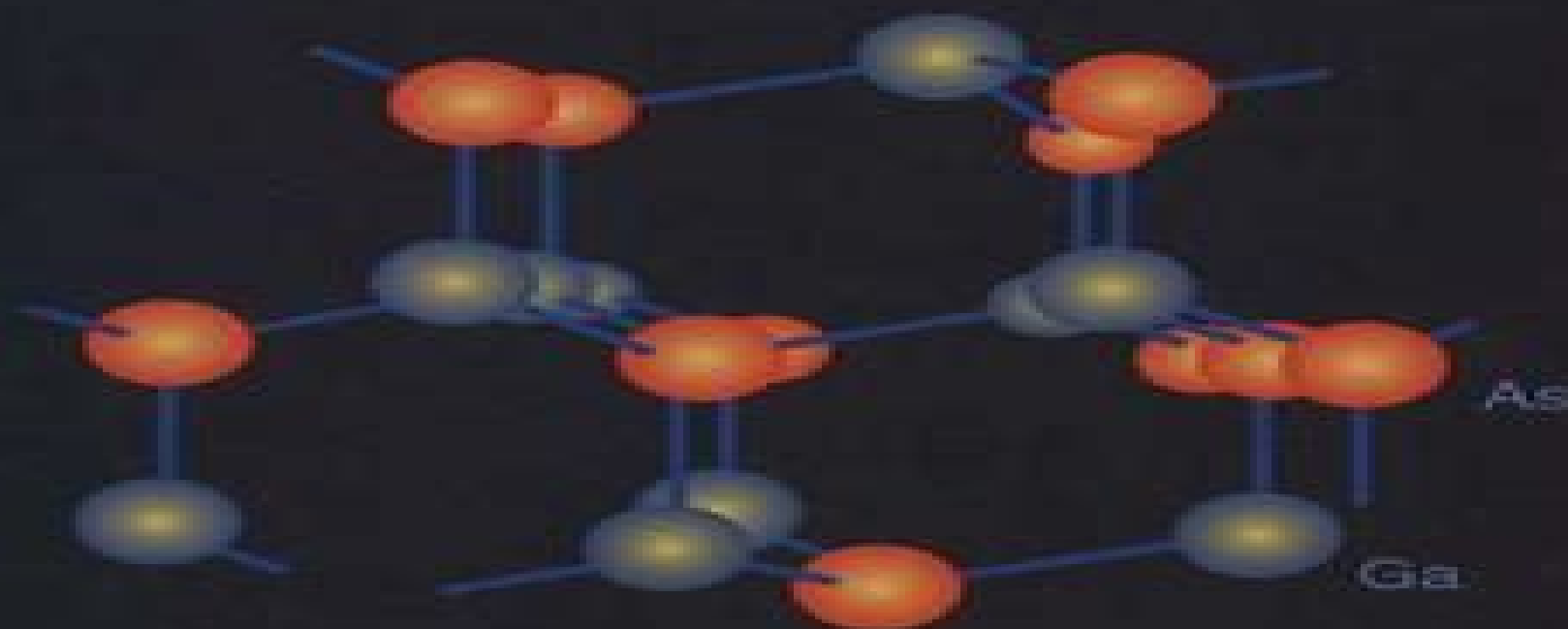


GaAs and Related Materials

Bulk Semiconducting and
Superlattice Properties



Sadao Adachi

World Scientific

GaAs And Related Materials Bulk Semiconducting And Superlattice Properties

Thomas S. Miller



GaAs And Related Materials Bulk Semiconducting And Superlattice Properties:

GaAs And Related Materials Sadao Adachi, 1994-10-25 This book covers the various material properties of bulk GaAs and related materials and aspects of the physics of artificial semiconductor microstructures such as quantum wells and superlattices made of these materials A complete set of the material properties are considered in this book They are structural properties thermal properties elastic and lattice vibronic properties collective effects and some response characteristics electronic energy band structure and consequences optical elasto optic and electro optic properties and carrier transport properties This book attempts to summarize in graphical and tabular forms most of the important theoretical and experimental results on these material properties It contains a large number of references useful for further study Timely topics are discussed as well This book will be of interest to graduate students scientists and engineers working on semiconductors

GaAs and Related Materials Sadao Adachi, 1994 This book covers the various material properties of bulk GaAs and related materials and aspects of the physics of artificial semiconductor microstructures such as quantum wells and superlattices made of these materials A complete set of the material properties are considered in this book They are structural properties thermal properties elastic and lattice vibronic properties collective effects and some response characteristics electronic energy band structure and consequences optical elasto optic and electro optic properties and carrier transport properties This book attempts to summarize in graphical and tabular forms most of the important theoretical and experimental results on these material properties It contains a large number of references useful for further study Timely topics are discussed as well This book will be of interest to graduate students scientists and engineers working on semiconductors

Properties of Group-IV, III-V and II-VI Semiconductors Sadao Adachi, 2005-06-14 Almost all the semiconductors of practical interest are the group IV III V and II VI semiconductors and the range of technical applications of such semiconductors is extremely wide The purpose of this book is twofold to discuss the key properties of the group IV III V and II VI semiconductors to systemize these properties from a solid state physics aspect The majority of the text is devoted to the description of the lattice structural thermal elastic lattice dynamic electronic energy band structural optical and carrier transport properties of these semiconductors Some corrective effects and related properties such as piezoelectric elastooptic and electrooptic properties are also discussed The book contains convenient tables summarizing the various material parameters and the definitions of important semiconductor properties In addition graphs are included in order to make the information more quantitative and intuitive The book is intended not only for semiconductor device engineers but also physicists and physical chemists and particularly students specializing in the fields of semiconductor synthesis crystal growth semiconductor device physics and technology

Properties of Semiconductor Alloys Sadao Adachi, 2009-03-12 The main purpose of this book is to provide a comprehensive treatment of the materials aspects of group IV III V and II VI semiconductor alloys used in various electronic and optoelectronic devices The topics covered in this book include the

structural thermal mechanical lattice vibronic electronic optical and carrier transport properties of such semiconductor alloys The book reviews not only commonly known alloys SiGe AlGaAs GaInPAs and ZnCdTe but also new alloys such as dilute carbon alloys CSiGe CSiSn etc III N alloys dilute nitride alloys GaNAs and GaInNAs and Mg or Be based II VI semiconductor alloys Finally there is an extensive bibliography included for those who wish to find additional information as well as tabulated values and graphical information on the properties of semiconductor alloys

Quantum Wells, Wires and Dots Paul Harrison, Alex Valavanis, 2016-04-29 Quantum Wells Wires and Dots provides all the essential information both theoretical and computational to develop an understanding of the electronic optical and transport properties of these semiconductor nanostructures The book will lead the reader through comprehensive explanations and mathematical derivations to the point where they can design semiconductor nanostructures with the required electronic and optical properties for exploitation in these technologies This fully revised and updated 4th edition features new sections that incorporate modern techniques and extensive new material including Properties of non parabolic energy bands Matrix solutions of the Poisson and Schrödinger equations Critical thickness of strained materials Carrier scattering by interface roughness alloy disorder and impurities Density matrix transport modelling Thermal modelling Written by well known authors in the field of semiconductor nanostructures and quantum optoelectronics this user friendly guide is presented in a lucid style with easy to follow steps illustrative examples and questions and computational problems in each chapter to help the reader build solid foundations of understanding to a level where they can initiate their own theoretical investigations Suitable for postgraduate students of semiconductor and condensed matter physics the book is essential to all those researching in academic and industrial laboratories worldwide Instructors can contact the authors directly p.harrison@shu.ac.uk a.valavanis@leeds.ac.uk for Solutions to the problems

Springer Handbook of Electronic and Photonic Materials Safa Kasap, Peter Capper, 2017-10-04 The second updated edition of this essential reference book provides a wealth of detail on a wide range of electronic and photonic materials starting from fundamentals and building up to advanced topics and applications Its extensive coverage with clear illustrations and applications carefully selected chapter sequencing and logical flow makes it very different from other electronic materials handbooks It has been written by professionals in the field and instructors who teach the subject at a university or in corporate laboratories The Springer Handbook of Electronic and Photonic Materials second edition includes practical applications used as examples details of experimental techniques useful tables that summarize equations and most importantly properties of various materials as well as an extensive glossary Along with significant updates to the content and the references the second edition includes a number of new chapters such as those covering novel materials and selected applications This handbook is a valuable resource for graduate students researchers and practicing professionals working in the area of electronic optoelectronic and photonic materials

Basic Properties of III-V Devices - Understanding Mysterious Trapping Phenomena Kompa, Günter, 2014 Trapping effects

in III V devices pose a great challenge to any microwave device modeler Understanding their physical origins is of prime importance to create physics related reliable device models The treatment of trapping phenomena is commonly beyond the classical higher education level of communication engineers This book provides any basic material needed to understand trapping effects occurring primarily in GaAs and GaN power HEMT devices As the text material covers interdisciplinary topics such as crystal defects and localized charges trap centers and trap dynamics deep level transient spectroscopy and trap centers in passivation layers the book will be of interest to graduate students of electrical engineering communication engineering and physics as well as materials device and circuit engineers in research and industry *Spin-orbit Coupling Effects in Two-Dimensional Electron and Hole Systems* Roland Winkler,2003-10-10 The first part provides a general introduction to the electronic structure of quasi two dimensional systems with a particular focus on group theoretical methods The main part of the monograph is devoted to spin orbit coupling phenomena at zero and nonzero magnetic fields Throughout the book the main focus is on a thorough discussion of the physical ideas and a detailed interpretation of the results Accurate numerical calculations are complemented by simple and transparent analytical models that capture the important physics Optical Properties of Materials and Their Applications Jai Singh,2020-01-07 Provides a semi quantitative approach to recent developments in the study of optical properties of condensed matter systems Featuring contributions by noted experts in the field of electronic and optoelectronic materials and photonics this book looks at the optical properties of materials as well as their physical processes and various classes Taking a semi quantitative approach to the subject it presents a summary of the basic concepts reviews recent developments in the study of optical properties of materials and offers many examples and applications Optical Properties of Materials and Their Applications 2nd Edition starts by identifying the processes that should be described in detail and follows with the relevant classes of materials In addition to featuring four new chapters on optoelectronic properties of organic semiconductors recent advances in electroluminescence perovskites and ellipsometry the book covers optical properties of disordered condensed matter and glasses concept of excitons photoluminescence photoinduced changes and electroluminescence in noncrystalline semiconductors and photoinduced bond breaking and volume change in chalcogenide glasses Also included are chapters on nonlinear optical properties of photonic glasses kinetics of the persistent photoconductivity in crystalline III V semiconductors and transparent white OLEDs In addition readers will learn about excitonic processes in quantum wells optoelectronic properties and applications of quantum dots and more Covers all of the fundamentals and applications of optical properties of materials Includes theory experimental techniques and current and developing applications Includes four new chapters on optoelectronic properties of organic semiconductors recent advances in electroluminescence perovskites and ellipsometry Appropriate for materials scientists chemists physicists and electrical engineers involved in development of electronic materials Written by internationally respected professionals working in physics and electrical

engineering departments and government laboratories

Optical Properties of Materials and Their Applications 2nd Edition is an ideal book for senior undergraduate and postgraduate students and teaching and research professionals in the fields of physics chemistry chemical engineering materials science and materials engineering

Single Crystals of Electronic Materials Roberto Fornari, 2018-09-18

Single Crystals of Electronic Materials Growth and Properties is a complete overview of the state of the art growth of bulk semiconductors It is not only a valuable update on the body of information on crystal growth of well established electronic materials such as silicon III V II VI and IV VI semiconductors but also includes chapters on novel semiconductors such as wide bandgap oxides like ZnO Ga₂O₃ In₂O₃ Al₂O₃ nitrides AlN and GaN and diamond Each chapter focuses on a specific material providing a comprehensive overview that includes applications and requirements thermodynamic properties schematics of growth methods and more Presents the latest research and most comprehensive overview of both standard and novel semiconductors Provides a systematic examination of important electronic materials including their applications growth methods properties technologies and defect and doping issues Takes a close look at emerging materials including wide bandgap oxides nitrides and diamond

Optical Properties of Crystalline and Amorphous Semiconductors Sadao Adachi, 2012-12-06

Optical Properties of Crystalline and Amorphous Semiconductors Materials and Fundamental Principles presents an introduction to the fundamental optical properties of semiconductors This book presents tutorial articles in the categories of materials and fundamental principles Chapter 1 optical properties in the reststrahlen region Chapter 2 those in the interband transition region Chapters 3 and 4 and at or below the fundamental absorption edge Chapter 5 Optical Properties of Crystalline and Amorphous Semiconductors Materials and Fundamental Principles is presented in a form which could serve to teach the underlying concepts of semiconductor optical properties and their implementation This book is an invaluable resource for device engineers solid state physicists material scientists and students specializing in the fields of semiconductor physics and device engineering

Optical Constants of Crystalline and Amorphous Semiconductors Sadao Adachi, 2013-11-27

Optical Constants of Crystalline and Amorphous Semiconductors Knowledge of the refractive indices and absorption coefficients of semiconductors is especially important in the design and analysis of optical and optoelectronic devices The determination of the optical constants of semiconductors at energies beyond the fundamental absorption edge is also known to be a powerful way of studying the electronic energy band structures of the semiconductors The purpose of this book is to give tabulated values and graphical information on the optical constants of the most popular semiconductors over the entire spectral range This book presents data on the optical constants of crystalline and amorphous semiconductors A complete set of the optical constants are presented in this book They are the complex dielectric constant $\epsilon = \epsilon' - i\epsilon''$ complex refractive index $n = n' - ik$ absorption coefficient α and normal incidence reflectivity R The semiconductor materials considered in this book are the group IV elemental and binary III V IT VI IV VI binary semiconductors and their alloys The reader will find the companion book **Optical Properties of Crystalline and Amorphous Semiconductors Materials and Fundamental Principles** useful since it

emphasizes the basic material properties and fundamental principles. *Mems/Nems* Cornelius T. Leondes, 2007-10-08 This significant and uniquely comprehensive five volume reference is a valuable source for research workers practitioners computer scientists students and technologists It covers all of the major topics within the subject and offers a comprehensive treatment of MEMS design fabrication techniques and manufacturing methods It also includes current medical applications of MEMS technology and provides applications of MEMS to opto electronic devices It is clearly written self contained and accessible with helpful standard features including an introduction summary extensive figures and design examples with comprehensive reference lists

Concise Encyclopedia of Semiconducting Materials & Related Technologies S. Mahajan, L. C. Kimerling, 2013-10-22 The development of electronic materials and particularly advances in semiconductor technology have played a central role in the electronics revolution by allowing the production of increasingly cheap and powerful computing equipment and advanced telecommunications devices This Concise Encyclopedia which incorporates relevant articles from the acclaimed Encyclopedia of Materials Science and Engineering as well as newly commissioned articles emphasizes the materials aspects of semiconductors and the technologies important in solid state electronics Growth of bulk crystals and epitaxial layers are discussed in the volume and coverage is included of defects and their effects on device behavior Metallization and passivation issues are also covered Over 100 alphabetically arranged articles written by world experts in the field are each intended to serve as the first source of information on a particular aspect of electronic materials The volume is extensively illustrated with photographs diagrams and tables A bibliography is provided at the end of each article to guide the reader to recent literature A comprehensive system of cross references a three level subject index and an alphabetical list of articles are included to aid readers in the abstraction of information

Optical Properties of Condensed Matter and Applications Jai Singh, 2006-10-02 Following a semi quantitative approach this book presents a summary of the basic concepts with examples and applications and reviews recent developments in the study of optical properties of condensed matter systems Key Features Covers basic knowledge as well as application topics Includes theory experimental techniques and current and developing applications Timely and useful contribution to the literature Written by internationally respected contributors working in physics and electrical engineering departments and government laboratories

Handbook of Optoelectronic Device Modeling and Simulation Joachim Piprek, 2017-10-10 Optoelectronic devices are now ubiquitous in our daily lives from light emitting diodes LEDs in many household appliances to solar cells for energy This handbook shows how we can probe the underlying and highly complex physical processes using modern mathematical models and numerical simulation for optoelectronic device design analysis and performance optimization It reflects the wide availability of powerful computers and advanced commercial software which have opened the door for non specialists to perform sophisticated modeling and simulation tasks The chapters comprise the know how of more than a hundred experts from all over the world The handbook is an ideal starting point for beginners but also gives experienced researchers the opportunity to renew and

broaden their knowledge in this expanding field **Atomic Scale Images of Acceptors in III-V Semiconductors**
 Sebastian Loth, 2008 New Developments in Semiconductor Research Thomas S. Miller, 2005 This book includes within its scope studies of the structural electrical optical and acoustical properties of bulk low dimensional and amorphous semiconductors computational semiconductor physics interface properties including the physics and chemistry of heterojunctions metal semiconductor and insulator semiconductor junctions all multi layered structures involving semiconductor components dopant incorporation growth and preparation of materials including both epitaxial e g molecular beam and chemical vapour methods and bulk techniques and in situ monitoring of epitaxial growth processes Also included are appropriate aspects of surface science such as the influence of growth kinetics and chemical processing on layer and device properties The physics of semiconductor electronic and optoelectronic devices are examined including theoretical modelling and experimental demonstration all aspects of the technology of semiconductor device and circuit fabrication structures incorporating Langmuir Blodgett films resists lithography and metalisation where they are concerned with the definition of small geometry structure The structural electrical and optical characterisation of materials and device structures are also included The scope encompasses materials and device reliability reliability evaluation of technologies failure analysis and advanced analysis techniques such as SEM E beam optical emission microscopy acoustic microscopy techniques liquid crystal techniques noise measurement reliability prediction and simulation reliability indicators failure mechanisms including charge migration trapping oxide breakdown hot carrier effects electro migration stress migration package related failure mechanisms and effects of operational and environmental stresses on reliability *Solid State Physics* , 1999-10-25 Solid State Physics Graphene, Ge/III-V, and Emerging Materials for Post-CMOS Applications 2 P. Srinivasan, 2010-04 This issue of ECS Transactions addresses the fundamental material science characterization modeling and applications of Graphene Ge III V and Emerging materials designed for alternatives technologies to replace CMOS

Gaas And Related Materials Bulk Semiconducting And Superlattice Properties Book Review: Unveiling the Power of Words

In a world driven by information and connectivity, the power of words has become more evident than ever. They have the capacity to inspire, provoke, and ignite change. Such may be the essence of the book **Gaas And Related Materials Bulk Semiconducting And Superlattice Properties**, a literary masterpiece that delves deep into the significance of words and their impact on our lives. Published by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we will explore the book's key themes, examine its writing style, and analyze its overall effect on readers.

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