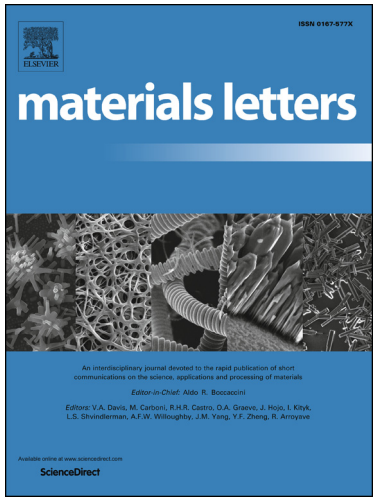

All Solid-State Thin-Film Lithium-ion Battery with Ti/ZnO/LiPON/$LiMn_2O_4$/Ti Structure Fabricated by Magnetron Sputtering

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All Solid-State Thin-Film Lithium-ion Battery with Ti/ZnO/LiPON/$LiMn_2O_4$/Ti Structure Fabricated by Magnetron Sputtering

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Abstract

An all solid-state thin-film Lithium-ion Battery with Ti/ZnO/LiPON/$LiMn_2O_4$/Ti structure was successfully deposited on the glass substrate by magnetron sputtering without any heat treatments. With the protection of LiPON films, the cell formed by crystal ZnO, amorphous LiPON and $LiMn_2O_4$, and Ti films presents a stable reversible capacity of 22 μAh/cm^2 between 0.5 – 5 V at the current density of 5 μA/cm^2 in the air at the room temperature. The microstructure and phase structure of cell were characterized with XRD, SEM and Raman spectroscopy techniques, respectively. Good electrical performance proves it could be useful for low-power thin film battery applications onto lower-temperature substrate materials and battery stacks.

Keywords: Solid-state thin-film lithium-ion battery, Sputtering, Crystal ZnO films, Amorphous $LiMn_2O_4$ films, Electrical properties, Energy storage and conversion

1. Introduction

A lighter, safer, efficient and reliable battery is on the soar with the development of micro-electro-