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Transport Electron Scattering by Structural Defects in InSb Quantum Wells T.D. MISHIMA, M.B. SANTOS, University of Oklahoma — Among all the binary III-V semiconductors, InSb has the highest electron mobility and the narrowest band-gap. Field effect transistors and magnetic-field sensors are examples of devices based on InSb quantum wells (QWs) that exploit these material properties. In this study, we have investigated electron scattering due to two dominant structural defects, micro-twins (MTs) and threading dislocations (TDs), in InSb QWs grown on GaAs (001) substrates via AlInSb buffer layers. A linear regression analysis shows that the room-temperature electron mobility in InSb QWs has a strong correlation with the densities of both MTs and TDs, with an R^2 value of 0.9791. The MT-originated energy barrier and reflection coefficient for electron conduction in InSb QWs are estimated to be 0.09 eV and 0.33, respectively. The TD-limited electron mobility in InSb QWs is explained by electric charge with a density of 1.3 $\times 10^{-10}$ C/m along a TD line. In addition to further discussion of the data, we will show the derivations of some key equations used for the mathematical analyses. This work was supported by the NSF under Grants Nos. DMR-0520550 and DMR- 0808086.

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