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PROCESSING OF INDIUM SULFIDE AND CADMIUM SULFIDE THIN FILMS BY SPUTTERING-RF AT OXYGEN ATMOSPHERE FOR APPLICATIONS IN OPTOELECTRONICS DEVICES

One of the important physical properties to consider in a semiconductor window is the value of its band-gap E_g . In₂S₃ and CdS have typical E_g of the order of 2.42 and 2.62 eV, respectively; that is, their absorption window is in the visible light region. In this work, different configurations of these semiconductors were processed by means of the processing technique Magneto-Planar Cathode Sputtering in Radio Frequency mode (Sputtering-RF) in an Ar+O₂ atmosphere, such as: In₂S₃/CdS, In₂S₃:O₂/CdS, In₂S₃/CdS:O₂ and In₂S₃:O₂/CdS:O₂; with the purpose of studying the change in the optoelectrical properties of these window Semiconductors. In₂S₃ and CdS semiconductors, when deposited together sequentially in Sputtering-RF in an Ar atmosphere with the parameters: RF source power (P_{ot} = 150 and 100 W, respectively), substrate temperature (T_s = 250 and 225 °C, respectively) and deposition pressure (P = 10 and 12.5 mTorr, respectively), has a thickness of approximately 150 nm (In₂S₃ = 50 nm and CdS = 100 nm) and an average deposition rate of approximately 6 nm/min; whereas, when these same semiconductors are deposited in an O₂ atmosphere with a flux of 1.0 sccm (5% of the total Ar+O₂ flow entering the deposition chamber, approximately). As results we obtained that the mentioned configurations and with these same deposition parameters; the thickness decreases around 125 nm (average deposition rate of 5 nm/min); as well as other optical and morphological changes, such as: the absorption window is shifted towards the UV region (370 nm), for the In₂S₃:O₂/CdS:O₂ configuration; attractive properties for the mentioned applications.

Keywords

Window materials, Thin films, Sputtering-RF

Reference

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Incorporation of an efficient β -In₂S₃ thin film as window material into CdTe photovoltaic devices Mater.Res.Express6(2019)125510
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Author approval

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