Karlsruhe Institute of Technology

Division III – Mechanical and Electrical Engineering

Institute for Applied Materials –
Energy Storage Systems (IAM-ESS)

Litona

Materials for Sustainable Sodium-Ion Batteries

Litona is a startup of KIT's Institute for Applied Materials – Energy Storage Systems (IAM-ESS). It focuses on the development and commercialization of energy storage materials for inexpensive and sustainable sodium-ion batteries cells.

Sodium – The Alternative to Lithium

Sodium-ion batteries represent an alternative to the common lithium-ion batteries. Presently, lithium-based batteries are used in nearly all mobile phones, notebooks, electrical vehicles, and many other mobile applications. They have an excellent performance, but are based on expensive raw materials that are unevenly distributed and can only be found in limited areas of the world. Sodium-based batteries, by contrast, can be produced from uncritical and affordable raw materials. This results in the potential of reducing both costs of batteries and Europe's dependence on resources from other continents.
For comparison: Sodium is about a thousand times more abundant in the Earth's crust than lithium. Hence, the costs of sodium carbonate feedstock are 30 to 100 times lower than those of the equivalent lithium carbonate feedstock. However, sodium-ion batteries store less energy per volume than lithium-ion batteries.

Prussian White Analogs for the Cathode

Litona's work currently focuses on special energy storage materials for the cathode of sodium-based batteries, so-called Prussian white analogs. These are entirely made of inexpensive raw materials like iron, sodium, and manganese. Compared to other possible energy storage materials for cathodes of sodium-ion batteries, Prussian white analogs have an energy output that is nearly independent of the charging state and a high fast-charging capability. These advantages make them interesting for stationary energy storage in particular. These systems are used, for instance, to store the energy of wind power plants and solar facilities. Then, the energy can be made available without any delay whenever there is no wind and the sun does not shine. Stationary storage systems are applied in large industrial facilities, where permanent power supply must be

Litona founder Sebastian Büchele (right) holding a bottle of Prussian White powder. (KIT/Markus Breig)

guaranteed, as well as in private households to prevent blackouts and/or for the storage of solar power. In future, sodium-based batteries might also be used in small and medium-sized electric vehicles.

Solutions for Research and Big Customers

First customers of Litona are research institutions which want to study sodium-based storage systems that have hardly been accessible so far due to lacking storage materials. By producing them, Litona accelerates research into promising batteries technologies in Europe. In the long term, Litona will sell large amounts of materials to major customers to meet the demand of the mass market and to push an affordable energy transition.

Synthesis lab in Helmholtz Energy Materials Foundry.
(KIT/Amadeus Bramsiepe)

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