Solar cells based on indium treated CIGS absorber

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The problem of replacing CdS buffer layer in polycrystalline CIGS thin film solar cells is important meaning the application of non- toxic materials with wide band gap for solar cell. Indium hydroxy sulphide, $In_x(OH,S)_y$ is by the moment the most promising candidate for this purpose Meantime the electrical and structural properties of such layers and of interfaces depend much on the both electrochemical treatment and the deposition technique that in its turn influence the resulting energy conversion parameters of CIGS-based solar cells.

In this contribution we present a new fabrication procedure of CIGS-based solar cells with the objective of CIGS surface doping by indium. We studied $In_x(OH,S)_y$ films deposited by chemical bath deposition (CBD) technique using aqueous baths with thioacetamide as the sulfur source on soda-lime glasses and on the modified by indium treatment and as deposited CIGS absorber layers. The fabricated films and interface surfaces were characterized by AFM, SEM. The developed films provide continuous and uniform covering of the substrates and may have two different structures with grain size of about 30 nm. The XPS spectra show the presence of indium hydroxy sulphide, indium (III) sulphate, oxide and hydroxide.

CIGS solar cells based on CIGS absorber doped by indium using $In_x(OH,S)_y$ and CdS buffer layers were fabricated and the main photovoltaic parameters of these devices were examined. The results have shown relations between the interface treatment and cell characteristics. Efficiencies comparable with those of the reference cells made with CdS have been obtain

To conclude, we have developed a new fabrication procedure of solar cells with $In_x(OH,S)_y$ and CdS buffer layers based on CIGS absorber doped with In.

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