Landau Level Spectrum in In$_{0.53}$Ga$_{0.47}$As/InP Heterostructures

CHI ZHANG, YANHUA DAI, KRISTJAN STONE, RUI-RUI DU, Rice University — We report on magnetotransport results from a high-quality Rashba two-dimensional electron gas (2DEG) formed in undoped In$_{0.53}$Ga$_{0.47}$As/InP heterostructures, which were MOCVD grown on (100) InP substrate. The 2DEG has a density of $n_e \sim 1.1 \times 10^{11}$/cm$^2$ and a mobility of $\mu \sim 2 \times 10^5$ cm$^2$/Vs at $T = 300$ mK, and with illumination from a light-emitting diode, the $n_e$ can be tuned to $1.5 \times 10^{11}$/cm$^2$. A systematic pattern in $R_{xx}$ and $R_{xy}$, corresponding to the opening and closing of the integer quantum Hall gaps, was observed as a function of $n_e$, as well as a function of tilt angle in tilted field experiments. We are interested in the possible observation of resonant spin Hall conductance in this system. Experimental data and a brief discussion will be presented. The work at Rice was supported by NSF DMR-0706634.

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