

1. Record Nr.	UNINA9910782213703321
Autore	Dutta N. K (Niloy K.), <1953->
Titolo	Semiconductor optical amplifiers [[electronic resource] /] / Niloy K Dutta & Qiang Wang
Pubbl/distr/stampa	Singapore ; ; Hackensack, NJ, : World Scientific Pub., c2006
ISBN	1-281-90906-8 9786611909062 1-61583-869-4 981-270-723-9
Descrizione fisica	1 online resource (310 p.)
Altri autori (Persone)	WangQiang <1973 September 2->
Disciplina	621.3827
Soggetti	Optical amplifiers Optical communications
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Contents; Preface; Authors' Biographies; 1. Introduction; 1.1 Historical Developments; 1.2 Semiconductor Materials; 1.3 Operating Principles; 1.4 Applications; 1.5 Book Overview; 1.6 Future Challenges; 1.7 References; 2. Basic Concepts; 2.1 Introduction; 2.2 Optical Gain; 2.2.1 Gain spectrum and bandwidth; 2.2.2 Gain saturation; 2.3 Dielectric Waveguide; 2.4 Condition for Amplification; 2.5 P-N Junction; 2.6 Amplifier Characteristics; 2.7 Multiquantum Well Amplifiers; 2.8 References; 3. Recombination Mechanisms and Gain; 3.1 Introduction; 3.2 Radiative Recombination; 3.2.1 Condition for gain; 3.2.2 Gain calculation; 3.2.3 Spontaneous emission rate; 3.3 Nonradiative Recombination; 3.3.1 Auger effect; 3.3.2 Surface recombination; 3.3.3 Recombination at defects; 3.3.4 Carrier leakage over the heterobarrier; 3.4 Quantum Well Amplifiers; 3.4.1 Energy levels; 3.4.2 Optical gain and Auger recombination; 3.4.3 Strained quantum well amplifiers; 3.5 Gain in Quantum Wire (QWR) and Quantum Dot (QD) Structures; 3.6 References; 4. Epitaxial Growth and Amplifier Designs; 4.1 Introduction; 4.2 Material Systems; 4.3 Epitaxial Growth Methods; 4.3.1 Liquid phase epitaxy; 4.3.2 Vapor phase epitaxy; 4.3.3 Metal-organic chemical vapor deposition; 4.3.4 Molecular beam

epitaxy; 4.3.5 Chemical beam epitaxy; 4.4 Strained Layer Epitaxy; 4.5 Selective Area Growth; 4.5.1 Model of SAG; 4.5.2 Materials growth using SAG; 4.6 Amplifier Designs; 4.6.1 Leakage current; 4.7 Growth of QWR and QD Materials; 4.8 References; 5. Low Reflectivity Facet Designs; 5.1 Introduction; 5.2 Low Reflectivity Coatings; 5.3 Buried Facet Amplifiers; 5.4 Tilted Facet Amplifiers; 5.5 Amplified Spontaneous Emission and Optical Gain; 5.6 References; 6. Amplifier Rate Equations and Operating Characteristics; 6.1 Introduction 6.2 Amplifier Rate Equations for Pulse Propagation 6.3 Pulse Amplification; 6.4 Multichannel Amplification; 6.5 Amplifier Application in Optical Transmission Systems; 6.5.1 In-line amplifiers; 6.5.2 Optical pre-amplifier; 6.5.3 Power amplifier; 6.6 Amplifier Noise; 6.6.1 Noise analysis for optical transmission; 6.7 Gain Dynamics; 6.7.1 Model of gain recovery; 6.7.2 Quantum dot SOA; 6.8 References; 7. Photonic Integrated Circuit Using Amplifiers; 7.1 Introduction; 7.2 Integrated Laser and Amplifier; 7.3 Multichannel WDM Sources with Amplifiers; 7.4 Spot Size Conversion (SSC) 7.5 Mach-Zehnder Interferometer 7.6 References; 8. Functional Properties and Applications; 8.1 Introduction; 8.2 Four-Wave Mixing; 8.2.1 CW FWM results; 8.2.1.1 FWM analysis; 8.2.2 Pulsed FWM results; 8.2.3 FWM bandwidth; 8.3 Cross Gain Modulation; 8.3.1 Rate equations for multiple pulse propagation; 8.3.2 Bandwidth of cross gain modulation; 8.4 Cross Phase Modulation; 8.4.1 Mach-Zehnder interferometer; 8.5 Wavelength Conversion; 8.6 Optical Demultiplexing; 8.6.1 Four-wave mixing based scheme; 8.6.2 Cross phase modulation based scheme; 8.7 OTDM System Applications; 8.7.1 Clock recovery 8.7.2 OTDM transmission

Sommario/riassunto

This invaluable book provides a comprehensive treatment of the design and applications of the semiconductor optical amplifier (SOA). SOAs are important components for optical communication systems with applications as in-line amplifiers and as functional devices in evolving optical networks. The functional applications of SOAs were first studied in the early 1990's; since then, the diversity and scope of such applications have been steadily growing. Semiconductor Optical Amplifiers is self-contained and unified in presentation. The treatments in the book are detailed enough to capture
