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STUDY OF SELENISATION OF Mo AND Mo/Cu-Zn-Sn STACKED LAYERS

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Selenisation of metal precursors, stacked metal layers on Mo covered glasses were used to study the synthesis of $CuInSe_2$ (CISe) and its In-free analog $Cu(ZnSn)Se_2$ ($Cu_2ZnSnSe_4$) (CZTSe) as absorber materials for solar cells. The precursor layers were deposited by electrodeposition and selenised. The formation and properties of $MoSe_2$ layers between absorber and Mo depend on many factors of processing. In the present study the interaction of Se with Mo as a conductive substrate material is investigated. The important question that needs to be clarified is the following: what parameters of the preparation process determine the growth and structural properties of the $MoSe_2$ layer. Polycrystalline Mo substrates (Mo/glass, Mo-foil, Mo-polyimide, ITO/Mo/glass) were selenised for various durations ranging from 20 min to 5 h. Selenisation was performed by two different methods: (1) samples were annealed in a preheated two-temperature-zone quartz tubular reactor and (2) selenisation in an isothermal sealed quartz ampoules. The selenisation process as a function of temperature and time was investigated by X-ray diffraction (XRD), energy dispersive spectroscopy (EDX), scanning electron microscopy (SEM) and by Raman spectroscopy. The results show that the $MoSe_2$ formation depends on the processing history of the Mo prior to selenisation. The structural evolution was clearly illustrated by the increase of film thickness during selenisation process.