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A Method to Optimize Transport Properties of AlGaN/GaN on Silicon J.D. DANIEL, S. ELHAMRI, R. BERNEY, M. AHOUJJA, Physics, University of Dayton, W.C. MITCHEL, AFRL/MLPS, Wright-Patterson AFB, OH , J.C. ROBERTS, P. RAJAGOPAL, J.W. COOK, JR., E.L. PINER, K.J. LINTHICUM, Nitronex Corporation, 2305 Presidential Drive, Durham, NC — We report on a study to investigate the impact of a thin AlN interlayer on the transport properties of AlGaN/GaN heterostructures grown by MOCVD on silicon substrates. Hall and Shubnikov-de Haas (SdH) measurements were used to compare the transport parameters of the conventional, AlGaN/GaN, structure to those of an AlGaN/AlN/GaN. The results clearly indicate that the interlayer leads to an enhancement of both the mobility and the carrier density. At 300 K, the carrier density and mobility for the conventional structure were roughly 8.57x10^{12} cm^{-2} and 1523 cm^2/Vs, respectively. For the structure containing the AlN interlayer these numbers were 10.03 x 10^{12} cm^{-2} and 1937 cm^2/Vs respectively. While the carrier density remained relatively unchanged down to 10 K, the mobility for the modified structure increased substantially. Shubnikov-de Haas measurements confirmed the presence of a high quality 2DEG in both structures. However, the amplitudes of the SdH oscillations in the conventional structure were higher.

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