson Yuxiu Lai
15:50 – 16:00	PHOENIX – Joris de Hoog
16:00 – 16:20	Roundtable Discussion (20 min) *Exploring synergies on safety, sustainable chemistries, criticality reduction, and smart battery functionalities.*
16:20 – 16:35	Comfort Break (15 min)

Session 3 – Manufacturing, Digitalisation & Circularity

16:35 – 16:45	BATTwin – Ozan Emre Demir
16:45 – 16:55	BATMASS – David San Juan
16:55 – 17:05	REUSE – Andreas Bittner
17:05 – 17:25	Roundtable Discussion (20 min) *Open exchange on links between manufacturing innovation, digitalisation, and circular value chains.*

17:25 – 17:30 Closing Reflections & Next Steps

Project Descriptions:

1. FULL-MAP – Mesfin Haile Mamme
   FULL-MAP focuses on accelerating the discovery and optimization of materials and interfaces for next-generation batteries through a comprehensive Materials Acceleration Platform. It integrates artificial intelligence, autonomous synthesis, high-throughput experiments, inverse design strategies and advanced characterization workflows. The project adopts a chemistry-agnostic approach and enables iterative refinement of hypotheses through continuous feedback loops between digital models and laboratory data. By validating the platform across several battery use cases, FULL-MAP aims to reduce development timescales by a factor of five, strengthen European innovation capacity and contribute to the Battery 2030+ long-term vision.

2. ULTRABAT – Ivano Eligio Castelli *(Talk title: Understanding the Battery Interface to Make Better Batteries)*
   ULTRABAT investigates the ultrafast physicochemical processes that govern electron, ion, and molecular dynamics at battery interfaces, addressing the fundamental knowledge gap in charge and ion transfer mechanisms. Charges moving across interfaces induce atomic rearrangements that critically affect transport efficiency, yet these processes remain poorly understood due to their ultrafast timescales and nanometer length scales. To probe them, ULTRABAT pushes the boundaries of advanced characterization by combining ultra-bright and ultra-fast X-ray free electron laser (XFEL) scattering and spectroscopy, visible ultrafast spectroscopy, solid-state NMR, and operando techniques with multiscale simulations. This synergy enables direct observation of charge transfer between redox centers in electrode compounds and across solid/liquid interfaces, while NMR provides insights into local ordering and lithium interfacial dynamics. The resulting experimental insights and data frameworks advance the “battery interface genome” paradigm, improving predictive design of interfaces and informing strategies to control redox reactions. By deepening understanding of ion diffusion and interfacial phenomena, ULTRABAT supports the development of more durable, high-performance, and safer energy storage systems in line with Battery 2030+ goals.

3. SAFELOOP – Ulla Lassi
   SAFELOOP addresses safety, circularity and competitiveness across the entire life cycle of lithium-ion batteries for electric vehicles. The project develops design strategies, recycling processes and monitoring methods to facilitate the integration of up to 25 % recycled materials in next-generation EV batteries, and aims to achieve recycling rates approaching 90 % within a decade. It emphasizes hazard reduction, fault detection and sustainable production, aligning with European industrial and environmental objectives. By bridging manufacturing, use-phase and end-of-life processes, SAFELOOP seeks to minimize risks while enhancing value chain efficiency.

4. SAGELi – Colin Jean-François *(Talk title: Presentation of the SAGELi project)*
   SAGELi aims to deliver safer and more sustainable lithium-ion batteries for electric mobility by addressing both material criticality and safety challenges. While NMC-based cells dominate today’s high-energy market, they remain prone to thermal runaway, raising safety concerns. To overcome this, SAGELi explores manganese-rich cathode chemistries, focusing on lithium-rich oxides that combine competitive energy density with improved thermal stability, and rock salt–type (cDRS) materials that eliminate nickel

and cobalt, reducing dependence on critical raw materials. In parallel, the project develops strategies to stabilize electrode-electrolyte interfaces and applies advanced characterisation and modelling to understand safety behaviour throughout ageing. By combining innovative materials, interface engineering, and predictive tools, SAGELi supports the Battery 2030+ roadmap, contributing to safer, high-performance, and resource-responsible batteries for Europe's transition to decarbonised mobility.

5. BATTWIN – Ozan Emre Demir *(Talk title: Towards Zero-Defect Manufacturing in Battery Production Lines)*
   BATTwin develops a multilevel Digital Twin Platform to accelerate zero-defect battery manufacturing and shorten the ramp-up of European gigafactories. As defect rates during commissioning can reach 15–30% depending on process stage, the platform integrates real-time process data, predictive modelling, and advanced quality control to detect deviations early, reduce scrap, and optimize production efficiency. Its architecture is knowledge-based and explainable, embedding digital twins into human-centric workflows; scalable, improving yield at different volumes; flexible, capable of linking single processes to entire production lines; and robust, adaptable to various chemistries, geometries, and operating conditions. By boosting learning curves, minimizing material waste, and ensuring high-yield production, BATTwin strengthens Europe's competitiveness against global producers and contributes to sustainable, large-scale battery manufacturing in line with Battery 2030+ priorities.

6. SALAMANDER – Samson Yuxiu Lai *(Talk title: Recent progress in SALAMANDER smart functionalities in Li-ion batteries)*
   SALAMANDER focuses on developing smart lithium-ion batteries with embedded sensors and self-healing functionalities to enhance resilience, safety, and lifetime. The project integrates three sensor types and two self-healing mechanisms to counteract the most damaging reactions in electrodes. On the anode, silicon/carbon composites are combined with thermally activated polymer networks that re-bind fractured silicon nanoparticles, alongside resistance sensor arrays to monitor electrode integrity. On the cathode, sacrificial Li salts are embedded in NMC622 to compensate for degradation. These smart elements are designed to communicate with the battery management system, enabling physics-based models to trigger controlled self-healing responses. Complemented by life cycle assessment to validate recyclability and sustainability, this approach advances Battery 2030+ goals on self-healing and longevity, while supporting scalable manufacturing and a circular European battery value chain.

7. INERRANT – Spyros Yannopoulos
   INERRANT advances materials, interfaces and diagnostic techniques to enhance the safety, lifetime and environmental performance of lithium-ion batteries. The project explores optimized electrode compositions, improved electrolytes and innovative characterization methods to reduce degradation pathways and minimize thermal and mechanical hazards. It places emphasis on material sustainability and efficient cell design to meet the requirements of electromobility and grid applications. Outcomes are expected to contribute to safer, longer-lasting and more resource-efficient European battery technologies.

8. PHOENIX – Joris de Hoog *(Talk title: Sensors for Smart batteries: options explored)*
   PHOENIX develops next-generation battery concepts that combine enhanced sustainability, safety, and performance through the integration of smart sensing and self-healing functionalities. The project focuses on specific sensors and triggering devices designed to capture early signs of degradation and initiate restorative actions, thereby improving reliability and extending service life. These functionalities are coupled with advanced battery management systems that interpret sensor signals and activate tailored responses to mitigate damage. Alongside material and design innovations, PHOENIX addresses lifecycle considerations to ensure environmentally responsible solutions for mobility and energy applications. By reducing environmental impact while safeguarding competitiveness, PHOENIX supports the broader Battery 2030+ roadmap and contributes to the development of robust, sustainable, and intelligent energy storage technologies.

9. REUSE – Andreas Bittner
   REUSE targets circularity and improved end-of-life management of lithium-ion batteries, with a particular focus on low-value chemistries such as LFP. The project develops automated sorting, disassembly, direct reuse strategies and advanced recycling techniques. It integrates environmental assessment and economic viability analysis to design effective circular value chains. By improving material recovery rates and enabling second-life use, REUSE supports EU sustainability goals and reduces dependency on virgin raw materials.

10. BATMASS – David San Juan
    BATMASS focuses on digital platforms and analytical solutions to optimize battery manufacturing, quality control and lifecycle assessment. The project provides data-driven tools for monitoring production parameters, identifying inefficiencies and enhancing process reliability. By facilitating informed decision-making and interoperability across stakeholders, BATMASS contributes to improved productivity, cost reduction and sustainable manufacturing practices. Its outputs support both industrial deployment and research-based innovation in the European battery ecosystem.

11. OPINCHARGE – Kristina Kolarova *(Talk title: OPINCHARGE: Advanced Operando Tools for Next-Generation Batteries)*
    OPINCHARGE advances the understanding of charge transport and interface dynamics in lithium-ion batteries by developing cutting-edge operando characterisation tools. The project employs advanced electron and ion microscopy, spectroscopy, and isotopic labelling techniques to probe the formation and evolution of the solid–electrolyte interphase and cathode–electrolyte interface, alongside charge transport and degradation mechanisms across multiple scales. These experimental breakthroughs are coupled with artificial intelligence, machine learning, and modelling for real-time interpretation, predictive performance insights, and integration with European data infrastructures. Coordinated by LIST, the multidisciplinary consortium of research, industry, and SMEs fosters collaboration and open science, delivering open and FAIR datasets to enable cross-project synergies. By generating quantitative models of interface dynamics and ageing, OPINCHARGE contributes to the Battery 2030+ roadmap and aligns with BATT4EU priorities. The outcomes are expected to inform safer, longer-lasting, and more sustainable batteries, supporting Europe's ambition to lead the global energy transition.