

# PULSELiON

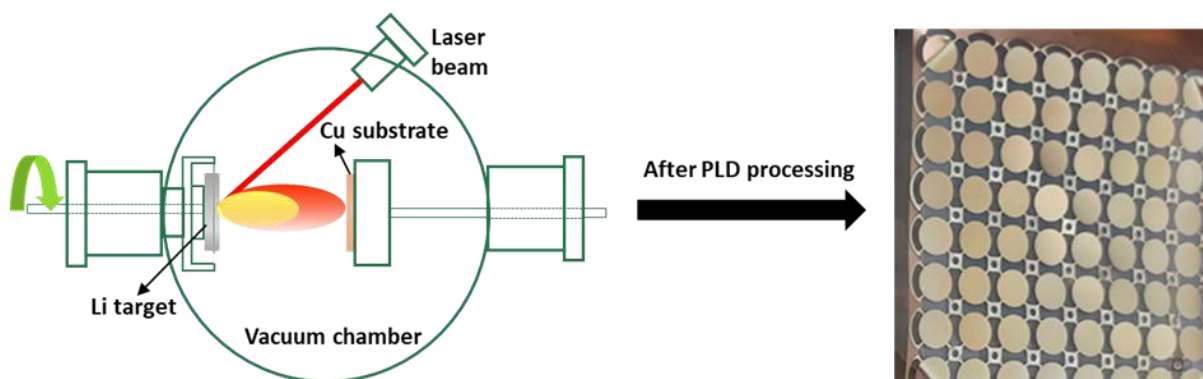
## Newsletter #3 – April 2024

In this newsletter, you will learn more about the project PULSELiON latest activities and the activities to come. The next newsletter will be published in September 2024. Do you want to stay informed about the latest PULSELiON news in the meanwhile? Please stay tuned via our website [www.project-pulseion.eu](http://www.project-pulseion.eu), or follow us on [LinkedIn](#) and [X](#).

### WHAT IS NEW?

#### MILESTONE 3 ACHIEVED: Stable Li thin metal film anode

The achievement of Milestone 3 – Stable Li thin metal film anode – has been worth demonstrating the success on manufacturing the Li thin metal anode by Pulsed Laser Deposition (PLD) technique, where a 20  $\mu\text{m}$  thick Li layer was deposited on top of Cu foil. Stripping-plating measurements of symmetric cells placing a sulfide solid electrolyte as a separator in coin cell configuration, without applying any external pressure, did not display worse electrochemical performance than a commercial 20  $\mu\text{m}$  thick Li-on-Cu electrode at a current density of 0.15  $\text{mA}\cdot\text{cm}^{-2}$  for capacity of 0.3  $\text{mAh}\cdot\text{cm}^{-2}$ .



In addition, the Li-on-Cu electrode manufactured by PLD has also shown its potential on using as an anode in full cells based on Nickel-Manganese-Cobalt (NMC) active material in coin cell configuration displaying not an inconsiderable discharge specific capacity with a high retention capacity for the initial cycles. Thereby, after the accomplishment of the Li-on-Cu manufacturing by PLD and its validation, now it is time to move forwards of exploring the inorganic protective layers to protect the Li metal anode by PLD in PULSELiON project.

The completion of MS3 has been the result of dedicated teamwork, commitment, and the collective expertise of all those partners involved in work package 3. Congratulations to the team for this great achievement!

#### Social media campaign to introduce all partners is completed

The PULSELiON consortium consists of a multidisciplinary consortium of 15 partners from 10 countries and is coordinated by RISE. All partners in the consortium, and their individual roles in the project, have been introduced in a social media campaign. This campaign was completed last November with the introduction of our partner PNO. In case you have missed this campaign and you are curious about the partners in PULSELiON, please feel free to have a look at our website (<https://project-pulseion.eu/partners/>), LinkedIn (<https://www.linkedin.com/showcase/pulseion/>) or X ([https://twitter.com/PULSELiON\\_EU](https://twitter.com/PULSELiON_EU)) social media channels



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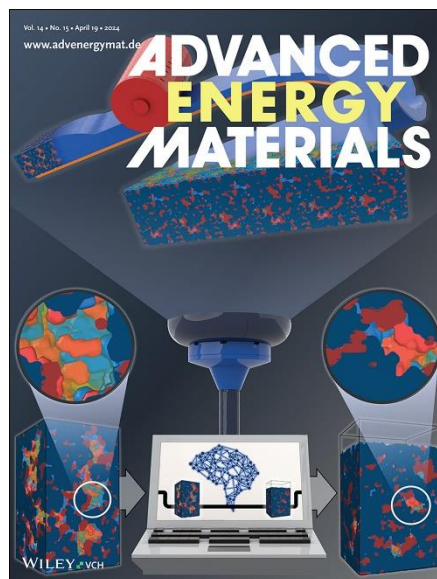
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### 5 OPEN ACCESS PUBLICATIONS were published in the last period

Since the publication of the last newsletter, the scientist in PULSELiON have been very active in disseminating the innovations in our project. An astonishing 5 new open access publications, that acknowledge funding by project PULSELiON, have been published between November 2023 and April 2024. This brings the total number already to 7 open access publications from project PULSELiON within the first half of the project.

Of course we are proud to share an overview of the achieved publications so far:

- 1st publication – journal article “Critical Current Density Measurements of Argyrodite Li6PS5Cl Solid Electrolyte at Ambient Pressure” has been published in the Journal of The Electrochemical Society on 20 October 2023.
- 2nd publication – journal article “Three Dimensional Physical Modeling of the Wet Manufacturing Process of Solid State Battery Electrodes” has been published in the Journal of Power Sources Volume 580 on 1 October 2023.
- 3rd publication – journal article “A perspective on the building blocks of a solid-state battery: from solid electrolytes to quantum power harvesting and storage”, which has been published in the Journal of Materials Chemistry A on 3 November 2023
- 4th publication – journal article “Influence of the mixing speed in the rheology of NMC622-based Li-ion battery electrode slurries”, which has been published in volume 26 of the Journal of Power Sources Advances in April 2024
- 5th publication – journal article “Time-Dependent Deep Learning Manufacturing Process Model for Battery Electrode Microstructure Prediction”, which has been published in the Journal for Advanced Energy Materials (Wiley) on 5 March 2024.
- 6th publication – journal article “Round-robin test of all-solid-state battery with sulfide electrolyte assembly in coin-type cell configuration”, which has been published in the Electrochemical Science Advances Journal on 29 March 2024.
- 7th publication – journal article “Cathodes pinpoints for the next generation of energy storage devices: the LiFePO4 case study”, which has been published in the Journal of Physics: Materials on 6 February 2024



The social media campaign to introduce these publications is ongoing. Of course, the published articles can be found on our website: <https://project-pulseion.eu/results/>

# PULSELiON

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## Launch of the PULSELiON concept video

Last December, was the official launch of our PULSELiON concept video. In this video, you will learn more about the technological concept behind project PULSELiON, and about the expected results and impact. Did you miss it? Feel free to watch it on our website: <https://project-pulselion.eu/launch-of-the-pulselion-concept-video/> and have fun watching!



## 4<sup>th</sup> General Assembly meeting and month 18 review meeting

On 19 March, the official month 18 review meeting was held. Our work package leaders and key researchers gathered at the office of PNO in Brussels together with the project officer of CINEA of the European Commission to discuss the progress in project PULSELiON. In the week before, on 12 March, also our 4<sup>th</sup> General Assembly took place. Our specialists from 15 countries all over Europe gathered digitally this time, and each work package presented their progress.



We can safely conclude that we are well on our way to push the borders in solid-state battery manufacturing. And enabling large scale manufacturing of solid-state batteries.



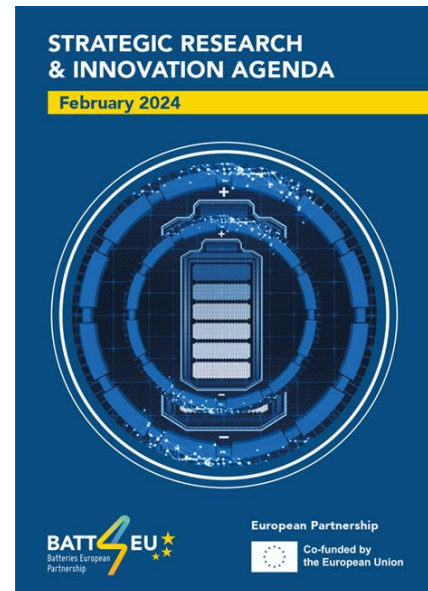
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## BATT4EU Strategic Research and Innovation Agenda (SRIA) 2024 is published

The vision of BATT4EU is to establish in Europe by 2030 world's best innovation ecosystem to boost a competitive, sustainable and circular European battery value chain and to drive the transformation towards a carbon-neutral society. It will do so by preparing and equipping Europe to commercialise the next-generation battery technologies by 2030, which will enable the rollout of zero-emission mobility and renewable energy storage.

To achieve this objective and the goals set up by the European Commission, BATT4EU has developed a [Strategic Research and Innovation Agenda](#). This Strategic Research and Innovation Agenda is the result of input collected by the Batteries European Partnership Association (BEPA) and Batteries Europe from hundreds of European battery experts organised in Working Groups and Task Forces each covering different battery topics. The document will feed into the work on the next Horizon Europe battery Work Programmes, particularly the 2025 one which BEPA is currently working on.



## SOLID4B cluster workshop presentation by Franco Zanotto

On 15 April 2024, The Solid4B Cluster workshop on Solid State Batteries took place. The theme was “Scaling up high energy density solid-state batteries: a lab-to-pilot line perspective”. Experts were diving deep into discussions about high-energy-density solid-state batteries, offering invaluable insights into the future of battery technology. Our specialist Franco Zanotto of LRCS presented “Digital twins for the upscaling of ASSB cathode manufacturing” from project PULSELiON.

“SCALING UP HIGH ENERGY DENSITY SOLID-STATE BATTERIES: A LAB-TO-PILOT LINE PERSPECTIVE”

HYBRID WORKSHOP

MONDAY, 15 APRIL  
12:30 PM (CET)

REGISTER NOW

SOLID4B  
Going solid for safer batteries

Curious for the activities of the SOLID4B cluster? Please follow [the SOLID4B cluster on LinkedIn](#).

# PULSELiON

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## WHAT IS NEXT?

PULSELiON will of course continue its activities. In the next issue of the newsletter, we hope to present new progress. The main developments in the coming period will be:

### ACHIEVE MILESTONE 4: NMC-sulfide cathode by wet processing

In coming June, project PULSELiON will achieve its next milestone: the high loading NMC-sulfide cathode by wet processing. To verify this Milestone, cycling performance of full cells will be assessed. We will present this milestone in our next newsletter and on our website and social channels

### Contribution to the BEPA 2-yearly report

Every two years [BEPA](#), the Batteries European Partnership Association, reports the progress of the battery development projects of the BATT4EU partnership. Also project PULSELiON has sent their contributions for this report.

A graphic for the BATT4EU Partnership. It features a dark blue background with a stylized, colorful line graph in shades of green, blue, and yellow. The text is white and bold. In the bottom left corner, there is a small logo for the BATT4EU Partnership with a right-pointing arrow.

**BATT4EU is a Co-programmed Partnership established under Horizon Europe (The next Framework Programme for Research and Innovation of the European Union)**

BATT4EU Partnership 

### Launch of the “people behind project PULSELiON” campaign

As with every innovation project, the success is determined by highly motivated, brilliant people. Not only their developed innovations deserve to be in the spotlight, certainly also the people behind the success. To make this happen, we will launch the “people behind project PULSELiON” social media campaign. Are you curious who are behind the success and innovations in project PULSELiON, please make sure to follow us on LinkedIn (<https://www.linkedin.com/showcase/pulseion/>) or X ([https://twitter.com/PULSELiON\\_EU](https://twitter.com/PULSELiON_EU)).



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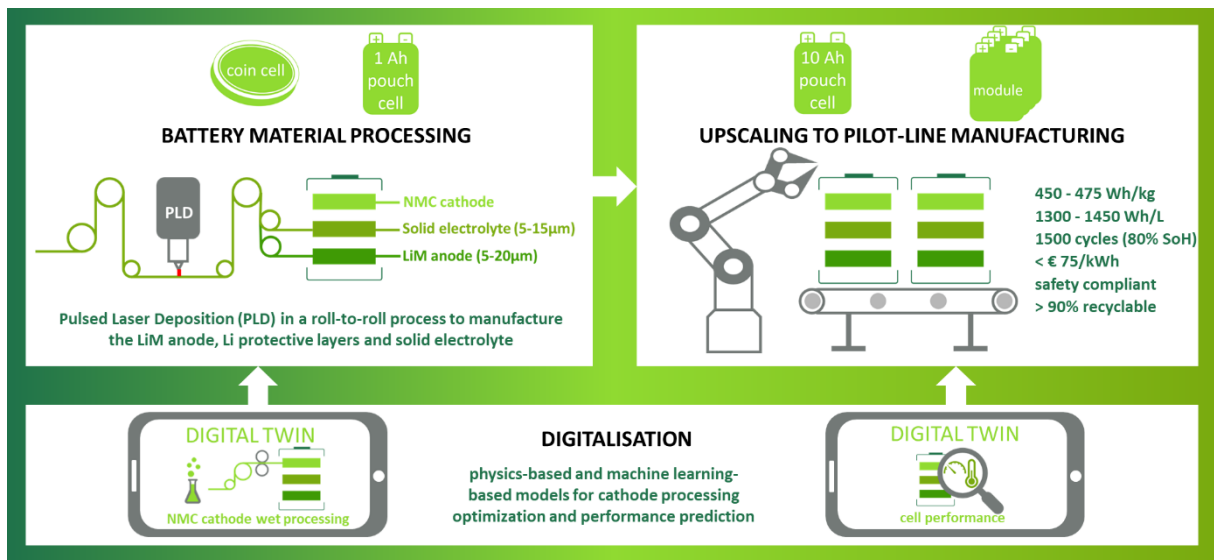
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## ABOUT PROJECT PULSELiON:

Project PULSELiON has the ambition to develop a manufacturing process for Generations 4a – 4b solid-state batteries, while improving the battery energy density (450-475 Wh/Kg and 1300-1450 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. The results of PULSELiON will help increase global competitiveness of the European battery ecosystem, increase safety of batteries, decrease battery production costs, and improve battery recyclability. PULSELiON is a Horizon Europe project bringing together a multidisciplinary consortium of 15 partners from 10 countries.

# PULSELiON

## PULsed Laser depoSition tEchnology for soLid State battery manufacturing supported by digitalization



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