
Solid State Electronic Devices Global Edition

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*Solid State Electronic
Devices Global Edition*

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HARRY HUERTA

Solid-state Electronics Research World Scientific

For undergraduate electrical engineering students or for practicing engineers and scientists interested in updating their understanding of modern electronics One of the most widely used introductory books on semiconductor materials, physics, devices and technology, Solid State Electronic Devices aims to: 1) develop basic semiconductor physics concepts, so students can better understand current and future devices; and 2) provide a sound understanding of

current semiconductor devices and technology, so that their applications to electronic and optoelectronic circuits and systems can be appreciated. Students are brought to a level of understanding that will enable them to read much of the current literature on new devices and applications. Teaching and Learning Experience This program will provide a better teaching and learning experience—for you and your students. It will help: Provide a Sound Understanding of Current Semiconductor Devices: With this background, students will be able to see how their applications to electronic and optoelectronic circuits and systems are meaningful. Incorporate the Basics of Semiconductor Materials and Conduction

Processes in Solids: Most of the commonly used semiconductor terms and concepts are introduced and related to a broad range of devices. Develop Basic Semiconductor Physics Concepts: With this background, students will be better able to understand current and future devices. **Emerging Trends in Terahertz Solid-State Physics and Devices** Oxford University Press, USA This volume provides a timely description of the latest compact MOS transistor models for circuit simulation. The first generation BSIM3 and BSIM4 models that have dominated circuit simulation in the last decade are no longer capable of characterizing all the important features of modern sub-100nm MOS transistors. This

book discusses the second generation MOS transistor models that are now in urgent demand and being brought into the initial phase of manufacturing applications. It considers how the models are to include the complete drift-diffusion theory using the surface potential variable in the MOS transistor channel in order to give one characterization equation.

Solid State Devices and Technology John Wiley & Sons

The present edition is brought up to incorporate the useful suggestions from a number of readers and teachers for the benefit of students. A topic on common-collector configuration is added to the chapter XIII. A new chapter on logic gates is introduced at the end. Keeping in view the present style of university Question papers, a number of very short, short and long thoroughly revised and corrected to remove the errors which crept into earlier editions.

Fundamentals of Solid-State Electronics S. Chand Publishing

Electromigration in ULSI Interconnections provides a comprehensive description of the electromigration in integrated circuits. It is intended for both beginner and

advanced readers on electromigration in ULSI interconnections. It begins with the basic knowledge required for a detailed study on electromigration, and examines the various interconnected systems and their evolution employed in integrated circuit technology. The subsequent chapters provide a detailed description of the physics of electromigration in both Al- and Cu-based Interconnections, in the form of theoretical, experimental and numerical modeling studies. The differences in the electromigration of Al- and Cu-based interconnections and the corresponding underlying physical mechanisms for these differences are explained. The test structures, testing methodology, failure analysis methodology and statistical analysis of the test data for the experimental studies on electromigration are presented in a concise and rigorous manner. Methods of numerical modeling for the interconnect electromigration and their applications to the understanding of electromigration physics are described in detail with the aspects of material properties, interconnection design, and interconnect process parameters on the

electromigration performances of interconnects in ULSI further elaborated upon. Finally, the extension of the studies to narrow interconnections is introduced, and future challenges on the study of electromigration are outlined and discussed.

Solid-State Physics for Electronics

World Scientific

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.

The Physics and Modeling of Mosfets
Butterworth-Heinemann

This book describes the basic physics of semiconductors, including the hierarchy of transport models, and connects the theory with the functioning of actual semiconductor devices. Details are worked out carefully and derived from the basic physics, while keeping the internal coherence of the concepts and explaining various levels of approximation. Examples are based on silicon due to its industrial importance. Several chapters are included that provide the reader with the quantum-mechanical concepts necessary for

understanding the transport properties of crystals. The behavior of crystals incorporating a position-dependent impurity distribution is described, and the different hierarchical transport models for semiconductor devices are derived (from the Boltzmann transport equation to the hydrodynamic and drift-diffusion models). The transport models are then applied to a detailed description of the main semiconductor-device architectures (bipolar, MOS). The final chapters are devoted to the description of some basic fabrication steps, and to measuring methods for the semiconductor-device parameters.

Basic Electronics S. Chand Publishing
This companion to Fundamentals of Solid-State Electronics provides a helpful summary of the main text for students and lecturers alike. The clear typeface, large font, and point form layout, are designed to produce viewgraphs for lectures and to provide ample margins for study notes. This Study Guide comes complete with a detailed description of two one-semester solid-state electronics core courses, taught to about 80-100 sophomore-junior students each time, four

years apart. It links the contents of the one-semester lecture course to the textbook.

Solid State Electronic Devices Springer Science & Business Media

Semiconductors are at the heart of modern living. Almost everything we do, be it work, travel, communication, or entertainment, all depend on some feature of semiconductor technology.

Comprehensive Semiconductor Science and Technology, Six Volume Set captures the breadth of this important field, and presents it in a single source to the large audience who study, make, and exploit semiconductors. Previous attempts at this achievement have been abbreviated, and have omitted important topics. Written and Edited by a truly international team of experts, this work delivers an objective yet cohesive global review of the semiconductor world. The work is divided into three sections. The first section is concerned with the fundamental physics of semiconductors, showing how the electronic features and the lattice dynamics change drastically when systems vary from bulk to a low-dimensional structure and further to a

nanometer size. Throughout this section there is an emphasis on the full understanding of the underlying physics. The second section deals largely with the transformation of the conceptual framework of solid state physics into devices and systems which require the growth of extremely high purity, nearly defect-free bulk and epitaxial materials. The last section is devoted to exploitation of the knowledge described in the previous sections to highlight the spectrum of devices we see all around us. Provides a comprehensive global picture of the semiconductor world Each of the work's three sections presents a complete description of one aspect of the whole Written and Edited by a truly international team of experts

INTRODUCTION TO SEMICONDUCTOR

MATERIALS AND DEVICES Academic Press
This Book Is Designed To Cater The Need Of Students Of B.Sc. (Pass And Hons.) Students Of Various Indian Universities On The Basis Of Model Curriculum Recently Proposed By Cdc Of Ugc. The Book Comprises 569 Figures, 266 Examples, 233 Problems And 336 Objective Questions, Distributed In 13 Chapters.

Each Problem Is Followed By Its Answer. The Inclusion Of A Large Number Of Problems And Review Questions Are Aimed At Evaluating The Degree Of Conceptual Comprehension A Student Has Acquired As A Result Of Studying The Book. The Solved Examples Are Targetted To Illustrate The Theoretical Ideals Described In The Text. Although The Book Is Aimed To Target B.Sc. Students, Yet Chemists, Material Scientists And Electrical Engineers Would Find It Useful Not Only In Persuing Their Studies, But Also In Professional Applications. The Existence Of Sufficient Number Of Objective Questions Are Framed To Help The Student Immensely To Encounter Competitive Examinations Like Net, Slet, Ics And State Civil Services.

Industrial Solid-state Electronics World Scientific

Designed as a text for undergraduate students of engineering in Electrical, Electronics, and Computer Science and IT disciplines as well as undergraduate students (B.Sc.) of physics and electronics as also for postgraduate students of physics and electronics, this compact and accessible text endeavours to simplify the

theory of solid state devices so that even an average student will be able to understand the concepts with ease. The authors, Prof. Somanathan Nair and Prof. S.R. Deepa, with their rich and long experience in teaching the subject, provide a detailed discussion of such topics as crystal structures of semiconductor materials, Miller indices, energy band theory of solids, energy level diagrams and mass action law. Besides, they give a masterly analysis of topics such as direct and indirect gap materials, Fermi-Dirac statistics, electrons in semiconductors, Hall effect, PN junction diodes, Zener and avalanche breakdowns, Schottky barrier diodes, bipolar junction transistors, MOS field-effect transistors, Early effect, Shockley diodes, SCRs, TRIAC, and IGBTs. In the Second Edition, two new chapters on opto-electronic devices and electro-optic devices have been added. The text has been thoroughly revised and updated. A number of solved problems and objective type questions have been included to help students develop grasp of the contents. This fully illustrated and well-organized text should prove invaluable to students pursuing various courses in

engineering and physics. **DISTINGUISHING FEATURES** • Discusses the concepts in an easy-to-understand style. • Furnishes over 300 clear-cut diagrams to illustrate the discussed. • Gives a very large number of questions—short answer, fill in the blanks, tick the correct answer and review questions—to sharpen the minds of the reader. • Provides more than 200 fully solved numerical problems. • Gives answers to a large number of exercises.

Electronic Structure of Organic

Semiconductors Pearson Education India Describing the fundamental physical properties of materials used in electronics, the thorough coverage of this book will facilitate an understanding of the technological processes used in the fabrication of electronic and photonic devices. The book opens with an introduction to the basic applied physics of simple electronic states and energy levels. Silicon and copper, the building blocks for many electronic devices, are used as examples. Next, more advanced theories are developed to better account for the electronic and optical behavior of ordered materials, such as diamond, and disordered materials, such as amorphous

silicon. Finally, the principal quasi-particles (phonons, polarons, excitons, plasmons, and polaritons) that are fundamental to explaining phenomena such as component aging (phonons) and optical performance in terms of yield (excitons) or communication speed (polarons) are discussed.

Solid State Electronic Devices World Scientific

One of the most widely used introductory books on semiconductor materials, physics, devices and technology, *Solid State Electronic Devices* aims to: 1) develop basic semiconductor physics concepts, so students can better understand current and future devices; and 2) provide a sound understanding of current semiconductor devices and technology, so that their applications to electronic and optoelectronic circuits and systems can be appreciated. Students are brought to a level of understanding that will enable them to read much of the current literature on new devices and applications.--Amazon.

[1896-1946, Programma ter gelegenheid van het gouden kloosterjubileum van zuster Bernardinus op 26 november 1946](#)

Newnes

For devices courses found in electronics technology and electronics engineering technology departments. Written in an engaging, personable style, this guide to solid-state electronic devices explores the latest in semiconductor theory and applications, showing how semiconductors fit within circuits, how circuits and logic gates make decisions, and how to properly adapt solid-state devices into a circuit design. Designed with the non-technical student in mind, it requires minimal mathematical knowledge, and goes out of its way to explain new ideas and concepts step-by-step, in a clear, succinct, and easily understandable manner.

[Fundamentals of Solid-state Electronics](#)
PHI Learning Pvt. Ltd.

This Solution Manual, a companion volume of the book, *Fundamentals of Solid-State Electronics*, provides the solutions to selected problems listed in the book. Most of the solutions are for the selected problems that had been assigned to the engineering undergraduate students who were taking an introductory device core course using this book. This Solution Manual also contains an extensive

appendix which illustrates the application of the fundamentals to solutions of state-of-the-art transistor reliability problems which have been taught to advanced undergraduate and graduate students. This book is also available as a set with Fundamentals of Solid-State Electronics and Fundamentals of Solid-State Electronics — Study Guide.

Solid State Properties Springer Science & Business Media
Microelectronic Circuits by Sedra and Smith has served generations of electrical and computer engineering students as the best and most widely-used text for this required course. Respected equally as a textbook and reference, "Sedra/Smith" combines a thorough presentation of fundamentals with an introduction to present-day IC technology. It remains the best text for helping students progress from circuit analysis to circuit design, developing design skills and insights that are essential to successful practice in the field. Significantly revised with the input of two new coauthors, slimmed down, and updated with the latest innovations, Microelectronic Circuits, Eighth Edition, remains the gold standard in providing the

most comprehensive, flexible, accurate, and design-oriented treatment of electronic circuits available today.
Physical Properties of Semiconductors New Age International
This book is a lucid presentation for chemists, electrical engineers, surface scientists, and solid-state physicists, of the fundamentals underlying the construction of simple and small chemical sensors. The first part of the book is a review of the theoretical background in solid state physics, chemistry and electronics. Semiconductor and solid electrolyte bulk models are reviewed as well as solid/gas and solid/liquid interface models. Membranes and catalysis theory are also covered expansively. The second part is a discussion of more complete sensor devices, their essential components, and of the important developments in this area over the last fifteen to twenty years. The book provides guidance through the multidisciplinary world of chemical sensors. It should be understandable to students with some training in physics and chemistry and a general knowledge of electronics. Finally, comments on economic considerations in the

development of new sensor products and suggestions for future research and development should be of value to company R&D planners. Key Features * Introduction * Solid State Background * Solid/Gas Interfaces * Solid/Liquid Interfaces * Catalysis Background * Membrane Background * Biosensor Principles * Principles of Chemfet Operation * Silicon Based Chemical Sensors * Thin Film Gas Sensors * Solid Electrolytes-Devices * Gas Sensors Based on Semiconductor Powders * Application of Solid State Chemical Sensors

Band Structure of Semiconductors
World Scientific

For undergraduate electrical engineering students or for practicing engineers and scientists, interested in updating their understanding of modern electronics. One of the most widely used introductory books on semiconductor materials, physics, devices and technology, this text aims to: 1) develop basic semiconductor physics concepts, so students can better understand current and future devices; and 2) provide a sound understanding of current semiconductor devices and technology, so that their applications to

electronic and optoelectronic circuits and systems can be appreciated. Students are brought to a level of understanding that will enable them to read much of the current literature on new devices and applications.

Solid State Electronic Devices Springer
This book fills a gap between many of the basic solid state physics and materials science books that are currently available. It is written for a mixed audience of electrical engineering and applied physics students who have some knowledge of elementary undergraduate quantum mechanics and statistical mechanics. This book, based on a successful course taught at MIT, is divided pedagogically into three parts: (I) Electronic Structure, (II) Transport Properties, and (III) Optical Properties. Each topic is explained in the context of bulk materials and then extended to low-dimensional materials where applicable.

Problem sets review the content of each chapter to help students to understand the material described in each of the chapters more deeply and to prepare them to master the next chapters.

Modern Semiconductor Quantum

Physics Pearson Higher Ed
Band Structure of Semiconductors provides a review of the theoretical and experimental methods of investigating band structure and an analysis of the results of the developments in this field. The book presents the problems, methods, and applications in the study of band structure. Topics on the computational methods of band structure; band structures of important semiconducting materials; behavior of an electron in a perturbed periodic field; effective masses and g-factors for the most commonly encountered band structures; and the

treatment of cyclotron resonance, Shubnikov-de Haas oscillations, magnetophonon resonance, and magneto-optical phenomena are discussed. Experimental physicists, theoretical physicists, students and research workers, and engineers working in the field of semiconductor electronics will find this book a great source of vital information. *Physics of Semiconductor Devices* Springer Science & Business Media
Provides a multidisciplinary introduction to quantum mechanics, solid state physics, advanced devices, and fabrication. Covers wide range of topics in the same style and in the same notation. Most up to date developments in semiconductor physics and nano-engineering. Mathematical derivations are carried through in detail with emphasis on clarity. Timely application areas such as biophotonics, bioelectronics