Preface

Solid electrolytes are solids which conduct ions like Li^+, Ag^+, Na^+, O^{2-} etc. They play an important role in energy storage devices like batteries and fuel cells. Various classes of lithium based inorganic solid electrolyte materials like LISICONs, NASICONs, Lithium Halides, Perovskites, Lithium Garnets etc have been extensively studied for their Li^+ conducting properties and for their prospective applications in Li-batteries. NASICON (Na like Super Ion CONducting) are a special class of materials with a robust 3-D framework. Lithium Aluminum Titanium Phosphate (LATP) is a well known NASICON compound. Doping this compound with trivalent cations like yttrium, gallium and scandium to study their effect on Li^+ conductivity has been performed in the present work. The thesis is divided into five chapters and content of each chapters are as follows.

Chapter-1 presents a general background and applications of Solid State Ionics followed by a comprehensive survey of the solid electrolytes. This is followed by a review of NASICON and other Li^+ ion conducting materials. In **Chapter-2,** various theoretical details about the experimental techniques used, the electrical formalisms to explain conduction mechanism in ion conducting solids has been discussed. **Chapter-3** describes the preparation method and experimental details of characterization (experimental techniques). **Chapter-4** shows results and discussion of the experimental characterization studies. **Chapter-5** discusses the frequency dependent impedance data which has been used to calculate various physical parameters like impedance Z^*, dielectric permittivity ε^* and modulus M^*. This chapter discusses in detail the results of conductivity and tries to map them with the findings to the various experimental techniques. Effects of doping and temperature variation have been studied for their effect on the Li^+ ion conductivity. Finally a summary has been provided. The last part contains the details of publications so far which have culminated from the research work.

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