High Mobility InSb Quantum Well with Dislocation Filtering Buffer Layer Grown on GaAs (001) Substrates MADHAVIE EDIRISOORIYA, TETSUYA MISHIMA, MICHAEL SANTOS, University of Oklahoma — A small electron mass makes InSb quantum wells (QWs) with Al$_x$In$_{1-x}$Sb barriers attractive for field-effect transistors, mesoscopic magnetoresistors, and ballistic transport devices. The large spin-orbit effects in InSb make InSb QW structures attractive for spin transport devices. The electron mobility of an InSb QW with an Al$_x$In$_{1-x}$Sb buffer layer is partly limited by scattering caused by crystalline defects that arise from the large lattice mismatch (14.6%) between the epilayers and the GaAs (001) substrate. Our transmission electron microscopy measurements show that Al$_x$In$_{1-x}$Sb/Al$_y$In$_{1-y}$Sb interfaces reduce the concentration of threading dislocations. We observed electron mobilities of 38,000 cm$^2$/Vs and 121,000 cm$^2$/Vs at 300K and 77K, respectively, in an InSb QW grown on a 1.5μm thick Al$_x$In$_{1-x}$Sb buffer layer with two Al$_y$In$_{1-y}$Sb interlayers. These values are 16% and 75% higher at 300K and 77K, respectively, than observed in a structure without interlayers. The improved mobility is apparent in studies of geometrical magnetoresistance in devices with channels that are short and wide.