



Scienxt Journal of Emerging Technologies in Electronics Engineering
Volume-2 || Issue-1 || Jan-Apr || Year-2024 || pp. 1-13

Dual gate dielectrically modulated both sided cavity TFET biosensor using III-V Compound Semiconductor performance analysis

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Abstract:

An extensive analysis of dielectrically modulated TFET based biosensor has been done. Cavity on both side of the gate oxide is introduced, to make sure the biomolecules in the sensor cavity can cover more area over the gate-oxide channel interface. It will help to increase the electric field intensity at gate channel interface. III-V compound semiconductor is used here for the direct band gap nature and higher mobility of the carriers. Device parameters like ON-current (I_{ON}), Threshold voltage (V_{TH}), ON-OFF current ratio (I_{ON}/I_{OFF}), subthreshold swing (SVTH) all are recorded for different dielectric constant (K) and different charge density. A comprehensive analysis of the device parameter and device sensing ability has been done by considering various charge density inside the cavity.

Keywords— Dielectrically Modulated Tunnel Field Effect Transistor (DM-TFET), Dielectric Constant (K), ON-Current (I_{ON}), Threshold Voltage (V_{TH}), Subthreshold Swing (SSVTH), ONOFF current ratio (I_{ON}/I_{OFF}), Sensing ability.