

Meet the SPINMATE Partners!

INOVA+, responsible for conducting the communication and dissemination activities in SPINMATE, conducted a series of interviews to the project partners.



SPINMATE

ARKEMA



Introducing Arkema: leading company in Specialty Materials. Building on its unique set of expertise in materials science, Arkema designs materials to address the ever-growing demand for innovative and sustainable materials, driven by the challenges of new energies, new technologies, the depletion of resources, mobility, and increasing urbanization.

<https://www.arkema.com/global/en/>

WWW.SPINMATE.EU

Hello G r me Godillot! 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 TME, and your role there?

Arkema is a high-performance materials company that specializes in three main segments: adhesive solutions, advanced materials, and coating solutions. With a global workforce of over 21,100 employees across 55 countries, the company reported sales of  9.5 billion in 2023. As a major player in the battery industry, Arkema offers innovative solutions both inside and outside the cell, including Kynar  PVDF resins for binder and separator coatings, Incellion  acrylic solutions, Graphistrength  carbon nanotubes, and Foranext  electrolyte salts. These new materials have been developed to extend battery life and increase storage capacity. I have been with the company for 10 years, starting as an R&D engineer and now serving as the project manager for gel polymer batteries, also known as semi-solid batteries. I am based at the GRL research centre near Pau, France.

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?

The current Li-ion batteries you have in your car and your electronic devices contain flammable liquid electrolytes. Therefore, an accidental opening of a battery cell will probably cause a fire outbreak. SPINMATE project develops semi-solid battery that contain a non-flammable semi-solid electrolyte to increase the safety of electric vehicles. Then, this semi-solid electrolyte is compatible with the use of a high-capacity lithium metal anode, thus allowing to reach the high energy densities that are required by the automotive application. Finally, SPINMATE's technology is compatible with existing battery production equipment to facilitate the industrialisation of the materials and processes developed.

SPINMATE project starts with the development and optimisation of cell components from 1 Ah to 10 Ah. ARKEMA will take a key role on the raw material optimisation particularly with Solid polymer electrolyte. Could you tell us more about the process, and which will be the main challenges?

The solid polymer electrolyte comprises polymers, lithium salts as the source of Li ions, and plasticizers to enhance conductivity. As a producer of polymers and lithium salts, Arkema has been researching gel polymer electrolytes for several years and has since gained the necessary capabilities to select the optimal grades of polymer and lithium salt for this application. However, the main challenge of a solid electrolyte is to achieve similar conductivities as liquid electrolytes while maintaining sufficient mechanical properties to obtain a self-supported membrane as a separator. Thanks to the combination of two polymers, CICE was able to develop a self-supported membrane with good conductivity and electrochemical stability.

In the second year, SPINMATE will begin the modification and optimisation of the manufacturing equipment for the upscaled production of electrode and electrolyte sheets. Which process parameters will be used on the coating line modification for solid electrolyte layer manufacturing – conducted by ARKEMA?

In conventional liquid electrolytes-based batteries, the electrolyte is impregnating the porosity of the three elements of the battery, i.e. the cathode, the separator, and the anode.

In semi-solid technology, the anode is made of lithium metal and the solid polymer electrolyte is present inside the cathode (we name it catholyte) and as a separative membrane (playing the role of electric insulator and Li ion conductor) between the two electrodes. The catholyte is introduced during the preparation of the cathode and it is developed by CIDETEC. Arkema is focusing on the development of the separative membrane.

The process developed by CICE is mainly manual and was optimized by Arkema to make it more automated and suitable for producing larger quantities (still at lab scale). Unfortunately, it couldn't be adapted to conventional coating line equipment for upscaling at pilot scale (batch of several meters). Therefore, the partners decided to work again on the electrolyte formulation to make it compatible with a production on existing equipment. Arkema is currently validating the new formulation at lab scale and upscaling on the coating line is planned early 2025.

Interesting! How solid electrolyte layers will be manufactured with those optimized process parameters?

The development is still ongoing, but the goal is to produce the solid polymer electrolyte on the same pilot scale equipment that is used for cathode or anode manufacturing. First the polymer is solubilized in a solvent, and it is then mixed with plasticizers and lithium salts. Afterwards, the solution is transferred to the coating line for casting on a liner support and drying. We finally obtain thin film (20-50 μm) which is easily removable from the liner. It can be wound on a spool and sent to battery manufacturer to be used as separative membrane in the batteries.

What are you personally most enthusiastic about achieving during SPINMATE?

The upscaling of the gel polymer electrolyte production is exciting. As an R&D engineer, I see a lot of materials developed at lab scale which will never be industrialized for many reasons. Upscaling the production of the membrane at pilot scale (several tens to several hundreds of meters) is a real challenge as it is often more difficult than expected. Furthermore, it makes the solution we developed more real, one step away from industrialization and hopefully we'll see it in the future commercial batteries!

ARKEMA is a leading institution on the design of materials to address the demands of the mobility sector. Which benefits result from your role on the preparation of solid-state electrolytes complying with the performance requirements of SSBs in SPINMATE?

The battery performances targeted in SPINMATE are a huge improvement compared to the state of the art, with the will to address all the weaknesses of Li-ion technology (safety, energy density, scalability and sustainability). To maximise chances of success, it is mandatory to rely on partners with strong capabilities in developing new materials and processes to meet customer requirements. Arkema, who is a leader in developing battery materials for more than 30 years, is one of them.

Certainly, there will be readers interested to meet you and discuss your experience in SPINMATE. Which events will be possible to meet ARKEMA in the upcoming months (name of the event, date, location)?

Arkema's battery team attends all the major events specialising in battery and e-mobility events in Europe, the United States and China. In Europe, we have a booth at The Battery Show Europe and AABC held in June 2025.



Gérôme Godillot

R&D Engineer Materials for
Batteries



Visit our website at www.spinmate.eu and
follow us on social media!



Contact info: info@spinmate.eu



**SPINMATE project has received funding from the
European Union's Horizon Europe Framework
Programme under grant agreement No 101069712**