EXCITON BANDWIDTH IN DILUTE MAGNETIC SEMICONDUCTORS WITH QUANTUM WELLS: INFLUENCE OF INTERFACE ROUGHNESS AND SPIN-FLIP PROCESSES

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S u m m a r y

The influence of interface roughness and spin-flip processes on the exciton bandwidth and absorption optical spectra in quantum wells in dilute magnetic semiconductors is studied theoretically. The interface roughness is studied under the assumption that there are islands with magnetic impurities in the non-magnetic layers near interfaces. These islands have form of disks and the radii of disks are less than the exciton radius. The calculations for a CdMnTe/CdTe/CdMnTe quantum well have shown that different components of the spectrum have different dependence of the bandwidth on a magnetic field: the bandwidth of the σ^--component of the exciton transition increases as the magnetic field rises while it decreases for the σ^+-component. This phenomenon is explained by a coherent summation of the spin-dependent and spin-independent parts of the interaction between an exciton and a magnetic impurity. Numerically, the value of the bandwidth depends on the number of defects, radii of islands, and their distribution over radii and may reach 1—10 meV. It is shown that the contribution of inelastic spin-flip scattering to the exciton bandwidth is small.