

A study on SnO₂/LiPON/LiFePO₄ structure all-solid-state lithium ion battery

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In this study, we prepared and characterized of thin-film batteries by DC(direct current) and RF(radio frequency) sputtering for all-solid-state lithium ion batteries. Ti and Cu thin films were deposited by DC sputtering for cathode and anode current collector. LiFePO₄ thin film was deposited by RF sputtering for cathode. LiPON thin film was deposited by RF sputtering for electrolyte. SnO₂ thin film was deposited by RF sputtering for anode.

The surface morphologies and cross sectional view of thin films were characterized by FESEM(field-emission scanning electron microscopy). The structural properties of thin films were evaluated by XRD(X-ray diffraction). Ionic conductivity of LiPON thin film was evaluated by EIS(Electrochemical impedance spectroscopy). Ionic conductivity of LiPON thin film was 2.22×10^{-6} S/cm. Electrochemical properties of thin film battery were also characterized by galvanostatic system. Electrochemical test shows reasonable performance compare to those of bulk Li-ion batteries using LiFePO₄ cathode, LiPON electrolyte, and SnO₂ anode. It is expected to contribute to more reasonable batteries for micro devices.