



# Optical Properties of Narrow-Gap Low-Dimensional Structures

Edited by

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# Optical Properties Of Narrow Gap Low Dimensional Structures

**DP Hallahan**



## **Optical Properties Of Narrow Gap Low Dimensional Structures:**

### **Optical Properties of Narrow-Gap Low-Dimensional Structures** Clivia M. Sotomayor Torres, J.C. Portal, J.C.

Maan, R.A. Stradling, 2012-12-06 This volume contains the Proceedings of the NATO Advanced Research Workshop on Optical Properties of Narrow Gap Low Dimensional Structures held from July 29th to August 1st 1986 in St Andrews Scotland under the auspices of the NATO International Scientific Exchange Program The workshop was not limited to optical properties of narrow gap semiconductor structures Part III Sessions on for example the growth methods and characterization of III V II VI and IV VI materials discussed in Part II were an integral part of the workshop Considering the small masses of the carriers in narrow gap low dimensional structures LOS in Part I the enhanced band mixing and magnetic field effects are explored in the context of the envelope function approximation Optical nonlinearities and energy relaxation phenomena applied to the well known systems of HgCdTe and GaAs GaAlAs respectively are reviewed with comments on their extension to narrow gap LOS The relevance of optical observations in quantum transport studies is illustrated in Part IV A review of devices based on epitaxial narrow gap materials defines a frame of reference for future ones based on two dimensional narrow gap semiconductors in addition an analysis of the physics of quantum well lasers provides a guide to relevant parameters for narrow gap laser devices for the infrared Part V The roles and potentials of special techniques are explored in Part VI with emphasis on hydrostatic pressure techniques since this has a pronounced effect in small mass narrow gap non parabolic structures

### **Optical Properties of Narrow-Gap Low-Dimensional Structures** Clivia M Sotomayor Torres, J C Portal, J C

Maan, 1987-06-30 **Light Scattering in Semiconductor Structures and Superlattices** D.J. Lockwood, Jeff F.

Young, 2013-12-20 Just over 25 years ago the first laser excited Raman spectrum of any crystal was obtained In November 1964 Hobden and Russell reported the Raman spectrum of GaP and later in June 1965 Russell published the Si spectrum Then in July 1965 the forerunner of a series of meetings on light scattering in solids was held in Paris Laser Raman spectroscopy of semiconductors was at the forefront in new developments at this meeting Similar meetings were held in 1968 New York 1971 Paris and 1975 Campinas Since then and apart from the multidisciplinary biennial International Conference on Raman Spectroscopy there has been no special forum for experts in light scattering spectroscopy of semiconductors to meet and discuss latest developments Meanwhile technological advances in semiconductor growth have given rise to a veritable renaissance in the field of semiconductor physics Light scattering spectroscopy has played a crucial role in the advancement of this field providing valuable information about the electronic vibrational and structural properties both of the host materials and of heterogeneous composite structures On entering a new decade one in which technological advances in lithography promise to open even broader horizons for semiconductor physics it seemed to us to be an ideal time to reflect on the achievements of the past decade to be brought up to date on the current state of the art and to catch some glimpses of where the field might be headed in the 1990s **Point and Extended Defects in Semiconductors** Giorgio

Benedek, 2013-06-29 The systematic study of defects in semiconductors began in the early fifties. From that time on many questions about the defect structure and properties have been answered but many others are still a matter of investigation and discussion. Moreover during these years new problems arose in connection with the identification and characterization of defects, their role in determining transport and optical properties of semiconductor materials and devices as well as from the technology of the ever increasing scale of integration. This book presents to the reader a view into both basic concepts of defect physics and recent developments of high resolution experimental techniques. The book does not aim at an exhaustive presentation of modern defect physics rather it gathers a number of topics which represent the present time research in this field. The volume collects the contributions to the Advanced Research Workshop on Point Defects and Surface Defects in Semiconductors held at the Ettore Majorana Centre at Erice, Italy from 2 to 7 November 1988 in the framework of the International School of Materials Science and Technology. The workshop has brought together scientists from thirteen countries. Most participants are currently working on defect problems in either silicon submicron technology or in quantum wells and superlattices where point defects, dislocations, interfaces and surfaces are closely packed together. **Interacting Electrons in Reduced Dimensions** Dionys Baeriswyl, David K. Campbell, 2012-12-06 As its name suggests the 1988 workshop on Interacting Electrons in Reduced Dimensions focused on the wide variety of physical effects that are associated with possibly strongly correlated electrons interacting in quasi one and quasi two dimensional materials. Among the phenomena discussed were superconductivity, magnetic ordering, the metal-insulator transition, localization, the fractional Quantum Hall effect, QHE, Peierls and spin-Peierls transitions, conductance fluctuations and sliding charge density waves (CDW) and spin density waves (SDW). That these effects appear most pronounced in systems of reduced dimensionality was amply demonstrated at the meeting. Indeed when concrete illustrations were presented they typically involved chain-like materials such as conjugated polymers, inorganic CDW systems and organic conductors or layered materials such as high temperature copper oxide superconductors, certain of the organic superconductors and the QHE samples or devices where the electrons are confined to a restricted region of sample e.g. the depletion layer of a MOSFET. To enable this broad subject to be covered in thirty five lectures and about half as many posters the workshop was deliberately focused on theoretical models for these phenomena and on methods for describing as faithfully as possible the true behavior of these models. This latter emphasis was especially important since the inherently many-body nature of problems involving interacting electrons renders conventional effective single particle mean field methods e.g. Hartree-Fock or the local density approximation in density functional theory highly suspect. Again this is particularly true in reduced dimensions where strong quantum fluctuations can invalidate mean field results. Resonant Tunneling in Semiconductors L.L. Chang, E.E. Mendez, C. Tejedor, 2012-12-06 This book contains the proceedings of the NATO Advanced Research Workshop on Resonant Tunneling in Semiconductors: Physics and Applications held at Escorial, Spain on May 14-18, 1990. The tremendous growth in the past two decades in the field of

resonant tunneling in semiconductor heterostructures has followed if not outpaced the expansion witnessed in quantum structures in general. Resonant tunneling shares also the multi disciplinary nature of that broad area with an emphasis on the underlying physics but with a coverage of material systems on the one end and device applications on the other. Indeed that resonant tunneling provides great flexibility in terms of materials and configurations and that it is inherently a fast process with obvious device implications by the presence of a negative differential resistance have contributed to the unrelenting interest in this field. These proceedings consist of 49 refereed articles they correspond to both invited and contributed talks at the workshop. Because of the intertwining nature of the subject matter it has been difficult to subdivide them in well defined sections. Instead they are arranged in several broad categories meant to serve only as guidelines of emphasis on different topics and aspects. The book starts with an introduction to resonant tunneling by providing a perspective of the field in the first article. This is followed by discussions of different material systems with various band structure effects.

**Band Structure Engineering in Semiconductor Microstructures** R.A. Abram, M. Jaros, 2012-12-06 This volume contains the proceedings of the NATO Advanced Research Workshop on Band Structure Engineering in Semiconductor Microstructures held at Il Ciocco Castelveccchio Pascali in Tuscany between 10th and 15th April 1988. Research on semiconductor microstructures has expanded rapidly in recent years as a result of developments in the semiconductor growth and device fabrication technologies. The emergence of new semiconductor structures has facilitated a number of approaches to producing systems with certain features in their electronic structure which can lead to useful or interesting properties. The interest in band structure engineering has stimulated a variety of physical investigations and novel device concepts and the field now exhibits a fascinating interplay between pure physics and device technology. Devices based on microstructures are useful vehicles for fundamental studies but also new device ideas require a thorough understanding of the basic physics. Around forty researchers gathered at Il Ciocco in the Spring of 1988 to discuss band structure engineering in semiconductor microstructures.

**Evaluation of Advanced Semiconductor Materials by Electron Microscopy** David Cherns, 2012-12-06 The last few years have seen rapid improvements in semiconductor growth techniques which have produced an expanding range of high quality heterostructures for new semiconductor devices. As the dimensions of such structures approach the nanometer level it becomes increasingly important to characterise materials properties such as composition, uniformity, strain, interface sharpness and roughness and the nature of defects as well as their influence on electrical and optical properties. Much of this information is being obtained by electron microscopy and this is also an area of rapid progress. There have been advances for thin film studies across a wide range of techniques including for example convergent beam electron diffraction, X ray and electron energy loss microanalysis and high spatial resolution cathodoluminescence as well as by conventional and high resolution methods. Important developments have also occurred in the study of surfaces and film growth phenomena by both microscopy and diffraction techniques. With these developments in

mind an application was made to the NATO Science Committee in late summer 1987 to fund an Advanced Research Workshop to review the electron microscopy of advanced semiconductors This was subsequently accepted for the 1988 programme and became the NATO Advanced Research Workshop on the Evaluation of Advanced Semiconductor Materials by Electron Microscopy The Workshop took place in the pleasant and intimate surroundings of Wills Hall Bristol UK during the week 11 17 September 1988 and was attended by fifty five participants from fourteen countries

**Dynamics of Magnetic Fluctuations in High-Temperature Superconductors** George Reiter, Peter Horsch, Gregory C. Psaltakis, 2012-12-06 This NATO Advanced Research Workshop was held at a time when there was little consensus as to the mechanism for high temperature superconductivity in the context of a world undergoing major changes in its political alignments and sense of the possibility for the future It was characterized by generosity in the sharing of our uncertainties and speculations as was appropriate for both the subject matter and the context The workshop was organized of necessity around the experimental work as is this volume Where the theoretical work is directly relevant to particular experiments it is included in the appropriate sections with them Most of the participants felt strongly that magnetic fluctuations played an important role in the mechanism for high  $T_c$  although with the exception of the ILS R work reported by Luke showing results inconsistent with the anyon picture and the work on flux phases by Lederer the mechanism remained an issue in the background A major focus was the phenomenological interpretation of the NMR data

**Metallization and Metal-Semiconductor Interfaces** Inder P. Batra, 2012-12-06 This book represents the work presented at a NATO Advanced Research Workshop on Metallization and Metal Semiconductor Interfaces held at the Technical University of Munich Garching W Germany from 22 26 August 1988 The major focus of the workshop was to evaluate critically the progress made in the area of metal semiconductor interfaces The underlying theme was the mechanism of Schottky barrier formation and a serious assessment of the various models A significant fraction of the workshop time was also spent in discussing the interaction of alkali metals with semiconductors Alkali metals on semiconductors form ordered overlayers and the resulting system often exhibits one dimensional metallic properties The nature of their interaction has introduced new and exciting complexities and this was pursued at length during the lively discussions at the workshop A half a day was devoted to Scanning Tunneling Microscopy the emphasis being on its utility in providing structural and electronic character of low coverage regime The book should provide readers with the most current status of the research activity in the general area of metal semiconductor interfaces at an international level It should also serve as an excellent introduction to the field since sufficient review type of material has also been included The workshop organizers Dr I P Batra Director mM Almaden Research Center San Jose Prof S Ciraci Bilkent University Ankara Prof C Y Pong University of California Davis Prof Dr F Koch Local Chairman Technical University Munich Garching Dr H

**Sustainable Nanosystems Development, Properties, and Applications** Putz, Mihai V., Mirica, Marius Constantin, 2016-08-01 Global economic demands and population surges have led to dwindling resources and problematic

environmental issues As the climate and its natural resources continue to struggle it has become necessary to research and employ new forms of sustainable technology to help meet the growing demand Sustainable Nanosystems Development Properties and Applications features emergent research and theoretical concepts in the areas of nanotechnology photovoltaics electrochemistry and materials science as well as within the physical and environmental sciences Highlighting progressive approaches and utilization techniques this publication is a critical reference source for researchers engineers students scientists and academicians interested in the application of sustainable nanotechnology

**Directory of Published Proceedings** ,1991      **The Cumulative Book Index** ,1989 A world list of books in the English language

*Information Sources in Physics* Dennis F. Shaw,1994 This third edition includes two new chapters on quantum optics and physics of materials and eight of the other chapters have been completely rewritten by new authors All chapters have been revised and updated Patent coverage now includes European and international patents Theoretical materials a      *Quantum Well and Superlattice Physics II* Federico Capasso,Gottfried H. Döhler,Joel N. Schulman,1988      **Manufacturing Engineering and Technology for Manufacturing Growth** Da Yun Xu,2012-12-27 Selected peer reviewed papers from the 2012 International Conference on Manufacturing Engineering and Technology for Manufacturing Growth METMG 2012 November 1 2 2012 San Diego USA      **Quantum Well and Superlattice Physics** ,1988      Landau Level Spectroscopy ,1991      Books in Series, 1876-1949 R.R. Bowker Company,1982      量子阱と超格子 (Japan),1990

## Reviewing **Optical Properties Of Narrow Gap Low Dimensional Structures**: Unlocking the Spellbinding Force of Linguistics

In a fast-paced world fueled by information and interconnectivity, the spellbinding force of linguistics has acquired newfound prominence. Its capacity to evoke emotions, stimulate contemplation, and stimulate metamorphosis is actually astonishing. Within the pages of "**Optical Properties Of Narrow Gap Low Dimensional Structures**," an enthralling opus penned by a very acclaimed wordsmith, readers attempt an immersive expedition to unravel the intricate significance of language and its indelible imprint on our lives. Throughout this assessment, we shall delve into the book's central motifs, appraise its distinctive narrative style, and gauge its overarching influence on the minds of its readers.

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### **Table of Contents Optical Properties Of Narrow Gap Low Dimensional Structures**

1. Understanding the eBook Optical Properties Of Narrow Gap Low Dimensional Structures
  - The Rise of Digital Reading Optical Properties Of Narrow Gap Low Dimensional Structures
  - Advantages of eBooks Over Traditional Books
2. Identifying Optical Properties Of Narrow Gap Low Dimensional Structures
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Optical Properties Of Narrow Gap Low Dimensional Structures
  - User-Friendly Interface
4. Exploring eBook Recommendations from Optical Properties Of Narrow Gap Low Dimensional Structures
  - Personalized Recommendations
  - Optical Properties Of Narrow Gap Low Dimensional Structures User Reviews and Ratings



- Optical Properties Of Narrow Gap Low Dimensional Structures and Bestseller Lists
- 5. Accessing Optical Properties Of Narrow Gap Low Dimensional Structures Free and Paid eBooks
  - Optical Properties Of Narrow Gap Low Dimensional Structures Public Domain eBooks
  - Optical Properties Of Narrow Gap Low Dimensional Structures eBook Subscription Services
  - Optical Properties Of Narrow Gap Low Dimensional Structures Budget-Friendly Options
- 6. Navigating Optical Properties Of Narrow Gap Low Dimensional Structures eBook Formats
  - ePub, PDF, MOBI, and More
  - Optical Properties Of Narrow Gap Low Dimensional Structures Compatibility with Devices
  - Optical Properties Of Narrow Gap Low Dimensional Structures Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Optical Properties Of Narrow Gap Low Dimensional Structures
  - Highlighting and Note-Taking Optical Properties Of Narrow Gap Low Dimensional Structures
  - Interactive Elements Optical Properties Of Narrow Gap Low Dimensional Structures
- 8. Staying Engaged with Optical Properties Of Narrow Gap Low Dimensional Structures
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Optical Properties Of Narrow Gap Low Dimensional Structures
- 9. Balancing eBooks and Physical Books Optical Properties Of Narrow Gap Low Dimensional Structures
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Optical Properties Of Narrow Gap Low Dimensional Structures
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Optical Properties Of Narrow Gap Low Dimensional Structures
  - Setting Reading Goals Optical Properties Of Narrow Gap Low Dimensional Structures
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Optical Properties Of Narrow Gap Low Dimensional Structures
  - Fact-Checking eBook Content of Optical Properties Of Narrow Gap Low Dimensional Structures
  - Distinguishing Credible Sources

13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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