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Electron transport in doped GaAs nanowires contacted by evaporated metal films[1] ZHUTING SUN, ANDREI KOGAN, Univ of Cincinnati, TIMOTHY BURGESS, CHENNUPATI JAGADISH, Australian National University — We present electron transport measurements in doped GaAs nanowire samples contacted by metal interfaces as function of temperature. We show that the contact resistance is strongly dependent on T ($5K < T < 300K$), even though the resistance of the moderately doped nanowires ($N_D \approx 10^{18}\ cm^{-3}$), as expected, display little or no variation with T. We further show that the classical treatment of the Schottky barriers by Padovani and Stratton [1] fails to adequately describe the temperature dependence of the metal-nanowire interface, and present a corrected model that takes into account charge distribution in the contact region and the effect of the surface states on the nanowire. The nanowires, 100 nm in diameter, were grown by MOCVD growth method. The metal contacts, a 20nm Ti/ 300nm Al films were deposited via e-beam and thermal evaporation. We perform a detailed comparison between data on 9 nominally identical samples to the modified theory and find a good agreement. We also show how the measurement can be used to obtain an estimate of the effective doping density and the mobility of the nanowire. [1]: F.A. Padovani, R. Stratton, Field and thermionic-field emission in Schottky barriers, Solid-State Electronics, Volume 9, Issue 7, 1966

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