The coupling of Frenkel excitons (FEs) and intramolecular vibrations in an organic layer as a part of microcavity has been studied in the paper. Two cases are treated: a) uniaxial layer of point group 4 (optical axis is supposed perpendicular to the layer); b) monoclinic anthracene-like layer with monoclinic axis b perpendicular to the layer. The exciton-phonon coupling produces the vibronic wings with complex spectra which can contain bound exciton-phonon states and many-particle (unbound) bands. Consequently in those regions the absorption lines and the resonance members in dielectric tensor appear. We treat theoretically their effects on the polaritons in the microcavity and illustrate using numerical calculations the peculiarities of the polaritonic spectra in the vibronic wings of Frenkel excitons.

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Spectral functions of the Holstein polaron: exact and approximate solutions

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It is generally accepted that the dynamical mean field theory (DMFT) gives a good solution of the Holstein model [1], but only in dimensions greater than two. Here we show that the DMFT, which becomes exact in the weak coupling and in the atomic limit, provides an excellent numerically cheap approximate solution for the spectral function of the Holstein model in the whole range of parameters even in one dimension. To establish this, we made a detailed comparison with the spectral functions that we obtained using newly developed momentum-space numerically exact hierarchical equations of motion method, which yields electronic correlation functions directly in real time [2]. We crosschecked these conclusions with our path integral quantum Monte Carlo and exact diagonalization results, as well as with the available numerically exact results from the literature [3].

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