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Carbon Nanotube Field Effect Transistor - a Review

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Abstract : The crowning advances in Silicon based electronic technology have dominated the computation world for the past decades. The captivating performance of Si devices lies in sustainable scaling down of the physical dimensions, by that increasing device density and improved performance. But, the fundamental limitations due to physical, technological, economical, and manufacture features restrict further miniaturization of Si based devices. The pit falls are due to scaling down of the devices such as process variation, short channel effects, high leakage currents, and reliability concerns. To fix the above-said problems, it is needed either to follow a new concept that will manage the current hitches or to support the available concept with different materials. The new concept is to design spintronics, quantum computation or two terminal molecular devices. Otherwise, presently used well known three terminal devices can be modified with different materials that suits to address the scaling down difficulties. The first approach will occupy in the far future since it needs considerable effort; the second path is a bright light towards the travel. Modelling paves way to know not only the current-voltage characteristics but also the performance of new devices. So, it is desirable to model a new device of suitable gate control and project the its abilities towards capability of handling high current, high power, high frequency, short delay, and high velocity with excellent electronic and optical properties. Carbon nanotube became a thriving material to replace silicon in nano devices. A well-planned optimized utilization of the carbon material leads to many more advantages. The unique nature of this organic material allows the recent developments in almost all fields of applications from an automobile industry to medical science, especially in electronics field-on which the automation industry depends. More research works were being done in this area. This paper reviews the carbon nanotube field effect transistor with various gate configurations, number of channel element, CNT wall configurations and different modelling techniques.

Keywords : array of channels, carbon nanotube field effect transistor, double gate transistor, gate wrap around transistor, modelling, multi-walled CNT, single-walled CNT
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