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Renormalized Couplings and the Insulator and Metallic Behavior of Double-Stranded DNA[1] EFTA YUDIARSAH, SERGIO E. ULLOA, Ohio University — Electronic transport in double-stranded DNA is studied using a ladder model in a tight-binding Hamiltonian, withRealistic on- site energies [1] and hopping constants [2]. The effect of DNA molecules coupling to leads is studied on periodic poly (dG)-poly(dC) sequences with an embedded TGGGGT defect group. The differential conductance features diminish gradually and vanish at small coupling. The influence of counter-ions, local fields, and interaction with phonons can renormalize the hopping constants; we study the role of increasing intra-strand hopping on λ-phage DNA sequences. Increasing coupling results in the electronic transport of λ-sequences to change from insulator to metallic. Differential conductance dI/dV at low bias is vanishingly small for bare hopping constants found in the literature [2], and increases rapidly if they are enhanced by more than 5 times. Even at large uniform intra-chain coupling (1 eV), dI/dV drops drastically at low bias for sequences longer than 300 base pairs. Electron-phonon interactions are also considered. The diagonal (local) interaction results in polaronic effects while the non-diagonal terms yield phonon- assisted hopping. [1] S. Roche, Phys. Rev. Lett. 91, 108101 (2003). [2] A. A. Voityuk *et al.*, J. Chem. Phys. 114, 5614 (2001).

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