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# Electrochemical properties of all solid state Li/LiPON/Sn-substituted LiMn2O4 thin film batteries

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All solid-state thin film lithium batteries have many applications in miniaturized devices because of lightweight, long-life, low self-discharge and high energy density.

The research of cathode materials for thin film lithium batteries that provide high energy density at fast discharge rates is important to meet the demands for high-power applications. Among cathode materials, lithium manganese oxide materials as spinel-based compounds have been reported to possess specific advantages of high electrochemical potential, high abundant, low cost, and low toxicity. However, the lithium manganese oxide has problem of capacity fade which caused by dissolution of Mn ions during intercalation reaction and phase instability. For this problem, many studies on effect of various transition metals have been reported. In the preliminary study, the Sn-substituted LiMn2O4 thin films prepared by pulsed laser deposition have shown the improvement in discharge capacity and cycleability.

In this study, the thin films of LiMn2O4 and LiSn0.0125Mn1.975O4 prepared by RF magnetron sputtering were studied with effect of deposition parameters on the phase, surface morphology and electrochemical property. And, all solid-state thin film batteries comprised of a lithium anode, lithium phosphorus oxy-nitride (LiPON) solid electrolyte and LiMn2O4-based cathode were fabricated, and the electrochemical property was investigated.

**Keywords:** Thin film batteries, LiMn2O4, RF magnetron sputtering, all-solid-state battery