Abstract Submitted
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Weak localization and Shubnikov-de Haas oscillation in high carrier density AlInN/GaN heterostructures[1] LEI WANG, Department of Physics and Astronomy, University of South Carolina, SAKIB MUHTADI, Department of Electrical Engineering, University of South Carolina, MING YIN, Benedict College, Columbia, SC, EUN SANG CHOI, National High Magnetic Field Laboratory, Tallahassee, FL , ASIF KHAN, Department of Electrical Engineering, University of South Carolina, TIMIR DATTA, Department of Physics and Astronomy, University of South Carolina, USC COLLABORATION — AlInN/GaN heterostructures are of interest due to the potential application in high power and high frequency electronic devices. Here we report on the electrical and magneto transport studies of high carrier density 2DEG in AlInN/GaN heterostructure from 2K to 280K for fields up to 18T. At low temperatures, Shubnikov-de Haas oscillation at high magnetic fields and weak localization at low fields are observed. From the temperature dependent amplitude of SdH oscillation and Dingle plot, the effective mass of electron is extracted as m*=0.2327me, and quantum scattering time 0.035ps. Consistent with weak localization, the conductivity increases with increasing magnetic field at low fields. We find electron-electron interaction is dominant below 20K. With the increasing temperature, the scattering changes from acoustic phonon to optical phonon scattering. Consequently, throughout the temperature range studied the carrier mobility decreases as the temperature increases.

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