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Title:

Design of an Electronic Nanodevice with the DNA Backbone and Carbon Nanotubes.

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Abstract:

Semiconducting electronic devices are designed from the junctions of two materials whose electronic properties contribute to electric conduction. Each junction, when submitted to an electric tension (polarization), responds non-linearly and antisymmetrically, thus allowing electric conduction at a determined voltage level, with a preferential direction [1-2]. Organic materials are alternatives to new combinations of electric, thermal and synthesis properties for the devices. Studies made indicate the possibility of electrical conduction by the DNA, with damaged (modified) parts presenting different electric behaviors. These behaviors are due to interactions of its electronic properties [3]. In this work, it is done the study of the electronic transport properties of a semiconducting material designed from two organic materials, the DNA backbone and a carbon nanotube (SWCNT) as electrodes [3-4]; with the backbone and the nanotube kept at a distance (without effective connection between the electrodes and the DNA backbone), thus configuring a molecular junction by tunneling. All computational work has been done by means of the SIESTA method [5]. As results, it was obtained the density of electronic states (DOS), the transmission, and the respective currents form each voltage to which the system was submitted, both in the direct and the reverse polarization, and the conduction eigenchannels for the direct polarization. From those results, the I-V and conductance curves of the device were plotted, as well as the respective eigenchannel configuration for specific voltage points.

Keywords: Electronic transport; DNA backbone; Carbon nanotube;

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