

Vertical Strained Impact Ionization MOSFET (VESIMOS) Technology Approach for Based Biosensor Applications using its Behavioral Model

Abstract

This paper gives an overview about uniqueness characteristics of Vertical Strained Impact Ionization MOSFET (VESIMOS) technology act as bio-sensing devices. There are three proposed devices used VESIMOS technology which are Single Channel VESIMOS (SC-VESIMOS), Dual Channel (DC-VESIMOS), VESIMOS Incorporating Dielectric Pocket (VESIMOS-DP) are probably can become feasible candidates as biosensor devices. The selected devices from three structures was further analyzed for its behavioral model. The extracted parameter from the device simulations was used to design the circuitry model to represent the characteristic and behavior of the selected devices in circuit implementation. The best characteristic of the device shown by DC-VESIMOS and selected for further analysis. The behavioral model or equivalent circuit model of DC-VESIMOS used PSPICE circuit simulator. Main prerequisite of biosensor device are high sensitivity, faster response, and high reliability which represented by the VESIMOS structures. Low subthreshold swings present the sensitivity of the devices shown by DC-VESIMOS are 11.48 mV/dec and 10.53 mV/dec from TCAD and PSPICE results respectively.