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Theoretical investigation on linear and nonlinear optical properties of a core/shell/matrix structure

Nabil Zeiri

Kiarouan University, Tunisia

Biography

Nabil Zeiri is an Assistant Professor at Kiarouan University. He is also a Chairman of the Committe of Assisting Contrat ay Kiarouan University.

Abstract

The recent progress accomplished in crystal growth methods has made it possible the fabrication of zero dimensional 0D nano-systems such as quantum dots QD and quantum crystallites. These particular nanostructures can be synthesized by precipitation in either isolating or semiconducting matrices or even in organic liquids [1,2]. Encapsulating the QD with a host material such as PVA (poly-vinyl alcohol), PMMA (poly-methyl methacrylate), PE (poly-ethylene), PVP (poly-vinyl pyrrolidone), SiC (silicon carbide), Si3N4 (silicon nitride) and SiO2 (silicon dioxide) is usually required [3-5] is order to assure the QD stabilization and even bring up new properties that were absent.

We have theoretically investigated the linear and nonlinear properties in the framework of the effective-mass approximation for core/shell quantum dot surrounded by different dielectric matrices. Our numerical calculations depicted that peaks of dielectric function are strongly affected by the presence of dielectric matrix. In addition, our findings revealed clearly that peaks can be enhanced and experience a red or blue shift with the appropriate dielectric environment. It is also indicated that the presence of the dielectric mismatch in the QD-matrix system can cause significant enhancement on the linear and third order nonlinear dielectric function

Keywords: Nonlinear optic, Effective mass approximation, Core/shell quantum dot, dielectric matrices.

Publications

Publication I

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