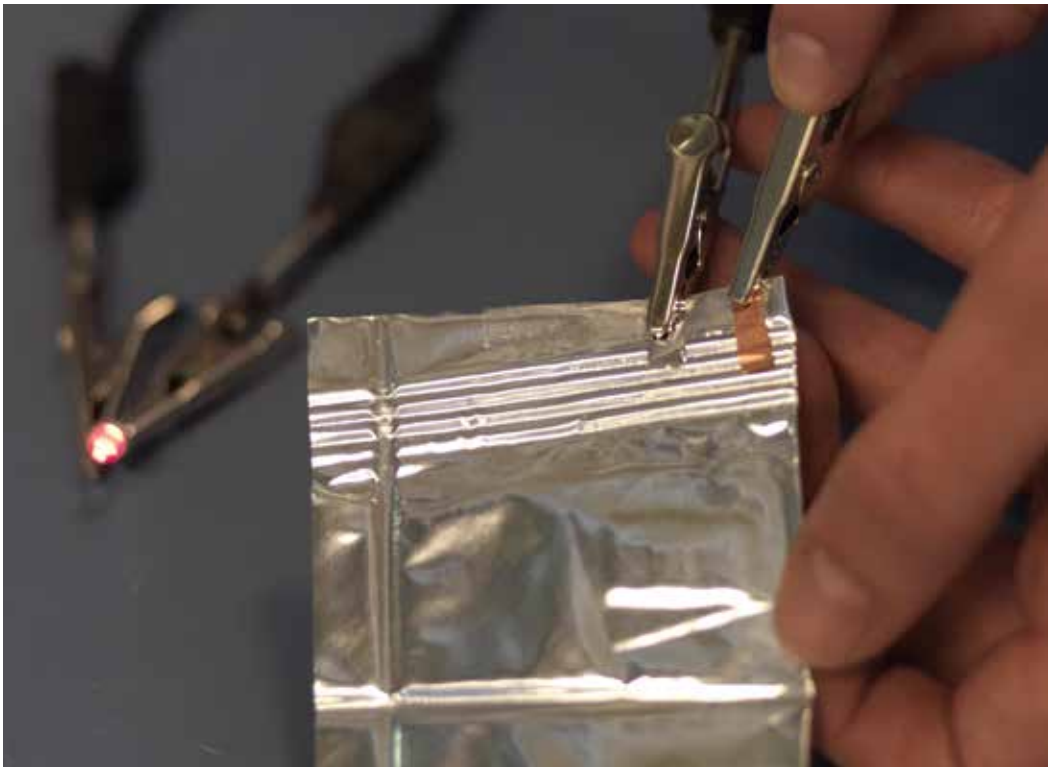
Technical University of Denmark

DTU

BATTERIES

- IMPROVED SOLUTIONS FOR MOBILE POWER



DTU Energy
Department of Energy Conversion and Storage

BATTERIES

– IMPROVED SOLUTIONS FOR MOBILE POWER

Batteries are used in countless applications where off-grid electricity is needed. With the growing importance of wind and solar power, batteries will also play an important role in storing surplus power, and electric vehicles are expected to be much more widespread in the future energy system. However, batteries store much less energy per volume or weight than fossil fuels, and the price of batteries also is relatively high. To meet the requirements of the transport sector and for energy storage, we need to see significant improvements in terms of energy and power density, durability, price, and safety.

The research in the Department of Energy Conversion and Storage targets new battery types with improved energy density, power density, durability and stability. We develop, characterize and test novel materials, cells and battery packs, in close collaboration with industry and other national and international research institutions.

Our main activities centre on atomic-scale computational materials design, using density functional theory (DFT) simulations on supercomputers, followed by synthesis of the most promising new materials. The materials development is closely coupled to the characterization of their structural, chemical, and electrochemical properties. Characterization down to the nano- and microscale is done using international large-scale neutron and synchrotron facilities. An important aspect is the development of *in situ* scattering methods to study the microstructure of the materials during realistic operation conditions. Finally, the materials are integrated in battery cells and packs for testing of performance and durability using, e.g., impedance spectroscopy.

We are not only working on the development of novel materials for existing battery technologies, e.g. new cathodes and solid electrolytes for lithium-ion (and similar metal-ion) batteries, but also on emerging technologies such as next-generation metal-air and metal-sulphur batteries, which have a significantly higher energy density.

ABOUT THE DEPARTEMENT

We focus on functional materials and their applications for sustainable energy technologies

FURTHER INFORMATION

www.energy.dtu.dk

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