427
Accession number:12903300
Title:Calculation of terahertz conductivity spectra in semiconductors with nanoscale modulation
Authors:Mrozek, J. (1); Neˇmec, H. (1)
Author affiliation:(1) Inst. of Phys., Prague, Czech Republic
Source title:Physical Review B (Condensed Matter and Materials Physics)
Abbreviated source title:Phys. Rev. B, Condens. Matter Mater. Phys. (USA)
Volume:86
Issue:7
Publication date:15 Aug. 2012
Pages:075308 (7 pp.)
Language:English
ISSN:1098-0121
CODEN:PRBMDO
Document type:Journal article (JA)
Publisher:American Physical Society
Country of publication:USA
Material Identity Number:DQ91-2012-031
Abstract:Monte Carlo simulations are employed to calculate terahertz conductivity of charge carriers in a potential with periodic modulation on the nanoscale. The modulation gives rise to two characteristic features in the conductivity spectra: a Drude peak owing to charge carriers with kinetic energy exceeding the modulation depth, and resonance due to charge carriers localized around potential minima. Both peaks shift in an applied magnetic field. We discuss the relationship between the modulation potential and the positions and strengths of the resonances. We also analyze the role of depolarization fields which are responsible for the difference between local and effective conductivity.
Number of references:21
Inspec controlled terms:electrical conductivity - Monte Carlo methods - semiconductors - terahertz wave spectra
Uncontrolled terms:terahertz conductivity spectra calculation - semiconductors - nanoscale modulation - Monte Carlo simulations - charge carriers - periodic modulation - Drude peak - kinetic energy - modulation depth - potential minima - applied magnetic field - modulation potential - resonance positions - resonance strengths - depolarization fields - local conductivity - effective conductivity
Inspec classification codes:A7360 Electrical properties of thin films and low-dimensional structures - A7870G Microwave and radiofrequency interactions with condensed matter - A7220J Charge carriers: generation, recombination, lifetime, and trapping (semiconductors/insulators)
Treatment:Theoretical or Mathematical (THR)
Discipline:Physics (A)
DOI:10.1103/PhysRevB.86.075308
Database:Inspec