

## Elaboration by spin coating and characterization of CZTS films

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**Abstract** – Thin films of  $\text{Cu}_2\text{ZnSnS}_4$  (CZTS) were deposited by the sol-gel spin coating method from a non-aqueous solution containing different molarities of precursors, cupric chloride  $\text{CuCl}_2 \cdot (2\text{H}_2\text{O})$  (2M), zinc chloride  $\text{ZnCl}_2$  (1M), stannic chloride  $\text{SnCl}_4 \cdot (2\text{H}_2\text{O})$  (1M) and thiourea  $\text{SC}(\text{NH}_2)_2$  (8M) dissolved in different volumes of solvents, methanol  $\text{CH}_3\text{OH}$  and deionized water. A light-yellow solution was formed by thermal centrifugation at adjustable speeds for several minutes. Characterizations were carried out after deposition, drying and thermal annealing of these films. XRD spectra showed the formation of several peaks with one peak corresponding to the (112) directions illustrating the presence of kesterite. The gap energy was deduced 1.87 eV from the transmittance obtained by UV-Visible-NIR. The percentages of the different CZTS constituents by SEM were recorded. The thicknesses of the films obtained by profilometer are between 0.6  $\mu\text{m}$  and 2  $\mu\text{m}$ . The theoretical study and the results of the characterization can contribute to the realization of a CZTS active layer of a photovoltaic cell.

**Keywords** – CZTS, Spin coating, XRD, Transmittance, SEM, Profilometer