Electrive

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Battery

HighMag: Magnesium batteries target sustainable energy future

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The EU-funded HighMag project, coordinated by the AIT Austrian Institute of Technology, has launched a Europe-wide effort to develop a new generation of magnesium-based batteries. The initiative aims to meet the rising demand for high-performance, safe and sustainable energy storage as transport and renewable energy systems electrify.



Image: AIT Austrian Institute of Technology (AI generated)

By Carla Westerheide

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HighMag Magnesium Battery research

Funded by the European Union

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HighMag follows the principle of Safe and Sustainable by Design (SSbD) and focuses on technologies compatible with existing lithium-ion battery production lines, enabling rapid scaling. The research covers two battery architectures: magnesium-sulphur systems with conversion cathodes and magnesium-metal systems with insertion cathodes. A new coated magnesium anode powder is being designed for both.

"Magnesium is about 1,000 times more abundant in the Earth's crust than lithium, safer to handle, inexpensive, and has a high theoretical storage capacity potential," the press release states. And HighMag addresses the key challenges of magnesium batteries, such as low electrochemical activity and limited stability. The project takes a systemic approach from materials to cells, including pilot-scale pouch validation, with safety, sustainability and recyclability built in. The aim is to raise technology readiness from TRL 2 to TRL 4.

"Magnesium is at the forefront of the next generation of batteries," says Dr Yuri Surace, Senior Scientist at AIT and HighMag project manager. "With HighMag, we are developing sustainable, powerful and cost-effective alternatives to lithium-ion batteries. Our goal is to advance the technology from the laboratory to pilot production—an important step toward safe and resource-efficient storage solutions for mobility and the energy transition."

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Prof Andreas Kugi, Scientific Director of AIT, adds: "HighMag is a flagship project of European battery research. By advancing magnesium batteries from fundamental research to industrial feasibility, we are strengthening Europe's technological sovereignty and laying the foundation for a sustainable and resilient energy future."

The AIT Battery Technologies Competence Unit is leading work on manganese-based insertion cathodes, scaling electrode coatings, gas analysis for system safety, pouch cell prototypes and recycling strategies. The consortium includes 13 institutions from Europe and Israel, among them AIT, University of Limerick, CEA, KIT, ZSW, Imperial College London and the Paul Scherrer Institute, alongside industrial partners such as Danube Cell Manufacturing GmbH and Amazemet Sp. z o.o.

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