INFLUENCE OF VIBRATIONAL MODE ON THE ELECTRONIC PROPERTIES OF DNA MOLECULE IN LADDER MODEL

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Within the class of biopolymers, DNA is expected to play an outstanding role in molecular electronics. We studied the electron transport properties in single DNA molecules considering a metal/DNA/metal system using model Hamiltonian method based on the tight-binding Hamiltonian for the ladder model of DNA [1]. Now Current-voltage relation, density of state and conductance study with vibration (a diagram) and without vibration (b diagrams) and compare with together [2, 3].

(Figure1) (Figure2) (Figure3)

Figure1: with vibration the energy gap and conductance are considerably decreasing. 
Figure2: with vibration the energy gap is decreasing and density of state is increasing. 
Figure3: with vibration the energy gap and current-voltage characteristic are decreasing.

Our results suggest a good agreement with the electronic structure of the DNA in the ladder model, additional presented a technique that allows the computation of electron transport in DNA, including local and nonlocal coupling to vibrations. And with vibration we can increase semiconducting behavior in our system.

References: