

化学浴沉积法制备CdS多晶薄膜

CdS Thin Films Deposited by CBD Method on Glass

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中文摘要

利用化学浴沉积法制备适合于铜铟镓硒薄膜太阳能电池缓冲层材料的CdS多晶薄膜, 研究了在不同温度和不同时间下沉积薄膜的性质. 薄膜生长开始由ion-by-ion机制控制, 随着时间的进行, cluster-by-cluster机制占据主导. 薄膜的生长速度随着沉积温度的升高而快速增加, 直到达到饱和厚度. 并且饱和厚度随温度升高而相应降低. SEM表明随沉积时间增加以及温度升高, 薄膜表面形貌从多孔到粗糙的不均匀转变. XRD结果显示, 薄膜由立方和六方两相结构组成, 控制沉积时间对薄膜的主要晶相结构很关键. 所有温度下沉积的CdS

英文摘要

CdS thin films were prepared by chemical-bath-deposited method and the effect of temperature and time on the properties of CdS thin films was studied. Independent of the deposited temperature, the growth was mainly controlled by the ion-by-ion growth mechanism at the beginning of the film deposition, then the cluster-by-cluster mechanism came to be dominant. The growth rate increased faster with the increasing of temperature until the thickness reached the limitation, then thickness instead become thinner. The scanning electron microscope results revealed that the morphology of the CdS film changed from pinholes to rough, inhomogeneous surface with increasing deposition time and deposition temperature. The X-ray diffraction results showed the film structure was a mixture of two phases: hexagonal and cubic, and it was very important to control deposition time to the film's crystal phase. All films in depth of approximate 100 nm existed above 65% transmittance, the absorption edge became "red-shift" with temperature rising. At 60 and 70 oC, with 20 min deposited-time, the energy band gap was more than 2.42 eV and decreased with time, while at 80 and 90 oC, the energy band gap was less than 2.42 eV and increased little when the time changed from 10 min to 15 min at 80 oC.

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