

Electronic Properties Of Materials An Introduction For Engineers

The monograph reviews various aspects of electronic properties of Dirac and Weyl semimetals. After a brief discussion of 2D Dirac semimetals, a comprehensive review of 3D materials is given. The description starts from an overview of the topological properties and symmetries of Dirac and Weyl semimetals. In addition, several low-energy models of Dirac and Weyl quasiparticles are presented. The key ab initio approaches and material realizations are given. The monograph includes detailed discussions of the surface Fermi arcs, anomalous transport properties, and collective modes of Dirac and Weyl semimetals. Superconductivity in these materials is briefly addressed.

Composites are the fastest growing class of structural material. Consequently, electronic properties are often difficult to find. This report was prepared in order to present a compilation of reliable data on the electronic and electrical properties of composites. Composites provide an opportunity to tailor the properties to the application; a factor that allows designers an unlimited variety of new materials for new uses. It is this feature that has contributed to the rapid growth of composites. The electrical properties of a composite can be of vital importance in the use or application of the material in a system. The designer therefore, must be able to obtain the necessary electrical or electronic property data to guide him in the materials selection. It is the purpose of this report to assist the designer and engineer in fulfilling that requirement. Properties This report provides a compilation of the most commonly required electronic properties data of structural composites. Thermal properties often influence electrical design; consequently several of these properties are included. The specific properties tabulated are: Arc Resistance Thermal Conductivity Arc Tracking Resistance Linear Thermal Expansion Dielectric Constant Coefficient Dissipation Factor Electrical (Volume) Resistivity Electrical (Volume) Conductivity Other electrical and thermal properties are compiled as the data was made available.

An Essential Guide to Electronic Material Surfaces and Interfaces is a streamlined yet comprehensive introduction that covers the basic physical properties of electronic materials, the experimental techniques used to measure them, and the theoretical methods used to understand, predict, and design them. Starting with the fundamental electronic properties of semiconductors and electrical measurements of semiconductor interfaces, this text introduces students to the importance of characterizing and controlling macroscopic electrical properties by atomic-scale techniques. The chapters that follow present the full range of surface and interface techniques now being used to characterize electronic, optical, chemical, and structural properties of electronic materials, including semiconductors, insulators, nanostructures, and organics. The essential physics and chemistry underlying each technique is described in sufficient depth for students to master the fundamental principles, with numerous examples to illustrate the strengths and limitations for specific applications. As

well as references to the most authoritative sources for broader discussions, the text includes internet links to additional examples, mathematical derivations, tables, and literature references for the advanced student, as well as professionals in these fields. This textbook fills a gap in the existing literature for an entry-level course that provides the physical properties, experimental techniques, and theoretical methods essential for students and professionals to understand and participate in solid-state electronics, physics, and materials science research. An Essential Guide to Electronic Material Surfaces and Interfaces is an introductory-to-intermediate level textbook suitable for students of physics, electrical engineering, materials science, and other disciplines. It is essential reading for any student or professional engaged in surface and interface research, semiconductor processing, or electronic device design.

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.

This book integrates materials science with other engineering subjects such as physics, chemistry and electrical engineering. The authors discuss devices and technologies used by the electronics, magnetics and photonics industries and offer a perspective on the manufacturing technologies used in device fabrication. The new addition includes chapters on optical properties and devices and addresses nanoscale phenomena and nanoscience, a subject that has made significant progress in the past decade regarding the fabrication of various materials and devices with nanometer-scale features.

A thorough introduction to fundamental principles and applications From its beginnings in metallurgy and ceramics, materials science now encompasses such high- tech fields as microelectronics, polymers, biomaterials, and nanotechnology. Electronic Materials Science presents the fundamentals of the subject in a detailed fashion for a multidisciplinary audience. Offering a higher-level treatment than an undergraduate textbook provides, this text benefits students and practitioners not only in electronics and optical materials science, but also in additional cutting-edge fields like polymers and biomaterials. Readers with a basic understanding of physical chemistry or physics will appreciate the text's sophisticated presentation of today's materials science. Instructive derivations of important formulae, usually omitted

in an introductory text, are included here. This feature offers a useful glimpse into the foundations of how the discipline understands such topics as defects, phase equilibria, and mechanical properties. Additionally, concepts such as reciprocal space, electron energy band theory, and thermodynamics enter the discussion earlier and in a more robust fashion than in other texts. Electronic Materials Science also features:

- * An orientation towards industry and academia drawn from the author's experience in both arenas
- * Information on applications in semiconductors, optoelectronics, photocells, and nanoelectronics
- * Problem sets and important references throughout
- * Flexibility for various pedagogical needs

Treating the subject with more depth than any other introductory text, Electronic Materials Science prepares graduate and upper-level undergraduate students for advanced topics in the discipline and gives scientists in associated disciplines a clear review of the field and its leading technologies.

Electronic materials provide the basis for many high tech industries that have changed rapidly in recent years. In this fully revised and updated second edition, the author discusses the range of available materials and their technological applications. Introduction to the Electronic Properties of Materials, 2nd Edition presents the principles of the behavior of electrons in materials and develops a basic understanding with minimal technical detail. Broadly based, it touches on all of the key issues in the field and offers a multidisciplinary approach spanning physics, electrical engineering, and materials science. It provides an understanding of the behavior of electrons within materials, how electrons determine the magnetic thermal, optical and electrical properties of materials, and how electronic properties are controlled for use in technological applications. Although some mathematics is essential in this area, the mathematics that is used is easy to follow and kept to an appropriate level for the reader. An excellent introductory text for undergraduate students, this book is a broad introduction to the topic and provides a careful balance of information that will be appropriate for physicists, materials scientists, and electrical engineers.

This comprehensive and unique book is intended to cover the vast and fast-growing field of electrical and electronic materials and their engineering in accordance with modern developments. Basic and pre-requisite information has been included for easy transition to more complex topics. Latest developments in various fields of materials and their sciences/engineering, processing and applications have been included. Latest topics like PLZT, vacuum as insulator, fiber-optics, high temperature superconductors, smart materials, ferromagnetic semiconductors etc. are covered. Illustrations and examples encompass different engineering disciplines such as robotics, electrical, mechanical, electronics, instrumentation and control, computer, and their inter-disciplinary branches. A variety of materials ranging from iridium to garnets, microelectronics, micro alloys to memory devices, left-handed materials, advanced and futuristic materials are described in detail.

The close relationship between experimentalists and theorists – whether solid state chemists or physicists – has, in the last few years, inspired much research in the field of materials with quasi one-dimensional structures. This volume, Part I of a two-volume set, reviews the basic theories describing the physical properties of one-dimensional materials including their superconducting characteristics. This description is mainly based on the properties of transition metal trichalcogenides. The novel collective transport mechanism for electronic conduction, exhibited by some of the latter compounds – NbSe₃ being considered as the prototype – is surveyed according to a classical theory and a theory including macroscopic quantum effects. In addition, the book contains a description of the properties of non-linear excitations, or solitons, in one-dimensional systems.

An informal and highly accessible writing style, a simple treatment of mathematics, and clear guide to applications, have made this book a classic text in electrical and electronic engineering. Students will find it both readable and comprehensive. The fundamental ideas relevant to the understanding of the electrical properties of materials are emphasized; in addition, topics are selected in order to explain the operation of devices having applications (or possible future applications) in engineering. The mathematics, kept deliberately to a minimum, is well within the grasp of a second-year student. This is achieved by choosing the simplest model that can display the essential properties of a phenomenon, and then examining the difference between the ideal and the actual behaviour. The whole text is designed as an undergraduate course. However most individual sections are self contained and can be used as background reading in graduate courses, and for interested persons who want to explore advances in microelectronics, lasers, nanotechnology and several other topics that impinge on modern life.

HIS FIRST EDITION OF Electronic Properties of Force Materials Laboratory, where Air Force respon T Materials: A Guide to the Literature initiates a sibility for these contracts has resided. Mr. John W. plan for making available the indexing work of the Atwood is Project Manager at Hughes Aircraft Electronic Properties Information Center. Since the Company. inception of EPIC in June, 1961, a basic objective has Professional members of EPIC are Charles L. M. been to use techniques and procedures that would Blocher, Donald L. Grigsby, Dana H. Johnson, allow maximum distribution and use of EPIC output. Thomas J. Lyndon, John T. Milek, Meta S. Neu Accordingly, data processing and reproduction tech berger, and Emil Schafer. All have ably contributed niques were established to reproduce and distribute to this work. Mr. Johnson and Mrs. Neuberger have easily and economically a few copies of what was been primarily responsible for the indexing effort; then a card index. Mr. Lyndon has supervised the classical library pro As the program advanced, it became apparent that cedures and the clerical effort; Mr. Blocher and Mr. a few copies of the index were not enough. The index Grigsby have controlled the indexing vocabulary, the should be available to all, instead of just a select few.

cross-references, and the data processing input; and However, this would have meant so many copies that Mr. Schafer has prepared the very excellent glossary, the cost would have drained funds from the program with the assistance of Mr. Milek.

In the last decade, much progress has been made in these materials. This book presents a highly coherent coverage of supramolecular, photosensitive and electroactive materials, namely those that have been extensively investigated for applications in fields of electronic and photonic technologies. This extensive reference provides broad coverage of on different types of materials, their processing, spectroscopic characterization, physical properties and device applications. The implications reach from molecular recognition in synthetic and natural complexes to exciting new applications in chemical technologies, materials, nanostructures, functional materials, new generation catalysts, signal transducers, medical and biomedical applications and novel separation techniques. All these applications rely on supramolecular properties such as molecular recognition, molecular information, and tailored molecular assemblies. This book is aimed to present a highly coherent coverage of supramolecular, photosensitive and electroactive materials and their applications in electronic and photonic technologies. The research behind these materials constitute some of the most actively pursued fields of science. Key Features * Covers supramolecular photosensitive and electroactive materials * Provides recent developments on metallophthalocyanines and polydiacetylenes * Include various types of supramolecular materials, their processing, fabrication, physical properties and device applications * Role of polyimides in microelectronic and tribology * Describes Photosynthetic and respiratory proteins, Dendrimers * A very special topic presented in a timely manner and in a format

This text on the electrical, optical, magnetic, and thermal properties of materials stresses concepts rather than mathematical formalism. Suitable for advanced undergraduates, it is intended for materials and electrical engineers who want to gain a fundamental understanding of alloys, semiconductor devices, lasers, magnetic materials, and so forth. The book is organized to be used in a one-semester course; to that end each section of applications, after the introduction to the fundamentals of electron theory, can be read independently of the others. Many examples from engineering practice serve to provide an understanding of common devices and methods. Among the modern applications covered are: high-temperature superconductors, optoelectronic materials, semiconductor device fabrication, xerography, magneto-optic memories, and amorphous ferromagnetics. The fourth edition has been revised and updated with an emphasis on the applications sections, which now cover devices of the next generation of electronics.

Provides a semi-quantitative approach to recent developments in the study of optical properties of condensed matter systems Featuring contributions by noted experts in the field of electronic and optoelectronic materials and photonics,

this book looks at the optical properties of materials as well as their physical processes and various classes. Taking a semi-quantitative approach to the subject, it presents a summary of the basic concepts, reviews recent developments in the study of optical properties of materials and offers many examples and applications. Optical Properties of Materials and Their Applications, 2nd Edition starts by identifying the processes that should be described in detail and follows with the relevant classes of materials. In addition to featuring four new chapters on optoelectronic properties of organic semiconductors, recent advances in electroluminescence, perovskites, and ellipsometry, the book covers: optical properties of disordered condensed matter and glasses; concept of excitons; photoluminescence, photoinduced changes, and electroluminescence in noncrystalline semiconductors; and photoinduced bond breaking and volume change in chalcogenide glasses. Also included are chapters on: nonlinear optical properties of photonic glasses; kinetics of the persistent photoconductivity in crystalline III-V semiconductors; and transparent white OLEDs. In addition, readers will learn about excitonic processes in quantum wells; optoelectronic properties and applications of quantum dots; and more. Covers all of the fundamentals and applications of optical properties of materials Includes theory, experimental techniques, and current and developing applications Includes four new chapters on optoelectronic properties of organic semiconductors, recent advances in electroluminescence, perovskites, and ellipsometry Appropriate for materials scientists, chemists, physicists and electrical engineers involved in development of electronic materials Written by internationally respected professionals working in physics and electrical engineering departments and government laboratories Optical Properties of Materials and Their Applications, 2nd Edition is an ideal book for senior undergraduate and postgraduate students, and teaching and research professionals in the fields of physics, chemistry, chemical engineering, materials science, and materials engineering.

This carefully revised third edition on the electrical, optical, magnetic, and thermal properties of materials stresses concepts rather than mathematical formalism. Many examples from engineering practice provide an understanding of common devices and methods.

The subject of electronics, and in particular the electronic properties of materials, is one which has experienced unprecedented growth in the last thirty years. The discovery of the transistor and the subsequent development of integrated circuits has enabled us to manipulate and control the electronic properties of materials to such an extent that the entire telecommunications and computer industries are dependent on the electronic properties of a few semiconducting materials. The subject area is now so important that no modern physics, materials science or electrical engineering degree programme can be considered complete without a significant lecture course in electronic materials. Ultimately the course requirements of these three groups of students may be quite different, but at the initial stages of the discussion of electronic properties of materials, the course requirements are

broadly identical for each of these groups. Furthermore, as the subject continues to grow in importance, the initial teaching of this vital subject needs to occur earlier in the curriculum in order to give the students sufficient time later to cover the increasing amount of material.

This introduction for engineers examines not only the physical properties of materials, but also their history, uses, development, and some of the implications of resource depletion and materials substitutions.

This graduate text explains the physical properties and applications of a wide range of smart materials.

This textbook presents the basic elements needed to understand and engage in research in semiconductor physics. It deals with elementary excitations in bulk and low-dimensional semiconductors, including quantum wells, quantum wires and quantum dots. The basic principles underlying optical nonlinearities are developed, including excitonic and many-body plasma effects. The fundamentals of optical bistability, semiconductor lasers, femtosecond excitation, optical Stark effect, semiconductor photon echo, magneto-optic effects, as well as bulk and quantum-confined Franz-Keldysh effects are covered. The material is presented in sufficient detail for graduate students and researchers who have a general background in quantum mechanics. Request Inspection Copy

Electronic Properties of Crystalline Solids: An Introduction to Fundamentals discusses courses in the electronic properties of solids taught in the Department of Materials Science and Engineering at Stanford University. The book starts with a brief review of classical wave mechanics, discussing concept of waves and their role in the interactions of electrons, phonons, and photons. The book covers the free electron model for metals, and the origin, derivation, and properties of allowed and forbidden energy bands for electrons in crystalline materials. It also examines transport phenomena and optical effects in crystalline materials, including electrical conductivity, scattering phenomena, thermal conductivity, Hall and thermoelectric effects, magnetoresistance, optical absorption, photoconductivity, and other photoelectronic effects in both ideal and real materials. This book is intended for upper-level undergraduates in a science major, or for first- or second-year graduate students with an interest in the scientific basis for our understanding of properties of materials.

These lectures on the fundamental electrical properties of materials will provide a clearer understanding of the operation of devices which have specific applications in engineering. ... a sprightly and readable version that is bound to be helpful to a variety of readers.'___ Physics Today .

It includes both chemical and physical approaches to the properties of solids, and clearly separates those aspects of materials properties that can be tackled with classical physics from those that require quantum mechanics. * Quantum mechanics are introduced later to allow readers to be familiar with some of the mathematics necessary for quantum mechanics before being exposed to its bewildering fundamental concepts. * Discusses the electronic properties of solids from the viewpoint of elementary band theory, and end with a brief treatment of semiconductors and some semiconducting devices.

Mechanical and thermal properties are reviewed and electrical and magnetic properties are emphasized. Basics of symmetry and internal

structure of crystals and the main properties of metals, dielectrics, semiconductors, and magnetic materials are discussed. The theory and modern experimental data are presented, as well as the specifications of materials that are necessary for practical application in electronics. The modern state of research in nanophysics of metals, magnetic materials, dielectrics and semiconductors is taken into account, with particular attention to the influence of structure on the physical properties of nano-materials. The book uses simplified mathematical treatment of theories, while emphasis is placed on the basic concepts of physical phenomena in electronic materials. Most chapters are devoted to the advanced scientific and technological problems of electronic materials; in addition, some new insights into theoretical facts relevant to technical devices are presented. Electronic Materials is an essential reference for newcomers to the field of electronics, providing a fundamental understanding of important basic and advanced concepts in electronic materials science. Provides important overview of the fundamentals of electronic materials properties significant for device applications along with advanced and applied concepts essential to those working in the field of electronics Takes a simplified and mathematical approach to theories essential to the understanding of electronic materials and summarizes important takeaways at the end of each chapter Interweaves modern experimental data and research in topics such as nanophysics, nanomaterials and dielectrics

Materials properties, whether microscopic or macroscopic, are of immense interest to the materials scientists, physicists, chemists as well as to engineers. Investigation of such properties, theoretically and experimentally, has been one of the fundamental research directions for many years that has also resulted in the discovery of many novel materials. It is also equally important to correctly model and measure these materials properties. Keeping such interests of research communities in mind, this book has been written on the properties of polyesters, varistor ceramics, and powdered porous compacts and also covers some measurement and parameter extraction methods for dielectric materials. Four contributed chapters and an introductory chapter from the editor explain each class of materials with practical examples. Due to its physical, chemical, and material properties, graphene has been widely studied both theoretically and experimentally since it was first synthesized in 2004. This book explores in detail the most up-to-date research in graphene-related systems, including few-layer graphene, sliding bilayer graphene, rippled graphene, carbon nanotubes, and adatom-doped graphene, among others. It focuses on the structure-, stacking-, layer-, orbital-, spin- and adatom-dependent essential properties, in which single- and multi-orbital chemical bondings can account for diverse phenomena. Geometric and Electronic Properties of Graphene-Related Systems: Chemical Bonding Schemes is excellent for graduate students and researchers, but understandable to undergraduates. The detailed theoretical framework developed in this book can be used in the future characterization of emergent materials.

This book provides an introduction to band theory and the electronic properties of materials at a level suitable for final-year undergraduates or first-year graduate students. It sets out to provide the vocabulary and quantum-mechanical training necessary to understand the electronic, optical and structural properties of the materials met in science and technology and describes some of the experimental techniques which are used to study band structure today. In order to leave space for recent developments, the Drude model and the introduction of quantum statistics are treated synoptically. However, Bloch's theorem and two tractable limits, a very weak periodic potential and the tight-binding model, are developed rigorously and in three dimensions. Having introduced the ideas of bands, effective masses and holes, semiconductor and metals are treated in some detail, along with the newer ideas of artificial structures such as super-lattices and quantum wells, layered organic substances and oxides. Some recent 'hot topics' in research are covered, e.g. the fractional Quantum Hall Effect and nano-devices, which can be understood using the techniques developed in the book. In illustrating examples of e.g. the de Haas-van Alphen effect, the book

focuses on recent experimental data, showing that the field is a vibrant and exciting one. References to many recent review articles are provided, so that the student can conduct research into a chosen topic at a deeper level. Several appendices treating topics such as phonons and crystal structure make the book self-contained introduction to the fundamentals of band theory and electronic properties in condensed matter physics today.

Photonic and Electronic Properties of Fluoride Materials: Progress in Fluorine Science, the first volume in this new Elsevier series, provides an overview of the important optical, magnetic, and non-linear properties of fluoride materials. Beginning with a brief review of relevant synthesis methods from single crystals to nanopowders, this volume offers valuable insight for inorganic chemistry and materials science researchers. Edited and written by leaders in the field, this book explores the practical aspects of working with these materials, presenting a large number of examples from inorganic fluorides in which the type of bonding occurring between fluorine and transition metals (either d- or 4f-series) give rise to peculiar properties in many fundamental and applicative domains. This one-of-a-kind resource also includes several chapters covering functional organic fluorides used in nano-electronics, in particular in liquid crystal devices, in organic light-emitting diodes, or in organic dyes for sensitized solar cells. The book describes major advances and breakthroughs achieved by the use of fluoride materials in important domains such as superconductivity, luminescence, laser properties, multiferroism, transport properties, and more recently, in fluoro-perovskite for dye-sensitized solar cells and inorganic fluoride materials for NLO, and supports future development in these varied and key areas. The book is edited by Alain Tressaud, past chair and founder of the CNRS French Fluorine Network. Each book in the collection includes the work of highly-respected volume editors and contributors from both academia and industry to bring valuable and varied content to this active field. Provides unique coverage of the physical properties of fluoride materials for chemists and material scientists Begins with a brief review of relevant synthesis methods from single crystals to nanopowders Includes valuable information about functional organic fluorides used in nano-electronics, in particular in liquid crystal devices, in organic light-emitting diodes, or in organic dyes for sensitized solar cells

Electrons in Solids, Second Edition: An Introductory Survey introduces the reader to electrons in solids and covers topics ranging from particles and waves to the free electron model, energy bands, and junctions. Optical and electrical properties are also discussed, along with magnetic properties. The wavelike properties of all of matter are chosen as an integrating theme into which to weave such themes as crystal lattice vibrations (with their effect on electron mobility and electrical and thermal conductivity), electromagnetic waves (with their effect on optical reflection and absorption), and electronic transport in solids (with its dependence on the wavelike properties of electrons). This book is comprised of 11 chapters and begins with an overview of particles and waves, together with classical views of electrons, light, and energy. The general properties of waves are then discussed, with particular reference to traveling waves, standing waves, transverse waves, and longitudinal waves. Lattice waves, light waves, and matter waves are also considered. The reader is also introduced to wave equations, boundary conditions, and general wave properties. The remaining chapters are devoted to optical, electrical, and magnetic properties as well as junctions, including metal-metal junctions, metal-semiconductor junctions, and metal-semiconductor junctions. This monograph is intended for undergraduates and first-year graduate students with a background primarily in materials science, metallurgy, or one of the other engineering disciplines.

"A classic text in the field, providing a readable and accessible guide for students of electrical and electronic engineering.

Ideal for undergraduates, the book is also an invaluable reference for graduate students and others wishing to explore this rapidly expanding field." -Cover.

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 understanding 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 specialized journal articles. Third, this book is not an encyclopedia. The selection of topics 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 diffraction, 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.

This book provides the knowledge and understanding necessary to comprehend the operation of individual electronic devices that are found in modern micro-electronics. As a textbook, it is aimed at the third-year undergraduate curriculum in electrical engineering, in which the physical electronic properties are used to develop an introductory understanding to the semiconductor devices used in modern micro-electronics. The emphasis of the book is on providing detailed physical insight into the microscopic mechanisms that form the cornerstone for these technologies. Mathematical treatments are therefore kept to the minimum level necessary to achieve suitable rigor.

- * Covers crystalline structure
- * Thorough introduction to the key principles of quantum mechanics
- * Semiconductor statistics, impurities, and controlled doping
- * Detailed analysis of the operation of semiconductor devices, including p-n junctions, field-effect transistors, metal-semiconductor junctions and bipolar junction transistors
- * Discussion of optoelectronic devices such as light-emitting diodes (LEDs) and lasers
- * Chapters on the device applications of dielectrics, magnetic materials, and superconductors

This fourth volume in the series 'Physics and Chemistry of Materials with Layered Structures' is concerned with providing a critical review of the significant optical and electrical properties by established authors who have themselves made many significant contributions to these fields. Research into these materials has recently gained a new impetus and their fascinating properties have attracted many new research workers. These people should find much of value in the reviews

contained in this volume and the editor is very much indebted for the painstaking and hard work put into the preparation of the various chapters by the authors. The optical properties provide useful information for deriving the band structures, a knowledge of which is required for an interpretation of measurements on the electronic properties. The chapters by Dr Evans, Dr Williams and Dr Bordas describe different techniques which have provided much detailed data on this subject. An interesting property of these materials is the comparative ease with which thin specimens may be prepared for these measurements and this is highlighted in the superconducting experiments outlined by Professor Frindt and Dr Huntley. These authors together with Dr Vandenberg's chapter on the magnetic properties also describe the interesting and significant intercalation mechanisms whereby a wide range of organic compounds and alkali metals may be incorporated in the lattice. This provides an additional parameter for varying the properties of these materials and may yet be seen to provide eventual possible applications of layer compounds.

Nanometre-sized clusters (nanoclusters) that make up amorphous materials (metallic alloys and organic and inorganic compounds) cast new light on the science and technology of this century. However, because various electronic characteristics of nanoclusters have been discovered during the past decade, there have been few publications concerned with the electronic properties of nanoclusters. This book presents a detailed study of these properties, beginning with their basic characteristics (from alloy synthesis to the electronic rule for the formation of amorphous alloys) to more technical aspects (such as new single electron transistors, superior ballistic conduction).

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