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Resonant Raman scattering in nanostructures with InGaAs/AlAs quantum dots

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Abstract Raman scattering by optical phonons in $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{AlAs}$ nanostructures with quantum dots has been studied experimentally for compositions corresponding to $x = 0.3-1$ under out-resonance conditions. Features due to scattering by GaAs- and InAs-like optical phonons in quantum dots have been detected, and the phonon frequencies have been determined as a function of the dot composition. With increasing excitation energy, a red shift is observed in the frequency of the GaAs-like phonon in quantum dots, which testifies to Raman scattering selective by the size of quantum dots. Under resonant conditions, multiphonon light scattering by optical and interface phonons is observed up to the third order, including overtones of the first-order phonons of InGaAs and AlAs materials and their combinations.

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