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# Unique rhombus-like precursor for synthesis of $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$ solid electrolyte with high ionic conductivity

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## Abstract

Na super ionic conductor (NASICON)-type  $\text{LiTi}_2(\text{PO}_4)_3$  as a promising solid electrolyte has been widely used in all-solid-state lithium batteries. However, it still suffers from a low ionic conductivity. Herein, a hydrothermal-assisted solid-state reaction has been developed to synthesize rhombus-like  $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$  (LATP) powder. Rhombus-like intermediate species of aluminum-doped  $\text{NH}_4\text{TiOPO}_4$  and  $\text{Li}_3\text{PO}_4$  are obtained by hydrothermal process, and subsequently the intermediate species are further preheated at 600 °C to become LATP phase without changing the rhombus-like

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