

Bavarian Center for Battery Technology

Researching the battery of the future.





As an interdisciplinary research center at the University of Bayreuth, BayBatt brings together battery-specific expertise in physics and chemistry, materials science and engineering, computer science and economics.

The Bavarian Center for Battery Technology (BayBatt)

BayBatt was launched in 2019 as part of Bavaria's High-Tech Agenda. Its central tasks are the interdisciplinary research and development of battery storage systems and university teaching in the field of battery technology.

As a Central Research Institute of the University of Bayreuth, BayBatt addresses current challenges in the field of sustainable energy supply for industry, research, and society. These include e-mobility, energy storage systems of the future, smart batteries and power grids.

BayBatt builds bridges between fundamental research in electrochemistry, materials science, and engineering and the industrial application of the processes and models developed. In doing so, it follows the tradition of interdisciplinary foci at the University of Bayreuth and contributes to its research networks „Materials and Energy“ and „Ecology and Environment“.



BayBatt aims to be the first point of contact for Bavarian industry in the field of battery technology, providing expert advice, support for R&D projects and research services.

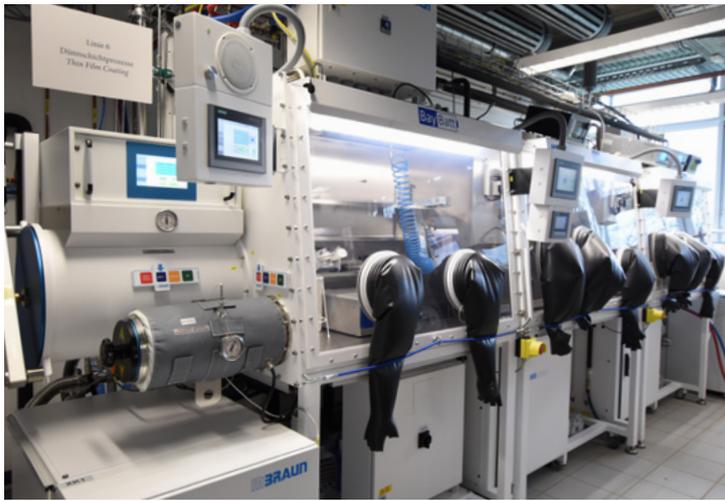
Research & Networks

Research at BayBatt covers the entire spectrum of innovative battery technology: from molecular fundamentals to electrode structuring and cell production to the use of batteries in networked energy storage systems.

Issues relating to future, improved recycling potential are addressed, as are the development of sodium-based solid-state batteries for greater range and safety, and aspects of modern battery management systems.

An important part of the research involves cooperation with other research institutions at the national and international level as well as with industry partners.

At the political level, BayBatt is represented on the advisory board of the German Battery Forum and in the Bavarian Battery Alliance, besides being a member in national and international interest groups.



Funded by the Bavarian High-Tech Agenda, a state-of-the-art research facility has been built on the Bayreuth campus.

Keylab BayBatt Cell Technology Center

The BayBatt Cell Technology Center is a key laboratory (keylab for short) for battery research at the University of Bayreuth. It enables accelerated innovation in battery materials and storage concepts through flexible and reproducible manufacturing and evaluation of experimentally produced battery cells in various formats.

The comprehensive process chain makes the Keylab a first-class platform for fundamental research and development of battery technologies in the fields of lithium-ion and post-lithium batteries.

BayBatt offers its partners in research and development cooperations scientific services, contract research and development research at the Keylab. In addition, joint doctoral projects with BayBatt's chairs are possible, which also benefit from the research center's central resources.



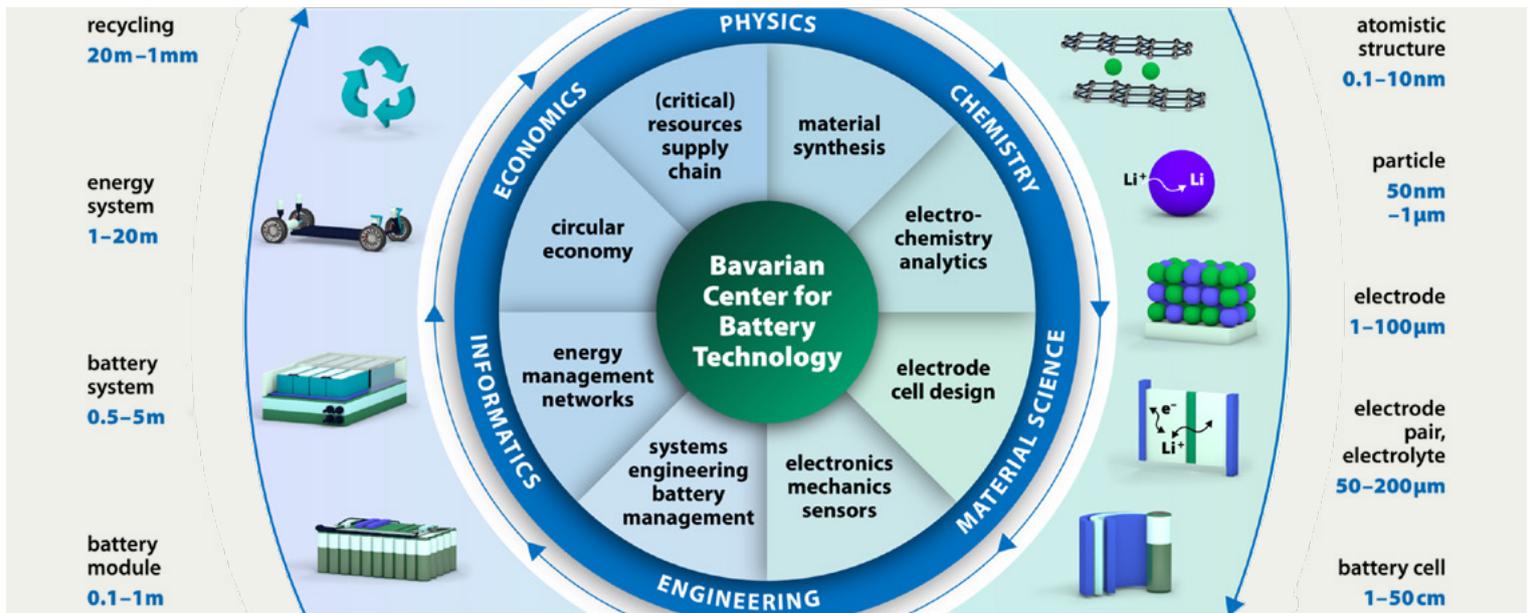
In this pilot plant for the manufacture of battery cells, which is unique in Germany, all kinds of material classes are processed with high precision into various types of battery cells.

Highlights

The Keylab offers battery cell production on a laboratory and pilot scale. Partial automation allows maximum flexibility with maximum reproducibility. All process steps, including sample transfer between lines, take place entirely under an argon atmosphere.

This unique glovebox environment is therefore designed for the safe handling of active materials (including lithium metal). It offers integrated synthesis, assembly, testing and post-mortem analysis functions. Preparative work ranging from water-based coatings to lithium deposition can be carried out.

Coin, experimental and pouch cell formats can be manufactured in the Keylab. Other highlights of the facility include laser cutting & punching, single sheet stacking & hot press, automated vacuum electrolyte filling, SEM with EDS in the argon glovebox, and precise forming & cycling.



Members

The members of BayBatt come from four different faculties at the University of Bayreuth.

Their research covers all scales of battery research and all stages of the battery value chain, from atomistic structure to particles, cell components and cells, battery modules and battery systems, right up to the overarching energy system.

This range of expertise is unique in Germany and is also reflected in the profiles of the participating chairs and their research foci.

12 professorships and 3 Junior Principal Investigator positions were created by the Bavarian High-Tech Agenda. In addition, BayBatt currently has an additional 16 members from existing chairs at the University of Bayreuth.

Physics

Prof. Dr. Harald Oberhofer
Dr. Liang-Yin Kuo (Junior Principal Investigator)
*Theoretical Physics VII —
Computational Materials Design*

Business & Information Systems Engineering

Prof. Dr. Marie-Louise Arlt
*Information Systems Research,
in particular on Connected Energy Storage*
Prof. Dr. Jens Strüker
Digital Energy Management



Members

Chemistry

Prof. Dr. Seema Agarwal
*Macromolecular Chemistry II —
Advanced Sustainable Polymers*

Prof. Dr. Matteo Bianchini
Dr. Qingsong Wang (Junior Principal Investigator)
Inorganic Active Materials f. Electrochem. Energy Storage

Prof. Dr. Josef Breu
Inorganic Colloids f. Electrochem. Energy Storage

Prof. Dr. André Gröschel
Polymer Materials for Electrochemical Storage

Prof. Dr. Thomas Lunkenbein
Operando-Analytics f. Electrochem. Energy Storage

Prof. Dr. Johannes Margraf
Physical Chemistry V — Theory und Machine Learning

Prof. Dr. Roland Marschall
Physical Chemistry III — Sustainable Energy Materials

Prof. Dr. Georg Papastavrou
Physical Chemistry II — Interfaces and Nanoanalytics

Prof. Dr. Markus Retsch
Physical Chemistry I

Prof. Dr. Jürgen Senker
Dr. Helen Grüninger (Junior Principal Investigator)
Inorganic Chemistry III

Prof. Dr. em. Mukundan Thelakkat
Macromolecular Chemistry I — Applied Functional Polymers

Prof. Dr. Nella Vargas-Barbosa
Physical Chemistry VI — Electrochemistry

Engineering

Prof. Dr.-Ing. Mark-Matthias Bakran
Mechatronics

Prof. Dr. Francesco Ciucci
Electrode Design for Electrochemical Energy Systems

Prof. Dr.-Ing. Michael Danzer
Electrical Energy Systems

Prof. Dr.-Ing. Frank Döpfer
Manufacturing and Remanufacturing Technology

Prof. Dr.-Ing. Thorsten Gerdes
Keylab Glass Technology

Prof. Dr.-Ing. Christoph Helbig
Ecological Resource Technology

Prof. Dr. Christopher Künneth
Computational Materials Science

Prof. Dr.-Ing. Vincent Lorentz
Electronics for Electrical Energy Systems

Prof. Dr.-Ing. Ralf Moos
Functional Materials

Prof. Dr. Vedran Perić
Intelligent Energy Management

Prof. Dr.-Ing. Fridolin Röder
Methods for Battery Management

Prof. Dr.-Ing. Christina Roth
Electrochemical Process Engineering

Prof. Dr.-Ing. Jan Philipp Schmidt
Systems Engineering for Electrical Energy Storage



The study modules allow for individual specialisation along the entire battery value chain with its diverse technological challenges.

University Teaching at Master's Level

Since 2022, two interdisciplinary, battery-specific master's programmes have been affiliated with BayBatt. These are aimed at international and German graduates in the natural sciences or engineering who are interested in making the energy transition a success.

Both programmes deal with battery technologies, their scientific foundations and the development of energy storage systems, electromobility and power tools.

In order to gain a holistic understanding of battery technology, students first acquire basic knowledge in chemistry, materials research and electrical engineering. They then deepen their knowledge in the areas of their interest. Particular importance is placed on the practical application of what they have learned in research modules, internships abroad or in industry, and the Master's thesis.



At BayBatt, young scientists find ideal conditions for pursuing a doctorate and starting their academic careers.

Doctoral & Postdoctoral Training

In the working groups of BayBatt members, a large number of doctoral students are conducting PhD projects in the fields of electrochemical energy storage or battery technology. In addition to the chair's positions, BayBatt provides co-financing for doctoral positions for its members.

The BayBatt Graduate School promotes networking among PhD students from different faculties and departments through joint events and professional exchange. Doctoral students can take advantage of the center's unique opportunities in research and training, thereby increasing the international visibility and reputation of BayBatt.

Three postdoctoral positions at BayBatt are also funded through the Bavarian High-Tech Agenda. These *Junior Principal Investigators* are habilitating on a current topic in battery research and are supervised by a BayBatt member.

Director

Prof. Dr.-Ing. Michael Danzer
Chair of Electrical Energy Systems

University of Bayreuth

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Do you have any questions?

Coordinators

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