

AgBr-assisted CIGS growth on ITO substrates: Influence of the absorber thickness

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Abstract: Photovoltaic absorbers grown on a semi-transparent back contact are of interest because they enable the fabrication of bifacial or tandem devices, as well as photocatalysis applications made possible by backwall illumination. As far as Cu(In,Ga)Se₂ (CIGS) absorbers are concerned, the synthesis on transparent conductive oxide (TCO) is challenging because high substrate temperature, typically 550-600°C, is usually used to produce high quality crystallized thin films and high efficiency devices. Such substrate temperature during the CIGS growth deteriorates the TCO/CIGS interface, probably due to the formation of Gallium oxide. Metal halide treatment have been used to enhance the recrystallization of CIGS grown on Molybdenum substrates at lower temperature. In this study, we demonstrate that a flash evaporation of 20mg of AgBr during the synthesis at 450°C of CIGS on Indium Tin Oxide (ITO) substrates allow the production of high-quality devices. We investigate the influence of the thickness of the absorber grown in such conditions on structural and transport properties. We show that the effect of the AgBr treatment is higher on thin absorbers than on their thicker counterparts. Finally, we demonstrate a 11.3% efficiency under AM1.5 illumination for an ultra-tin (480nm) absorber grown on ITO.

Keywords: CIGS, AgBr treatment, ITO back contact, CIGS solar cell