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# Closed space sublimated CdS thin films for CdS/CdTe solar cells: Effect of source temperature

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Among various solar cell technologies, thin-film solar cells stand out due to their promising efficiencies and low manufacturing cost. In CdS/CdTe solar cells, cadmium telluride (CdTe) has a bandgap of 1.45 eV and is used as the absorber material, while cadmium sulfide (CdS), which has a wide bandgap of 2.42 eV is used as the window layer. Many techniques can be used to deposit CdS window layers, and promising results have been attained using the close-spaced sublimation (CSS) technique, which is a strong candidate for manufacturing applications. The reported work was mainly focused on optimizing the source temperature for depositing CdS window layers using CSS technique. The source temperature was varied from 600 °C to 680 °C in steps of 20 °C with a fixed 100 °C difference between the source and substrate temperatures. The pressure was maintained at $2-3$ torr during the depositions, and the deposition time was maintained at 2 minutes. The optical characterization was conducted using the UV-Visible spectrophotometer, and electrical characteristics were obtained using the solar simulator PEC L01. Also, the X-ray fluorescence spectrometer was used to measure the CdS layer thickness. The best small area dot cell with a CSS CdS window layer had a cell efficiency of 6.9 % with an open-circuit voltage (VOC) of 700 mV, short circuit current (JSC) of 18.9 mA $cm^{-2}$ and a fill factor (FF) of 51.8 %.

*Keywords:* *CdS/CdTe solar cells, CdS window layer, Close-spaced sublimation.*