

Non Linear Optical Properties Of Semiconductors Iopscience

Basic Properties of Semiconductors Semiconductor Physics and Applications Electronic Structure and Optical Properties of Semiconductors Handbook on Physical Properties of Semiconductors Quantum Theory Of The Optical And Electronic Properties Of Semiconductors Fundamentals of Semiconductors Surface Properties of Semiconductors Radiative Properties of Semiconductors Physical Properties of Semiconductors Fundamentals of Semiconductor Quantum Theory Of The Optical And Electronic Properties Of Semiconductors (5th Edition) Electrical and Optical Properties of Semiconductors Properties of Advanced Semiconductor Materials Photoelectronic Properties of Semiconductors Properties of Semiconductor Alloys Semiconductor Optics 1 Optical Properties and Band Structure of Semiconductors Electrical Properties of Semiconductor Surfaces Surface Properties of Semiconductors and Dynamics of Ionic Crystals Electronic Properties of Doped Semiconductors P.T. Landsberg M. Balkanski Marvin L. Cohen Sadao Adachi Hartmut Haug Peter YU A. N. Frumkin N. M. Ravindra Charles M. Wolfe Peter YU Hartmut Haug D. V. Skobel tsyn Michael E. Levinstein Richard H. Bube Sadao Adachi Heinz Kalt David L. Greenaway Daniel R. Frankl D. V. Skobel tsyn B.I. Shklovskii

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since volume 1 was published in 1982 the centres of interest in the basic physics of semiconductors have shifted volume 1 was called band theory and transport properties in the first edition but the subject has broadened to such an extent that basic properties is now a more suitable title seven chapters have been rewritten by the original authors however twelve chapters are essentially new with the bulk of this work being devoted to important current topics which give this volume an almost encyclopaedic form the first three chapters discuss various aspects of modern band theory and the next two analyze impurities in semiconductors then follow chapters on semiconductor statistics and on surfaces interfaces and band offsets as they occur in heterojunctions chapters 8 to 19 report on newer topics though a survey of transport properties of carriers is also included among these are transport of hot electrons and thermoelectric effects including here and elsewhere properties of low dimensional and mesoscopic structures the electron hole liquid the quantum hall effect localisation ballistic transport coherence in superlattices current ideas on tunnelling and on quantum confinement and scattering processes are also covered

this textbook covers the basic physics of semiconductors and their applications to practical devices with emphasis on the basic physical principles upon which these devices operate extensive use of figures is made to enhance the clarity of the presentation and to establish contact with the experimental side of the topic graduate students and lecturers in semiconductor physics condensed matter physics electromagnetic theory and quantum mechanics will find this a useful textbook and reference work

the aim of this 3 volume reference is to present accurate reliable and up to date information on the physical properties elemental semiconductors vol 1 iii v compound semiconductors vol 2 and ii vi semiconductors vol 3 the data on the physical properties of each material are organized in the same way throughout these volumes to facilitate searching for information the physical properties considered in these volumes can be classified into 12 groups structural properties thermal properties elastic properties phonons and lattice vibronic properties collective effects and related properties energy band structure energy band gaps energy band structure electron and hole effective mass electronic deformation potential electron affinity and schottky barrier height optical properties elastooptic electrooptic and nonlinear optical properties and carrier transport properties an extensive bibliography is included for those who wish to

find additional information

the current technological revolution in the development of computing devices has created a demand for a textbook on the quantum theory of the electronic and optical properties of semiconductors and semiconductor devices this book successfully fulfills this need based on lectures given by the authors it is a comprehensive introduction for researchers or graduate level students to the subject certain sections can also serve as a graduate level textbook for use in solid state physics courses or for more specialized courses the final chapters establish a direct link to current research in semiconductor physics

this third updated edition of fundamentals of semiconductors attempts to fill the gap between a general solid state physics textbook and research articles by providing detailed explanations of the electronic vibrational transport and optical properties of semiconductors the approach is physical and intuitive rather than formal and pedantic theories are presented to explain experimental results this textbook has been written with both students and researchers in mind its emphasis is on understanding the physical properties of si and similar tetrahedrally coordinated semiconductors the explanations are based on physical insights each chapter is enriched by an extensive collection of tables of material parameters figures and problems many of these problems lead the student by the hand to arrive at the results

optical properties particularly in the infrared range of wavelengths continue to be of enormous interest to both material scientists and device engineers the need for the development of standards for data of optical properties in the infrared range of wavelengths is very timely considering the on going transition of nano technology from fundamental r d to manufacturing radiative properties play a critical role in the processing process control and manufacturing of semiconductor materials devices circuits and systems the design and implementation of real time process control methods in manufacturing requires the knowledge of the radiative properties of materials sensors and imagers operate on the basis of the radiative properties of materials this book reviews the optical properties of various semiconductors in the infrared range of wavelengths theoretical and experimental studies of the radiative properties of semiconductors are presented previous studies potential applications and future developments are outlined in chapter 1 an introduction to the radiative properties is presented examples of instrumentation for measurements of the radiative properties is described in chapter 2 in chapters 3

11 case studies of the radiative properties of several semiconductors are elucidated the modeling and applications of these properties are explained in chapters 12 and 13 respectively in chapter 14 examples of the global infrastructure for these measurements are illustrated

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this invaluable textbook presents the basic elements needed to understand and research into semiconductor physics it deals with elementary excitations in bulk and low dimensional semiconductors including quantum wells quantum wires and quantum dots the basic principles underlying optical nonlinearities are developed including excitonic and many body plasma effects fundamentals of optical bistability semiconductor lasers femtosecond excitation the optical stark effect the semiconductor photon echo magneto optic effects as well as bulk and quantum confined franz keldysh effects are covered the material is presented in sufficient detail for graduate students and researchers with a general background in quantum mechanics this fifth edition includes an additional chapter on quantum optical effects where the theory of quantum optical effects in semiconductors is detailed besides deriving the semiconductor luminescence equations and the expression for the stationary luminescence spectrum results are presented to show the importance of coulombic effects on the semiconductor luminescence and to elucidate the role of excitonic populations

containing the most reliable parameter values for each of these semiconductor materials along with applicable references these data are organized in a structured logical way for each semiconductor material reviews traditional semiconductor materials as well as new advanced semiconductors essential authoritative handbook on the properties of semiconductor materials

the interaction between light and electrons in semiconductors forms the basis for many interesting and practically significant properties this book examines the fundamental physics underlying this rich complexity of photoelectronic properties of semiconductors and will familiarise the reader with the relatively simple models that are useful in describing these fundamentals the basic physics is also illustrated with typical recent examples of experimental data and observations following introductory material on the basic concepts the book moves on to consider a wide range of phenomena including photoconductivity recombination effects photoelectronic methods of defect analysis photoeffects at grain boundaries amorphous semiconductors photovoltaic effects and photoeffects in quantum wells and superlattices the author is professor of materials science and electrical engineering at stanford university and has taught this material for many years he is an experienced author his earlier books having found wide acceptance and use readers will therefore find this volume to be an up to date and concise summary of the major concepts models and results it is intended as a text for graduate students but will be an important resource for anyone researching in this interesting field

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 like GaAs , GaInP and ZnCdTe but also new alloys such as dilute carbon alloys like SiGe , SiSn etc iii n alloys dilute nitride alloys like GaN and InN 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

this revised and updated edition of the well received book by c klingshirn provides an introduction to and an overview of all aspects of semiconductor optics from ir to visible and uv it has been split into two volumes and rearranged to offer a clearer structure of the course content inserts on important experimental techniques as well as sections on topical research have been added to support research oriented teaching and learning volume 1 provides an introduction to the linear optical mathematical treatment has been kept as elementary as possible to allow an intuitive approach to the understanding of results of semiconductor spectroscopy building on the phenomenological model of the lorentz oscillator the book describes the interaction of light with fundamental optical excitations in semiconductors phonons free carriers excitons it also offers a broad review of seminal research

results augmented by concise descriptions of the relevant experimental techniques e g fourier transform ir spectroscopy ellipsometry modulation spectroscopy and spatially resolved methods to name a few further it picks up on hot topics in current research like quantum structures mono layer semiconductors or perovskites the experimental aspects of semiconductor optics are complemented by an in depth discussion of group theory in solid state optics covering subjects ranging from physics to materials science and optoelectronics this book provides a lively and comprehensive introduction to semiconductor optics with over 120 problems more than 480 figures abstracts to each chapter as well as boxed inserts and a detailed index it is intended for use in graduate courses in physics and neighboring sciences like material science and electrical engineering it is also a valuable reference resource for doctoral and advanced researchers

optical properties and band structure of semiconductors volume 1 presents the experimental studies of the fundamental structure of semiconductors and insulators this book provides detailed information of the available measurement methods and results for a large number of both cubic and non cubic materials comprised of 10 chapters this volume begins with an overview of the fundamental band structure of semiconductors this text then discusses the instrumentation and methods available for the measurement of absorption coefficient absolute reflection coefficient and other optical properties of insulators and semiconductors primarily in their fundamental region other chapters consider the interband transitions in the one electron approximation the final chapter deals with the equivalence of the transverse and longitudinal dielectric constants in the frequency range under consideration this book is a valuable resource for solid state physicists readers and researchers with interest in the electron and optical properties of semiconductors and insulators will also find this book useful

first generation semiconductors could not be properly termed doped they were simply very impure uncontrolled impurities hindered the discovery of physical laws baffling researchers and evoking pessimism and derision in advocates of the burgeoning pure physical disciplines the eventual banishment of the dirt heralded a new era in semiconductor physics an era that had purity as its motto it was this era that yielded the successes of the 1950s and brought about a new technology of semiconductor electronics experiments with pure crystals provided a powerful stimulus to the development of semiconductor theory new methods and theories were developed and tested the effective mass method for complex bands the theory of impurity states and the theory of kinetic phenomena these

developments constitute what is now known as semiconductor physics in the last fifteen years however there has been a noticeable shift towards impure semiconductors a shift which came about because it is precisely the impurities that are essential to a number of major semiconductor devices technology needs impure semiconductors which unlike the first generation items are termed doped rather than impure to indicate that the impurity levels can now be controlled to a certain extent

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