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## Illumination-Dependent Photovoltaic Parameters of CdS/ZnTe Solar Cells

Ion Lungu, Lidia Ghimpu, Victor Suman,  
Dumitru Untila, Tamara Potlog

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### Abstract

This paper focuses on the influence of the illumination of CdS/ZnTe solar cells with different ZnTe thin film thicknesses. The devices were analyzed through current-voltage measurements. The values of the open circuit voltage ( $V_{oc}$ ) and the short circuit current density ( $J_{sc}$ ) depend on the substrate and source temperatures. The  $J_{sc}$  is observed to decrease from  $224 \mu\text{A}/\text{cm}^2$  to  $95 \mu\text{A}/\text{cm}^2$  with increasing the source temperature from  $560^\circ\text{C}$  to  $600^\circ\text{C}$ , while the  $V_{oc}$  increases from  $0.41 \text{ V}$  to  $0.54 \text{ V}$ , respectively. The value of  $V_{oc}$  increasing from  $0.68 \text{ V}$  to  $0.76 \text{ V}$ , but  $J_{sc}$  decreasing from  $760 \mu\text{A}/\text{cm}^2$  to  $500 \mu\text{A}/\text{cm}^2$ , when ZnTe thin film thickness increasing. Besides, the impact of the light intensity on the photovoltaic parameters of the CdS/ZnTe solar cells with different ZnTe thin film thicknesses was analyzed. The increasing in the light intensity from  $20 \text{ mW}/\text{cm}^2$  to  $100 \text{ mW}/\text{cm}^2$  rise the  $V_{oc}$  from  $0.67 \text{ V}$  to  $0.76 \text{ V}$  tending further to saturation. Regardless of ZnTe thin film thickness,  $\eta$  increases logarithmically with the light intensity, but for the  $J_{sc}$  is observed linear dependence. The  $R_s$  increases with the increasing ZnTe thin film thickness, but decreases with the increasing of light intensity. Also, the  $R_{sh}$ , changes under changing the ZnTe thickness and the light intensity.

*Keywords: solar cells, close space sublimation method, photovoltaic parameters, thin films*

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