

CDCL₂ ANNEALING OF CHEMICAL BATH DEPOSITED CADMIUM SULPHIDE THIN FILMS FOR PHOTOVOLTAIC SOLAR CELLS

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Chemical bath deposited cadmium sulfide (CBD CdS) thin films are common n-type partners in CdTe and CIS solar cells. It has been shown that high direct current (DC) resistivity (10^4 Ohm cm) of as-deposited and air annealed CBD CdS layers is connected with their polycrystalline cluster-like nanosize structure⁽¹⁾.

The investigation of recrystallization process of CBD CdS thin films in the presence of liquid flux was the main objective of this work. Due to strong influence of oxygen and oxide compounds in the CdCl₂ annealing process⁽²⁾, the heat treatments were performed in closed controlled ambient of partial pressures of components, volume of liquid phase and temperature, according to the phase diagram of CdS – CdCl₂. The crystal microstructure of CBD CdS thin films was characterized by scanning electron microscopy. Chemical composition was analyzed by energy dispersive X-ray spectroscopy.

Grain growth mechanism of CdS depends on the volume of liquid flux and sintering is determined by tensile forces between the grains due to capillary phenomena on the meniscus of contacting grains.

Significant increase in crystallinity and DC conductivity up to 10 (Ohm cm) of CdS thin films has been achieved. The recrystallized CBD CdS thin films have densely packed crystalline grains, smooth surface morphology and are suitable for development of high performance CdS/CdTe solar cells.

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TOPICS + KEYWORDS: CdTe Solar Cells, CdCl₂ Annealing, CdCl₂ Flux, CdS Recrystallization.