

Accepted Manuscript

The transparent all-solid-state rechargeable micro-battery manufacturing by RF magnetron sputtering

Suat Pat, Soner Özen, H. Hakan Yudar, Şadan Korkmaz, Zerrin Pat



PII: S0925-8388(17)31368-3

DOI: [10.1016/j.jallcom.2017.04.169](https://doi.org/10.1016/j.jallcom.2017.04.169)

Reference: JALCOM 41573

To appear in: *Journal of Alloys and Compounds*

Received Date: 10 March 2017

Revised Date: 2 April 2017

Accepted Date: 14 April 2017

Please cite this article as: S. Pat, S. Özen, H.H. Yudar, Ş. Korkmaz, Z. Pat, The transparent all-solid-state rechargeable micro-battery manufacturing by RF magnetron sputtering, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.04.169.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The transparent all- solid-state rechargeable micro-battery manufacturing by RF magnetron sputtering

Suat PAT^{1*}, Soner ÖZEN¹, H. Hakan YUDAR, Şadan KORKMAZ¹, Zerrin PAT²

¹Eskişehir Osmangazi University, Physics Department, 26480, Eskişehir, Turkey

²Bilecik Şeyh Edebali University, Chemistry Department, Bilecik Turkey

* Corresponding Authors e-mail: suatpat@ogu.edu.tr

Phone/ Fax: +90.222.2393750

Abstract:

In this paper, a transparent all-solid-state battery was manufactured by RF magnetron sputter, for the first time. LiFePO_4 and $\text{Li}_4\text{Ti}_5\text{O}_{12}$ are popular cathode and anode materials, respectively. For the solid-state electrolyte coating, the Li_3PO_4 material is also promising solid electrolyte materials due to the high ionic conductivity. The stack structure of the battery was *silver paste/anode ($\text{Li}_4\text{Ti}_5\text{O}_{12}$)/electrolyte (Li_3PO_4)/cathode (LiFePO_4)/ITO/glass*. An indium tin oxide (ITO) coated glass substrate was used as a transparent and conductive material. The resistance of the coated ITO layer is 40 Ω . RF power for the LiFePO_4 , Li_3PO_4 , and $\text{Li}_4\text{Ti}_5\text{O}_{12}$ layers deposition process was adjusted to 100 Watt at argon atmosphere. This stack structure didn't contain any liquid or gel electrolyte layer. The fully solid electrolyte was deposited by the RF magnetron sputter. The mean crystallite sizes of the deposited layers approximately 30 nm, 21 nm and 30 nm for LiFePO_4 , Li_3PO_4 and $\text{Li}_4\text{Ti}_5\text{O}_{12}$ layer, respectively. The transparency of the manufactured battery is approximately 80 %. Electrochemical impedance analyses and cyclic voltammetry measurements were done. The Nyquist diagram and equivalent circuit model were determined. Warburg constant and Li-ion diffusion coefficient were calculated approximately 38 $\Omega/\text{s}^{-1/2}$ and $4.2 \times 10^{-10} \text{ cm}^2/\text{s}$,

Download English Version:

<https://daneshyari.com/en/article/5459035>

Download Persian Version:

<https://daneshyari.com/article/5459035>

[Daneshyari.com](https://daneshyari.com)