

High density $\text{Li}_{1-x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ (LATP) solid electrolyte synthesis via spray pyrolysis

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Phosphate based solid electrolyte LATP ($\text{Li}_{1-x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$) is promising material due to its high electrochemical stability, low cost, environment friendliness as well as favorable ambient temperature ionic conductivity.

To achieve high ionic conductivity of a solid electrolyte, controlling packing density and internal microcrack formation is critical. Conventionally, the preparation of LATP can occur by solid-state reactions or wet chemical pathways such as sol-gel synthesis. In both cases, time-consuming milling process is essential to control particle size. Also, these methods lack of control on particle shape.

In this work, we synthesized LATP ceramic powder with controlled particle shape and size through aerosol based spray pyrolysis process. With small particle size and narrow distribution, microcrack formation was suppressed and spherical shape enhanced packing density through the sintering process. The sintered sample was well-packed with high density, resulting in high ionic conductivity.

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