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Peculiarities of exciton bandwidth in double semiconductor quantum wells with diluted magnetic layers

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The exciton scattering in double quantum wells, some layers of which are formed by ternary semiconductor alloys (like, for example, $Cd_{1-x}Mn_xTe$, $Zn_{1-x}Mn_xSe$), is considered. In such disordered layers the scattering is caused primarily by the interaction of the carriers with the fluctuations of impurity concentration and (in a case of diluted magnetic semiconductors) with the fluctuations of magnetic ion spin projections. In the structures containing both ordered and disordered layers the probability of the scattering depends on the degree of the exciton wavefunction localization in the disordered layers, where it interacts with the fluctuations.

It is shown [1] that for some parameters of the structure the exciton wavefunction can penetrate deeply into the ordered layers of the structure that leads to a sharp decrease of the probability of the scattering. Particularly, the probability of the scattering in the system with the disordered quantum wells of the equal widths essentially drops: in this case the penetration of the wave function in the ordered barrier layers of the structure is maximal that decreases the effect of the fluctuations in the disordered layers and, as the result, essentially decreases the excitonic optical bandwidth.

In diluted magnetic semiconductors, where parameters of the structure can be tuned by the external magnetic field, the same effect can be reached by tuning of the one particle levels in the quantum wells by external magnetic field that also lead to the delocalization of the wave function and to the narrowing of the optical bands.

1. *G.V.Vertsimakha,* Peculiarities of exciton scattering in double semiconductor quantum wells with disordered layers// Semiconductor physics, quantum electronics and optoelectronics.- 2015. -18.- P. 110-114.