

Accepted Manuscript

$\text{Cu}_2\text{ZnSnS}_4$ thin films by sulfurization in melted sulfur

S.A. Bashkurov, U.S. Hekkel, M.S. Tivanov, A.M. Saad

PII: S0167-577X(18)30391-4
DOI: <https://doi.org/10.1016/j.matlet.2018.03.035>
Reference: MLBLUE 23996

To appear in: *Materials Letters*

Received Date: 11 January 2018
Revised Date: 2 March 2018
Accepted Date: 4 March 2018



Please cite this article as: S.A. Bashkurov, U.S. Hekkel, M.S. Tivanov, A.M. Saad, $\text{Cu}_2\text{ZnSnS}_4$ thin films by sulfurization in melted sulfur, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.03.035>

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.

Cu₂ZnSnS₄ thin films by sulfurization in melted sulfur

S.A. Bashkurov^{1*}, U.S. Hekkel¹, M.S. Tivanov², A.M. Saad³

¹Scientific-Practical Materials Research Centre of NAS of Belarus, Minsk, 220072, Belarus

²Belarusian State University, Nezavisimosti av. 4, 220030 Minsk, Belarus

³Al-Balqa Applied University, PO Box 4545, Amman 11953, Jordan

*Corresponding author's e-mail: sp-box@yandex.ru

Abstract

Cu₂ZnSnS₄ (CZTS) thin films were synthesized by sulfurization of subsequently electrochemically deposited Cu/Sn/Zn metal precursors on Mo foil substrates in melted sulfur on air at the temperature of 440 °C close to the sulfur boiling point for 1 hour. The films contain only CZTS phase with lattice parameters $a = 5.422 \pm 0.002$ Å and $c = 10.811 \pm 0.006$ Å and components at. % ratio: Cu/(Sn+Zn) = 1.05, Zn/Sn = 1.22, (Cu+Sn+Zn)/S = 0.93. The film surface is densely packed without cracks or pinholes. The obtained results show the practical ability to obtain CZTS thin films by a novel technically simple and low-cost liquid-based process.

Keywords: Cu₂ZnSnS₄; CZTS; thin films; electrochemical deposition; sulfurization; liquid-based process.

Download English Version:

<https://daneshyari.com/en/article/8013638>

Download Persian Version:

<https://daneshyari.com/article/8013638>

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