## عنوان مقاله:

Ballistic (n,0) Carbon Nanotube Field Effect Transistors I-V Characteristics: A Comparison of

## محل انتشار:

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## خلاصه مقاله:

Due to emergence of serious obstacles by scaling of the transistors dimensions, it has been obviously proved that silicon technology should be replaced by a new one having a high ability to overcome the barriers of scaling to nanometer regime. Among various candidates, carbon nanotube (CNT) field effect transistors are introduced as the most promising devices for substituting the silicon-based technologies. Since the channel of these transistors is made of CNT then its properties, such as chiral vector, have prominent effects on determining the performance of devices. In this paper the CNT diameter impact on tunneling and thermionic emission (TE) currents of a coaxially-gated carbon nanotube field effect transistor (CNTFET) with doped source/drain extensions is investigated. The source/channel/drain of this transistor are a zigzag CNT with (n,0) chirality. The n value could be in the form of n = 3a + 1 or n = 3a + 2. By increasing the a , the diameter increases while the energy band gap EG of the CNT decreases; as a result by increasing the a value, the on/off current ratio decreases. However, for n = 3a + 2 the EG of a CNT shows a higher value; then at a given a , for n = 3a + 1 the on/off current ratio may decrease due to a lower EG and hence higher tunneling and TE current. Generally, subthreshold swing improves and threshold voltage increases for a lower diameter device; consequently, the leakage current could diminish. ON-state current and output conductance have higher values for a higher diameter. Also, the difference between EG and hence the I-V characteristics of the device with n = 3a +1 and n = 3a + 2 is negligible for a higher diameter value. All the results could be justified based .on the energy-position resolved electron density and current spectrums on energy band diagram of the device

## کلمات کلیدی:

,Carbon Nanotube.,Voltage Effect Transistor,Channel Diameter,Device Performance,Quantum Simulation

## لینک ثابت مقاله در پایگاه سیویلیکا: