

Preparation and characterization of a new solid electrolyte, LiSiON, deposited by RF sputtering

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In this study, we prepared and characterized LiSiON solid electrolyte by RF (radio frequency) sputtering. The surface morphologies and cross sectional view of thin films were characterized by FE-SEM (field-emission scanning electron microscopy). Compositions of thin films were characterized by XPS (X-ray photoelectron spectroscopy). Ionic conductivity of thin-film electrolyte was measured in Cu/electrolyte/Cu sandwich structures on sapphire substrate with overlap area of  $0.16 \text{ cm}^2$  by EIS (electrochemical impedance spectroscopy). Cu used as blocking electrode with thickness of 100nm was deposited by DC magnetron sputtering in Ar atmosphere and LiSiON as solid electrolyte with thickness of 1 $\mu\text{m}$  was deposited by RF sputtering in Ar and N<sub>2</sub> atmosphere. EIS was performed in frequency range from 0.1Hz to 1MHz, using 10mV ac signal at room temperatures. Ionic conductivity of LiSiON was  $10^{-6} \text{ S/cm}$ , which is similar to those of other oxide electrolytes. Therefore, LiSiON can be a promising electrolyte in all-solid-state thin film batteries.