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Dynamics of quantum dash semiconductor laser

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Abstract:

We have investigated the dynamics of a quantum dash semiconductor, QDSC, laser under the effect of a number of control parameters that appear in the adopted theoretical model viz carrier to photon decay rates(η), injection current(J), gain value(g) and carrier escape rate(R). Relaxation oscillation in the output intensity of the QDSC laser is reduced and the dc part of the output can be increased as a result of choosing the set (η, J, g, R).

Key words: Quantum dash semiconductor laser, Relaxation oscillation, DC part of the output.

The article is part of an ongoing M.Sc research

Introduction:

A quantum dash is an elongated nanostructure whose cross-section is similar to that of a shallow quantum dot (QD), of a cross-section of the same size of QDs (about $2-3\text{nm} \times 10-20\text{nm}$) [1] and a length of hundreds of nanometers (100-200nm). A typical assembly of quantum dashes is shown in the scanning electron microscopy picture, Fig(1) [2], and the structure details are shown in fig(2) [3].

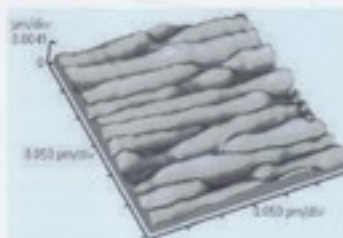


Figure (1) Atomic force micrograph of the InAs quantum -dash [2]