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**InSb-based epilayers and quantum wells grown on off-axis and on-axis Ge(001) substrates by MBE**[1] MUKUL DEBNATH, TETSUYA MISHIMA, MICHAEL SANTOS, University of Oklahoma, KHALID HOSSAIN, Amethyst Research Inc., ORIN W HOLLAND, Amethyst Research Inc, UNIVERSITY OF OKLAHOMA TEAM, AMETHYST RESEARCH INC COLLABORATION — The highest electron and hole mobilities in quantum wells (QWs) at room temperature have been observed in QWs made of InSb and Ge, respectively. This provides a motivation for integrating InSb and Ge devices onto a single wafer. We report our investigation of the molecular beam epitaxy (MBE) of InSb epilayers and InSb/$Al_xIn_{1-x}Sb$ QWs on Ge(001) substrates that are on-axis or $6^o$-off-axis. The formation of anti-phase domains (APDs) makes growth of high-quality InSb films on Ge a substantial challenge. Reflection high-energy electron diffraction patterns during growth indicate a two-domain and single-domain reconstruction for epilayers grown on on-axis and off-axis substrates, respectively. The narrowest X-ray rocking curve width is 215 arc sec for a 2.0-$\mu$m-thick InSb epilayer on an off-axis substrate. The room temperature electron mobility of a 4.0-$\mu$m-thick InSb epilayer was 1.5 times higher for growth on an off-axis Ge(001) substrate (53,500 $cm^2$/V-s) compared to growth on an on-axis substrate (34,500 $cm^2$/V-s). These data indicated that APDs are suppressed in the structures grown on off-axis Ge(001) substrates.

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