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Growth of $\text{Cu}_2\text{ZnSnS}_4$, ZnO by spray pyrolysis and CdS by Chemical Bath Deposition for solar cell devices

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We have studied the effect of the flow rate on the physical properties of CuInS_2 thin films. But as the indium is an expensive element and rare in the earth's crust, CuInS_2 is replaced by $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) which has received considerable attention as one of the promising absorbers for the fabrication of solar cells with conversion efficiency close to 12.6% [1]. In order to improve its structural, morphological, electrical and optical properties, we started by preparing CZTS thin film using an aqueous solution at various substrate temperatures by spray pyrolysis technique. Next sprayed CZTS thin film prepared under the optimised conditions is annealed in nitrogen atmosphere at 450, 500 and 550 °C during 60 min. In another hand, we have prepared the CZTS thin films using an ethanolic solution at various sulfur concentration then the film deposited at the optimised condition was annealed under nitrogen atmosphere for an hour at different annealing temperatures. Finally, as ultimate test it is useful to finish some solar cells and test them accordingly. In our next researches, we can test our findings through the proposed following solar cell: Ag/CZTS/CdS/ZnO/ZnO:Al. The CZTS thin films will be elaborated under the optimized experimental spray parameters for both solution types. In our laboratory, cadmium sulfide nanomaterial is grown by Chemical bath deposition it is a buffer layer and Zinc oxide material is synthesised by spray pyrolysis it is an optical window in solar cell devices.

Biography:

Prof. Dr Najoua-Turki Kamoun is a full Professor at the Faculty of Sciences of Tunis (FST)/ University of Tunis El-Manar Tunisia. She obtained her Ph.D thesis in 1992 from FST and the Habilitation in Physics in Tunisia (FST) in 2000 and she is a Professor since 2007. Her academic research focuses on Transparent conductive oxides (TCO: ZnO, SnO₂, In₂O₃, TiO₂), binary semiconductors (In₂S₃, SnS, CdS, Cu₂S, ZnS, PbS), ternary (CuInS₂, In_(2-x)GaxS₂, P3HT) and quaternary compounds (CuIn_(1-x)GaxS₂:CIGS and Cu₂ZnSnS₄:CZTS) for optoelectronic applications such as photocatalysis, gas sensors, solar cells, UV and IR detectors. Nanomaterials and thin films are grown by different low cost techniques (spray pyrolysis, chemical bath deposition, spin coating). She published more than 90 papers in International Journals and supervised more than 20 Ph.D thesis. Since 1989 she is a researcher in Physics Condensed Matter Laboratory (LPMC) where she is a head since 2011. In the period 2013-2014 she occupied the post of General Director of Physico-Chemical Analysis Institute in the Technopole of Sidi Thabet