Laser irradiation effects on the CdTe/ZnTe quantum dot structure studied by Raman and AFM spectroscopy

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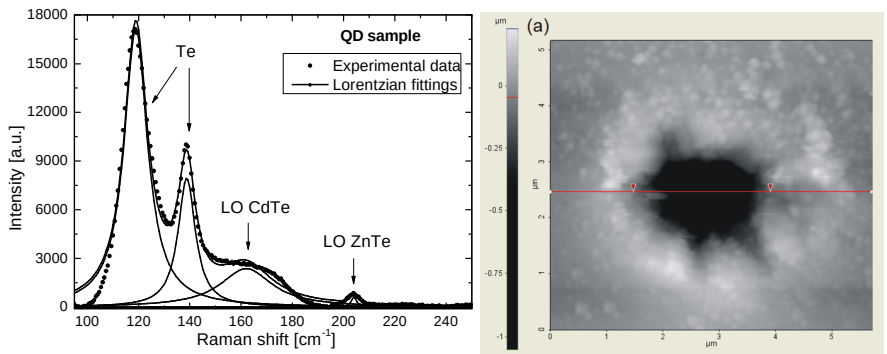
Micro-Raman spectroscopy has been applied to investigate the impact of laser irradiation on semiconducting CdTe/ZnTe quantum dots (QDs) structures. A reference sample (without dots) was also studied for comparison. Both samples were grown by molecular beam epitaxy technique on the *p*-type GaAs substrate. The Raman spectra have been recorded for different time of a laser exposure and for various laser powers. The spectra for both samples exhibit peak related to the localized longitudinal (LO) ZnTe phonon of a wavenumber equal to 210cm^{-1}. For the QD sample a broad band corresponding to the LO CdTe phonon related to the QD-layer appears at a wavenumber of 160cm^{-1}. With increasing time of a laser beam exposure and laser power the spectra get dominated by tellurium - related peaks appearing at wavenumbers around 120cm^{-1} and 140cm^{-1}. Simultaneously the ZnTe surface undergoes rising damage, with the formation of Te aggregates at the pinhole edge as reveal AFM observations. Local temperature of irradiated region has been estimated from the anti-Stokes/Stokes ratio of the Te modes intensity and it was found to be close or exceeding ZnTe melting point. Thus the laser damage can be explained by the ablation process.



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