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Band alignment of hydrogen-plasma cleaned MBE CdTe on InSb (001) XINGYE WANG, CALLI CAMPBELL, YONGHANG ZHANG, ROBERT NEMANICH, Arizona State University — CdTe is a II-VI semiconductor with promising potential in many applications, in particular for optoelectronics. It has a bandgap of 1.5 eV. InSb is a III-V semiconductor with a reported narrow bandgap of 0.17 eV. A close lattice match exists between these two semiconductors. Thus, it is interesting to investigate the band offset between a CdTe-InSb heterojunction, which could be applied to quantum well structures. In this research, the substrate is commercially obtained single crystal InSb (001). A dual-chamber II-VI and III-V molecular beam epitaxy (MBE) system was used to thermally desorb native oxides, then deposit an InSb (001) buffer layer followed by 7 nm of epitaxial CdTe (001). After film deposition the sample was transferred to a multichamber system for photoemission analysis. A remote hydrogen plasma process was used to clean the surfaces, which were exposed to atmosphere during the transition process. Monochromatic x-ray photoemission spectroscopy (XPS) and ultra-violet photoemission spectroscopy (UPS) were used to characterize the electrical properties of the samples. The result of this research indicates a valence band offset of 0.9 eV, which is between the value predicted by the Anderson electron affinity rule (0.96 eV) and that calculated by Tersoff (0.84 eV).

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