Comparative Study of Different Material Tri-Gate MOSFET with Dielectric Material

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Abstract

In this paper, a near investigation of the design of the TG MOSFET tri-gate metal oxide semiconductor field effect transistor device utilizes the SILVACO TCAD. SILVACO TCAD will be widely utilized for circuital plan and authorization. Device simulator system ATLAS is utilized. ATLAS tool, utilizes a single-material-gate (SMG), a double-material- gate (DMG), and three-material-gate (TMG) tri-gate MOSFET (TGMOSFET), respectively, with hafnium dioxide HfO_2 as dielectric materials are utilized. It shows a traditional model and better DC, AC execution of the tri-material-gate design, creates a high drive flow of the three-material-gate TGMOSFET with dielectric, and shows better electrical qualities contrasted with other device structures. In this paper, all the device boundaries of single-, dual-, and tri-material-gate TGMOSFETs are determined exhaustively, and HfO_2 and SiO_2 are dielectrics. HfO_2 is utilized to expand the gate capacitance in the device, subsequently expanding the drive current. Therefore, the presentation of the device can be improved. Analyze electrical boundaries like electric field, surface potential, electronic mobility, and flow thickness with HfO_2 as a dielectric. A correlation of channel flow, transconductance, and output conductivity between these models with dielectric is contemplated.

References