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Innovative methodology for battery testing

Battery innovation is hindered by cost and time-consuming test protocols. Shortening this timeframe and reducing the number of tests by developing a virtual tool is the challenge of the EU-funded project THOR.

The battery sector is growing rapidly, mainly due to the push of European environmental and mobility policies. Batteries also find countless applications in many sectors, from shipping to telecommunications, from automotive to wearable devices. Technological innovation, however, does not always keep pace with market needs and the speed of demand.

In fact, growth and innovation in the battery industry are often hampered by expensive and time-consuming protocols and testing, requiring large numbers of samples and sophisticated infrastructure. To give an example, a battery concept generated in 2023 could reach the production stage in 2032, as the performance, aging, and safety characteristics of the designed battery must be evaluated through lengthy trial-and-error tests.

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The European project THOR, launched in Grenoble in June 2023, aims to shorten the timeframe, reduce the number of physical tests and promote innovation in battery design by developing a virtual tool – a so-called digital twin – that simulates battery behaviour. The project will target mobility and stationary applications and focus on commonly used battery chemistries (accounting for 60 percent of the market share by 2030).

Through an interdisciplinary approach involving experimenters and modelling experts, three independent physics-based models will be developed for performance, durability, and safety. The models will then be combined and optimised with an artificial intelligence-based approach to form a holistic digital twin of cell, module, and pack. The digital twin will be accessible to end users through an efficient and user-friendly interface.

The consortium draws on entities from the industry, institute, and academia sector with world-wide excellence in the fields of battery engineering and development, energy and innovation.

“In the THOR project, our consortium will develop new methodologies for testing batteries” says Lise Daniel, Project coordinator, “with for instance model-assisted design of experiments and we will make the challenging interlink between different models to build a digital twin of battery. The need to use virtual tool is here. THOR results will help saving resources and generating new knowledge in battery community.”

Contacts:
Project coordinator:
Lise Daniel, Commissariat à l’Energie Atomique et Aux Energies Alternatives, lise.daniel@cea.fr

Communication Manager:
Chiara Locuratolo, Fondazione ICONS chiara.locuratolo@icons.it

Project website: www.thorbatteries.eu
Twitter: https://twitter.com/THORbatteries
Linkedin: https://www.linkedin.com/company/thor-eu-project/about/?viewAsMember=true

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