

Meet the SPINMATE Partners!



Introducing CIC energiGUNE: an energy research center specialized in electrochemical storage (batteries), thermal energy solutions and hydrogen technologies that aims to generate disruptive scientific knowledge in materials and technological solutions related to energy, and contributing to improve industry competitiveness and sustainable development.

<https://CICenergiGUNEnergigune.com/en>

WWW.SPINMATE.EU

Hello Nicola Boaretto! Thank you for this opportunity to meet you and talk about SPINMATE. To kick-off, could you give us, in your own words, a short introduction to CIC energiGUNE, and your role there?

CIC energiGUNE is a Basque energy research center specialized in electrochemical energy storage, thermal energy storage and conversion, and hydrogen technologies, that aims to generate disruptive scientific knowledge in materials and technological solutions related to energy and contribute to improve industry competitiveness and sustainable development. The center, a member of the Basque Research & Technology Alliance-BRTA, is a strategic initiative of the Basque Government, and is also supported by the Provincial Council of Alava and the Basque Energy Agency.

Within CIC energiGUNE, I am Senior Researcher in the Organic & Hybrid Materials Group. I am specialized in the synthesis and design of polymeric materials for electrochemical applications, such as polymer electrolytes and binders for lithium batteries.

To someone reading this who is still not familiar with SPINMATE, how would you describe it in simple terms, and how do you distinguish it from other projects or initiatives?

SPINMATE project aims at developing innovative and scalable manufacturing techniques for solid-state lithium metal batteries. The focus is on the optimization, production and scale-up of the cell components (cathode, anode, and solid-state electrolyte), and on the development of a pilot line for large cells production. Digitalization, based on digital twins and machine learning, will play here a fundamental role. In this sense, **SPINMATE** differs from other projects on solid-state batteries because it combines advanced materials development with a focus on the scalability and cell production. Thus, it's a step forward towards the maturation of solid-state battery technology.

CIC energiGUNE takes an active role on the development and optimisation of cell components, leading the full cell integration process in SPINMATE. Could you tell us more about this process? Which will be the main outcomes?

CIC energiGUNE leads the work package dedicated to the development of the cell components, that is cathode, anode, and solid-state electrolyte, and is particularly involved in the development of the electrolyte.

The work package spans from the synthesis of the cathode active material and the production of the individual components (electrode and electrolyte layers) to the integration in small "monolayer" cells, with capacity of about 60 mAh. The main objective is to optimize the composition, properties, and processing of the individual components, to produce them for integration in full cell, and to define the final cell configuration that will be transferred to the other work packages for scaling-up the process for large cell production. More specifically, the objectives are to synthesize and scale up the production of the cathode active material, to integrate this in an optimized positive electrode, to develop a solid polymer electrolyte with high conductivity and electrochemical stability, and to develop a Li metal foil negative electrode.

In SPINMATE, the evaluation of performance, durability, and safety of cells, from monolayer to final prototype, will start with a Monolayer Cell Testing lead by CIC energiGUNE. What will be the main goal for the formation and testing procedures on monolayer cells? Which parameters will be assessed for the cells' optimisation?

The application of different formation and testing procedures on small monolayer cells will allow evaluating of their performance and finding optimal aging and formation parameters for the larger cells that will be tested at a later stage. The goal is to stabilize interfaces and limit the irreversible reactions during the initial thermal/electrical formation cycles to get the best energy density and cyclability. Temperature, pressure, preliminary heating treatment, charge/discharge rate, cut-off voltages, and cycling mode will be varied to optimize the cycling conditions.

What are you personally most enthusiastic about achieving during SPINMATE?

The solid-state electrolyte is the core and most critical component of this technology. It must have high ionic conductivity, enabling comparable performances with currently used liquid electrolytes, but also strong mechanical properties, to avoid short circuits, which are a big issue with lithium metal. Furthermore, it must have a wide electrochemical stability window, to avoid degradation in contact with high-voltage cathodes and with the highly reactive lithium metal anode. These are serious challenges, so developing a polymer electrolyte showing good performance in large cells will be a great achievement.

CIC energiGUNE is a research centre expert in materials development for electrochemical devices. How your role on the development and optimisation of cell materials and the definition of the final cell chemistry in SPINMATE will strengthen your position for collaborative technology transfer to industry?

Our participation in SPINMATE represents an excellent opportunity to collaborate with industrial partners on the development of solid-state electrolytes and next generation lithium batteries.

Certainly, there will be readers interested to meet you and discuss your experience in SPINMATE. Which events will be possible to meet CIC energiGUNE in the upcoming months?

CIC energiGUNE will attend the 244th ECS Meeting (October 8-12, 2023 | Gothenburg, Sweden).

INOVA+ – responsible for implementing the communication and dissemination activities in SPINMATE – conducted a series of interviews to the SPINMATE partners. If you would like to know more about the project partners, visit our online channels.

SPINMATE Website: www.spinmate.eu

SPINMATE Social media channels:



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