The School

»A distinct feature of the International Graduate School is the synergetic combination of basic and applied research – motivating and preparing young scientists for future careers in science and industry in a unique and ambitious way.«
Prof. Dr. Frank Glorius

Established:
> July 1, 2020, University of Münster

Funded by:
> The state of North Rhine-Westphalia

Founding partners:
> MEET Battery Research Center
> Department of Chemistry and Pharmacy of University of Münster
> In close cooperation with Helmholtz Institute Münster

PhD-positions:
> 45 for three years

Research interest:
> Battery research

Spokespersons and Academic Heads of BACCARA:
> Prof. Dr. Frank Glorius
> Prof. Dr. Martin Winter

Curriculum

Degree:
> Dr. rer. nat. (Doctor of natural sciences)

Languages:
> Courses are held in English

Programme duration:
> 6 semesters

Supervision:
> Choose between more than 25 principal investigators

Includes:
> Working in focused research groups, lectures, conferences, workshops, mentor support, buddy programme, language courses

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International Graduate School of Battery Chemistry, Characterization, Analysis, Recycling & Application

Research Fields

In BACCARA young research talents benefit from the concentrated knowledge of renowned researchers: More than 25 professors and heads of junior research groups from the Department of Chemistry and Pharmacy, MEET Battery Research Center and other WWU departments are involved in BACCARA.

We are looking for excellent young scientists in the field of battery research to become outstanding research personalities.

You can choose a topic for your doctorate in the following fields:

Theory & Modelling

Making informed decisions in material synthesis and component integration by theoretical analysis at different length and time scales:

› Use of ab initio methods
› Molecular dynamics simulations for a better understanding of structural and kinetic processes e.g. in electrolytes
› Machine learning concepts for better analysis of experimental and simulated data

Catalysis

Development and investigation of catalysts and catalysis reactions:

› Special interest: Catalysed reactions in lithium-ion batteries, especially polymer-based solid-state batteries (SSBs)
› Possible target: Formation during initial charging is mainly based on a polymerization reaction of electrolyte components and takes several hours to days

Battery Cell Technology

Bringing together the previously described research disciplines:

› Thorough electrochemical investigation of the interaction with the »battery cell« system
› In-depth post-mortem analysis to elucidate reaction mechanisms and damage patterns
› Collaboration with other research fields to iteratively improve materials

Material Synthesis

Development of new materials:

› Purpose: positively influence performance parameters (internal resistance, temperature window, battery life and intrinsic cell safety)
› Development of improved and sustainable synthesis routes

Analysis & Characterization

Broad method portfolio ranging from spectroscopic methods over micro and nano structure analysis to (un)conventional electrochemical methods:

› Collaboration with groups in the area of battery cell technology and material synthesis
› Local and global material analysis to characterize different interfaces and interphases
› Development and adaption of characterization methods

Recycling, Sustainability & Life Cycle Analysis

Rethinking and optimizing material development:

› Research into innovative materials and processes in the sense of »design for recycling«
› Development of processes with the help of life cycle analysis for the most energy-efficient separation and recovery of materials or even components