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Two-Dimensional Electron Transport in Selectively Doped GaAsN/AlGaAs Heterostructures X. BAI, Department of Physics, H.A. MCKAY, Department of Material Science and Engineering, R.S. GOLDMAN, Program in Applied Physics, Department of Material Science and Engineering, C. KURDAK, Department of Physics, University of Michigan, Ann Arbor, MI, 48109 — We have studied two-dimensional electron transport in high quality selectively doped GaAsN/AlGaAs heterostructures grown by molecular beam epitaxy. Four terminal magnetoresistance and Hall measurements are performed on Van der Pauw and gated Hall bar samples in a variable temperature cryostat at temperatures down to 1.6 K. In samples with an approximate nitrogen concentration of 0.02%, we observe integer quantum Hall effect and a well-resolved Shubnikov-de Haas oscillations at magnetic fields down to 0.7 Tesla. We have also observed a sharp negative magnetoresistance feature arising from weak localization effect at low magnetic fields. The electron mobility is found to be around 15,000 $cm^2/V \cdot s$ and weakly dependent on carrier concentration for carrier concentrations above 2.2×10^{11} cm^{-2} and found to be dropping rapidly with decreasing carrier concentration for carrier concentrations below 1.6×10^{11} cm^{-2}. For comparison, we have also studied nitrogen-free heterostuctures; the electron mobilities of these control samples were about an order of magnitude larger. We will discuss the electron scattering due to different types of nitrogen related defects in this material system.

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