Abstract

The experimental structure is Al/TiN/ZrN/ZrO_2/Zr-cap/Al_2O_3/GeO_2/n-Ge with a width 400 μm length 5 μm and width 400 μm length 10 μm. The reliability of this device is analyzed by the reliability of Time Dependent Dielectric Breakdown (TDDB) and Negative Bias Temperature Instance (NBTI). TDDB is the use of constant stress voltage in the accumulation mode for measurement. The results of the Weibull distribution analysis showed that the β value was 2.269. And through the V model to predict the distribution of this device after ten years. The experimental results also show that the leakage current of this element is dominated by charge trapping. NBTI is a given negative stress voltage, the measurement time to 0 seconds to 5000 seconds for constant stress voltage test. The results of the threshold Voltage(V_{th}) and the saturation current ($I_{D, SAT}$) were used to predict the lifetime of the device by using the V model and the Power Law model. Finally, we compare the results of two different lengths to know that NBTI is independent of the length channel of the stress voltage.

Keywords: TDDB 、NBTI 、charge trapping 、V model 、power law model 、lifetime