A Study of Characterization and Analysis in P-Channel Flash Memory Devices

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ABSTRACT

Abstract The flash memory is a better choice than others in the nonvolatile memory market, therefore, it will be much valuable for us to investigate its characteristics, and there are lots of researches about it. Recently, the research of flash memory, the focus is always concentrated on the threshold voltage shift due to programming or erasing operation, data retention time, data endurance, programming efficiency, erasing speed, and so on. This benifits higher device reliability, speed, and integrity. The nonvolatile memory devices have the capability to store the informations. The most used programming method is F-N tunneling scheme or channel-hot-electron(CHE) scheme overcoming the floating gate barrier. It is very convenient for N-channel flash memory to program by positive gate bias. So that P-channel flash memory is less attracted to researchers. The data storage is mainly determined by the charges on the floating gate. Such that if the change of charge on the floating gate can be accurate to predict, then the shifting of devices threshold voltage and the data storage or not can be discriminated. Therefore in this thesis, we will investigate the threshold voltage alteration during the programming and erasing operation of the submicron P-channel flash memory. And, a comparison in both types is also maded. In this submicronmeter P-channel flash memory devices, the programming model, which is called Channel-Hot-Hole-Induced-Hot-Electron Current Model, to simulate the charge injection in the flash memory is used. For erasing operation, a well-known model, Fowler-Nordheim Electron Tunneling Model, will be used during theoretical simulation.

Keywords : Flash Memory ; P-channel ; program ; erase ; threshold voltage ; F-N tunneling ; impact ionization

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