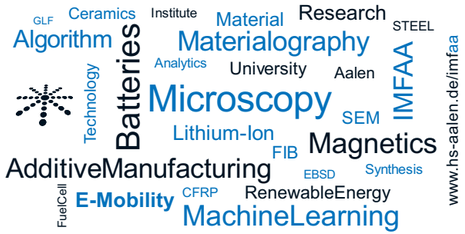
Equipment

- Powder synthesis and processing technology
- Laser processing and additive manufacturing in cooperation with LaserApplicationCenter and Center of Virtual Product Design
- Destructive and non-destructive materials testing
- Software tools for machine learning and simulation
- Magnet testing lab
- Battery technology and testing lab
- Materialography, light optical and scanning electron microscopy



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Aalen University

Institut IMFAA Materialforschung Aalen

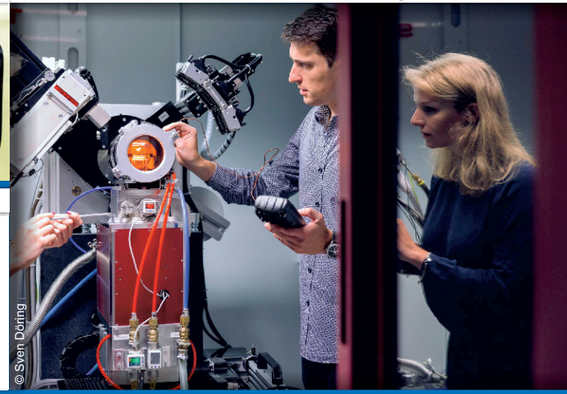
Materials Research Institute Aalen

Energy

Mobility

Sustainability

Knowledge



Applied research in

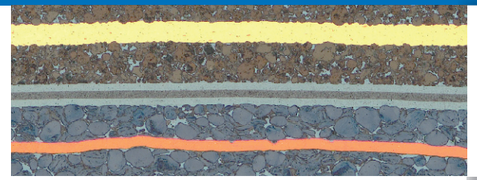
Systems
Materials
Evaluation

The Materials Research Institute (Institut für Materialforschung Aalen IMFAA) specializes in processing, characterization and testing of materials and components. Its main focus is on advanced materials and components for resource efficient mobility, renewable energy, additive manufacturing as well as on machine learning and industrial internet. The research is oriented to questions from industry.
The team of scientists has a strong interdisciplinary background in materials science, mechanical engineering, physics, chemistry, mineralogy and computer science.
The institute offers a platform for various research collaborations with industrial and scientific partners and opportunities for bachelor, master and doctoral students as well as Post-docs to work on highly attractive topics.

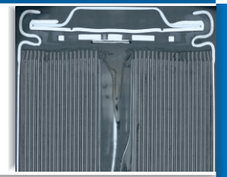
Institut IMFAA Materialforschung Aalen

Research topics

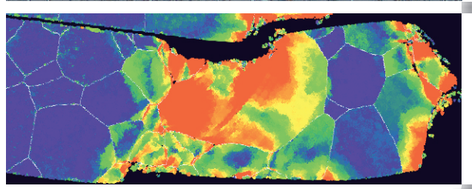
Energy storage materials



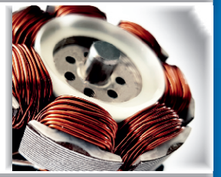
- Lithium-ion and post-Lithium-ion technologies: Development of high performance electrodes and manufacturing technologies on lab scale
- Modelling and simulation of electrochemical and thermal properties on electrode and cell level including thermal management
- Cell testing, electrochemical characterization and post-mortem analysis



Magnetic materials

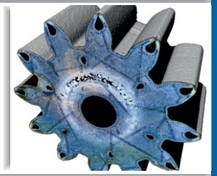


- Development of high-performance hard- and soft-magnetic materials with tailored properties, search for new magnetic materials with high-throughput experimentation
- Quantitative microstructure analysis for quality assessment and the development of physical micromagnetic models
- Analysis of demagnetization processes and aging



Additive manufacturing

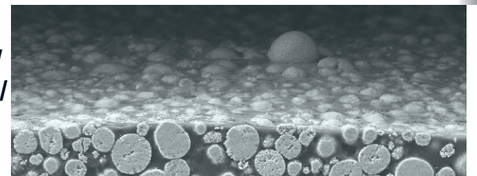
- Powder development for additive manufactured materials
- Optimization of additive manufacturing process parameters for laser-powder bed fusion and lithography based technologies
- Characterization methods for process and quality evaluation



Lightweight materials

- Fiber reinforced polymers: Mechanical testing, microstructural analysis, effect of machining on properties
- Hybrid materials: Joining technology, surface treatment, aging, mechanical, microstructural and non-destructive characterization
- Component design

Materialography / materials testing / machine learning



- Computer tomography, light optical and scanning electron microscopy and high-end surface preparation of structural and functional materials
- Specific image processing and machine learning algorithms for automated and quantitative materials microscopy
- Microstructure based models to predict materials properties
- Materials testing: strength and fracture mechanical characterization (also at high temperatures)