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High Efficiency Ultra-thin CdS/CdTe Solar Cells[1] NABA PAUDEL, KRISTOPHER WIELAND, ALVIN COMPAAN, University of Toledo — Polycrystalline thin-film CdTe is currently the dominant thin-film technology in world-wide PV manufacturing. Typically a 2-8 μm thick CdTe layer is used for large scale CdS/CdTe based solar cells and modules. With finite Te resources, it is appropriate to limit the utilization of Te by reducing the thickness of the CdTe layer in these devices. But thinning the CdTe in solar cells and modules often decreases the conversion efficiency due to incomplete photon absorption and increased probability of shunting. In this study, ultra-thin CdTe devices were prepared by magnetron sputtering which appears to be well suited to control growth rate, grain size, and film stress. 0.25 – 2.1 μm CdTe was sputtered on Pilkington TEC15 SnO2:F-coated soda-lime glass substrates with a high resistivity transparent interfacial layer after 60-80 nm of sputtered CdS. With optimum cell post-deposition processing, we obtained cells with efficiencies of 8%, 10.3%, 12.0% for CdTe thicknesses, respectively, of 0.25, 0.50, 0.75 μm. We believe that these represent the highest efficiencies yet obtained for CdS/CdTe cells with these submicron absorber-layer thicknesses.

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