



Optical properties of pulsed laser-deposited Cu_2SnS_3 films for photovoltaics

Crovetto, Andrea; Ettlenger, Rebecca Bolt; Schou, Jørgen; Hansen, Ole

Published in:
Book of abstracts

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Crovetto, A., Ettlenger, R. B., Schou, J., & Hansen, O. (2015). Optical properties of pulsed laser-deposited Cu_2SnS_3 films for photovoltaics. In *Book of abstracts: EMRS 2015 Spring meeting*

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Optical properties of pulsed laser-deposited Cu_2SnS_3 films for photovoltaics

Andrea Crovetto⁽¹⁾, Rebecca B. Ettliger⁽²⁾, Jørgen Schou⁽²⁾ and Ole Hansen^(1,3)

⁽¹⁾DTU Nanotech, Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark

⁽²⁾DTU Fotonik, Technical University of Denmark, DK-4000 Roskilde, Denmark

⁽³⁾CINF, Center for Individual Nanoparticle Functionality, Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark

The ternary chalcogenide compound Cu_2SnS_3 (CTS) is of interest for thin film photovoltaic applications. The tetragonal phase of CTS typically exhibits a direct band gap of around 1.35 eV and a high absorption coefficient. Hence it can be potentially employed as a photovoltaic absorber using the same device structure as in $\text{Cu}(\text{In,Ga})\text{Se}_2$ solar cells. On the other hand, the cubic phase of CTS has a typical bandgap of 0.9 eV and good lattice matching to $\text{Cu}_2\text{ZnSnS}_4$ (CZTS). Therefore it may find an application as a top absorber in a CTS/CZTS tandem cell.

In this work, CTS films are grown by pulsed laser deposition (PLD) on fused silica glass and Mo-coated soda lime glass substrates. Cubic and tetragonal phases are obtained by changing deposition parameters (temperature and laser fluence) and post-annealing conditions (annealing temperature and time). Dielectric functions and other optical properties of the resulting CTS films are extracted by spectroscopic ellipsometry. The differences in band gap, absorption coefficient and critical points in the dielectric functions are related to structural, compositional and morphological differences in the CTS films. The validity of the optical models used to derive dielectric functions from ellipsometry is discussed in relation to results from direct measurement methods such as optical transmission, Scanning Electron Microscopy (SEM) stylus profiling and atomic force microscopy (AFM).