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Resonant Raman scattering by strained and relaxed germanium quantum dots

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Abstract This paper reports on the results of resonant Raman scattering investigations of the fundamental vibrations in Ge/Si structures with strained and relaxed germanium quantum dots. Self-assembled strained Ge/Si quantum dots are grown by molecular-beam epitaxy on Si(001) substrates. An ultrathin SiO_2 layer is grown prior to the deposition of a germanium layer with the aim of forming relaxed germanium quantum dots. The use of resonant Raman scattering (selective with respect to quantum dot size) made it possible to assign unambiguously the line observed in the vicinity of 300 cm^{-1} to optical phonons confined in relaxed germanium quantum dots. The influence of confinement effects and mechanical stresses on the vibrational spectra of the structures with germanium quantum dots is analyzed.

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