AN INVESTIGATION OF CdZnTe THIN FILMS FOR PHOTOVOLTAGICS

Y. V. Znamenshchykov, *postgraduate student*

In the last decade, the interest in the study of thin film CdZnT e (CZT) alloys has been increased due to their important industrial applications as solar cells, photodetectors, and gamma-ray detectors. The properties of$Cd_{1-x}Zn_xTe$ (CZT) make it a prime candidate for terrestrial photovoltaic applications. This ternary structure is one of the important semiconductor compounds, as a top device in a high efficiency tandem solarcell structure, due to its tunable physical parameter. CZTis semiconductor with a tunable band gap of 1.51–2.36 eV. Solar cells with efficiencies of 15–20% or higher can be achieved by using a tandem structure, which consists of a top cell and a bottom cell connected in a series. In this type of solar cell, the lightpasses through the top cell first, which has a wider band gap to absorb light of shorter wavelengths, and the remaining light passes through the bottom cell with a lower band gap to absorb light of higher wavelengths. For a tandem cell structure, the ideal band gap for the top and bottom cell is well known as about 1.7 and 1 eV, respectively. Cadmium Zinc Telluride is a suitable candidate for the top cell. Also, the high atomic number,tunable energy band gap to minimize leakage currents at room temperature, high detective quantum efficiency, good charge transport, and high intrinsic mobility-lifetime products for electrons and holes offer it an attractive candidature as a good radiation detector material. For production of large area applications of CZT-based photovoltaic devices,thin film technology has to be applied. Close spaced sublimation method was used to deposit thin films; at least two different targets, such as CdTe and ZnTe, were used. Film deposition and substrate temperature effects on the composition of the thin film were also investigated.

A. M. Diadechko, *ELA*

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