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Solvent-free Ternary Polymer Electrolytes with High Ionic Conductivity for Stable Sodium-based Batteries at Room Temperature

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Maider Zarrabeitia

Stefano Passerini

Invited for this month's cover are the Electrochemistry for Batteries and Beyond Li: materials & interphases groups led by Prof. Stefano Passerini and Dr. Maider Zarrabeitia, respectively, at Helmholtz Institute Ulm (HIU). The cover picture shows a solvent-free polymer electrolyte-based sodium-metal battery operating at room temperature for stationary applications. Read the full text of the Research Article at 10.1002/batt.202300092.

What is the most significant result of this study?

The study focuses on the design and physicochemical/electrochemical characterization of solvent-free polymer electrolytes for solid-state sodium-based batteries. Surprisingly, the FSI anion-based polymer electrolyte is the best candidate. This is an unexpected result since the lithium-based FSI-based polymer electrolyte shows poor electrochemical performance. This demonstrates the necessity of understanding the different properties between lithium and sodium systems. The project is funded by BMBF within TRANSITION (03XP0186) and Transition Transfer (03XP0533) projects.

Who performed the experiments and designed the cover?

The research activities were mainly conducted by Daniel Roscher, PhD student. He joined the group of Prof. Stefano Passerini as a PhD candidate at Helmholtz Institute Ulm (HIU), where he worked as a PhD candidate at the Karlsruhe Institute of Technology (KIT). His research fields are layered oxide cathodes, polymer electrolytes, and sodium-based batteries.

Who are the corresponding authors?

Dr. Maider Zarrabeitia has been an associated principal investigator and group leader of Beyond Li: materials and interphases groups at HIU. Her activities focuses on electrode materials and electrolytes beyond lithium-based technology, such as sodium- and potassium-ion batteries, as well as understanding the electrode-electrolyte interphases for several battery technologies. She received her PhD in Materials Science and Technology in 2016 from the University of Basque Country (Spain) while being a researcher of CIC energiGUNE, including two research stages at the University of Camerino (Italy). Stefano Passerini is Professor at the Chemistry Department of Sapienza University of Rome and Distinguished Senior Fellow at KIT. Formerly professor at the HIU (Germany) as Director of HIU, and the University of Muenster (Germany) as co-founder and co-Director of the MEET battery research center. His research focuses on the basic understanding and development of materials for high-energy batteries and supercapacitors, with the goal to create sustainable energy storage systems from environmentally friendly and available materials and processes. He is an internationally recognized pioneer in the field of ionic liquids and the development of alkali-ion batteries.