



Semiconductor Injection Lasers

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Semiconductor Injection Lasers:

Semiconductor Injection Lasers Jerome K. Butler, 1980 Advances In Semiconductor Lasers And Applications To Optoelectronics (Ijhses Vol. 9 No. 4) Mitra Dutta, Michael A Strosio, 2000-06-21 Foreword by Charles H Townes This volume includes highlights of the theories underlying the essential phenomena occurring in novel semiconductor lasers as well as the principles of operation of selected heterostructure lasers To understand scattering processes in heterostructure lasers and related optoelectronic devices it is essential to consider the role of dimensional confinement of charge carriers as well as acoustical and optical phonons in quantum structures Indeed it is important to consider the confinement of both phonons and carriers in the design and modeling of novel semiconductor lasers such as the tunnel injection laser quantum well intersubband lasers and quantum dot lasers The full exploitation of dimensional confinement leads to the exciting new capability of scattering time engineering in novel semiconductor lasers As a result of continuing advances in techniques for growing quantum heterostructures recent developments are likely to be followed in coming years by many more advances in semiconductor lasers and optoelectronics As our understanding of these devices and the ability to fabricate them grow so does our need for more sophisticated theories and simulation methods bridging the gap between quantum and classical transport *Lightwave Communications Technology: Semiconductor injection lasers, I-II*, 1985 *Semiconductor injection lasers*, 1982 Characteristics of Semiconductor Injection Lasers A. Kar, University of Wales. Institute of Science and Technology, 1983 *Semiconductors and Semimetals*, 1985-04-25 Semiconductors and Semimetals **Advances in Semiconductor Lasers and Applications to Optoelectronics** Mitra Dutta, Michael A. Strosio, 2000 Foreword by Charles H Townes This volume includes highlights of the theories underlying the essential phenomena occurring in novel semiconductor lasers as well as the principles of operation of selected heterostructure lasers To understand scattering processes in heterostructure lasers and related optoelectronic devices it is essential to consider the role of dimensional confinement of charge carriers as well as acoustical and optical phonons in quantum structures Indeed it is important to consider the confinement of both phonons and carriers in the design and modeling of novel semiconductor lasers such as the tunnel injection laser quantum well intersubband lasers and quantum dot lasers The full exploitation of dimensional confinement leads to the exciting new capability of scattering time engineering in novel semiconductor lasers As a result of continuing advances in techniques for growing quantum heterostructures recent developments are likely to be followed in coming years by many more advances in semiconductor lasers and optoelectronics As our understanding of these devices and the ability to fabricate them grow so does our need for more sophisticated theories and simulation methods bridging the gap between quantum and classical transport Semiconductor Laser Fundamentals Toshiaki Suhara, 2004-03-16 Ranging from fundamental theoretical concepts to advanced device technologies this reference text explores the engineering characteristics and performance of specific semiconductor lasers It defines key principles in electromagnetics

optoelectronics and laser implementation for novel applications in optical communications storage processing measurement and sensing This text prepares students for advanced experimental and theoretical research in semiconductor laser technology and provides the only comprehensive systematic and concise description of semiconductor lasers available for an understanding of the physics and parameters of laser operation and function **Phase Stability of Injection-locked**

Beam of Semiconductor Lasers, 1992 Semiconductor Lasers Govind P. Agrawal, Niloy K. Dutta, 2013-11-27 Since its invention in 1962 the semiconductor laser has come a long way Advances in material purity and epitaxial growth techniques have led to a variety of semiconductor lasers covering a wide wavelength range of 0.3-100 μm The development during the 1970s of GaAs semiconductor lasers emitting in the near infrared region of 0.8-0.9 μm resulted in their use for the first generation of optical fiber communication systems However to take advantage of low losses in silica fibers occurring around 1.3 and 1.55 μm the emphasis soon shifted toward long wavelength semiconductor lasers The material system of choice in this wavelength range has been the quaternary alloy InGaAsP During the last five years or so the intense development effort devoted to InGaAsP lasers has resulted in a technology mature enough that lightwave transmission systems using InGaAsP lasers are currently being deployed throughout the world This book is intended to provide a comprehensive account of long wave length semiconductor lasers Particular attention is paid to InGaAsP lasers although we also consider semiconductor lasers operating at longer wave lengths The objective is to provide an up to date understanding of semiconductor lasers while incorporating recent research results that are not yet available in the book form Although InGaAsP lasers are often used as an example the basic concepts discussed in this text apply to all semiconductor lasers irrespective of their wavelengths **Lasers and Masers**, 1962 **Semiconductor Disk Lasers** Oleg G. Okhotnikov, 2010-03-30 This timely publication presents a review of the most recent developments in the field of Semiconductor Disk Lasers Covering a wide range of key topics such as operating principles thermal management nonlinear frequency conversion semiconductor materials short pulse generation electrical pumping and laser applications the book provides readers with a comprehensive account of the fundamentals and latest advances in this rich and diverse field In so doing it brings together contributions from world experts at major collaborative research centers in Europe and the USA Each chapter includes a tutorial style introduction to the selected topic suitable for postgraduate students and scientists with a basic background in optics making it of interest to a wide range of scientists researchers engineers and physicists working and interested in this rapidly developing field It will also serve as additional reading for students in the field Semiconductor Lasers: Basic Physics, Technology, and Design Heinrich Rieck, 1970 **Modeling of Semiconductor Injection Lasers** Alfredo R. Linz, 1984

Quantum Dot Lasers on Silicon Bozhang Dong, 2023-02-04 This book provides guidelines and design rules for developing high performance low cost and energy efficient quantum dot QD lasers for silicon photonic integrated circuits PIC optical frequency comb generation and quantum information systems To this end the nonlinear properties and dynamics of

QD lasers on silicon are investigated in depth by both theoretical analysis and experiment This book aims at addressing four issues encountered in developing silicon PIC 1 The instability of laser emission caused by the chip scale back reflection During photonic integration the chip scale back reflection is usually responsible for the generation of severe instability i e coherence collapse from the on chip source As a consequence the transmission performance of the chip could be largely degraded To overcome this issue we investigate the nonlinear properties and dynamics of QD laser on Si in this book to understand how can it be applied to isolator free photonic integration in which the expensive optical isolator can be avoided Results show that the QD laser exhibits a high degree of tolerance for chip scale back reflections in absence of any instability which is a promising solution for isolator free applications 2 The degradation of laser performance at a high operating temperature In this era of Internet of Thing IoT about 40% of energy is consumed for cooling in the data center In this context it is important to develop a high temperature continuous wave CW emitted laser source In this book we introduce a single mode distributed feedback DFB QD laser with a design of optical wavelength detuning OWD By taking advantage of the OWD technique and the high performance QD with high thermal stability all the static and dynamical performances of the QD device are improved when the operating temperature is high This study paves the way for developing uncooled and isolator free PIC 3 The limited phase noise level and optical bandwidth of the laser are the bottlenecks for further increasing the transmission capacity To improve the transmission capacity and meet the requirement of the next generation of high speed optical communication we introduce the QD based optical frequency comb OFC laser in this book Benefiting from the gain broadening effect and the low noise properties of QD the OFC laser is realized with high optical bandwidth and low phase noise We also provide approaches to further improve the laser performance including the external optical feedback and the optical injection 4 Platform with rich optical nonlinearities is highly desired by future integrated quantum technologies In this book we investigate the nonlinear properties and four wave mixing FWM of QD laser on Si This study reveals that the FWM efficiency of QD laser is more than ten times higher than that of quantum well laser which gives insight into developing a QD based silicon platform for quantum states of light generation Based on the results in this book scientists researchers and engineers can come up with an informed judgment in utilizing the QD laser for applications ranging from classical silicon PIC to integrated quantum technologies *Distributed Feedback Semiconductor Lasers* John E.

Carroll, James Whiteaway, Dick Plumb, 1998 Concentrating on presenting a thorough analysis of DFB lasers from a level suitable for research students this book emphasises and gives extensive coverage of computer aided modeling techniques

Handbook of Solid-State Lasers Peter Cheo, 1988-11-29 Provides information on both state of the art technology and fundamental principles of fully developed solid state lasers emphasizing their operational characteristics and physical properties Six contributions discuss theories and techniques of III V semiconductor diode lasers describe various ty

Laser Diode Modulation and Noise Klaus Petermann, 2012-12-06 Laser diodes represent a key element in the

emerging field of opto electronics which includes for example optical communication optical sensors or optical disc systems For all these applications information is either transmitted stored or read out The performance of these systems depends to a great deal on the performance of the laser diode with regard to its modulation and noise characteristics Since the modulation and noise characteristics of laser diodes are of vital importance for optoelectronic systems the need for a book arises that concentrates on this subject This book thus closes the gap between books on the device physics of semiconductor lasers and books on system design Complementary to the specific topics concerning modulation and noise the first part of this book reviews the basic laser characteristics so that even a reader without detailed knowledge of laser diodes may follow the text In order to understand the book the reader should have a basic knowledge of electronics semiconductor physics and optical communications The work is primarily written for the engineer or scientist working in the field of optoelectronics however since the book is self contained and since it contains a lot of numerical examples it may serve as a textbook for graduate students In the field of laser diode modulation and noise a vast amount has been published during recent years Even though the book contains more than 600 references only a small part of the existing literature is included **Fundamentals of**

Semiconductor Physics MIJOE JOSEPH,2015-04-28 Semiconductors have made an enormous impact on 20 th century science and technology This is because components made from semiconductors have very favorable properties such as low energy consumption compactness and high reliability and so they now dominate electronics and radio engineering Semiconductors are indispensable for space exploration where the requirements of small size low weight and low energy consumption are especially stringent This book uses quantum mechanical concepts and band theory to present the theory of semiconductors in a comprehensible term It also describes how basic semiconductor devices eg diodes transistors and losers operate The book was written for senior high school and B E B Tech students interested in semiconductor physics

Ultra-high Frequency Dynamics of Semiconductor Injection Lasers Kam-Yin Lau,California Institute of Technology.
Division of Engineering and Applied Science,1981

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