

Analisis Spektrum Serapan Sistem *Hybrid Semiconductor Quantum Dot – Metal Nanoshell*

Abstrak

Telah dilakukan studi teoretis untuk menganalisis spektrum serapan dari *semiconductor quantum dot* (SQD) yang dihibridisasi dengan *metal nanoshell* (MNS). SQD dimodelkan sebagai *two-level system* dan respon optisnya dianalisis dengan formalisme *density matrix*. MNS digambarkan terdiri dari sebuah inti dielektrik yang dilapisi logam dan respon optisnya digambarkan secara klasik oleh polarisabilitasnya. Sistem dieksitasi dengan medan listrik osilatif $E = E_0 \cos \omega t$. Hasil yang diperoleh menunjukkan bahwa hibridisasi SQD-MNS menyebabkan spektrum serapan SQD termodifikasi. Spektrum serapan SQD mengalami pelebaran dan pergeseran puncak spektrum serapan. Modifikasi yang terjadi dapat dikontrol dengan mengubah jarak antara SQD-MNS dan mengatur ketebalan MNS.

Kata Kunci : *Nanohybrid, Serapan, Semiconductor Quantum Dot, Metal Nanoshell*

Absorption Spectrum Analysis of a Semiconductor Quantum Dot – Metal Nanoshell Hybrid System

Abstract

A theoretical study was conducted to analyze the absorption spectrum of a semiconductor quantum dot (SQD) hybridized with a metal nanoshell (MNS). The SQD is modeled as a two-level system and its optical response is analyzed using the density matrix formalism. The MNS is described as consisting of a dielectric core coated with metal and its optical response is described classically by its polarizability. The system is excited by an oscillating electric field, $E = E_0 \cos \omega t$. The results show that the hybridization of SQD-MNS modified the absorption spectrum of the SQD. The absorption spectrum of the SQD shifted and broadened. The modification that occurred can be controlled by changing the distance between the SQD-MNS and adjusting the thickness of the MNS.

Keywords: Nanohybrid, Absorption, Semiconductor Quantum Dot, Metal Nanoshell