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VIII ВСЕРОССИЙСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНЫМ УЧАСТИЕМ, ПОСВЯЩЕННАЯ 50-ЛЕТИЮ ОСНОВАНИЯ ИНСТИТУТА ХИМИИ НЕФТИ

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VIBRON DRESSING IN THE THREE PARALELL MACROMOLECULAR CHAIN STRUCTURE

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The macromolecules like DNA as well as other biological structures that consist of several parallel macromolecular chains play important role in the process of bioinformation transmission in living cells [1]. On the other hand, due to its good features in the field of miniaturization of microelectronic and optoelectronic devices, there appears a renewed interest for application of such structures in construction of nanocrystals, nanowires, and molecular circuits.

Earlier, the properties of both the intramolecular vibrational excitation (vibron) in a quasi 1D macro-molecular structure, and the case of two macromolecular chains. were studied in our papers [9-11], in part, within improved Holstein molecular crystal model [2,3,4]. There it was supposed that due to the vibron interaction with optical phonon modes, vibron form partially dressed small polaron states. The properties of these states were investigated, in dependence on basic system parameters and temperature of a thermal bath

In this work, we studied the properties of the single intramolecular vibration excitation in the structure consisted of three parallel macromolecular chains. We again assumed that the vibration dressing occurs due to the vibrational excitation with optical phonon modes. The influence of the thermal bath temperature and the dipole-dipole interaction between nearest neighbouring structure elements on the quasiparticle properties was considered. In order to examine the influence of the strength of interaction coupling on the vibration dressing, we employed partial dressing method. We found that the vibration dressing continuously exchanges, from slightly dressed, practically free excitation, to heavy dressed small polaron excitation. Obtained results are compared to one predicted to standard small polaron theory [2-7].

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