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Strain, Confinement and Density Dependence of the Effective Mass of Holes in InSb Quantum Wells CHOMANI GASPE, M. EDIRISOORIYA, T.D. MISHIMA, R.E. DOEZEMA, M.B. SANTOS, University of Oklahoma, L.C. TUNG, Y.J. WANG, NHMFL, Florida State University — The valence band structure in a III-V quantum well (QW) is complicated by the presence of two highly non-parabolic bands. The lower (higher) energy band has a hole mass that is lighter (heavier) for motion in the plane of the QW. The energy separation between the two bands increases with increasing biaxial compressive strain and decreasing well width. An expected anticrossing between the two bands can add significantly to their non-parabolicity. We report an experimental study of the effective mass of 2D holes in a series of remotely doped InSb QWs under biaxial compressive strain. Only the lower energy band is occupied at low tempearture. Cyclotron resonance measurements at 4.2K show that the hole effective mass increases with increasing hole density from $0.045m_e$ at 2.1×10^{11} cm^{-2} to $0.083m_e$ at 5.1×0^{11} cm^{-2}. The smallest effective mass of $0.017m_e$ was observed in the QW with the largest compressive strain (1.06%) and narrowest well width (7nm). This work was supported by the NSF Grants Nos. DMR-0520550 and DMR-088086.

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