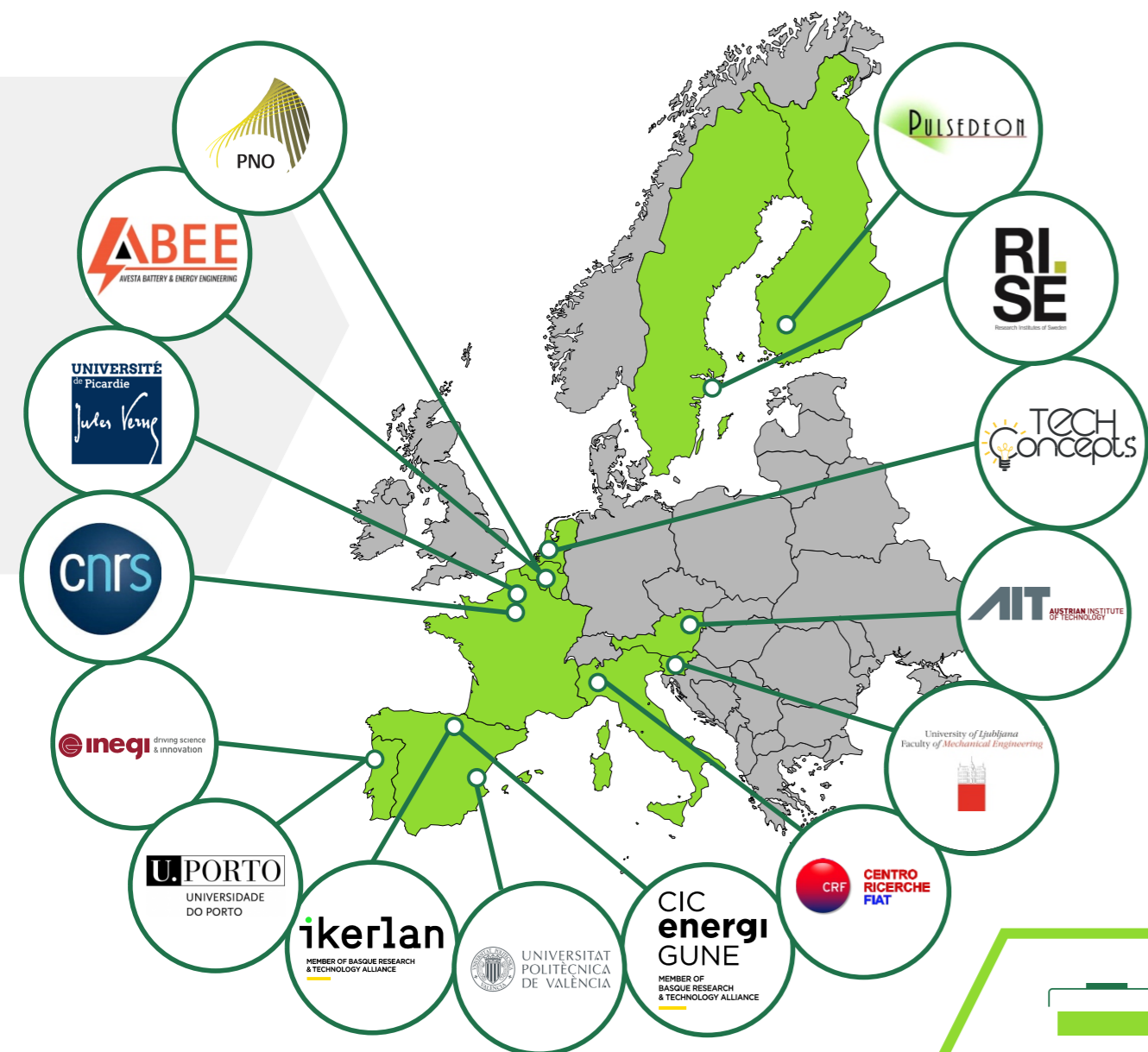
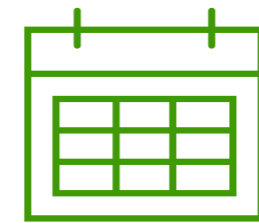


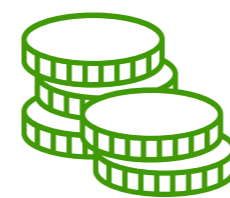
## CONSORTIUM



## FACTS and FIGURES



48 months  
started 1-9-2022



EU contribution  
€ 6 998 543



15 PARTNERS  
from 10 countries

## CONTACT Information

Project Coordinator: Anwar Ahniyaz - RISE

Project Manager: Maxim Fissoun - RISE



[www.project-pulseion.eu](http://www.project-pulseion.eu)



PULSELiON



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PULSELiON\_EU

# PULSELiON

**Pulsed Laser dePosition tEchnology  
for soLiD State battery manufacturing  
supported by digitalization**

[www.project-pulseion.eu](http://www.project-pulseion.eu)

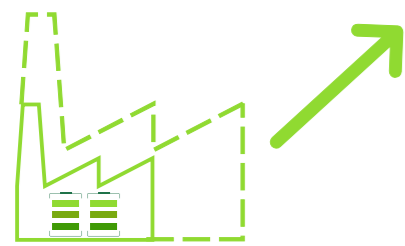
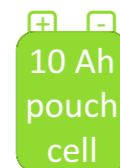


This project has received funding from the European Union's  
Horizon Europe research and innovation programme (GA No. 101069686)

## RELEVANCE

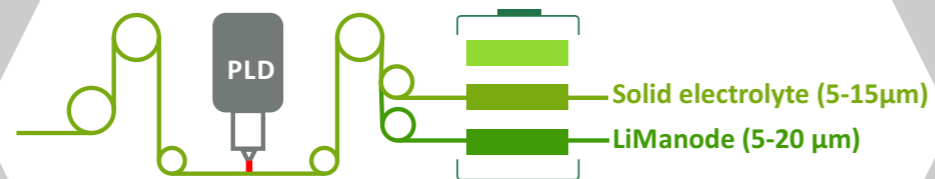
Lithium-ion battery cells with conventional active materials are reaching their limits in terms of energy densities. Also, safety issues arise with the utilization of liquid organic electrolyte, which is becoming even more critical with the recent introduction of advanced materials made to increase cell voltage and fast-charging rates.

In this context, solid-state electrolytes enable overcoming current battery cells limitations in terms of voltage and safety (reducing the Lithium dendrite formation risk) leading to an increased intrinsic thermal and electrochemical stability. However, they are not yet manufactured on a large scale. To enable large scale manufacturing of Solid-state batteries, project PULSELiON sets out new pulsed laser deposition based technologies for solid-state battery manufacturing.



### BATTERY MATERIAL PROCESSING

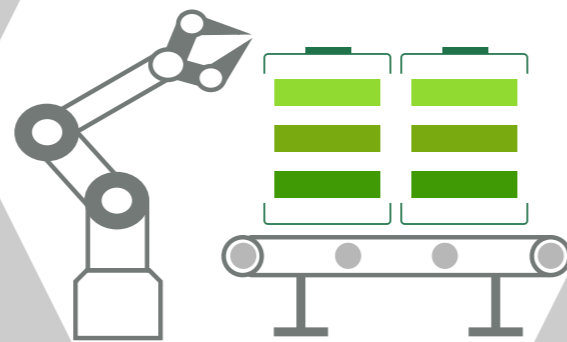
Pulsed Laser Deposition (PLD) in a roll-to-roll process to manufacture the LiM anode, Li protective layers and solid electrolyte



NMC cathode wet processing



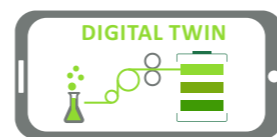
### UPSCALING TO PILOT-LINE MANUFACTURING



### LCA and COST MODELLING



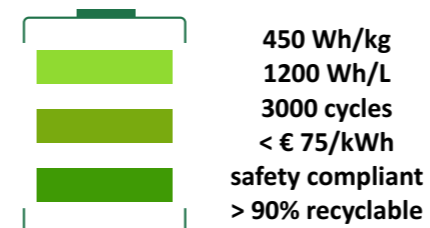
### DIGITALISATION



physics-based and machine learning-based models for cathode processing optimization and performance prediction



### PULSELiON BATTERY KPIS



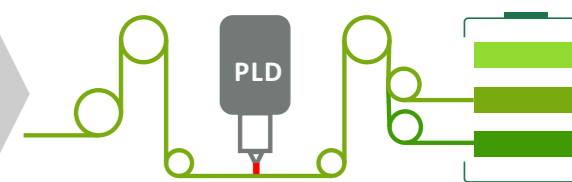
### CELL TESTING & SAFETY



## CONCEPT

The PULSELiON project has the ambition to develop a manufacturing process for solid-state batteries, while improving the battery energy density (450 Wh/kg and 1200 Wh/L), costs and safety. The main innovation in project PULSELiON is bringing Pulsed Laser Deposition (PLD) based solid-state battery manufacturing technology from TRL3 to TRL6.

PULSELiON project develops a manufacturing process for Generation 4b solid-state batteries that are based on a lithium-metal anode, a sulfide solid electrolyte, and a nickel-rich NMC cathode. A novel Pulsed Laser Deposition (PLD) technique will be adapted and modified into a single-step vacuum process for safe and efficient manufacturing of anode components composed of lithium metal, protective layers, and sulfide-based solid electrolytes. The cathode layer will be based on conventional wet processing techniques.



## IMPACT

### THE PULSELiON TECHNOLOGY WILL:

- Increase global competitiveness of the European battery ecosystem through delivering breakthrough technologies and knowledge in battery materials, cell design and manufacturing for next generation solid-state batteries
- Increase safety and long-term stability of future batteries during their operational life
- Accelerate the application of batteries in EVs and the renewable energy sector, due to increased energy, power and charging performance of batteries
- Enable the production costs decrease to below € 75/kWh with the novel PULSELiON manufacturing technologies, when applied in mass productions
- Advance sustainability and Life Cycle Assessment of the battery value chain by increasing the critical material recovery rate of the PULSELiON batteries during recycling to 90%, via eco-design of the battery production and recycling processes

# PULSELiON