

DigiCell: Sustainable Manufacturing of Battery Cells and Packs through Digital Processes and AI-based Data Analytics

New Battery Research Project Embarks on Mission to Power Europe's Green Energy Future

Vienna, 23 January 2024 – Global demand for batteries is expected to soar over the next decade, fuelled largely by efforts to curb climate change and speed up the transition to renewable energy sources. The rapid growth in the electric vehicle (EV) sector is expected to further drive demand. The EU aims to be climate-neutral by 2050, an objective at the heart of the European Green Deal. The shift towards a greener and more circular energy sector is inextricably linked to the development of innovative battery systems supported by digital modelling technologies.

This is where the new research project DigiCell steps in. By aiming to transform the manufacturing and testing processes of single cells and full automotive packs with advanced modelling and machine learning techniques, DigiCell's goal is to make the battery value chain more efficient, reliable, and sustainable.

To achieve this, the multidisciplinary team of researchers is developing new measurement tools for materials as well as multi-scale digitally integrated battery models combined with artificial intelligence (AI) and machine learning. DigiCell is applying these new scientific tools and models not only to lithium-ion batteries (LiB) but also to beyond-lithium cell solutions to generate a long-lasting impact on future battery cell technologies. Bringing together partners from eight European countries, DigiCell will receive a total of more than EUR 6 million in funding from the European Union's Horizon Europe programme and the Swiss State Secretariat for Education, Research, and Innovation (SERI) over the next three years.

Advanced Materials and Digital Modelling for High-Performance and Sustainable Batteries

DigiCell's AI-based models will simulate battery behaviour under different manufacturing conditions and correlate battery performance with materials properties. By adjusting production parameters according to the models, DigiCell can monitor and control the properties and the quality of the materials, interphases and other components. This new approach combines nano-to-macro materials and physics modelling to test battery packs up to Megawatt power for the first time – a big improvement of current battery testing methods.

DigiCell will also create a virtual replica or 'digital twin' of the manufacturing process to run real-time simulations and exchange information with actual production lines. The novel approach can significantly reduce material waste, save manufacturing-related energy spending and lower emissions, all while enhancing battery life-cycle performance.

Coupled with the development of standardisation protocols, the DigiCell researchers ensure the reliable design of new and sustainable materials and processes for battery cell and pack production. These results will be made available via a web-based open innovation platform. Overall, this marks a crucial step towards providing high-performance, cost-effective, and sustainable batteries for a green energy future, and lays a solid scientific foundation for the electrification of transportation and energy storage efficiency.

DigiCell to Pave the Way Towards a Greener Future

DigiCell paves the way for an advance in battery storage technologies and EVs that can propel Europe towards a circular, climate-neutral and sustainable economy. These improvements will significantly contribute to reaching the technical targets of the 2030 European Strategic Energy Technology (SET) plan and the EU's long-term strategy until 2050.

“We will combine advanced battery and materials tests with multi-physics modelling and integrate them in an open-environment ecosystem. This way, we will revolutionise the EU scientific landscape for batteries, supported by AI-based data analytics. With DigiCell, we are generating a long-term impact by increasing the competitiveness of large-scale industrial production of batteries in Europe,” says project deputy coordinator Dr Nawfal Al-Zubaidi-R Smith from Keysight Technologies.

DigiCell is kicking off its activities today with a consortium-wide meeting in Vienna, Austria.

Key Facts

Full Name: DigiCell – Battery Material Characterisation and Digital Twins for Cell to Pack Performance in Agile Manufacturing Pilot Lines and Automotive Field

Start Date: 1 January 2024

Duration: 36 months

Budget: EUR 6 million (EUR 5.4 million funded by the European Union, EUR 0,6 million funded by the State Secretariat for Education, Research, and Innovation – SERI as a financial contribution to the Swiss partner)

Coordinator: Keysight Technologies Austria GmbH

Website: <https://www.digicell-project.eu>

Project Partners

Austria

- Keysight Technologies Austria GmbH
- Johannes Kepler University Linz
- KREISEL Electric GmbH
- AIT Austrian Institute of Technology

Belgium

- IRES

France

- French National Centre for Scientific Research (CNRS)
 - University of Picardie Jules Verne

Germany

- ISC International Standards Consulting GmbH & Co. KG
- Eurice – European Research and Project Office GmbH

Italy

- Roma Tre University
- Politecnico di Torino
- Centro Ricerche Fiat SCPA

Press Release

Spain

- Leitat

Switzerland

- Federal Institute of Metrology METAS

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