

Solution-Processed Synthesis of Nano-Sized Argyrodite Solid Electrolytes with Cavitation Effect for High Performance All-Solid-State Lithium-Ion Batteries

Invited for this month's cover picture is the group of Dr. Jun-Ho Park. The cover picture shows a particle size reduction process of $\text{Li}_6\text{PS}_5\text{Cl}$ solid electrolyte with a cavitation bubbling effect during a novel solution-processed synthesis. By reducing the particle size of the solid electrolyte, it is possible to increase the contact area between the two materials and reduce the interfacial resistance between cathode and electrolyte materials. Read the full text of the Research Article at 10.1002/batt.202300036.

What is the most significant result of this study?

$\text{Li}_6\text{PS}_5\text{Cl}$ solid electrolyte for cathode was synthesized by newly proposed solution-processed synthesis process, called solvent exchange with bubble (SEB). Through this pioneering process, the authors synthesized the $\text{Li}_6\text{PS}_5\text{Cl}$ solid electrolyte with both a large contact area and sufficient lithium-ion conductivity. The $\text{Li}_6\text{PS}_5\text{Cl}$ prepared by SEB has a particle size below 800 nm and sufficient ionic conductivity of 1.54 mS cm^{-1} at 25°C , which is suitable for practical application in all-solid-state cells. Furthermore, it was found that the size reduction mechanism by damage dynamics of bubbling process is achieved by the cavitation effect using molecular dynamic simulations.

What was the inspiration for this cover design?

The authors want to show a particle size reduction process of $\text{Li}_6\text{PS}_5\text{Cl}$ solid electrolyte with a cavitation bubbling effect during a novel solution-processed synthesis. And the nano-sized-particles are very suitable for practical application in all-solid-state cells with both a large contact area and sufficient lithium-ion conductivity.

Who designed the cover?

The cover design was a collaboration work of the first authors Y. Huh and Dr. H. G. Lee and the corresponding author Dr. J. H. Park.

