

ENVIRONMENTAL EFFECTS ON ELECTRIC PROPERTIES OF DNA MOLECULE

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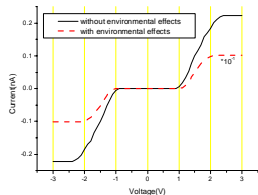
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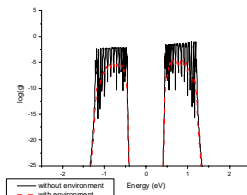
We examined here the problem of electronic conduction between two metallic leads via a DNA molecule. The formal analysis is accomplished through the use of T-matrix formalism of scattering theory and Löwdin's partitioning technique. We calculated conductance, DOS and I-V characteristics for a T.B model in the limit of small applied voltages. Considering Büttiker's idea for inelastic scattering, we included environmental effects in our calculations and the results compared with the data in absence of environmental effects.

We used a ladder model for the molecule in this work and assumed that the ends of the molecule are connected to two metal leads. We described the environment by phase-breaking processes on the bases which modeled by coupling each base of DNA to a fictitious electronic reservoir. [1,2] Eliminating the degrees of freedom, the electrodes and dephasing reservoirs can be described by semi-infinite one-dimensional tight-binding chains and we may substitute related self-energy terms and write the effective Hamiltonian of total lead/DNA/lead system. We calculated the conductance, the local DOS on the wire sites and the I-V characteristics exploiting Green's function method [1,3].

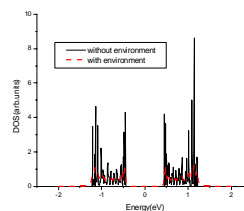
Fig 1, 2 and 3 illustrate our results. A drastic decrease in conductance is noted with environment. Inclusion of environment have no influences on constructional properties of the system.



(Fig. 1)



(Fig. 2)



(Fig. 3)

References

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