Improving of electrical and optical properties of cadmium sulfide by using different metal additives

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Thin films of metal sulfides show promise for application as photovoltaic converters, optoelectronic and thermoelectric devices, and photodiode arrays. Cadmium sulfide is one of the most important II-VI semiconductors with a direct-band transition and with a band gap (E_g) of 2.42 eV. A variety of methods have been developed to prepare CdS such as solid phase reaction, gas phase reaction with H_2S or sulphur vapour, solvothermal route, sol-gel template, electrodeposition and etc. Nowadays the successive ionic layer adsorption and reaction (SILAR) method has advantageous due to it allows to control the film thickness at atomic level, which is difficult by the conventional chemical bath deposition (CBD) and electrodeposition methods.

This work is focused on the investigation of influence of Cu, Zn and In on the surface morphology, optical and electrical properties of cadmium sulfide films prepared by means of the SILAR method. The morphology and composition of the prepared CdS thin films (with and without additives) were characterized using field-emission scanning electron microscopy, energy dispersive X-ray spectroscopy and X-ray photoelectron spectroscopy XPS. The optical properties of the CdS thin films deposited onto glass substrates were investigated by means of UV/Vis spectrophotometrical measurements.

It was found that the Cu, Zn and In additives play an important role on the changes of morphological, electrical and optical properties of the cadmium sulfide coatings investigated, comparing with that without of mentioned additives.

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