Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Low Temperature Synthesis of Cubic-phase Fast-ionic Conducting Bi-doped Garnet Solid State Electrolytes. DEREK K. SCHWANZ, ERNESTO MARINERO, School of Materials Engineering, Purdue University — We report on the synthesis of cubic-phase fast ionic conducting garnet solid state electrolytes based on LiLaZrO (LLZO) at unprecedented low synthesis temperatures. Ionic conductivities around 1.2 x 10-4 S/cm are readily achieved. Bismuth aliovalent substitution into LLZO utilizing the Pechini processing method is successfully employed to synthesize LiLaZrBiO compounds. Cubic phase LiLaZrBiO powders are generated in the temperature range 650C to 900C in air. In contrast, in the absence of Bi and under identical synthesis conditions, the cubic phase of LiLaZrO is not formed below 750C and a transformation to the poor ionically conducting tetragonal phase is observed at 800C for the undoped compound. The critical role of Bi in lowering the formation temperature of the garnet cubic phase and the improvements in ionic conductivity are elucidated in this work through microstructural and electrochemical studies.

Ernesto Marinero
Purdue Univ

Date submitted: 06 Nov 2015 Electronic form version 1.4