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**Comparative study of Zn(O,S) layer obtained by RF and pulsed DC magnetron sputtering for photovoltaic application**

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Zn(O,S) thin film is a promising alternative to the classical CdS buffer layer for CIGS solar cell. Unlike to the CdS grown by chemical bath deposition, Zn(O,S) layers can be deposited by RF sputtering of a ZnS target under O<sub>2</sub> atmosphere or co-sputtering of ZnS and ZnO targets [1][2]. These processes are well adapted to further industrial application. Within a large project dedicated to the development of CIGS solar cell fully fabricated by magnetron sputtering [3], we investigated the deposition of Zn(O,S) buffer layer by magnetron sputtering of a ZnS target in a reactive Ar-O<sub>2</sub> plasma by two different routes: RF magnetron sputtering (RFMS) and pulsed DC magnetron sputtering (DCMS). Pulsed DCMS appears as more suitable for a further industrialization thanks its compatibility for deposition on large area and a significant cost reduction.

The properties of both types of Zn(O,S) layers, i.e. chemical, structural, morphological and optical properties, were investigated by XPS, XRD, SEM, TEM, ellipsometry and UV-visible spectroscopy and will be presented. We will compare the specificity of each supply type, RFMS and pulsed DCMS, on the layers properties. We will focus on the correlation between the oxygen content in the layers and their optical properties. In particular, the energy band gap value may be tuned by the oxygen content with a high average transmittance in the visible range.

[1]A. Grimm et al, Thin Solid Films vol. 520 1330-1333 (2011)

[2] B-K. Meyer et al, Applied Physics Letters vol. 85 4929-4931(2004)

[3] R. Meunier et al, submitted; oral communication at COFMER'01 and AVS' 61 (2014)

**Keywords**

Buffer layer

Zn(O,S)

Sputtering

CIGS

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