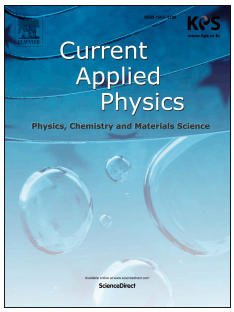
Accepted Manuscript



Effect of carriers localized in clusters on optical properties of $In_{0.21}Ga_{0.79}As/GaAs$ multiple quantum wells

Ibtissem Fraj, Tarek Hidouri, Faouzi Saidi, Lotfi Bouzaiene, Larbi Sfaxi, Hassen Maaref

PII: S1567-1739(16)30288-7

DOI: 10.1016/j.cap.2016.10.013

Reference: CAP 4348

To appear in: *Current Applied Physics*

Received Date: 15 August 2016

Accepted Date: 19 October 2016

Please cite this article as: I. Fraj, T. Hidouri, F. Saidi, L. Bouzaiene, L. Sfaxi, H. Maaref, Effect of carriers localized in clusters on optical properties of $In_{0.21}Ga_{0.79}As/GaAs$ multiple quantum wells, *Current Applied Physics* (2016), doi: 10.1016/j.cap.2016.10.013.

Effect of carriers localized in clusters on optical properties of $In_{0.21}Ga_{0.79}As/GaAs$ multiple quantum wells

Ibtissem. Fraj*,Tarek. Hidouri, Faouzi. Saidi*, Lotfi. Bouzaiene, Larbi. Sfaxi, and Hassen. Maaref

Université de Monastir, Laboratoire de Micro-Optoélectronique et Nanostructures (LMON), Faculté des Sciences, Avenue de l'environnement, 5019 Monastir, Tunisie.

*Corresponding authors: frajibtissem@yahoo.fr, faouzi.saidi@gmail.com

Abstract

$In_{0.21}Ga_{0.79}As$ multiple quantum wells MQW, with different well thickness L, are grown on [001] and [113] A GaAs growth directions by molecular beam epitaxy MBE. An asymmetric photoluminescence PL line shape denoted LE_A and LE_B in the lower energies side has been observed in both structures. These emissions of deep localized states can be related to the energy potential modulation associated to Indium cluster formation. Temperature dependence of photoluminescence properties has been reported. Localized state ensemble LSE model has investigated atypical behaviors of PL peak energies and the full width at half maximum FWHM of both emissions. These abnormal behaviors are explained by carriers captured by localized recombination centers. Competition processes between localized and delocalized excitons have been occurred to interpret the PL properties. The degree of localization induced by quantum-dot-like states and critical temperatures between different temperatures regions increase as far as away [001] growth direction.

Keywords: Photoluminescence, Multiple quantum wells, S-shaped form, and LSE model.