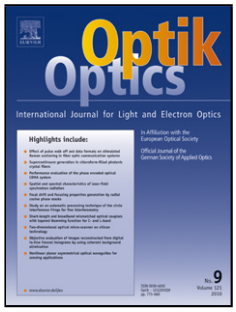

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Third nonlinear optical susceptibility of CdS/ZnS Core-Shell spherical quantum dots for optoelectronic devices

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Abstract:

In this paper, we have investigated the optical properties of CdSe/ZnS core shell quantum dot. The carriers wave functions and eigenenergies have been obtained by solving the three dimensional Schrödinger equation under the frame work of the effective-mass envelope-function theory. Then we have calculated the nonlinear susceptibilities associated with intersubbandtransitions in the conduction band for CdS/ZnS spherical quantum dots. In addition, we have also investigated theoretically the third order susceptibilities for quadratic electro-optic effects as a function of the core, shell radii, pump photo-energy and time relaxation. Numerical calculations revealed that susceptibilities have one peak (resonance) and depend on the parameters already mentioned. Indeed, by increasing the width of shell, the peaks of susceptibilities will be red shifted and the intensities will in fact increase as functions of pump photon energy. The obtained results can give a new degree of freedom in optoelectronic device applications.

Keywords: Core/shell nanostructures, Quantum dots, third order nonlinear Susceptibility.