Vibron properties in quasi 1D molecular structures: the case of two parallel unshifted macromolecuar chains

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We study the hopping mechanism of the vibron excitation transport in the system of two parallel unshifted 1D macromolecuar chains in the framework of non adiabatic polaron theory. We suppose that the vibron interaction with thermal oscillations of the macromolecular structural elements will result in vibron self-trapping and the formation of the partial dressed vibron state. We also suppose that quasi-particle motion takes place via a sequence of random sitejumps, in each of which the quasiparticle can hop to a first neighbor site of the macromolecular chain. With use of the modified Holstein polaron model, we calculate vibron effective mass and mobility in dependence of the basic system parameters and temperature. Special attention was paid to the influence of interchain coupling to vibron dressing. We find that for certain values of the system parameters quasiparticle properties abruptly changes, and at the same time the probability of the quasiparticle hopping from one to its neighbor macromolecular site abruptly decreases.