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Analysis of Cylindrical Double Gate Junctionless Carbon Nanotube Field Effect Transistor (JL-CNTFET) for Sensing Applications

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Abstract

The authors have designed a novel cylindrical Double Gate Junctionless Carbon Nanotube Field Effect Transistor (JL-CNTFET) with core gate and shell gate as well as homogeneous source, channel, and drain. Due to homogeneous doping, the problems of junction resistance are reduced and doping gradient is also not required. We aim to demonstrate the effect of plasma parameters on performance of the designed device. We analyze various properties of the proposed device, such as transconductance, output conductance, early voltage, and cutoff frequency at different plasma parameters, corresponding to various values of different channel radius. Lower plasma parameter values are important for higher drain current, higher output conductance, and lower cutoff frequency. Finding the optimal balance of plasma parameters is crucial for the best device performance. The device's efficiency can be increased by altering plasma parameters. This will lead to a better performance and real-life application. The proposed device can be utilized well for biosensing applications. The results obtained through simulated device are in good agreement with the existing experimental observations.

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