

Abstract Submitted
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Influence of a high resistivity transparent (HRT) layer on the performance of CdTe solar cells¹ HASITHA MAHABADUGE, KRISTOPHER WIELAND, ALVIN COMPAAN, University of Toledo — Cadmium telluride (CdTe) solar cells have become very successful for large scale application of photovoltaic energy conversion with Ohio-based solar cell manufacturer, First Solar, now the largest manufacturer of thin-film cells in the world. Although CdTe solar cells have shown laboratory efficiencies in excess of 16.5% its realistic potential efficiency is well above 20%. High-resistivity transparent oxide buffer layers (HRT's) added between the transparent conducting oxide (TCO) and CdS layers in CdTe solar cells can enhance the performance of the device. Our results show an increase in efficiency with the HRT layer with the greatest contribution coming from improved fill factor (FF). Open circuit-voltage (V_{oc}) and short-circuit current (J_{sc}) stay relatively constant. The effect of different materials as the HRT layer on the cell structure TCO/HRT/CdS/CdTe/Cu/Au was investigated using commercially available SnO₂:F as the TCO. The study included ZnO, ZnO:Al, SiO₂, SnO₂ and Al₂O₃. Our results show that ZnO and ZnO:Al are promising candidates for the HRT layer and the use of ZnO:Al reactively sputtered with O₂ is particularly attractive since the transition from TCO to HRT is accomplished simply by adding O₂ to the Ar sputtering gas.

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