Enhancement of the Performance of TFET using Asymmetrical Oxide Spacers and Source Engineering

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Abstract

In this paper, some techniques to enhance the performance of the tunneling field effect transistor (TFET) devices are studied. Two proposed techniques, which could be used simultaneously to improve the performance of TFET, are presented. The first technique is using different oxide materials for the spacers over the drain and source. The second technique is to select a different material of the source other than Si. The study is based on the DC ID-VGS characteristics as well as the high frequency characteristics regarding the capacitance and cut-off frequency. It was found from this study, that it is advantageous to use different materials for the spacers. The materials chosen for this work are HfO2 as the spacer over the source and SiO2 over the drain. It is also shown that using Ge as a source material provides the best performance. The criterion of the choices presented in this paper is based on providing higher ON current and lower ambipolar current and higher cut-off frequency.

References