



## Influence of the type of conducting glass substrate on the properties of electrodeposited CdS and CdTe thin films

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### Abstract

Owing to the greater efficiency in energy conversion by absorbing energy in a wider range of the solar spectrum, thin film CdS/CdTe solar cells have been popularized as a prominent application of photovoltaics and the technique of electrodeposition (ED) is an ideal method available for producing both CdS and CdTe materials upon its unrivaled simplicity, low cost, scalability and manufacturability. Typically the quality of these deposited thin films depends on several growth parameters and amid them, the type of conducting glass substrate plays a crucial role. This study is focused on the influence of conducting glass substrate on the properties of electrodeposited CdS and CdTe thin films. Two types of glass substrates coated with different transparent conducting oxide (TCO) layers namely; fluorine-doped tin oxide (FTO) and indium tin oxide (ITO) having different sheet resistances (FTO: 7 and 13  $\Omega$ /sq and ITO: 7 and 15  $\Omega$ /sq) were considered. CdS and CdTe materials were electrodeposited respectively on each of these types of TCO layers using a three electrode electrolytic system under a consistent set of growth parameters which has been pre-optimized with respect to FTO having sheet resistance of 7  $\Omega$ /sq. The deposited CdS and CdTe thin layers were subsequently heat treated and characterized to understand their optical, electrical, morphological and structural properties. Accordingly, CdS and CdTe semiconductor materials deposited on glass/FTO (7  $\Omega$ /sq) substrates have exhibited better optoelectronic qualities and hence, endorse the requirement of individual growth parameter optimization for each type of TCO glass substrate for the production of good quality CdS and CdTe thin films in photovoltaic device fabrications.

**Keywords:** Glass substrate; Electrodeposition; Cadmium sulfide; Cadmium telluride; Thin film.