Abstract Submitted for the MAR12 Meeting of The American Physical Society

Solid Electrolyte for Advanced Lithium Batteries GHOLAM-ABBAS NAZRI, BALAJI P MANDAL, Wayne State University, MARYAM NAZRI, Applied Sciences Inc., VAMAN NAIK, University of Michigan - Dearborn, PREM VASHINAVA, Kettering University, RATNA NAIK, Wayne State University, ENERGY STORAGE AND GENERATION TEAM — Lithium battery is a promising energy storage system due to its high energy density and high rate capability and its application ranges from micro to large scale megawatt batteries. The current technology is using liquid electrolyte that limits its application due to flammable nature of the electrolyte, particularly at high temperatures, and difficulty in fabrication and miniaturization of the device. We report a novel solid electrolyte with high lithium ion conductivity as a replacement for the current liquid electrolyte, particularly for electronic applications. The solid state lithium ion conductor is based on lithium germanium phosphorous sulfide compound. The compound is prepared by solid state reaction at 500 °C. The crystallinity and phase purity of the sample is checked by XRD. We also measured ionic conductivity of the sample using both 4-probe and impedance techniques. High lithium ion conductivity at room temperature is observed. In this study we have investigated the dynamics of ion conduction, XRD, and Raman spectra of the super ion conductor. Electrochemical performance of the solid electrolyte in a lithium cell and its stability against high voltage cathodes and lithium anode will also be presented.

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