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Highly Sensitive Micro-Hall Magnetometers Using InSb Quantum Wells SAPTHARISHI EASWARAN, VASYL KUNETS, DOREL GUZUN, YURIY MAZUR, University of Arkansas, MIKE SANTOS, SHEENA MURPHY, University of Oklahoma, GREGORY SALAMO, University of Arkansas, DEPARTMENT OF PHYSICS: UNIVERSITY OF ARKANSAS COLLABORATION, DEPARTMENT OF PHYSICS AND ASTRONOMY: UNIVERSITY OF OKLAHOMA COLLABORATION — Delta doping in the barrier of InSb/$Al_{0.12}In_{0.88}Sb$ heterostructures grown by molecular beam epitaxy are studied as micro-Hall sensors. By varying the doping level and the delta position in the barrier, full control of the two dimensional electron gas confined in InSb quantum well is achieved. For example, we demonstrate control of device parameters such as the absolute magnetic sensitivity, noise level, and device detection limit of a micro-Hall sensor. The 200μm x 35μm device demonstrates a detection limit of 25 nT and 11 nT at 300 K and 80 K, respectively. These limits were measured at the operating frequency of 10 kHz where 1/f noise is negligible. In addition, if spatial resolution is not needed pT detectivity can be achieved using larger sensors on the order of $1mm^2$. The devices discussed here show a low thermal drift that is less than $2\%/^oK$ and attractive signal linearity up to 0.1 T for either polarity of the magnetic field at room temperature.

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