El salvador solid-state batteries

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The development of solid-state batteries (SSBs) has gained significant attention due to their potential for enhanced safety and energy density compared to traditional lithium-ion batteries (LIBs). SSB performance is greatly affected by the stability of interfaces throughout the battery cell, which vary depending on the materials chosen for the cathode, electrolyte/separator, and anode. Lithium metal anodes can achieve excellent performance but are expensive and highly reactive, leading to unwanted reactions at the solid electrolyte (SE)/electrode interface that can impact long-term performance. It is therefore critical to design electrolytes with high ionic conductivity/Li+ transport, a wide electrochemical operating window, and stable interfaces.

For more information on the capabilities of PHI XPS instruments for in-situ and ex-situ chemical analysis, please attend Dr. Kateryna Artyushkova"s upcoming Invited Talk on "Advances in XPS Analysis of Battery Materials" at the 244th ECS Meeting in Gothenburg, Sweden this October.

1 H. Huo; M. Jiang; B. Mogwitz; J. Sann; Y. Yusim; T.-T. Zuo; Y. Moryson; P. Minnmann; F.H. Richter; C.V. Singh; J. Janek. "Interface Design Enabling Stable Polymer/Thiophosphate Electrolyte Separators for Dendrite-Free Lithium Metal Batteries." Angewandte Chemie International, 2023, 62, e202218044.

2 S. Wenzel; T. Leichtweiss; D. Kr?ger; J. Sann; J. Janek. "Interphase formation on lithium solid electrolytes - An in situ approach to study interfacial reactions by photoelectron spectroscopy." Solid State Ionics, 2015, 271, 98-105

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Aircraft batteries have different requirements for land vehicles. For example, they need to be as light as possible while still being able to store the huge amounts of energy required to power flights and be able to quickly discharge large amounts of this energy when needed.

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The aircraft could also benefit from a wider temperature of operation, especially at high temperatures, and the batteries also need to be more inherently safe than their land-based equivalents, as the dangers of an in-flight fire are more serious than one on the ground.

The Solid-state Architecture Batteries for Enhanced Rechargeability and Safety (SABERS) initiative is currently working to develop a battery that meets these goals to usher in a new era of power storage for electric air travel.

A joint venture between NASA, Georgia Institute of Technology, Argonne National Laboratory, and Pacific Northwest National Laboratory, SABERS researchers have been using different materials and novel construction methods to develop a new kind of battery.

"We wanted to use and combine currently available technologies in different and unique ways, using some of NASA"s core material science techniques and technologies it"s created," says Dr Rocco Viggiano, principal investigator for SABERS at NASA"s Glenn Research Center in Cleveland, Ohio.

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