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Anisotropy in the Amplitude of Shubnikov-de Haas Oscillations in AlGa_N/Ga_N Heterostructures S. ELHAMRI, R. BERNEY, M. AHOJJJA, G. LANDIS, University of Dayton, W. MITCHEL, W. MITCHELL, Wright Patterson Air Force Base — Variable temperature resistivity and Hall effect measurements were performed on several AlGa_N/Ga_N heterostructures. The temperature dependence of the mobility and carrier density extracted from these measurements indicated the presence of a good quality two dimensional electron gas. At liquid helium temperatures, the carrier density and mobility in these samples ranged from about 2×10^{12} to roughly $1 \times 10^{13} \text{ cm}^{-2}$ and from about 4000 to more than 50000 cm^2/Vs respectively. Variable field magnetoresistance studies were also conducted on several of these van der Pauw shaped samples at 1.2 K in fields up to 8 T. These measurements revealed the presence of Shubnikov-de Haas oscillations in the longitudinal magnetoresistance. However, the amplitude of the Shubnikov-de Haas oscillations originating from perpendicular van der Pauw positions were not isotropic. This anisotropy varied with the carrier density which was changed by illumination. The results of this study suggest that the anisotropy is either a manifestation of spatial carrier density inhomogeneities and/or an indication of a nonuniform scattering mechanism arising from an anisotropic interface roughness.

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