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Impact of Degree of Graphitization, Surface Properties and Particle Size Distribution on Electrochemical Performance of Carbon Anodes for Potassium-Ion Batteries

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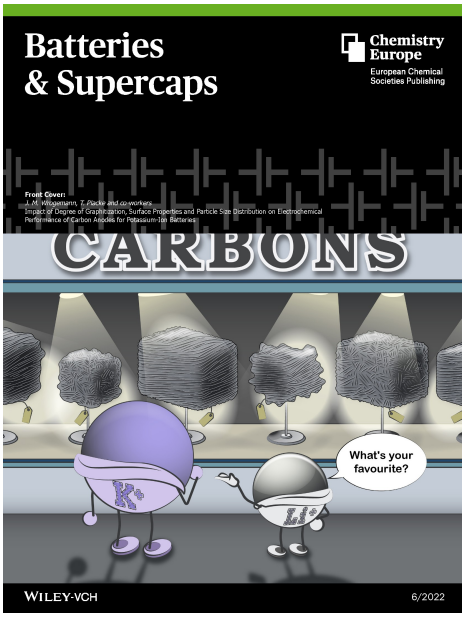
Invited for this month's cover picture is the group of Dr. Tobias Placke and Prof. Dr. Martin Winter from the MEET Battery Research Center (University of Münster, Münster, Germany). The cover picture shows two characters representing a potassium- and lithium-ion in front of a variety of carbons. The impact of several material properties of carbonaceous materials on potassium-ion storage is systematically investigated and compared to lithium-ion chemistry. Read the full text of the Research Article at 10.1002/batt.202200045.

What encouraged you to study this topic?

The huge and urgent demand of energy storage systems for the future drives us to study further alternative energy storage systems with an increased sustainability and material availability compared to lithium-ion batteries (LIBs). Energy storage systems based on a potassium-ion chemistry offer new possibilities in terms of improved material availability and reduced costs compared to LIBs. The possibility of electrochemical intercalation of K^+ ions into graphite makes potassium-ion batteries (PIBs) an interesting alternative and may allow a transfer of knowledge from LIBs to PIBs accelerating a possible commercialization in specific niche applications in the future. With our systematic studies, we hope to create an improved fundamental understanding of structure-property relationships for carbonaceous anodes for PIBs.



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What are your favorite aspects of this project?

Early state technologies with low technology readiness levels often suffer from a variety of challenges with respect to key requirements for application. By studying basic material properties and understanding structure-property relationships, specific challenges can often be overcome by rational material design. This combination of investigating basic properties and the application of gained knowledge makes applied science in general to an interesting research field.

What are the main challenges in the broad area of your research?

Battery science is an interdisciplinary field involving various research disciplines such as electrochemistry, material science and analytical chemistry. The huge number of parameters inside of battery cells makes it difficult to fundamentally understand different phenomena, and to compare achievements and findings in the scientific community with each other. It is highly recommended that researchers clearly and completely report their experimental parameters to accelerate the progress of gaining scientific insides.

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