

# Electrical Properties of doubly doped Lithium ion conducting aluminum titanium phosphate NASICON system $\text{Li}_{1.3}\text{Al}_{0.29}\text{Ga}_{0.05}\text{Sc}_{0.05}\text{Ti}_{1.7}(\text{PO}_4)_3$

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We present the electrical properties of a new and hitherto unreported compound of NASICON (Na-like Super Ionic Conductors) type. Compounds of nominal composition  $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$  (LATP) along with  $\text{Li}_{1.3}\text{Al}_{0.29}\text{Ga}_{0.01}\text{Ti}_{1.7}(\text{PO}_4)_3$  (LAGTP) and  $\text{Li}_{1.3}\text{Al}_{0.29}\text{Sc}_{0.01}\text{Ti}_{1.7}(\text{PO}_4)_3$  (LASTP) were also prepared along with the  $\text{Li}_{1.3}\text{Al}_{0.29}\text{Ga}_{0.005}\text{Sc}_{0.005}\text{Ti}_{1.7}(\text{PO}_4)_3$  (LAGSTP) in the same batch using solid state reaction method. Structural characterization was done using x-ray diffraction (XRD) while the impedance measurements were carried out using Agilent E4980A Precision LCR Meter in the frequency range of 2 MHz to 20 Hz and in the temperature range of 20° C to 120° C. The compound LAGSTP was found to possess  $\text{Li}^+$  ion conductivity of the order of  $10^{-4}$  S/cm – an order lower than the parent compounds LATP and LAGTP. However this value was better than the compound LASTP. Density – an important parameter which influences the  $\text{Li}^+$  conductivity in all the above compounds was found increase with doping of scandium in the system. The density value of the novel compound was found to be in an intermediate range between LAGTP and LASTP systems.