The performance comparison of $Li_{1.3}Al_{0.3}Ti_{1.7}(PO_4)_3$ solid electroyte via various synthesizing methods.

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Development of all-solid-state Li-ion batteries (ASSLBs) has gained significant attention because of its electrochemical, chemical, mechanical, thermal stability and diminished flammability [1, 2]. There are several types of solid electrolytes for ASSLBs such as LISICON-like, argyrodite, garnet, NASICON, Li-nitride, perovskite and Li-halide. Among all types, one of the most stable electrolytes with sufficient ionic conductivity is NASICON, particularly $Li_{1.3}Al_{0.3}Ti_{1.7}(PO_4)_3$ (LATP03)[3].

This research investigates different fabrication methods of LATP03 solid electrolyte such as solid-state, solution chemistry, sol-gel, spray-drying and a molten flux and their structural, morphological and electrochemical characterizations.

Structure of LATP was confirmed by X-Ray Diffraction, and cell parameters were obtained using Rietveld refinement method via GSASII. The morphology of crystals were observed via scanning electron microscopy. The ionic conductivity of materials was determined by electrochemical impedance spectroscopy and it was carried out by applying electron conductive materials on a electrolyte's both sides as blocking electrodes. It was found that the ionic conductivity of LATP03 depends on fabrication methods, grain size, theoretical density of pellets and morphology.

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References

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