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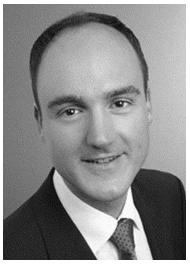
BATTERIES & SUPERCAPS
Cover Profile

Deriving Structure-Performance Relations of Chemically Modified Chitosan Binders for Sustainable High-Voltage $LiNi_{0.5}Mn_{1.5}O_4$ Cathodes


Matthias Kuenzel


Regis Porhiel


Dominic Bresser


Jakob Asenbauer


Peter Axmann


Margret Wohlfahrt-Mehrens


Stefano Passerini

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Invited for this month's cover picture is the group of Prof. Dr. Stefano Passerini. The front cover illustrates the use of citric acid (co-)crosslinked bio-derived polymers, with chitosan and guar gum, as water-soluble binders for sustainable lithium-ion battery cathodes. Read the full text of the Article at 10.1002/batt.201900140.

How would you describe to the layperson the most significant result of this study?

Lithium-ion batteries rely on the highly complex interplay of various (chemical) components within the electrolyte and the electrodes, including polymeric binding agents for the latter. For the positive electrode, this is commonly a fluorine-containing polymer that requires the use of toxic organic solvents for the processing. Herein, we show that it is possible to replace this toxic organic solvent by using water instead and biowaste-derived chitosan as alternative binding agent—in fact, the second most abundant polymer in nature. Moreover, we show which are key characteristics for such polymer to provide suitable electrochemical performance.

What was the biggest surprise (on the way to the results presented in this paper)?

Besides the waste-derived chitosan polymers, we investigated also a highly pure, artificially synthesized chitosan polymer. It was anticipated that this expensive material might be the best-performing binder, which was (fortunately) not the case. In fact, the waste-derived chitosan turned out to be readily applicable and performing best.

What was the inspiration for this cover design?

The cover design was inspired by a photograph of the western coast of Ireland that shows the coastline of the Atlantic Ocean and has been taken by one of the authors. In fact, this is the home of the Northern Prawn: its shell waste is a major source of chitosan.