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Chen-S. Tsai (Ed.)

# Guided-Wave Acousto-Optics

Interactions, Devices and Applications



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**Guided Wave Acousto Optics Interactions Devices And  
Applications Springer Series In Electronics And  
Photonics Vol 23**

**Tao Wei**



## **Guided Wave Acousto Optics Interactions Devices And Applications Springer Series In Electronics And Photonics Vol 23:**

*Guided-Wave Acousto-Optics* Chen S. Tsai, 2013-12-01 The field of integrated or guided wave optics has experienced significant and continuous growth since its inception in the late 1960s. There has been a considerable increase in research and development activity in this field worldwide and some significant advances in the realization of working integrated optic devices and modules have been made in recent years. In fact there have already been some commercial manufacturing and technical applications of such devices and modules. The guided wave acoustooptics involving Bragg interactions between guided optical waves and surface acoustic waves is one of the areas of integrated optics that has reached some degree of scientific and technological maturity. This topical volume is devoted to an in depth treatment of this emerging branch of science and technology. Presented in this volume are concise treatments on bulk wave acoustooptics, guided wave optics and surface acoustic waves and detailed studies of guided wave acoustooptic Bragg diffraction in three promising material substrates namely LiNbO<sub>3</sub>, ZnO, SiO<sub>2</sub> and GaAs, the resulting wide band modulators and deflectors and applications. The chapters cover not only the basic principles and the theoretical analysis but also the design, fabrication and measurement of the resulting devices and modules and their applications. *Integrated Optics: Theory and Technology* Robert G.

Hunsperger, 2013-06-05 Professor Hunsperger's *Integrated Optics* is one of the few texts that is comprehensive and thorough enough for use both as a classroom text (practice problems are included) and as a specialist's reference. The gratifying success of the first two editions and the continuing rapid development of the field necessitated the writing of this third edition. All chapters have been revised and updated and a new chapter on quantum well devices has been added. As in the previous editions, detailed descriptions of the phenomena, devices and technology used in optical integrated circuits and their relationship to fiber optics are presented. The trend of telecommunications toward the use of single mode systems operating at the longer wavelengths of 1.3 and 1.55  $\mu\text{m}$  is explained and documented with illustrations of recently developed devices and systems. Broader coverage of GaInAsP devices and optical integrated circuits is provided and the new growth techniques of molecular beam epitaxy (MBE) and metal organic chemical vapor deposition (MOCVD) are described. A discussion of the extensive development of hybrid optical integrated circuits in lithium niobate is also included. From the reviews: I never had the opportunity of using Hunsperger as a text to teach from but after reading the present third edition I think it must be a pleasure to do so. It is a good book because of its precise language and its didactic organization with many clear tables; it is exhaustive in its details and rigorous in its background; it is well suited for a graduate level course. *Guided-Wave Optoelectronics* Theodor Tamir, 2013-03-08 The first guided wave components that employed signals in the form of light beams traveling along thin films were fabricated a little more than two decades ago. The parallel development of semiconductor lasers and the subsequent availability of low loss optical fibers made possible the implementation of

completely optical systems for communications signal processing and other applications that had used only electronic circuitry in the past. Referred to as integrated optics, this technology has been reinforced by utilizing electronic components that act as controlling elements or perform other functions for which the optical counterparts are not as effective. The broader area thus generated was aptly named optoelectronics and it currently represents a fascinating, rapidly evolving and most promising technology. Specifically, the amalgamation of electronic and optics components into an integrated optoelectronics format is expected to provide a wide range of systems having miniaturized, high speed, broad band and reliable components for telecommunications, data processing, optical computing and other applications in the near and far future. This book is intended to cover primarily the optical portion of the optoelectronics area by focusing on the theory and applications of components that use guided optical waves. Hence, all aspects of integrated optics are discussed, but optoelectronic components having primarily electronic rather than optical functions have not been included. Each chapter has been written by experts who have actively participated in developing the specific areas addressed by them.

*Gate Dielectrics and MOS ULSIs* Takashi Hori, 2012-12-06. Gate Dielectrics and MOS ULSIs provides necessary and sufficient information for those who wish to know well and go beyond the conventional SiO<sub>2</sub> gate dielectric. The topics particularly focus on dielectric films satisfying the superior quality needed for gate dielectrics even in large scale integration. And since the quality requirements are rather different between device applications, they are selected in an application oriented manner, e.g. conventional SiO<sub>2</sub> used in CMOS logic circuits, nitrided oxides which recently became indispensable for flash memories and composite ONO and ferroelectric films for passive capacitors used in DRAM applications. The book also covers issues common to all gate dielectrics such as MOSFET physics, evaluation, scaling and device application integration for successful development. The information is as up to date as possible, especially for nanometer range ultrathin gate dielectric films indispensable in submicrometer ULSIs. The text, together with abundant illustrations, will take even the inexperienced reader up to the present high state of the art. It is the first book presenting nitrided gate oxides in detail.

**Acousto-optics and Applications**, 1998. *Physics of Quantum Electron Devices* Federico Capasso, 2013-03-07. The ability to engineer the bandstructure and the wavefunction over length scales previously inaccessible to technology using artificially structured materials and nanolithography has led to a new class of electron semiconductor devices whose operation is controlled by quantum effects. These structures not only represent exciting tools for investigating new quantum phenomena in semiconductors but also offer exciting opportunities for applications. This book gives the first comprehensive treatment of the physics of quantum electron devices. This interdisciplinary field at the junction between material science, physics and technology has witnessed an explosive growth in recent years. This volume presents a detailed coverage of the physics of the underlying phenomena and their device and circuit applications together with fabrication and growth technology.

**Acousto-optics and Applications III** Antoni Śliwiński, Bogumil B. J. Linde, Piotr Kwiek, 1998. *Silicon-Based*

*Millimeter-Wave Devices* Johann-Friedrich Luy, Peter Russer, 2013-03-07 *Silicon Based Millimeter Wave Devices* describes field theoretical methods for the design and analysis of planar waveguide structures and antennas The principles and limitations of transit time devices with different injection mechanisms are discussed as are aspects of fabrication and characterization The physical properties of silicon Schottky contacts and diodes are treated in a separate chapter Two chapters cover the silicon germanium devices physics and RF properties of the heterobipolar transistor and quantum effect devices such as the resonant tunneling element are described The integration of devices in monolithic circuits is explained and advanced technologies are presented along with the self mixing oscillator operation Finally sensor and system applications are considered

**Electrophotography and Development Physics** Lawrence B. Schein, 2013-03-07 *Electrophotography and Development Physics* focuses on the complicated and increasingly important technology found in photocopiers and laser printers An introduction chapter acquaints the reader with the technical history of electrophotography its current and projected markets and also alternative related copying and printing technologies A concise description of the physics of the complete electrophotographic process is followed by an in depth treatment of static electricity The three types of development systems two component monocomponent and liquid and their associated charging mechanisms In this second edition a discussion of the new color copiers and a chapter updating the original material have been added On mastering this material which is presented in a manner suitable for both the newcomer and the established expert the reader will have a working knowledge of the electrophotographic process and a detailed knowledge of its important subsystem development

Nonlinear Photonics Hyatt M. Gibbs, Galina Khitrova, Nasser Peyghambarian, 2012-12-06 *Nonlinear photonics* is the name given to the use of nonlinear optical devices for the generation communication processing or analysis of information This book is a progress report on research into practical applications of such devices At present modulation switching routing decision making and detection in photonic systems are all done with electronics and linear optoelectronic devices However this may soon change as nonlinear optical devices e g picosecond samplers and switches begin to complement optoelectronic devices The authors succinctly summarize past accomplishments in this field and point to hopes for the future making this an ideal book for newcomers or seasoned researchers wanting to design and perfect nonlinear optical devices and to identify applications in photonic systems

**Photonic Switching** T. Kenneth Gustafson, Peter W. Smith, 2012-12-06 The first topical meeting on Photonic Switching was held March 18 20 1987 in Incline Village Nev USA in conjunction with the second topical meeting on Optical Computing It was sponsored by the IEEE Lasers and Electro Optics Society and the Optical Society of America with the co operation of the IEEE Communications Society The attendance at these meetings was well in excess of 500 persons a measure of the growing worldwide interest in optical techniques for switching and signal processing Our goal in organizing the Photonic Switching meeting was to provide a forum for the presentation of original papers on the subjects of devices and architectures suitable for switching

multiplexing or routing of optical signals The purpose of the meeting was to foster and enhance interaction between two groups that share a common interest in exploring possible applications of photonic switching technology people working on optical switching devices and components and people working on future switching systems and networks

**Semiconductor Optical Modulators** Koichi Wakita, 2013-11-27 The introduction of GaAs AlGaAs double heterostructure lasers has opened the door to a new age in the application of compound semiconductor materials to microwave and optical technologies A variety and combination of semiconductor materials have been investigated and applied to present commercial uses with these devices operating at wide frequencies and wavelengths Semiconductor modulators are typical examples of this technical evolutions and have been developed for commercial use Although these have a long history to date we are not aware of any book that details this evolution Consequently we have written a book to provide a comprehensive account of semiconductor modulators with emphasis on historical details and experimental reports The objective is to provide an up to date understanding of semiconductor modulators Particular attention has been paid to multiple quantum well MQW modulators operating at long wavelengths taking into account the low losses and dispersion in silica fibers occurring at around 1.3 and 1.55  $\mu\text{m}$  At the present time MQW structures have been investigated but these have not been sufficiently developed to provide characteristic features which would be instructive enough for readers One problem is the almost daily publication of papers on semiconductor modulators Not only do these papers provide additional data but they often modify the interpretations of particular concepts Almost all chapters refer to the large number of published papers that can be consulted for future study

**Single-Electron Tunneling and Mesoscopic Devices** Hans Koch, K.v. Klitzing, Heinz Lübbig, 2012-12-06 Single electron tunneling SET and related phenomena have recently come to be considered as hot topics This also became apparent when we organized the 4th International Conference on Superconducting and Quantum Effect Devices and Their Applications SQUID 91 which was held June 18-21 1991 in Berlin Germany Impressed by the number of contributions dedicated to the new physics of ultrasmall devices we deemed it appropriate to devote this volume of the Springer Series in Electronics and Photonics to these specialized proceedings The other contributions presented at SQUID 91 which are more conventional in character but nevertheless contain excitingly innovative results are published separately as Volume 64 of the series Springer Proceedings in Physics At first glance it seems strange that a conference abbreviated SQUID 91 should attract so many papers on non superconducting devices and in fact the first SQUID XX conferences dealt exclusively with the physics and technology of Josephson junctions SQUIDs and other superconducting devices and their applications However many concepts developed for superconducting devices like tunneling flux quantization and flux charge conjugation appeared to be suitable for ultrasmall non superconducting structures as well and many researchers in the field of superconducting devices extended their activities accordingly Thus the extension of the conference programme evolved quite informally Meanwhile the meetings established themselves as well known conference

series tradition ally appreciated by the SQUID community for its balanced mixture of physics and technology review and preview SQUID XX became a kind of a trademark

**Photonic Switching II** Kunio Tada,H. Scott Hinton,2012-12-06 The 1990 International Topical Meeting on Photonic Switching was held April 12 14 1990 in Kobe Japan in conjunction with the 1990 International Meet ing on Optical Computing It was sponsored by the Institute of Electronics Information and Communication Engineers in cooperation with the IEEE Lasers and Electro Optics Society the Optical Society of America and the Japan So ciety of Applied Physics The attendance was in excess of 340 persons with 18 countries represented a testimony to the current international interest in photonic switching This book contains expanded and more detailed versions of most of the papers presented at the topical meeting With the success of optical fibers there is an increased demand for a switch ing system that can operate directly on the light present in the fibers The goal is to reduce the total number of optical to electrical and electrical to optical transformations as far as possible in addition to exploiting the large spec tral and temporal bandwidth offered by such an optically transparent system

**Ultra-Fast Silicon Bipolar Technology** Ludwig Treitinger,Mitiko Miura-Mattausch,2013-03-13 Since the first bipolar transistor was investigated in 1947 enormous efforts have been devoted to semiconductor devices The strong world wide competition in fabricating metal oxide semiconductor field effect of develop transistor MOSFET memories has accelerated the pace ments in semiconductor technology Bipolar transistors play a major role due to their high speed performance Delay times of about 20 ps per gate have already been achieved Because of this rapid technologi cal progress it is difficult to predict the future with any certainty In 1987 a special session on ultrafast bipolar transistors was held at the European Solid State Device Research Conference Its aim was to sum marize the most recent developments and to discuss the future of bip olar transistors This book is based on that session but also includes contributions by other participants such that a broad range of up to is presented Several conclusions can be drawn from date information this information the first and most important is the very large poten tial for future progress still existing in this field This progress is char acterized by the drive towards higher speed and lower power con sumption required for complex single chip systems as well as by sev eral concrete technological implementations for fulfilling these dem is that a large part of this potential can be ands The second conclusion realized by rather unsophisticated techniques and configurations well suited to uncomplicated transfer to fabrication

**Monolithic Diode-Laser Arrays** Nils W. Carlson,2012-12-06 Over the last two decades the search for a compact high power semiconductor source has produced many designs and concepts for monolithic diode laser arrays and optical amplifiers However only a few design approaches have emerged with the potential for producing high power high brightness monolithic sources Although semiconductor diode lasers are the most compact highest gain and most efficient laser sources challenges remain in developing structures that will produce high quality diffraction limited output beams This book presents and analyzes the results of work performed over the last twenty years in the development of high brightness diode laser arrays

*Handbook of Optics: Devices,*

*measurements, and properties* Michael Bass, 1995 Annotation A new volume in the field's bestselling optics reference an entirely new opus focusing on x ray nonlinear and vision optics Provides the same mix of tutorial writing with in depth reference material that distinguished Volumes I II      *Handbook of Advanced Electronic and Photonic Materials and Devices: Ferroelectrics and dielectrics* Hari Singh Nalwa, 2001 Electronic and photonic materials discussed in this handbook are the key elements of continued scientific and technological advances in the 21st century The electronic and photonic materials comprising this handbook include semiconductors superconductors ferroelectrics liquid crystals conducting polymers organic and superconductors conductors nonlinear optical and optoelectronic materials electrochromic materials laser materials photoconductors photovoltaic and electroluminescent materials dielectric materials nanostructured materials supramolecular and self assemblies silicon and glasses photosynthetic and respiratory proteins etc etc Some of these materials have already been used and will be the most important components of the semiconductor and photonic industries computers internet information processing and storage telecommunications satellite communications integrated circuits photocopiers solar cells batteries light emitting diodes liquid crystal displays magneto optic memories audio and video systems recordable compact discs video cameras X ray technology color imaging printing flat panel displays optical waveguides cable televisions computer chips molecular sized transistors and switches as well as other emerging cutting edge technologies Electronic and photonic materials are expected to grow to a trillion dollar industry in the new millennium and will be the most dominating forces in the emerging new technologies in the fields of science and engineering This handbook is a unique source of the in depth knowledge of synthesis processing fabrication spectroscopy physical properties and applications of electronic and photonic materials covering everything for today's and developing future technologies This handbook consists of over one hundred state of the art review chapters written by more than 200 world leading experts from 25 different countries With more than 23 000 bibliographic citations and several thousands of figures tables photographs chemical structures and equations this handbook is an invaluable major reference source for scientists and students working in the field of materials science solid state physics chemistry electrical and optical engineering polymer science device engineering and computational engineering photophysics data storage and information technology and technocrats everyone who is involved in science and engineering of electronic and photonic materials Key Features This is the first handbook ever published on electronic and photonic materials 10 volumes summarize the advances in electronic and photonic materials made over past the two decades This handbook is a unique source of the in depth knowledge of synthesis processing spectroscopy physical properties and applications of electronic and photonic materials Over 100 state of the art review chapters written by more than 200 leading experts from 25 different countries About 25 000 bibliographic citations and several thousand figures tables photographs chemical structures and equations Easy access to electronic and photonic materials from a single reference Each chapter is self contained with cross references Single reference having all inorganic organic and biological materials



Written in very clear and concise fashion for easy understanding of structure property relationships in electronic and photonic materials     **Soviet Physics** ,1991     *Materials and Devices for Photonic Circuits* ,2001

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