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Gate Dependent One-dimensional Transport in In2O3 Nanowires FEI LIU, MINGQIANG BAO, KANG L WANG, Department of Electrical Engineering, University of California at Los Angeles, Los Angeles, California 90095-1594, CHAO LI, BO LEI, CHONGWU ZHOU, Department of Electrical Engineering, University of Southern California, Los Angeles, California 90089 — The gate-dependent one-dimensional transport of single- crystalline semiconducting In_2O_3 nanowire field effect transistors is studied at low temperature by measuring I-V and differential conductance. The In_2O_3 nanowires were synthesized by a laser ablation process to have a diameter of 10 nm and a length of 2 μ m. Back gate was formed using a highly-doped silicon substrate with a gate oxide thickness of 0.5 μ m. At a smaller positive gate bias, gaps at near zero source-drain bias were observed for both current and differential conductance spectra due to the absence of the density of states in the source-drain energy window. The transport can be explained by Fermiliquid theory. On the other hand, when the Fermi energy of the nanowire moves up into the conduction band, the differential conductance of the semiconducting In_2O_3 nanowire exhibits zero-bias anomalies, following a power-law behavior similar to one-dimensional Luttinger-liquid. These results suggest that electron-electron interaction must be taken into consideration for the understanding of transport of nanowires at low temperature under a large gate bias.

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