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Two-dimensional hole systems in InSb and $In_xGa_{1-x}As$ quantum wells CHOMANI GASPE, MADHAVIE EDIRISOORIYA, TETSUYA MISHIMA, MICHAEL SANTOS, University of Oklahoma — CMOS circuits require $p-$type transistors with high hole mobility, in addition to $n$type transistors with high electron mobility. In zinc-blende semiconductors, a narrower band gap leads to smaller effective masses for electrons and holes. We have achieved room-temperature electron mobilities of 10,000 and 40,000 cm^2/Vs in quantum wells made of $In_{0.53}Ga_{0.47}As$ and InSb, respectively. To achieve high hole mobilities, strain and confinement must be maximized. Both parameters increase the energy splitting between holes with light in-plane mass and those with heavy in-plane mass. We have observed a room-temperature hole mobility of 600 cm^2/Vs in InSb quantum wells with remotely Be-doped $Al_xIn_{1-x}Sb$ barriers grown on GaAs substrates by molecular beam epitaxy. We will discuss the effects of strain, structural parameters, and defect density on hole mobility in InSb and $In_xGa_{1-x}As$ quantum wells.

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