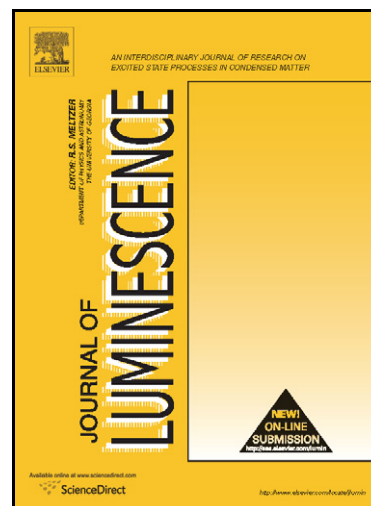


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The optical absorption coefficient and refractive index changes of aspherical quantum dot placed at the center of a cylindrical nano-wire

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Keywords: Refractive index, Absorption coefficient, Spherical quantum dot, Nano-wire

Abstract

In this study, the optical properties of an InAs spherical quantum dot placed at the center of a GaAs cylindrical nano-wire are investigated. The wave functions and the corresponding energy eigenvalues are numerically calculated in the framework of the effective mass approximation using finite element method. The behavior of the linear, third-order nonlinear, the total optical absorption coefficients and optical refractive index changes are studied in detail, as a function of the incident photon energy for different geometric parameters, incident photon intensities and relaxation times by means of the compact density matrix approach. The results show that as the dot radius, nano-wire radius and nano-wire height increase both red and blue shifts appear. Moreover, the results also show that the relaxation time and the incident optical intensity have great influences on the absorption coefficient and refractive index changes.

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