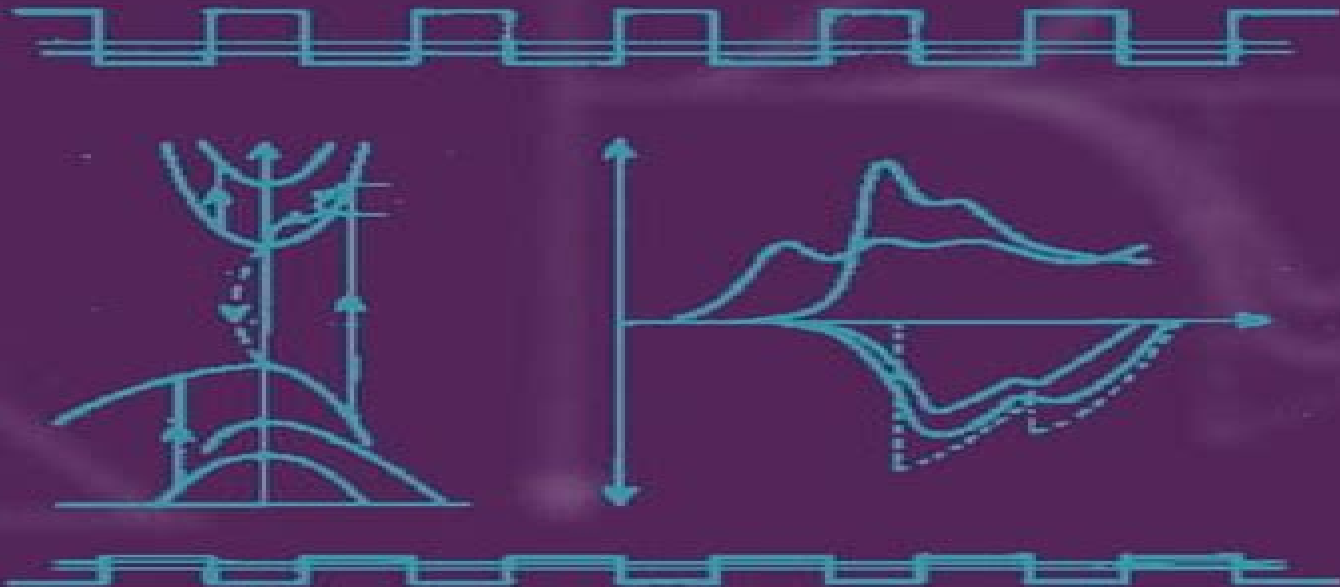


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THEORY OF OPTICAL PROCESSES IN SEMICONDUCTORS BULK AND MICROSTRUCTURES

P. K. BASU



Theory Of Optical Processes In Semiconductors Paperback

RJ Alexander



Theory Of Optical Processes In Semiconductors Paperback:

Theory of Optical Processes in Semiconductors Prasanta Kumar Basu, P. K. Basu, 2003 Semiconductor optoelectronic devices are at the heart of all information generation and processing systems and are likely to be essential components of future optical computers. With more emphasis on optoelectronics and photonics in graduate programmes in physics and engineering, there is a need for a text providing a basic understanding of the important physical phenomena involved. Such a training is necessary for the design, optimization and search for new materials, devices and application areas. This book provides a simple quantum mechanical theory of important optical processes, i.e. band to band, intersubband and excitonic absorption and recombination in bulk, quantum wells, wires, dots, superlattices and strained layers, including electro-optic effects. The classical theory of absorption, quantization of radiation and band picture based on $k \cdot p$ perturbation has been included to provide the necessary background. Prerequisites for the book are a knowledge of quantum mechanics and solid state theory. Problems have been set at the end of each chapter, some of which may guide the reader to study processes not covered in the book. The application areas of the phenomena are also indicated.

Fundamentals of Photonics Bahaa E. A. Saleh, Malvin Carl Teich, 2020-03-04 Fundamentals of Photonics: A complete, thoroughly updated, full color third edition. Fundamentals of Photonics, Third Edition is a self-contained and up-to-date introductory level textbook that thoroughly surveys this rapidly expanding area of engineering and applied physics. Featuring a blend of theory and applications coverage, it includes detailed accounts of the primary theories of light, including ray optics, wave optics, electromagnetic optics, and photon optics, as well as the interaction of light and matter. Presented at increasing levels of complexity, preliminary sections build toward more advanced topics such as Fourier optics and holography, photonic crystal optics, guided wave and fiber optics, LEDs and lasers, acousto-optic and electro-optic devices, nonlinear optical devices, ultrafast optics, optical interconnects and switches, and optical fiber communications. The third edition features an entirely new chapter on the optics of metals and plasmonic devices. Each chapter contains highlighted equations, exercises, problems, summaries, and selected reading lists. Examples of real systems are included to emphasize the concepts governing applications of current interest. Each of the twenty-four chapters of the second edition has been thoroughly updated.

Optical Processes in Semiconductors Jacques I. Pankove, 1975-01-01 Based on a series of lectures at Berkeley, 1968-1969, this is the first book to deal comprehensively with all of the phenomena involving light in semiconductors. The author has combined for the graduate student and researcher a great variety of source material, journal research, and many years of experimental research, adding new insights published for the first time in this book. Coverage includes energy states in semiconductors and their perturbation by external parameters; absorption relationships between optical constants; spectroscopy; radiative transitions; nonradiative recombination processes in pn junctions; semiconductor lasers; interactions involving coherent radiation; photoelectric emission; photovoltaic effects; polarization effects; photochemical effects; effect of traps on luminescence and reflective modulation. The author has

presented the subject in a manner which couples readily to physical intuition He introduces new techniques and concepts including nonradiative recombination effects of doping on optical properties Franz Keldysh effect in absorption and emission reflectance modulation and many others Dr Pankove emphasizes the underlying principle that can be applied to the analysis and design of a wide variety of functional devices and systems Many valuable references illustrative problems and tables are also provided here

Semiconductor Nanophotonics Prasanta Kumar Basu, Bratati Mukhopadhyay, Rikmantra Basu, 2022-04-05 Nanometre sized structures made of semiconductors insulators and metals and grown by modern growth technologies or by chemical synthesis exhibit novel electronic and optical phenomena due to the confinement of electrons and photons Strong interactions between electrons and photons in narrow regions lead to inhibited spontaneous emission thresholdless laser operation and Bose Einstein condensation of exciton polaritons in microcavities Generation of sub wavelength radiation by surface plasmon polaritons at metal semiconductor interfaces creation of photonic band gaps in dielectrics and realization of nanometer sized semiconductor or insulator structures with negative permittivity and permeability known as metamaterials are further examples in the area of Nanophotonics The studies help develop spasers and plasmonic nanolasers of subwavelength dimensions paving the way to use plasmonics in future data centres and high speed computers working at THz bandwidth with less than a few fJ bit dissipation The present book is aimed at graduate students and researchers providing them with an introductory textbook on Semiconductor Nanophotonics It gives an introduction to electron photon interactions in Quantum Wells Wires and Dots and then discusses the processes in microcavities photonic band gap materials metamaterials and related applications The phenomena and device applications under strong light matter interactions are discussed mostly by using classical and semi classical theories Numerous examples and problems accompany each chapter

Electron-Lattice Interactions in Semiconductors Yuzo Shinozuka, 2021-03-29 This book presents theoretical treatments on various electronic and atomic processes in non metallic materials from a unified point of view It starts with the basic properties of semiconductors treating the system as a macroscopic association of electrons and ions In their ground state fruitful results are derived such as the band theory for electrons in a periodic lattice and a useful concept of hole The electron lattice interaction is then introduced as a dynamical response of condensed matter when it is electronically excited With the aid of proper configuration coordinate diagrams various phenomena are precisely examined including carrier scattering polaron formation lattice relaxation Stokes shift and phonon side band in optical spectrum intrinsic and extrinsic self trapping and structural changes The book provides readers a deep understanding of the physics underlying these phenomena and excellent insight to develop their further research Graduate students who have finished the basic study on solid state physics and quantum mechanics and research scientists and engineers in materials science and engineering will benefit immensely from it

CERN Courier, 2003 **The Cumulative Book Index**, 1998 A world list of books in the English language

Second Order Non-linear Optics of Silicon and Silicon Nanostructures O. A.

Aktsipetrov, I. M. Baranova, K. N. Evtyukhov, 2018-09-03 The theory and practice of the non linear optics of silicon are inextricably linked with a variety of areas of solid state physics particularly semiconductor physics However the current literature linking these fields is scattered across various sources and is lacking in depth Second Order Non linear Optics of Silicon and Silicon Nanostructures describes the physical properties of silicon as they apply to non linear optics while also covering details of the physics of semiconductors The book contains six chapters that focus on The physical properties and linear optics of silicon Basic theoretical concepts of reflected second harmonics RSH The authors theory of the generation of RSH at the non linear medium linear medium interface An analytical review of work on the non linear optics of silicon The results of non linear optical studies of silicon nanostructures A theory of photoinduced electronic processes in semiconductors and their influence on RSH generation The book also includes methodological problems and a significant amount of reference data It not only reflects the current state of research but also provides a single thorough source of introductory information for those who are becoming familiar with non linear optics Second Order Non linear Optics of Silicon and Silicon Nanostructures is a valuable contribution to the fields of non linear optics semiconductor physics and microelectronics as well as a useful resource for a wide range of readers from undergraduates to researchers *British Paperbacks in Print* ,1984 Fundamentals of Semiconductor Theory and Device Physics Shyh Wang, 1989 **American Book Publishing Record** ,2000 **Choice** ,1989 **Paperbacks in Print** ,1980 *Soviet Physics, Uspekhi* ,1989

Semiconductor Device and Failure Analysis Wai Kin Chim, 2000 The diminishing size and greater complexity of modern semiconductor integrated circuits poses new challenges in fault detection Photon Emission Microscopy PEM is a physical fault localisation technique used for analysing IC failures Detailing the PEM technique and its application to semiconductor device analysis this unique reference Illustrates the application of the PEM technique in various areas of device reliability in particular hot carrier oxide and ESD reliability Presents the principles of design and calibration for a spectroscopic emission microscope system along with coverage of the three main operation modes frontside backside and spectroscopic PEM Provides an analysis of light emission in semiconductors under hot carrier and high field impulse stressing in MOS transistors and photon emission from biased MOS capacitors Not only an essential reference for researchers and students in the field the numerous practical examples throughout the text also make this an indispensable guide for failure analysis engineers and microelectronics industry professionals **Chemical Abstracts** ,2002 **Optica Applicata** ,1987 **American Book Publishing Record Cumulative, 1950-1977** R.R. Bowker Company. Department of Bibliography, 1978 Journal of Scientific & Industrial Research ,1981 **Cumulative Book Index** ,1972

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