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Abstract

In this paper pulsed laser deposition (PLD) methods are used to study p-n CdTe/CdS heterojunctions fabricated *in-situ*. *In-situ* film deposition allows higher quality p-n interfaces by minimizing spurious contamination from the atmosphere. Morphologic and structural analyses were carried for CdTe films deposited on various substrates and different deposition conditions. The electrical characteristics and performance of the resulting p-n heterojunctions were studied as function of substrate and post-deposition anneal temperature. *In-situ* growth results on diodes with a rectification factor of ~ 10^5, an ideality factor < 2, and a reverse saturation current ~10^{-8} A. The carrier concentration in the CdTe film was in the range of ~10^{15} cm^{-3}, as measured by C-V methods. The possible impact of sulfur diffusion from the CdS into the CdTe film is also investigated using High Resolution Rutherford Back-Scattering.