509.
Accession number:13089828
Title:Electronic states and intraband terahertz optical transitions in InGaAs quantum rods
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Source title:Journal of Applied Physics
Abbreviated source title:J. Appl. Phys. (USA)
Volume:111
Issue:7
Publication date:1 April 2012
Pages:073110 (6 pp.)
Language:English
ISSN:0021-8979
CODEN:JAPIAU
Document type:Journal article (JA)
Publisher:American Institute of Physics
Country of publication:USA
Material Identity Number:DK28-2012-014
Abstract:Strain-dependent eight-band method is used to analyze the electronic structure and intraband optical transitions in self-assembled InGaAs quantum rods in the terahertz range. The calculation of absorption spectra for the growth- and in-plane-polarized radiation shows some similarities to those of quantum well and single quantum dot structures, augmented with contribution from transitions between the dot and quantum well states. The influence of rod height on the electronic structure and the intraband absorption spectra is also investigated. It is found that the energy of maximal terahertz absorption can be tailored by the rod height for both in-plane and in-growth polarized radiation.
Number of references:22
Inspec controlled terms:conduction bands - effective mass - gallium arsenide - III-V semiconductors - indium compounds - k.p calculations - self-assembly - semiconductor growth - semiconductor quantum dots
Uncontrolled terms:conduction band profile - effective mass - maximal terahertz absorption energy - in-plane polarised radiation - intraband absorption spectra - electronic structure - strain-dependent eight-band k.p method - self-assembled quantum rods - intraband terahertz optical transitions - electronic states - InGaAs
Inspec classification codes:A7320D Electron states in low-dimensional structures - A7865K Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures) - A8116D Self-assembly in nanofabrication - A7115T Other methods of electronic structure calculations (condensed matter) - A7125J Effective mass and g-factors (condensed matter electronic structure) - A7125T Electronic structure of crystalline semiconductor compounds and insulators - B2520D II-VI and III-V semiconductors - B2550N Nanometre-scale semiconductor fabrication technology
Chemical indexing:InGaAs/int As/int Ga/int In/int InGaAs/ss As/ss Ga/ss In/ss

Treatment:Theoretical or Mathematical (THR)
Discipline:Physics (A); Electrical/Electronic engineering (B)
DOI:10.1063/1.3692069
Database:Inspec
IPC Code:B82B3/00; H01L21/02; H01L21/70