

Design, Simulation and Analysis of inverter gate based on Semiconductor Nanowire Field Effect Transistors in Silvaco to improve circuit performance based on device engineering

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Design, Simulation and Analysis of Inverter Gate Based on Semiconductor Nanowire Field Effect Transistors in Silvaco to Improve Circuit Performance Based on Device Engineering Abstract: In this thesis, we dealt with the simulation and analysis of inverter gate based on semi-conductor nanowire field effect transistors to boost its quality and improve the performance based on the device engineering. At first, we ed the simulated device in the circuit and device simulator (mixedmode) in silvaco, then the device behavior in inverter gate was investigated. Due to the improvement in circuit efficiency and increase in the inverter gate response rate, the circuit behavior was studied with changes in device specifications such as oxide thickness, oxide material change, surface change of the channel fluctuation and variation in fluctuation level on both sides of the source and drain. According to the results, among the changed specifications in the device, oxide material change and the increase in the level of channel fluctuation had the greatest impact on the inverter gate response, So we proposed a circuit model for transistor which has a very high response rate in the inverter gate circuit in addition to have a very low threshold voltage.

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