

## Solid State Physics Saxena Gupta

This book presents the current knowledge about superconductivity in high T<sub>c</sub> cuprate superconductors. There is a large scientific interest and great potential for technological applications. The book discusses all the aspects related to all families of cuprate superconductors discovered so far. Beginning with the phenomenon of superconductivity, the book covers: the structure of cuprate HTSCs, critical currents, flux pinning, synthesis of HTSCs, proximity effect and SQUIDS, possible applications of high T<sub>c</sub> superconductors and theories of superconductivity. Though a high T<sub>c</sub> theory is still awaited, this book describes the present scenario and BCS and RVB theories. The second edition was significantly extended by including film-substrate lattice matching and buffer layer considerations in thin film HTSCs, brick-wall microstructure in the epitaxial films, electronic structure of the CuO<sub>2</sub> layer in cuprates, s-wave and d-wave coupling in HTSCs and possible scenarios of theories of high T<sub>c</sub> superconductivity.

Nanowires are an important sector of circuit design whose applications in very-large-scale integration design (VLSI) have huge impacts for bringing revolutionary advancements in nanoscale devices, circuits, and systems due to improved electronic properties of the nanowires. Nanowires are potential devices for VLSI circuits and system applications and are highly preferred in novel nanoscale devices due to their high mobility and high-driving capacity. Although the knowledge and resources for the fabrication of nanowires is currently limited, it is predicted that, with the advancement of technology, conventional fabrication flow can be used for nanoscale devices, specifically nanowires. Innovative Applications of Nanowires for Circuit Design provides relevant theoretical frameworks that include device physics, modeling, circuit design, and the latest developments in experimental fabrication in the field of nanotechnology. The book covers advanced modeling concepts of nanowires along with their role as a key enabler for innovation in GLSI devices, circuits, and systems. While highlighting topics such as design, simulation, types and applications, and performance analysis of nanowires, this book is ideally intended for engineers, practitioners, stakeholders, academicians, researchers, and students interested in electronics engineering, nanoscience, and nanotechnology.

Modern Physics for Scientists and Engineers provides thorough understanding of concepts and principles of Modern Physics with their applications. The various concepts of Modern Physics are arranged logically and explained in simple reader friendly language. For proper understanding of the subject, a large number of problems with their step-by-step solutions are provided for every concept. University problems have been included in all chapters. A set of theoretical, numerical and multiple choice questions at the end of each chapter will help readers to understand the subject. This textbook covers broad variety of topics of interest in Modern Physics: The Special Theory of Relativity, Quantum Mechanics (Dual Nature of Particle as well as Schrödinger's Equations with Applications), Atomic Physics, Molecular Physics, Nuclear Physics, Solid State Physics, Superconductivity, X-Rays, Lasers, Optical Fibres, and Motion of Charged Particle in Electromagnetic Fields. The book is designed as a textbook for the undergraduate students of science and engineering.

This open access volume is the first comprehensive assessment of the Hindu Kush Himalaya (HKH) region. It comprises important scientific research on the social, economic, and environmental pillars of sustainable mountain development and will serve as a basis for evidence-based decision-making to safeguard the environment and advance people's well-being. The compiled content is based on the collective knowledge of over 300 leading researchers, experts and policymakers, brought together by the Hindu Kush Himalayan Monitoring and Assessment Programme (HIMAP) under the coordination of the International Centre for Integrated Mountain Development (ICIMOD). This assessment was conducted between 2013 and 2017 as the first of a series of monitoring and assessment reports, under the guidance of the HIMAP Steering Committee: Eklabya Sharma (ICIMOD), Atiq Raman (Bangladesh), Yuba Raj Khatriwada (Nepal), Linxiu Zhang (China), Surendra Pratap Singh (India), Tandong Yao (China) and David Molden (ICIMOD and Chair of the HIMAP SC). This First HKH Assessment Report consists of 16 chapters, which comprehensively assess the current state of knowledge of the HKH region, increase the understanding of various drivers of change and their impacts, address critical data gaps and develop a set of evidence-based and actionable policy solutions and recommendations. These are linked to nine mountain priorities for the mountains and people of the HKH consistent with the Sustainable Development Goals. This book is a must-read for policy makers, academics and students interested in this important region and an essentially important resource for contributors to global assessments such as the IPCC reports.

This continuing authoritative series deals with the chemistry, materials science, physics and technology of the rare earth elements. Volume 38 of the Handbook on the Physics and Chemistry of Rare Earth incorporates a recapitulation of the scientific achievements and contributions made by the late Professor LeRoy Eyring (1919-2005) to the science of the lanthanide oxides in which the lanthanide element has a valence equal to or greater than three. · Authoritative · Comprehensive · Up-to-date · Critical

The book covers recent trends in the field of devices, wireless communication and networking. It presents the outcomes of the International Conference in Communication, Devices and Networking (ICCDN 2018), which was organized by the Department of Electronics and Communication Engineering, Sikkim Manipal Institute of Technology, Sikkim, India on 2–3 June, 2018. Gathering cutting-edge research papers prepared by researchers, engineers and industry professionals, it will help young and experienced scientists and developers alike to explore new perspectives, and offer them inspirations on addressing real-world problems in the field of electronics, communication, devices and networking.

Lens Experiment | Telescope Experiment| Spectrometer Experiment | Interference Experiments | Diffraction Experiments| Polarimetry| Section Ii: Electricity And Magnetism| General Introduction | Calibration Experiments| Resistance Experiment | Electrolysis | Capacitanceand Magnetic Fields | Ballistic Galvanometer | Frequencyand Susceptibility| Section-iii: Heat | Thermalconductivity And Radiation Section-Iv: Sound:| Stretched Strings And Ultrasonics| Section-V: Solidstate Physics| Section-Vi: | Lasers And Optical Fibres| Section-Vii: General Experiments

This the third volume of six from the Annual Conference of the Society for Experimental Mechanics, 2010, brings together 56 chapters on Time-Dependent Constitutive Fracture and Failure. It presents early findings from experimental and computational investigations on Time Dependent Materials including contributions on Thermal and Mechanical Characterization, Coupled Experimental and Computational Analysis of Fracture Path Selection, Procedures for Mixed Mode Fracture Testing of Bonded Beams, and Experimental Study of Voids in High Strength Aluminum Alloys.

This volume provides the latest developments in the field of fractional dynamics, which covers fractional (anomalous) transport phenomena, fractional statistical mechanics, fractional quantum mechanics and fractional quantum field theory. The contributors are selected based on their active and important contributions to their respective topics. This volume is the first of its kind that covers such a comprehensive range of topics in fractional dynamics. It will point out to advanced undergraduate and graduate students, and young researchers the possible directions of research in this subject. In addition to those who intend to work in this field and those already in the field, this volume will also be

useful for researchers not directly involved in the field, but want to know the current status and trends of development in this subject. This latter group includes theoretical chemists, mathematical biologists and engineers.

Proceedings of the joint conferences of the Twenty-Fifth International Thermal Conductivity Conference and the Proceedings of the Thirteenth International Thermal Expansion Symposium, on June 13-16, 1999 in Ann Arbor, Michigan USA.

With over 17,000 articles concerning NMR published per year, keeping up to date with the latest developments and applications of this technique can prove time-consuming. Now in its 42nd volume, the Specialist Periodical Report on NMR provides a digest of the current literature, compiled by experts in the field. The current volume devotes several chapters to the aspects and applications of spin-spin couplings, and biochemists will find separate chapters dedicated to proteins, lipids and carbohydrates. Further chapters discuss the latest developments in nuclear shielding, imaging and NMR in living systems. For a comprehensive account of the latest developments and research using NMR, look no further than Specialist Periodical Reports - Nuclear Magnetic Resonance. An essential book for NMR lab and university shelf.

The basic requirement of human being is Roti, Kapada and Makan. Now a day ceramic tiles and ceramic ware are become basic requirement of people in the world. The people demand various types of high qualities ceramic tiles and other ceramic products are ever increasing. Also high demand of ceramic tiles and sanitary product in estate market in the world is increasing day by day. Ceramic tiles and other ceramic material are useful in Industries, scientific research, medical science, electronics components, space science, space yaan technology etc. Now a days ceramics materials useful in advance applications and demand of ceramics materials are increase in feature.

The book, 'Laser Physics and Technology', addresses fundamentals of laser physics, representative laser systems and techniques, and some important applications of lasers. The present volume is a collection of articles based on some of the lectures delivered at the School on 'Laser Physics and Technology' organized at Raja Ramanna Centre for Advanced Technology during March, 12-30, 2012. The objective of the School was to provide an in-depth knowledge of the important aspects of laser physics and technology to doctoral students and young researchers and motivate them for further work in this area. In keeping with this objective, the fourteen chapters, written by leading Indian experts, based on the lectures delivered by them at the School, provide along with class room type coverage of the fundamentals of the field, a brief review of the current status of the field. The book will be useful for doctoral students and young scientists who are embarking on a research in this area as well as to professionals who would be interested in knowing the current state of the field particularly in Indian context.

Solid state physics forms an important part of the undergraduate syllabi of physics in most of the universities. The existing competing books by Indian authors have too complex technical language which makes them abstractive to Indian students who use English as their secondary language. Solid State Physics is written as per the core module syllabus of the major universities and targets undergraduate B.Sc students. The book uses lecture style in explaining the concepts which would facilitate easy understanding of the concepts. The topics have been dealt with precision and provide adequate knowledge of the subject.

A highly coveted objective of modern materials science is to optimize multiple coupled functionalities in the same single phase material and control the cross-response via multiple external fields. One important example of such multi-functionality are multiferroic materials where two or more ferroic properties are intrinsically coupled. They include, among others, the magneto-electric and magneto-structural materials, which are well understood at the nano- and continuum length (and time) scales. The next emerging frontier is to connect these two limiting scales by probing the mesoscale physics of these materials. This book not only attempts to provide this connection but also presents the state-of-the art of the present understanding and potential applications of many related complex multifunctional materials. The main emphasis is on the multiscale bridging of their properties with the aim to discover novel properties and applications in the context of materials by design. This interdisciplinary book serves both graduate students and expert researchers alike.

This five-volume handbook focuses on processing techniques, characterization methods, and physical properties of thin films (thin layers of insulating, conducting, or semiconductor material). The editor has composed five separate, thematic volumes on thin films of metals, semimetals, glasses, ceramics, alloys, organics, diamonds, graphites, porous materials, noncrystalline solids, supramolecules, polymers, copolymers, biopolymers, composites, blends, activated carbons, intermetallics, chalcogenides, dyes, pigments, nanostructured materials, biomaterials, inorganic/polymer composites, organoceramics, metallocenes, disordered systems, liquid crystals, quasicrystals, and layered structures. Thin films is a field of the utmost importance in today's materials science, electrical engineering and applied solid state physics; with both research and industrial applications in microelectronics, computer manufacturing, and physical devices. Advanced, high-performance computers, high-definition TV, digital camcorders, sensitive broadband imaging systems, flat-panel displays, robotic systems, and medical electronics and diagnostics are but a few examples of miniaturized device technologies that depend the utilization of thin film materials. The Handbook of Thin Films Materials is a comprehensive reference focusing on processing techniques, characterization methods, and physical properties of these thin film materials. Helps readers understand the physics behind MOS devices for low-voltage and low-energy applications • Based on timely published and unpublished work written by expert authors • Discusses various promising MOS devices applicable to low-energy environmental and biomedical uses • Describes the physical effects (quantum, tunneling) of MOS devices • Demonstrates the performance of devices, helping readers to choose right devices applicable to an industrial or consumer environment • Addresses some Ge-based devices and other compound-material-based devices for high-frequency applications and future development of high performance devices. 'Seemingly innocuous everyday devices such as smartphones, tablets and services such as on-line gaming or internet keyword searches consume vast amounts of energy. Even when in standby mode, all these devices consume energy. The upcoming "Internet of Things" (IoT) is expected to deploy 60 billion electronic devices spread out in our homes, cars and cities. Britain is already consuming up to 16 per cent of all its power through internet use and this rate is doubling every four years. According to The UK's Daily Mail May (2015), if usage rates continue, all of Britain's power supply could be consumed by internet use in just 20 years. In 2013, U.S. data centers consumed an estimated 91 billion kilowatt-hours of electricity, corresponding to the power generated by seventeen 1000-megawatt nuclear power plants. Data center electricity consumption is projected to increase to roughly 140 billion kilowatt-hours annually by 2020, the equivalent annual output of 50 nuclear power plants. (Natural Resources Defense Council, USA, Feb. 2015) All these examples stress the urgent need for developing electronic devices that consume as little energy as possible. The book "MOS Devices for Low-Voltage and Low-Energy Applications" explores the different transistor options that can be utilized to achieve that goal. It describes in detail the physics and performance of transistors that can be operated at low voltage and consume little power, such as subthreshold operation in bulk transistors, fully depleted SOI devices, tunnel FETs, multigate and gate-all-around MOSFETs. Examples of low-energy circuits making use of these devices are given as well. The book "MOS Devices for Low-Voltage and Low-Energy Applications" is a good reference for graduate students, researchers,

semiconductor and electrical engineers who will design the electronic systems of tomorrow.' --- Dr. Jean-Pierre Colinge, Taiwan Semiconductor Manufacturing Company (TSMC) "The authors present a creative way to show how different MOS devices can be used for low-voltage and low-power applications. They start with Bulk MOSFET, following with SOI MOSFET, FinFET, gate-all-around MOSFET, Tunnel-FET and others. It is presented the physics behind the devices, models, simulations, experimental results and applications. This book is interesting for researchers, graduate and undergraduate students. The low-energy field is an important topic for integrated circuits in the future and none can stay out of this." --- Prof. Joao A. Martino, University of Sao Paulo, Brazil

Handbook of Optical Sensors provides a comprehensive and integrated view of optical sensors, addressing the fundamentals, structures, technologies, applications, and future perspectives. Featuring chapters authored by recognized experts and major contributors to the field, this essential reference: Explains the basic aspects of optical sensors and the principles of optical metrology, presenting a brief historical review Explores the role of optical waveguides in sensing and discusses sensor technologies based on intensity and phase modulation, fluorescence, and plasmonic waves Describes wavefront sensing, multiphoton microscopy, and imaging based on optical coherence tomography Covers optical fiber sensing, from light guiding in standard and microstructured optical fibers to sensor multiplexing, distributed sensing, and fiber Bragg grating Offers a broad perspective of the field and identifies trends that could shape the future, such as metamaterials and entangled quantum states of light Handbook of Optical Sensors is an ideal resource for practitioners and those seeking optical solutions for their specific needs, as well as for students and investigators who are the intellectual driving force of optical sensing.

Although ceramics have been known to mankind literally for millennia, research has never ceased. Apart from the classic uses as a bulk material in pottery, construction, and decoration, the latter half of the twentieth century saw an explosive growth of application fields, such as electrical and thermal insulators, wear-resistant bearings, surface coatings, lightweight armour, or aerospace materials. In addition to plain, hard solids, modern ceramics come in many new guises such as fabrics, ultrathin films, microstructures and hybrid composites. Built on the solid foundations laid down by the 20-volume series Materials Science and Technology, Ceramics Science and Technology picks out this exciting material class and illuminates it from all sides. Materials scientists, engineers, chemists, biochemists, physicists and medical researchers alike will find this work a treasure trove for a wide range of ceramics knowledge from theory and fundamentals to practical approaches and problem solutions.

This book presents the most important advances in the class of topological materials and discusses the topological characterization, modeling and metrology of materials. Further, it addresses currently emerging characterization techniques such as optical and acoustic, vibrational spectroscopy (Brillouin, infrared, Raman), electronic, magnetic, fluorescence correlation imaging, laser lithography, small angle X-ray and neutron scattering and other techniques, including site-selective nanoprobe. The book analyzes the topological aspects to identify and quantify these effects in terms of topology metrics. The topological materials are ubiquitous and range from (i) de novo nanoscale allotropes of carbons in various forms such as nanotubes, nanorings, nanohorns, nanowalls, peapods, graphene, etc. to (ii) metallo-organic frameworks, (iii) helical gold nanotubes, (iv) Möbius conjugated polymers, (v) block co-polymers, (vi) supramolecular assemblies, to (vii) a variety of biological and soft-matter systems, e.g. foams and cellular materials, vesicles of different shapes and genera, biomimetic membranes, and filaments, (viii) topological insulators and topological superconductors, (ix) a variety of Dirac materials including Dirac and Weyl semimetals, as well as (x) knots and network structures. Topological databases and algorithms to model such materials have been also established in this book. In order to understand and properly characterize these important emergent materials, it is necessary to go far beyond the traditional paradigm of microscopic structure–property–function relationships to a paradigm that explicitly incorporates topological aspects from the outset to characterize and/or predict the physical properties and currently untapped functionalities of these advanced materials. Simulation and modeling tools including quantum chemistry, molecular dynamics, 3D visualization and tomography are also indispensable. These concepts have found applications in condensed matter physics, materials science and engineering, physical chemistry and biophysics, and the various topics covered in the book have potential applications in connection with novel synthesis techniques, sensing and catalysis. As such, the book offers a unique resource for graduate students and researchers alike.

This book constitutes the refereed proceedings of the 17th International Symposium on VLSI Design and Test, VDAT 2013, held in Jaipur, India, in July 2013. The 44 papers presented were carefully reviewed and selected from 162 submissions. The papers discuss the frontiers of design and test of VLSI components, circuits and systems. They are organized in topical sections on VLSI design, testing and verification, embedded systems, emerging technology.

White biotechnology is industrial biotechnology dealing with various biotech products through applications of microbes. The main application of white biotechnology is commercial production of various useful organic substances, such as acetic acid, citric acid, acetone, glycerine, etc., and antibiotics like penicillin, streptomycin, mitomycin, etc., and value added product through the use of microorganisms especially fungi and bacteria. The value-added products included bioactive compounds, secondary metabolites, pigments and industrially important enzymes for potential applications in agriculture, pharmaceuticals, medicine and allied sectors for human welfare. In the 21st century, techniques were developed to harness fungi to protect human health (through antibiotics, antimicrobial, immunosuppressive agents, value-added products etc.), which led to industrial scale production of enzymes, alkaloids, detergents, acids, biosurfactants. The first large-scale industrial applications of modern biotechnology have been made in the areas of food and animal feed production (agricultural/green biotechnology) and pharmaceuticals (medical/red biotechnology). In contrast, the production of bio-active compounds through fermentation or enzymatic conversion is known industrial or white biotechnology. The beneficial fungal strains may play important role in agriculture, industry and the medical sectors. The beneficial fungi play a significance role in plant growth promotion, and soil fertility using both, direct (solubilization of phosphorus, potassium and zinc; production of indole acetic acid, gibberellic acid, cytokinin and siderophores) and indirect (production of hydrolytic enzymes, siderophores, ammonia, hydrogen cyanides and antibiotics)

mechanisms of plant growth promotion for sustainable agriculture. The fungal strains and their products (enzymes, bio-active compounds and secondary metabolites) are very useful for industry. The discovery of antibiotics is a milestone in the development of white biotechnology. Since then, white biotechnology has steadily developed and now plays a key role in several industrial sectors, providing both high valued nutraceuticals and pharmaceutical products. The fungal strains and bio-active compounds also play important role in the environmental cleaning. This volume covers the latest research developments related to value-added products in white biotechnology through fungi.

This book gives a comprehensive overview of graphene oxides (GO) from atomic structures and fundamental properties to technological applications. Atomic structural models, electronic properties, mechanical properties, optical properties, and functionalizing and compositing of GO are illustrated. Moreover, the excellent physical and chemical properties offer GO promising applications in electronic nanodevices, chemical sensors and catalyst, energy storage, and biotechnology, which are also presented in this book. Therefore, this book is of interest to researchers in physics, chemistry, materials science, and nanoscience.

This volume contains very carefully compiled material presenting bibliographic descriptions of approximately 3500 papers, with a computer-generated index on authors, subject headings, corporate addresses and journals. There are many on-line services available on fullerenes, but they serve mainly current-awareness functions; none of them is selectively complete and carefully indexed and none can replace a complete retrospective bibliography, which most researchers in the field would want to have on hand in their laboratories and offices. Contents:ForewordA Brief User's Guide to the Bibliography and the IndexesBibliographyAuthor IndexGeographical and Corporate IndexPartially Permuted Title Word IndexA Collection of Statistical Tables and Charts Readership: Materials scientists, condensed matter scientists, engineers and chemists.

keywords:Fullerene;Buckminster;Endohedral;Cage;Cluster;C60;C70;Cx;Nanotube;Superconductivity;AxC60;C-C;Nanostructure;Pi-Electrons;Isomers;Symmetry “To assess the comprehensiveness of the work would be perhaps a larger project than its compilation, but one hopeful indicator is that it even includes book reviews. Continuations are planned.” Science “It is hoped that the compilations will continue because they are of great interest to all participating in or even just entering fullerene research as well as to scholars of trends and fashions in scientific research. This is a beautifully produced volume, a visually pleasing addition to the Series whose inaugural volume has already been reviewed in these pages.” The Chemical Intelligencer

Solid state physics is the branch of physics that is primarily devoted to the study of matter in its solid phase, especially at the atomic level. This prestigious serial presents timely and state-of-the-art reviews pertaining to all aspects of solid state physics.

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 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

This book presents a selection of cutting-edge methods that allow readers to obtain novel models for nonlinear solid mechanics. Today, engineers need more accurate techniques for modeling solid body mechanics, chiefly due to innovative methods like additive manufacturing—for example, 3D printing—but also due to miniaturization. This book focuses on the formulation of continuum and discrete models for complex materials and systems, and especially the design of metamaterials. It gathers outstanding papers from the international conference IcONSOM 2019

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