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ZnTe:P/CdTe Superlattice Window for CdTe Solar Cell on InSb Substrates ERNESTO SUAREZ, XIN-HAO ZHAO, YUAN ZHAO, CALLI CAMPBELL, MAXWELL LASSISE, PRESTON WEBSTER, SHI LIU, YING-SHEN KUO, YONG-HANG ZHANG, Arizona State University — The current efficiency record of monocrystalline CdTe solar cells is significantly lower than the Shockley-Quassar limit. A primary reason for this is the unsuccessful p-type doping of CdTe, which is due to the existing dopants that are difficult to be ionized or to incorporate during epitaxial growth. Here we propose a CdTe/ZnTe solar cell with an n-type Indium doped CdTe absorber layer and a CdTe/p-ZnTe superlattice window layer. This superlattice utilizes high acceptor doping of ZnTe while reducing relaxation through the use of CdTe. Phosphorous has shown to be an effective dopant in ZnTe that can reach a 10^{19} cm^{-3} hole concentration. The window layer is designed with an average hole concentration of 1 x 10^{18} cm^{-3}, an effective bandgap of 1.64 eV, and a depletion width of 4 nm. The absorber layer is 1 m thick and has an electron concentration of 110^{16} cm^{-3}. Between the InSb substrate and the nCdTe absorber is an nMgCdTe barrier to reduce the non-radiative interface recombination and increase the minority carrier lifetime. The theoretical efficiency of this cell is 23%. Preliminary experimental results are also presented.

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