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Abstract:

We investigate the homogeneous linewidth of localized type-I excitons in type-II GaAs/AlAs superlattices. These localizing centers represent the intermediate case between quasi-two-dimensional (Q2D) and quasi-zero-dimensional localizations. The temperature dependence of the homogeneous linewidth is obtained with high precision from micro-photoluminescence spectra. We confirm the reduced interaction of the excitons with their environment with decreasing dimensionality except for the coupling to LO-phonons. The low-temperature limit for the linewidth of these localized excitons is five times smaller than that of Q2D excitons. The coefficient of exciton-acoustic-phonon interaction is 5 ~ 6 times smaller than that of Q2D excitons. An enhancement of the average exciton-LO-phonon interaction by localization is found in our sample. But this interaction is very sensitive to the detailed structure of the localizing centers.