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PROTOTYPE CELL MANUFACTURING

IWS scientists develop cost-effective and customized solutions along the process chain for battery cell production.

Electrode cutting

An automated laser system has been developed for cutting electrodes from coil:

- Flexible electrode dimensions
- Automated magazine loading with electrode blanks
- Roll-to-roll
- Local dry air supply

Cell assembly process

Development of automated cell manufacturing:

- Set-up of pouch cells stacked from single sheets
- Continuous separator packaging
- Tab welding
- Local dry air supply

Prototype cells

Multilayer pouch cells are manufactured for application-oriented evaluation. Prototypes for next generation battery systems are developed, including lithium-sulfur battery cells with a specific energy exceeding 350 Wh/kg and Li-Ion cells achieving a volumetric energy density higher than 600 Wh/L.

- 1 *Li-S prototype pouch cells: New materials can be evaluated in application-oriented tests.*
- 2 *Material properties can be decisively improved by targeted coating (carbon-coated (left) and uncoated (right) battery active material).*
- 3 *Roll-to-roll slot die coating: Customer-specific solutions range from paste development to the finished electrode.*
- 4 *Automated stacking process: prototype battery cells can be set up in a controlled dry air atmosphere.*

Our service offers

- Material processing & evaluation
- Process development for electrode & cell production
- Prototype cell manufacturing & evaluation
- R&D on next generation batteries (new materials, cell design, testing)

Contact us

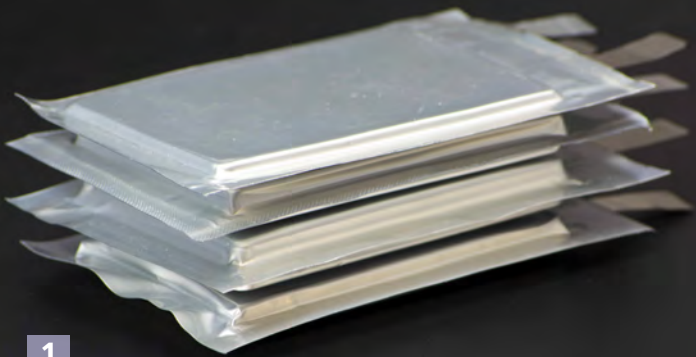
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CENTER FOR BATTERY RESEARCH

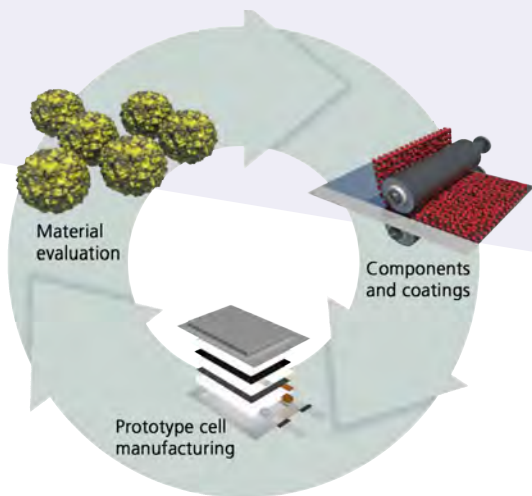




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Center for Battery Research

Fraunhofer IWS Dresden scientists focus their research on electro-mobility and stationary energy storage systems. Thanks to its know-how and the large variety of manufacturing technologies, the IWS team essentially contribute to battery development processes and innovations in many areas of the process chain. The Center for Battery Research has been established to support enterprises with solutions today and in the future. Fraunhofer IWS services the complete process chain for the development of new battery cells with a focus on material, surface and laser technologies.



2

MATERIAL EVALUATION

Implementing new active and passive materials in actual battery cells requires expertise in material processing, modification and testing. IWS offers know-how and equipment for holistically evaluating and adapting new battery components including:

Material analysis

Structural and electrochemical characterization is applied to generate understanding of structure-property relationships. Compatibility with different electrolyte and cell systems can be provided.

Material surface modification

Thin coatings are deposited on powders and flat substrates by means of liquid and gas phase processes. E.g. carbon thin films enable the reduction of interfacial resistances between active material and metallic current collector or electrically and ionically conductive encapsulation of active materials.

Material evaluation in prototype cells

State-of-the-art equipment for electrode and cell processing is applied for the manufacturing of multilayer pouch cells. Thus, new materials can be evaluated and compared to reference systems on pre-industrial prototypes.



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COMPONENTS AND COATINGS

Electrode development

Development of cost-efficient processes for electrode fabrication basing on aqueous or completely solvent-free processes:

- Material evaluation and feasibility studies
- Process development for continuous electrode fabrication
- System development for dry electrode fabrication

Functional films for cell components

Development of thin functional films to improve cell safety and stability:

- Inorganic heat resistant layers on separators and electrodes
- Ion-selective separator films
- Interface layers (Primer coatings, lithiophilic surfaces)

High energy anodes (Li-metal- and Si-anodes)

IWS-developed processes for anode fabrication basing on lithium or silicon which allow increasing the energy density of Lithium-battery cells:

- Optimization of energy density
- 5–50 μm thick films
- Tailored microstructure
- Interfaces and protective films