Abstract

Dipole-Dipole Interaction Effect on the Optical Response of Quantum Dot Ensembles

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We studied the effect of concentration on the optical spectra in the visible and FIR regions of ensembles of semiconductor quantum dots (QDs).

Semiconductor QDs possess discrete exciton and phonon spectra, which determine their dielectric response in the visible and FIR regions, respectively.

We found experimentally that, when the QDs concentration increases, both exciton and phonon related peaks in the absorption shift to the lower energy side and broaden.

This is explained by the increasing dipole-dipole interaction between the QDs, polarized by the electromagnetic wave. We performed calculations based on the couple dipoles equations, which confirm the observed effects experimentally.

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