NOW HIRING
Research Organisations
Mission: „We contribute to solving major and pressing issues facing society, science and industry through strategic programmatic cutting-edge research in energy, earth and environment, health, aeronautics, space and transportation, matter, and key technologies."
Universities and Research Organisations

- Universitäten: Ausbildung und Grundlagenforschung

Fundamentals ➔ Application
• Center of Excellence for research in electrochemical energy storage since 2011
• Campus of University Ulm since 2014: more than 200 scientists
• DFG Excellence Cluster from 2019
• DLR battery modeling activities are integrated into HIU
Greatest engineering achievements of the 20th century.*

1. Elektrification!
2. Automobile
3. Planes
4. Water supply
8. Computers
12. Space-flight
13. Internet
16. Health technology
19. Nuclear technology
20. New materials

Theory of batteries for electrification, traffic, aerospace!

* National Academy of Engineering, USA
Application of Lithium-Ion Batteries

5 MWh

27 kWh

10 kWh

1 Wh

5 Wh

500 Wh

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Multi-Scale Simulations of Batteries

Scale-bridging Simulation Methodology

density functional theory (DFT)

molecular dynamics, monte carlo

continuum mechanics

equivalent networks

*) Harris et al., Chem. Phys. Lett. 485, 265 (2010).

Lithium-Ion Batteries: Electrochemical Cell

- negative electrode discharge: **anode**
- positive electrode discharge: **cathode**
- separator

Lithium-Ion Batteries

Simulation of Satellite In-Flight Data

Battery Datasets
- Cycle data from 12 years

Japan Aerospace Exploration Agency (JAXA) provided the battery data of satellite REIMEI

Microstructure resolved simulations

Micro-Structure Resolved 3D Model

Pseudocolor
Var: concentration
Max: 0.02066
Min: 0.0000

Vector
Var: current density
Max: 0.1902
Min: 4.450e-011

Time = 40 s

LMO – LiPF₆ EC/DMC – Graphite Battery
Thank you for your attention!
Contact Details

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