

TCAD Simulation Study of Single, Double, and Triple Material Gate Engineered Trigate FinFETs

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A detailed comparative performance analysis of the Trigate Fin Field Effect Transistor (FinFET) device with different structures such as Single-Material Gate (SMG) FinFET, Double-Material Gate (DMG) FinFET, and Triple-Material Gate (TMG) FinFET has been done. Silvaco Atlas Technology Computer Aided Design (TCAD) tool is used to model the Trigate FinFET device structures and to characterize all the electrical parameters of the device. The simulation results confirm that TMG FinFET device structure shows better performance than SMG and DMG FinFET device structures, in terms of device electrical parameters such as surface potential, electric field, and drain current. Moreover, TMG FinFET device structure exhibits an excellent transconductance of $0.28 \mu\text{A/V}$ when compared with SMG FinFET ($0.21 \mu\text{A/V}$) and DMG FinFET ($0.24 \mu\text{A/V}$).

Keywords: TCAD, Trigate FinFET, drain current, transconductance, output conductance.

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