Optimal Nano-Dimensional Channel of GaAs-FinFET Transistor

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ABSTRACT

This paper investigates the optimal nano-dimensions channel for Gallium Arsenide Fin Field Effect Transistor (GaAs-FinFET) based on I_{ON}/I_{OFF} ratio and subthreshold swing (SS). The impact of reducing channel dimensions (length, width, and oxide thickness) on GaAs-FinFET performance has been evaluated in terms of various electrical characteristics (I_{ON}/I_{OFF}, SS, VT and DIBL). The MuGFET simulation tool is used in this study to simulate the current-voltage characteristics for different dimensions of channel. According to highest I_{ON}/I_{OFF} ratio, and nearest SS to the ideal SS, the best channel dimensions of GaAs-FinFET are designed. The results show that the best performance can be achieved with the lowest scaling factor, K of 0.25, when the length is 40 nm, the width is 3 nm, and the oxide thickness is 1 nm.

KEYWORDS: FinFET; ION/IOFF ratio; subthreshold swing

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