

عنوان مقاله:

MANY BODY OPTICAL PROPERTIES OF InGaP/InGaAlP QUANTUM WELLS for RED LASER DIODES

محل انتشار:

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خلاصه مقاله:

In this paper, the gain spectra due to exchange interaction and screening of the Coulomb correlation for the electron-hole plasma in strained-layer quantum wells InGaP/InGaAlP is studied as functions of carrier density and biaxial strain. We solve the Luttinger-Kohn Hamiltonian in the k-p method considering valence-band mixing to obtain the valence-band structure for the holes. Simulations are made in three steps. At the first step, the valence bands of the mentioned structure are obtained by considering compressive strain in quantum wells and without strain. It is found that the use of compressive strain leads to more separation between the valence bands. In the next step, the dipole transition matrix elements of the compressive quantum wells are calculated for TE and TM modes. According to the obtained results, it can be concluded that the heavy hole transition and the light hole transition has larger strength than the other transitions. Finally, the free and many body gain spectra of quantum wells are determined. The results impressively demonstrate that treatment of Coulomb collision effects is crucial, especially at low carrier density and when the accurate location of the peak gain is desired

کلمات کلیدی:

Quantum well, Diode laser, InGaP/InGaAlP, Many body effects

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