Characterization of CZTS thin films obtained by magnetron co-deposition from binary sputtering targets

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If photovoltaic energy is a so-called "clean" energy, the materials used, partly rare or non-durable ores, and the production processes are less so. To overcome the rare, toxic or expensive components of solar panels, copper, zinc, tin and sulfur (CZTS) cells seem to be an interesting solution [1].

A cost-effective way of synthesizing CZTS films has been developed using magnetron co-deposition from binary sputtering targets. Binary (Cu_2S, ZnS, SnS_2) and ternary $(Cu_2S)_x(ZnS)_y(SnS_2)_{1-x-y}$ compounds were obtained and characterized by X-ray diffraction [1,2,3,5], scanning electron microscopy [2,3,5], optical absorbance/spectroscopic ellipsometry [2,4,5], photoluminescence and Raman spectroscopy [2,3,5]. The binary films were also compared with the source sputtering targets in order to verify the stoichiometric transfer from target to substrate and to explore the relations between the properties of bulk materials and their corresponding thin film counterparts.

Our results show the ability to vary the composition around Cu_2ZnSnS_4 phase. In conclusion, it is possible to optimize the Cu_2ZnSnS_4 synthesis which further offers the possibility of improving the electrical properties of the material [6].

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