Electrical Engineering Materials And Semiconductor Devices

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Electrical Engineering Materials And Semiconductor Devices ***2022-11-16***

DECKER FRIEDMAN

Electrical Engineering Materials New Academic Science
Learn the latest advances in SiC (Silicon Carbide) technology from the leading experts in the field with this new cutting-edge resource. The book is your single source for in-depth information on both SiC device fabrication and system-level applications. This comprehensive reference begins with an examination of how SiC is grown and how defects in SiC growth can affect working devices. Key issues in selective doping of SiC via ion implantation are covered with special focus on implant conditions and electrical activation of implants. SiC applications discussed include chemical sensors, motor-control components, high-temperature gas sensors, and high-temperature electronics. By cutting through the arcane data and jargon surrounding the hype on SiC, this book gives an honest assessment of today's SiC technology and shows you how SiC can be adopted in developing tomorrow's applications.
Semiconductor Devices and Technologies for Future Ultra Low Power Electronics Springer Science & Business Media
The present book focuses on a broad domain of electrical engineering materials in the undergraduate level with some aspects to be taught in the post

graduate level, for which a co-ordination has been made according to the syllabus of Indian universities in the field of material science.This book has dealt with fundamentals of the subject matter in a comprehensive way along with emphasis on the different devices in the field of material science. Emphasis has been focused so that the students can have a comprehensive knowledge on the subject matter.Contents?Introduction ?Magnetic Materials ?Semiconductors ?Semiconductor Devices ?Superconductors ?Insulating Materials.

III–V Compound Semiconductors and Devices Academic Press
This book describes semiconductors from a materials science perspective rather than from condensed matter physics or electrical engineering viewpoints. It includes discussion of current approaches to organic materials for electronic devices. It further describes the fundamental aspects of thin film nucleation and growth, and the most common physical and chemical vapor deposition techniques. Examples of the application of the concepts in each chapter to specific problems or situations are included, along with recommended readings and homework problems.

Semiconductor Physical Electronics S. Chand Publishing
This textbook contains all the materials that an engineer needs to know to start a career in the semiconductor industry. It

also provides readers with essential background information for semiconductor research. It is written by a professional who has been working in the field for over two decades and teaching the material to university students for the past 15 years. It includes process knowledge from raw material preparation to the passivation of chips in a modular format.
Engineering Materials Science McGraw-Hill Companies
The book has been written in a lucid and systematic manner with necessary mathematical derivations, illustrations, examples and practise exercises providing detailed description of the materials used in electrical and electronics engineering and their applications. Beginning with the atomic structure of the materials, the book deals with the behaviour of dielectrics and their properties under the influence of DC and AC fields. It covers the magnetic properties of materials including soft and hard magnetic materials and their applications. The text discusses fabrication techniques and the basic physics involved in the operation of the semiconductors, junction transistors and rectifiers. It includes detailed description of optical properties of the materials (optical materials), photovoltaic materials and the materials used in lasers and optical fibres. It also incorporates the latest information on the materials used for the direct energy conversion

and fuel cell technologies. This book is primarily intended for undergraduate students of electrical engineering and electrical and electronics engineering. Key features • Contains sufficient numbers of solved numerical examples. • Includes a set of review questions and a list of references at the end of each chapter. • Provides a set of numerical problems in some of the chapters, wherever required. • Contains more than 150 diagrammatic illustrations for easy understanding of the concepts.

Semiconductor Materials Springer Science & Business Media Semiconductor spintronics is expected to lead to a new generation of transistors, lasers and integrated magnetic sensors that can be used to create ultra-low power, high speed memory, logic and photonic devices. Useful spintronic devices will need materials with practical magnetic ordering temperatures and current research points to gallium and aluminium nitride magnetic superconductors as having great potential. This book details current research into the properties of III-nitride semiconductors and their usefulness in novel devices such as spin-polarized light emitters, spin field effect transistors, integrated sensors and high temperature electronics. Written by three leading researchers in nitride semiconductors, the book provides an excellent introduction to gallium

nitride technology and will be of interest to all reseachers and industrial practitioners wishing to keep up to date with developments that may lead to the next generation of transistors, lasers and integrated magnetic sensors.

Surfaces and Interfaces of Electronic Materials Springer Science & Business Media This book addresses material growth, device fabrication, device application, and commercialization of energy-efficient white light-emitting diodes (LEDs), laser diodes, and power electronics devices. It begins with an overview on basics of semiconductor materials, physics, growth and characterization techniques, followed by detailed discussion of advantages, drawbacks, design issues, processing, applications, and key challenges for state of the art GaN-based devices. It includes state of the art material synthesis techniques with an overview on growth technologies for emerging bulk or free standing GaN and AlN substrates and their applications in electronics, detection, sensing, optoelectronics and photonics. Wengang (Wayne) Bi is Distinguished Chair Professor and Associate Dean in the College of Information and Electrical Engineering at Hebei University of Technology in Tianjin, China. Hao-chung (Henry) Kuo is Distinguished Professor and Associate Director of the Photonics Center at National Chiao-Tung University, Hsin-Tsu,

Taiwan, China. Pei-Cheng Ku is an associate professor in the Department of Electrical Engineering & Computer Science at the University of Michigan, Ann Arbor, USA. Bo Shen is the Cheung Kong Professor at Peking University in China.

A Textbook of Electrical Engineering Materials World Scientific

Problems after each chapter

Electrical Properties of Materials Springer Nature

This textbook gives a complete and fundamental introduction to the properties of III-V compound semiconductor devices, highlighting the theoretical and practical aspects of their device physics. Beginning with an introduction to the basics of semiconductor physics, it presents an overview of the physics and preparation of compound semiconductor materials, as well as a detailed look at the electrical and optical properties of compound semiconductor heterostructures. The book concludes with chapters dedicated to a number of heterostructure electronic and photonic devices, including the high-electron-mobility transistor, the heterojunction bipolar transistor, lasers, unipolar photonic devices, and integrated optoelectronic devices. Featuring chapter-end problems, suggested references for further reading, as well as clear, didactic schematics accompanied by six information-rich appendices, this textbook is ideal for graduate

students in the areas of semiconductor physics or electrical engineering. In addition, up-to-date results from published research make this textbook especially well-suited as a self-study and reference guide for engineers and researchers in related industries.

Fundamentals of Solid State Engineering

Springer Science & Business Media

The book has been throughly revised.Several new articles have been added,specifically,in chapters in mortar ,Concrete ,Paint:Varnishes,Distempers and Antitermite treatmant to make the book to still more comprehensive and a useful unit for the students preparing for the examination in the subject.

Library of Congress Subject Headings OUP Oxford

"Semiconductor-On-Insulator Materials for NanoElectronics Applications" is devoted to the fast evolving field of modern nanoelectronics, and more particularly to the physics and technology of nanoelectronic devices built on semiconductor-on-insulator (SemOI) systems. The book contains the achievements in this field from leading companies and universities in Europe, USA, Brazil and Russia. It is articulated around four main topics: 1. New semiconductor-on-insulator materials; 2. Physics of modern SemOI devices; 3. Advanced characterization of SemOI devices; 4. Sensors and

MEMS on SOI.
"Semiconductor-On-Insulator Materials for NanoElectonics Applications" is useful not only to specialists in nano- and microelectronics but also to students and to the wider audience of readers who are interested in new directions in modern electronics and optoelectronics.
The Materials Science of Semiconductors CRC Press
The main topic of this book is quantum mechanics, as the title indicates. It specifically targets those topics within quantum mechanics that are needed to understand modern semiconductor theory. It begins with the motivation for quantum mechanics and why classical physics fails when dealing with very small particles and small dimensions. Two key features make this book different from others on quantum mechanics, even those usually intended for engineers: First, after a brief introduction, much of the development is through Fourier theory, a topic that is at the heart of most electrical engineering theory. In this manner, the explanation of the quantum mechanics is rooted in the mathematics familiar to every electrical engineer. Secondly, beginning with the first chapter, simple computer programs in MATLAB are used to illustrate the principles. The programs can easily be copied and used by the reader to do the exercises at the end of the chapters or to just become more familiar with the material. Many of the figures in this

book have a title across the top. This title is the name of the MATLAB program that was used to generate that figure. These programs are available to the reader. Appendix D lists all the programs, and they are also downloadable at http://booksupport.wiley.com

ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS S. Chand Publishing

Market_Desc: · Graduate and Advanced Undergraduate Students of Electrical Engineering About The Book: This comprehensive introduction to the elementary theory and properties of semiconductors describes the basic physics of semiconductor materials and technologies for fabrication of semiconductor devices. Addresses approaches to modeling and provides details of measurement techniques. It also includes numerous illustrative examples and graded problems.

A Course in Electrical Engineering Materials John Wiley & Sons

Semiconductor Materials presents physico-chemical, electronic, electrical, elastic, mechanical, magnetic, optical, and other properties of a vast group of elemental, binary, and ternary inorganic semiconductors and their solid solutions. It also discusses the properties of organic semiconductors. Descriptions are given of the most commonly used semiconductor devices-charge-coupled devices,

field-effect transistors, unijunction transistors, thyristors, Zener and avalanche diodes, and photodiodes and lasers. The current trend of transitioning from silicon technology to gallium arsenide technology in field-effect-based electronic devices is a special feature that is also covered. More than 300 figures and 100 tables highlight discussions in the text, and more than 2,000 references guide you to further sources on specific topics.
Semiconductor Materials is a relatively compact book containing vast information on semiconductor material properties. Readers can compare results of the property measurements that have been reported by different authors and critically compare the data using the reference information contained in the book. Engineers who design and improve semiconductor devices, researchers in physics and chemistry, and students of materials science and electronics will find this a valuable guide.
Semiconductor Advanced Packaging John Wiley & Sons
This book covers the fundamentals and significance of 2-D materials and related semiconductor transistor technologies for the next-generation ultra low power applications. It provides comprehensive coverage on advanced low power transistors such as NCFETs, FinFETs, TFETs, and flexible transistors for future ultra low power applications owing to their better

subthreshold swing and scalability. In addition, the text examines the use of field-effect transistors for biosensing applications and covers design considerations and compact modeling of advanced low power transistors such as NCFETs, FinFETs, and TFETs. TCAD simulation examples are also provided. FEATURES Discusses the latest updates in the field of ultra low power semiconductor transistors Provides both experimental and analytical solutions for TFETs and NCFETs Presents synthesis and fabrication processes for FinFETs Reviews details on 2-D materials and 2-D transistors Explores the application of FETs for biosensing in the healthcare field This book is aimed at researchers, professionals, and graduate students in electrical engineering, electronics and communication engineering, electron devices, nanoelectronics and nanotechnology, microelectronics, and solid-state circuits.

Electronic Properties of Materials John Wiley & Sons

"This book focuses on a broad spectrum of electrical engineering materials at the undergraduate and postgraduate levels, for which a co-ordination has been made according to the syllabus of Indian universities in the field of materials science. It deals with fundamentals of the subject matter in a comprehensive way with emphasis on different devices in the field of

materials science. The text includes new developments in the subject elaborating electronic devices and their applications. The subject is particularly covered and explained lucidly in areas like magnetic materials, semiconductors, semiconductor devices, superconductors and insulating materials."--Jacket.

Electronic Engineering Materials and Devices

Firewall Media

Provides in-depth knowledge on novel materials that make electronics work under high-temperature and high-pressure conditions This book reviews the state of the art in research and development of lead-free interconnect materials for electronic packaging technology. It identifies the technical barriers to the development and manufacture of high-temperature interconnect materials to investigate into the complexities introduced by harsh conditions. It teaches the techniques adopted and the possible alternatives of interconnect materials to cope with the impacts of extreme temperatures for implementing at industrial scale. The book also examines the application of nanomaterials, current trends within the topic area, and the potential environmental impacts of material usage. Written by world-renowned experts from academia and industry, Harsh Environment Electronics: Interconnect Materials and Performance Assessment covers

interconnect materials based on silver, gold, and zinc alloys as well as advanced approaches utilizing polymers and nanomaterials in the first section. The second part is devoted to the performance assessment of the different interconnect materials and their respective environmental impact. -Takes a scientific approach to analyzing and addressing the issues related to interconnect materials involved in high temperature electronics -Reviews all relevant materials used in interconnect technology as well as alternative approaches otherwise neglected in other literature -Highlights emergent research and theoretical concepts in the implementation of different materials in soldering and die-attach applications -Covers wide-bandgap semiconductor device technologies for high temperature and harsh environment applications, transient liquid phase bonding, glass frit based die attach solution for harsh environment, and more -A pivotal reference for professionals, engineers, students, and researchers Harsh Environment Electronics: Interconnect Materials and Performance Assessment is aimed at materials scientists, electrical engineers, and semiconductor physicists, and treats this specialized topic with breadth and depth.

Quantum Mechanics for Electrical Engineers CRC Press

Milton Ohring's Engineering Materials

Science integrates the scientific nature and modern applications of all classes of engineering materials. This comprehensive, introductory textbook will provide undergraduate engineering students with the fundamental background needed to understand the science of structure–property relationships, as well as address the engineering concerns of materials selection in design, processing materials into useful products, andhow material degrade and fail in service. Specific topics include: physical and electronic structure; thermodynamics and kinetics; processing; mechanical, electrical, magnetic, and optical properties; degradation; and failure and reliability. The book offers superior coverage of electrical, optical, and magnetic materials than competing text.The author has taught introductory courses in material science and engineering both in academia and industry (AT&T Bell Laboratories) and has also written the well-received book, The Material Science of Thin Films (Academic Press).

An Essential Guide to Electronic Material Surfaces and Interfaces

Springer Science & Business Media

The present book on electrical, optical, magnetic and thermal properties of materials is in many aspects different from other introductory texts in solid state physics. First of all, this book is written for engineers, particularly materials and electrical

engineers who want to gain a fundamental under standing of semiconductor devices, magnetic materials, lasers, alloys, etc. Second, it stresses concepts rather than mathematical formalism, which should make the presentation relatively easy to understand. Thus, this book provides a thorough preparation for advanced texts, monographs, or special ized journal articles. Third, this book is not an encyclopedia. The selection oftopics is restricted to material which is considered to be essential and which can be covered in a 15-week semester course. For those professors who want to teach a two-semester course, supplemental topics can be found which deepen the understanding. (These sections are marked by an asterisk [*].) Fourth, the present text leaves the teaching of crystallography, X-ray diffrac tion, diffusion, lattice defects, etc. , to those courses which specialize in these subjects. As a rule, engineering students learn this material at the beginning of their upper division curriculum. The reader is, however, reminded of some of these topics whenever the need arises. Fifth, this book is distinctly divided into five self-contained parts which may be read independently.

SemiConductor Wafer Bonding John Wiley & Sons

A one-stop resource on all aspects of semiconductor wafer bonding for materials scientists and electrical engineers

Semiconductor Wafer Bonding addresses the entire spectrum of mainstream and likely future applications of wafer bonding. It examines all of the important issues surrounding this technology, including basic interactions between flat surfaces, the influence of particles, surface steps and cavities, surface preparation and room-temperature wafer bonding, thermal treatment of bonded wafer pairs, and much more. This unique, one-stop resource consolidates information previously available only by time-consuming searches through technical journals, proceedings, and book chapters for more than 1,000 published articles on wafer bonding. It covers all materials used for wafer bonding-including silicon, III-V compounds, fused and crystalline quartz, glass, silicon carbide, sapphire, ferroelectrics, and many others. For materials scientists and electrical engineers who need to exploit the potential of this flourishing technology, Semiconductor Wafer Bonding is a convenient one-stop resource for answers to many common questions. It is also an excellent text/reference for graduate students eager to learn about this interdisciplinary field, which spans surface chemistry, solid-state physics, materials science, and electrical engineering.