Physical and Electronic Characterization of $Li_7La_3Zr_2O_{12}$ Doped Thin Films

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Solid lithium ion conducting electrolytes are of essential importance for the development of all-solid-state lithium ion batteries with increased stability and power density. In particular, the garnet-type ceramic electrolyte $Li_7La_3Zr_2O_{12}$ stabilized with Al demonstrates a promising bulk ionic conductivity of $5x10^{-4}$ S cm^{-1} at 25°C with excellent stability against metallic Li.[1] In this work pellets were synthesised with sol-gel method and high density thin films of Al or Ga doped $Li_7La_3Zr_2O_{12}$ were deposited with PLD. The aim is to improve the ionic conductivity by substituting on the Li, La, and Zr sites using Al/Ga, lanthanides, and group 5 elements, respectively. In addition this model thin film electrolyte allows us to understand in depth the limiting factors for conductivity when moving from bulk to thin films. The films were characterized with XRD and SEM to determine the material phase and EIS was carried out with the aid of sputtered Pt contacts.

References

[1] R. Murugan, V Thangadurai, W. Weppner, *Angew. Chem.* **179** (2006) 974.