

TEMPERATURE DEPENDENCE
OF RAMAN SPECTRA OF SILICON
NANOCRYSTALS IN OXIDE MATRIX

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S u m m a r y

The temperature dependence of the Raman spectra of silicon nanocrystals (nc-Si) in a SiO_x matrix has been studied. The temperature evolution of the phonon spectra is considered as a result of the combined influence of the phonon-confinement effect, anharmonic phonon coupling, thermal expansion, and thermoelastic strains. The gradual relaxation of thermoelastic tensile strains in nc-Si with increase in the temperature is demonstrated. The effect of the laser heating on the Raman spectrum is studied, and the linear dependence of a local temperature in nc-Si on the power density of the exciting laser radiation is determined. The differences between the temperature dependences of the Raman spectra obtained at the thermal and local laser heatings of the nc-Si specimens are analyzed.