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Reactions in the Solid State Mar 27 2023 The whole of Volume 22 is devoted to the kinetics and mechanisms of the decomposition and interaction of inorganic solids, extended to include metal carboxylates. After an introductory chapter on the characteristic features of reactions in the solid phase, experimental methods of investigation of solid reactions and the measurement of reaction rates are reviewed in Chapter 2 and the theory of solid state kinetics in Chapter 3. The reactions of single substances, loosely grouped on the basis of a common anion since it is this constituent which most frequently undergoes breakdown, are discussed in Chapter 4, the sequence being effectively that of increasing anion complexity. Chapter 5 covers reactions between solids, and includes catalytic processes where one solid component remains unchanged, double compound formation and rate processes involving the interactions of more than three crystalline phases. The final chapter summarises the general conclusions drawn in the text of Chapter 2-5.

Basic Solid State Chemistry Feb 26 2023 Basic Solid State Chemistry, Second Edition is a thorough revision of this best selling introductory text. This new edition provides the reader with an up to date account of the essential topics in this exciting and developing area. Whilst the structure of the first edition has been retained, introducing topics in a logical and coherent way, the text has been revised to include latest developments and concepts. There is a new chapter on Synthetic Methods covering solid state, precursor, chemie douce, intercalation, gas phase (MOCVD, vapour phase transport), hydrothermal and other methods. In addition there is new material on fullerenes, spinels and applications of phase diagrams. The coverage of solid solutions has been expanded and many of the diagrams have been considerably improved, as have the examples and problems.

Materials Chemistry Feb 02 2021 Winner of a 2008 Textbook Excellence Award from the Text and Academic Authors Association (TAA)! Written to fill the need for a textbook that addresses inorganic-, organic-, and nano-based materials from a structure vs. property treatment, Materials Chemistry aims to provide a suitable breadth and depth coverage of the rapidly evolving materials field -- in a concise format. This modern treatment offers innovative coverage and practical perspective throughout, e.g.: the opening solid-state chemistry chapter uses color illustrations of crystalline unit cells and digital photos of models to clarify their structures, plus an ample amorphous-solids section; the metals chapter treats the full spectrum of powder metallurgical methods, complex phase behaviors of the Fe-C system and steels, and topics such as corrosion and shape-memory properties; the semiconductor chapter addresses evolution and limitations/solutions of modern transistors, as well as IC fabrication and photovoltaics; the polymer and ‘soft’ materials chapter describes all polymeric classes including dendritic polymers, as well as important additives such as plasticizers and flame-retardants, and emerging applications such as molecular magnets and self-repairing polymers; final chapters on nanomaterials and materials-characterization techniques are also carefully surveyed, focusing on nomenclature, synthetic techniques, and applications taken from the latest scientific literature. Most appropriate for Junior/Senior undergraduate students, as well as first-year graduate students in chemistry, physics, or engineering fields, Materials Chemistry may also serve as a valuable reference to industrial researchers. Each chapter concludes with a section that describes important materials applications, while appendices include laboratory modules for materials synthesis and a comprehensive timeline of major materials developments.

Defects in Solids Nov 23 2022 Provides a thorough understanding of the chemistry and physics of defects, enabling the reader to manipulate them in the engineering of materials. Reinforces theoretical concepts by placing emphasis on real world processes and applications. Includes two kinds of end-of-chapter problems: multiple choice (to test knowledge of terms and principles) and more extensive exercises and calculations (to build skills and understanding). Supplementary

material on crystallography and band structure are included in separate appendices.

Introduction to Solid State Physics for Materials Engineers Oct 10 2021 A concise, accessible, and up-to-date introduction to solid state physics Solid state physics is the foundation of many of today's technologies including LEDs, MOSFET transistors, solar cells, lasers, digital cameras, data storage and processing. Introduction to Solid State Physics for Materials Engineers offers a guide to basic concepts and provides an accessible framework for understanding this highly application-relevant branch of science for materials engineers. The text links the fundamentals of solid state physics to modern materials, such as graphene, photonic and metamaterials, superconducting magnets, high-temperature superconductors and topological insulators. Written by a noted expert and experienced instructor, the book contains numerous worked examples throughout to help the reader gain a thorough understanding of the concepts and information presented. The text covers a wide range of relevant topics, including propagation of electron and acoustic waves in crystals, electrical conductivity in metals and semiconductors, light interaction with metals, semiconductors and dielectrics, thermoelectricity, cooperative phenomena in electron systems, ferroelectricity as a cooperative phenomenon, and more. This important book: Provides a big picture view of solid state physics Contains examples of basic concepts and applications Offers a highly accessible text that fosters real understanding Presents a wealth of helpful worked examples Written for students of materials science, engineering, chemistry and physics, Introduction to Solid State Physics for Materials Engineers is an important guide to help foster an understanding of solid state physics.

Space Groups for Solid State Scientists Apr 04 2021 This Second Edition provides solid state scientists, who are not necessarily experts in crystallography, with an understandable and comprehensive guide to the new International Tables for Crystallography. The basic ideas of symmetry, lattices, point groups, and space groups are explained in a clear and detailed manner. Notation is introduced in a step-by-step way so that the reader is supplied with the tools necessary to derive and apply space group information. Of particular interest in this second edition are the discussions of space groups application to such timely topics as high-temperature superconductors, phase transitions, semiconductor superlattices, incommensurate modulation, and icosahedral symmetry. Key Features @bul

Solid State Phenomena Nov 11 2021 Solid State Phenomena explores the fundamentals of the structure and their influence on the properties of solids. This book is composed of five chapters that focus on the electrical and thermal conductivities of crystalline solids. Chapter 1 describes the nature of solids, particularly metals and crystalline materials. This chapter also presents a model to evaluate crystal structure, the forces between atom pairs, and the mechanism of plastic and elastic deformation. Chapter 2 demonstrates random vibrations of atoms in a solid using a one-dimensional array, while Chapter 3 examines the resistance of tungsten under various temperatures and measures its temperature coefficient of resistance. Chapter 4 surveys the increase in the number of conducting electrons in a solid when illuminated with light of sufficiently high photon energy to excite electrons out of filled valence bands. Chapter 5 considers the concept of diagmagnetism, paramagnetism, and ferromagnetism in solids.

Solid State Physics Sep 28 2020 Solid State Physics, a comprehensive study for the undergraduate and postgraduate students of pure and applied sciences, and engineering disciplines is divided into eighteen chapters. The First seven chapters deal with structure related aspects such as lattice and crystal structures, bonding, packing and diffusion of atoms followed by imperfections and lattice vibrations. Chapter eight deals mainly with experimental methods of determining structures of given materials. While the next nine chapters cover various physical properties of crystalline solids, the last chapter deals with the anisotropic properties of materials. This chapter has been added for benefit of readers to understand the crystal properties (anisotropic) in terms of some simple mathematical formulations such as tensor and matrix. New to the Second Edition: Chapter on: *Anisotropic Properties of Materials

Solid State Phenomena Oct 30 2020 Solid State Phenomena explores the fundamentals of the structure and their influence on the properties of solids. This book is composed of five chapters that focus on the electrical and thermal conductivities of crystalline solids. Chapter 1 describes the nature of solids, particularly metals and crystalline materials. This chapter also presents a model to evaluate crystal structure, the forces between atom pairs, and the mechanism of plastic and elastic deformation. Chapter 2 demonstrates random vibrations of atoms in a solid using a one-dimensional array, while Chapter 3 examines the resista ...

Organic Solid-State Chemistry—2 Sep 21 2022 Organic Solid-State Chemistry–2 presents the solid state reactions in molecular crystals. This book discusses the correlations of the chemical structures of products from organic solid state reactions with the molecular packing in the reactant crystal structures. Organized into 10 chapters, this book begins with an overview of the molecular behavior after the chemical transition state. This text then examines the electron paramagnetic resonance methods, which offer many features in connection with the study of chemical reactions in which a paramagnetic species is a product or a reactant. Other chapters consider the interpretation of radiationless transitions, thermal reactions, and photochemical decompositions and rearrangements. The final chapter deals with the experimental results concerning electron and hole production in anthracene crystals, with emphasis on the relevance of these studies to the fundamental question of the nature of the excess electron states in these low mobility crystals. This book is a valuable resource for solid state chemists, photochemists, spectroscopists, scientists, and research workers.

Reactions in the Solid State Feb 20 2020 The whole of Volume 22 is devoted to the kinetics and mechanisms of the decomposition and interaction of inorganic solids, extended to include metal carboxylates. After an introductory chapter on the characteristic features of reactions in the solid phase, experimental methods of investigation of solid reactions and the measurement of reaction rates are reviewed in Chapter 2 and the theory of solid state kinetics in Chapter 3. The reactions of single substances, loosely grouped on the basis of a common anion since it is this constituent which most frequently undergoes breakdown, are discussed in Chapter 4, the sequence being effectively that of increasing anion complexity. Chapter 5 covers reactions between solids, and includes catalytic processes where one solid component remains unchanged, double compound formation and rate processes involving the interactions of more than three crystalline phases. The final chapter summarises the general conclusions drawn in the text of Chapter 2-5.

Solid State Chemistry and Its Applications Jan 25 2023 The first broad account offering a non-mathematical, unified treatment of solid state chemistry. Describes synthetic methods, X-ray diffraction, principles of inorganic crystal structures, crystal chemistry and bonding in solids; phase diagrams of 1, 2 and 3 component systems; the electrical, magnetic, and optical properties of solids; three groups of industrially important inorganic solids--glass, cement, and refractories; and certain aspects of organic solid state chemistry, including the ``organic metal'' of new materials.

Physical Chemistry of Ionic Materials Aug 08 2021 Discover the physical chemistry of charge carriers in the second edition of this popular textbook Ionic and electronic charge carriers are critical to the kinetic and electrochemical properties of ionic solids. These charge carriers are point defects and are decisive for electrical conductivity, mass transport, and storage phenomena. Generally, defects are deviations from the perfect structure, and if higher-dimensional, also crucial for the mechanical properties. The study of materials science and energy research therefore requires a thorough understanding of defects, in particular the charged point defects, their mobilities, and formation mechanisms. Physical Chemistry of Ionic Materials is a comprehensive introduction to these charge carrier particles and the processes that produce, move, and activate them. Covering both core principles and practical applications, it discusses subjects ranging from chemical bonding and thermodynamics to solid-state kinetics and electrochemical techniques. Now in an updated edition with numerous added features, it promises to be the essential textbook on this subject for a new generation of materials scientists. Readers of the 2nd Edition of Physical Chemistry of Ionic

Materials will also find: Two new chapters on solid state electrochemistry and another on nanoionics Novel brief sections on photoelectrochemistry, bioelectrochemistry, and atomistic modelling put the treatment into a broader context Discussion of the working principles required to understand electrochemical devices like sensors, batteries, and fuel cells Real laboratory measurements to ground basic principles in practical experimentation Physical Chemistry of Ionic Materials is a valuable reference for chemists, physicists, and any working researchers or advanced students in the materials sciences.

Solid State Physics May 17 2022 Updated to reflect recent work in the field, this book emphasizes crystalline solids, going from the crystal lattice to the ideas of reciprocal space and Brillouin zones, and develops these ideas for lattice vibrations, for the theory of metals, and for semiconductors. The theme of lattice periodicity and its varied consequences runs through eighty percent of the book. Other sections deal with major aspects of solid state physics controlled by other phenomena: superconductivity, dielectric and magnetic properties, and magnetic resonance.

Solid State Fermentation for Foods and Beverages Jul 07 2021 Although one of the oldest microbial technologies used in food processing, solid-state fermentation (SSF) had, until recently, fallen out of favor. However, based on a series of established mathematical models, new design concepts for SSF bioreactors and process control strategies have been proposed, allowing SSF technology to reach new levels. Sol

Solid-State NMR III Organic Matter Nov 30 2020 Solid-State NMR is a branch of Nuclear Magnetic Resonance which is presently experiencing a phase of strongly increasing popularity. The most striking evidence is the large number of contributions from Solid-State Resonance atNMR meetings, approaching that ofliquid state resonance. Important progress can be observed in three areas: Methodological developments, applications to inorganic matter, and applications to organic matter. These developments are intented to be captured in three volumes in this series, each of them being devoted to more or less one of these areas. The present volume on Solid-State NMR III is devoted mainly to organic matter. The recent developments of deuteron NMR and their applications are reviewed in the first chapter. Crosspolarization, MAS, and dynamic angle spinning are being explored for enhancement of information and sensitivity. In addition to the analysis of classical relaxation times and modern 2D spectra, detailed dynamic information becomes accessible from investigations of the relaxation time anisotropies. The second chapter examines cross-polarization in static and rotating solids under conditions of spin diffusion and thermal motion. The underlying dipole-dipole interaction is further exploited by the techniques described in the third chapter for studies of polymer-polymer miscibility. Short range techniques are discriminated from long-range techniques based on spin diffusion. The use ofthese techniques is illustrated by a case study ofPMMAJPVF blends. The last chapter addresses novel z methods and applications of two-dimensional exchange NMR for investigations of relative molecular orientations, polymer morphology, molecular dynamics, and macroscopic molecular order.

Solid State Physics Dec 12 2021 Enables readers to easily understand the basics of solid state physics Solid State Physics is a successful short textbook that gives a clear and concise introduction to its subject. The presentation is suitable for students who are exposed to this topic for the first time. Each chapter starts with basic principles and gently progresses to more advanced concepts, using easy-to-follow explanations and keeping mathematical formalism to a minimum. This new edition is thoroughly revised, with easier-to-understand descriptions of metallic and covalent bonding, a straightforward proof of Bloch's theorem, a simpler approach to the nearly free electron model, and enhanced pedagogical features, such as more than 100 discussion questions, 70 problems--including problems to train the students' skills to find computational solutions--and multiple-choice questions at the end of each chapter, with solutions in the book for self-training. Solid State Physics introduces the readers to: Crystal structures and underlying bonding mechanisms The mechanical and vibrational properties of solids Electronic properties in both a classical and a quantum mechanical picture, with a treatment of the electronic phenomena in metals,

semiconductors and insulators More advanced subjects, such as magnetism, superconductivity and phenomena emerging for nano-scaled solids For bachelor's students in physics, materials sciences, engineering sciences, and chemistry, Solid State Physics serves as an introductory textbook, with many helpful supplementary learning resources included throughout the text and available online, to aid in reader comprehension.

Fundamentals of Condensed Matter and Crystalline Physics Dec 20 2019 This undergraduate textbook merges traditional solid state physics with contemporary condensed matter physics, providing an up-to-date introduction to the major concepts that form the foundations of condensed materials. The main foundational principles are emphasized, providing students with the knowledge beginners in the field should understand. The book is structured in four parts and allows students to appreciate how the concepts in this broad area build upon each other to produce a cohesive whole as they work through the chapters. Illustrations work closely with the text to convey concepts and ideas visually, enhancing student understanding of difficult material, and end-of-chapter exercises varying in difficulty allow students to put into practice the theory they have covered in each chapter and reinforce new concepts.

Solid State Chemistry Jul 27 2020 "A comprehensive guide to solid-state chemistry which is ideal for all undergraduate levels. It covers well the fundamentals of the area, from basic structures to methods of analysis, but also introduces modern topics such as sustainability." Dr. Jennifer Readman, University of Central Lancashire, UK "The latest edition of Solid State Chemistry combines clear explanations with a broad range of topics to provide students with a firm grounding in the major theoretical and practical aspects of the chemistry of solids." Professor Robert Palgrave, University College London, UK Building a foundation with a thorough description of crystalline structures, this fifth edition of Solid State Chemistry: An Introduction presents a wide range of the synthetic and physical techniques used to prepare and characterise solids. Going beyond this, this largely nonmathematical introduction to solid-state chemistry includes the bonding and electronic, magnetic, electrical, and optical properties of solids. Solids of particular interest--porous solids, superconductors, and nanostructures--are included. Practical examples of applications and modern developments are given. It offers students the opportunity to apply their knowledge in real-life situations and will serve them well throughout their degree course. New in the Fifth Edition A new chapter on sustainability in solid-state chemistry written by an expert in this field Cryo-electron microscopy X-ray photoelectron spectroscopy (ESCA) Covalent organic frameworks Graphene oxide and bilayer graphene Elaine A. Moore studied chemistry as an undergraduate at Oxford University and then stayed on to complete a DPhil in theoretical chemistry with Peter Atkins. After a two-year postdoctoral position at the University of Southampton, she joined the Open University in 1975, becoming a lecturer in chemistry in 1977, senior lecturer in 1998, and reader in 2004. She retired in 2017 and currently has an honorary position at the Open University. She has produced OU teaching texts in chemistry for courses at levels 1, 2, and 3 and written texts in astronomy at level 2 and physics at level 3. She was team leader for the production and presentation of an Open University level 2 chemistry module delivered entirely online. She is a Fellow of the Royal Society of Chemistry and a Senior Fellow of the Higher Education Academy. She was co-chair for the successful Departmental submission of an Athena Swan bronze award. Lesley E. Smart studied chemistry at Southampton University, United Kingdom. After completing a PhD in Raman spectroscopy, she moved to a lectureship at the (then) Royal University of Malta. After returning to the United Kingdom, she took an SRC Fellowship to Bristol University to work on X-ray crystallography. From 1977 to 2009, she worked at the Open University chemistry department as a lecturer, senior lecturer, and Molecular Science Programme director, and she held an honorary senior lectureship there until her death in 2016. At the Open University, she was involved in the production of undergraduate courses in inorganic and physical chemistry and health sciences. She served on the Council of the Royal Society of Chemistry and as the chair of their Benevolent Fund.

Bonding, Structure and Solid-State Chemistry Jun 06 2021 This book provides a study in

Bonding, Structure and Solid State Chemistry. It is based on lecture courses given over several years, but is not directed at any particular degree course. Thus, it will find a place in all years of first-degree courses in both chemistry and those subjects for which chemistry forms a significant part. It will also prepare readers for more intensive study in the title topics. Pre-knowledge is assumed in mathematics and physical sciences at about A-level. Additional mathematical and other topics are presented where necessary as appendices, so as not to disturb the flow of the main text. The book is copiously illustrated, including many stereoscopic diagrams (with practical advice on correct viewing) and colour illustrations. A suite of computer programs, some of which are interactive, has been devised for the book and is available on-line from the publisher's website [insert URL here]. They are available for both 32- and 64-bit operating systems, and are easily executed on a PC or laptop; notes on their applications are provided. Problems have been devised for each chapter and fully worked 'tutorial'; solutions are included. After an introductory chapter, the book presents a study based on the main interactive forces responsible for cohesion in the solid state of matter. No classification is without some ambiguity, but that chosen allows for a structured discussion over a wide range of compounds. Each chapter includes worked examples on the study topics which, together with the problems provided, should ensure a thorough understanding of the textual material.

Solid State NMR Spectroscopy Oct 22 2022 This book is for those familiar with solution-state NMR who are encountering solid-state NMR for the first time. It presents the current understanding and applications of solid-state NMR with a rigorous but readable approach, making it easy for someone who merely wishes to gain an overall impression of the subject without details. This dual requirement is met through careful construction of the material within each chapter. The book is divided into two parts: "Fundamentals" and "Further Applications." The section on Fundamentals contains relatively long chapters that deal with the basic theory and practice of solid-state NMR. The essential differences and extra scope of solid-state NMR over solution-state is dealt with in an introductory chapter. The basic techniques that all chapters rely on are collected into a second chapter to avoid unnecessary repetition later. Remaining chapters in the "Fundamentals" part deal with the major areas of solid-state NMR which all solid-state NMR spectroscopists should know about. Each begins with an overview of the topic that puts the chapter in context. The basic principles upon which the techniques in the chapter rely are explained in a separate section. Each of these chapters exemplifies the principles and techniques with the applications most commonly found in current practice. The "Further Applications" section contains a series of shorter chapters which describe the NMR techniques used in other, more specific areas. The basic principles upon which these techniques rely will be expounded only if not already in the Fundamentals part.

Computational Pharmaceutical Solid State Chemistry May 25 2020 This book is the first to combine computational material science and modeling of molecular solid states for pharmaceutical industry applications. • Provides descriptive and applied state-of-the-art computational approaches and workflows to guide pharmaceutical solid state chemistry experiments and to support/troubleshoot API solid state selection • Includes real industrial case examples related to application of modeling methods in problem solving • Useful as a supplementary reference/text for undergraduate, graduate and postgraduate students in computational chemistry, pharmaceutical and biotech sciences, and materials science

Solid State Batteries: Materials Design and Optimization Jan 01 2021 The field of solid state ionics is multidisciplinary in nature. Chemists, physicists, electrochimists, and engineers all are involved in the research and development of materials, techniques, and theoretical approaches. This science is one of the great triumphs of the second part of the 20th century. For nearly a century, development of materials for solid-state ionic technology has been restricted. During the last two decades there have been remarkable advances: more materials were discovered, modem technologies were used for characterization and optimization of ionic conduction in solids, trial and error approaches were deserted for defined predictions. During the same period fundamental

theories for ion conduction in solids appeared. The large explosion of solid-state ionic material science may be considered to be due to two other influences. The first aspect is related to economy and connected with energy production, storage, and utilization. There are basic problems in industrialized countries from the economical, environmental, political, and technological points of view. The possibility of storing a large amount of utilizable energy in a comparatively small volume would make a number of non-conventional intermittent energy sources of practical convenience and cost. The second aspect is related to huge increase in international relationships between researchers and exchanges of results make considerable progress between scientists; one find many institutes joined in common search programs such as the material science networks organized by EEC in the European countries.

Solid-state Lasers Aug 28 2020 A solid-state laser use and gain medium that is a solid, rather than a liquid such as dye lasers or a gas such as gas lasers. Semiconductor-based lasers are also in the solid state, but are generally considered separately from solid-state lasers. Generally, the active medium of a solid-state laser consists of a glass or crystalline host material to which is added a dopant such as neodymium, chromium, erbium, or other ions. Many of the common dopants are rare earth elements, because the excited states of such ions are not strongly coupled with thermal vibrations of the crystalline lattice (phonons), and the lasing threshold can be reached at relatively low brightness of pump. There are many hundreds of solid-state media in which laser action has been achieved, but relatively few types are in widespread use. Of these, probably the most common type is neodymium doped YAG. Neodymium-doped glass (Nd:glass) and Ytterbium-doped glasses and ceramics are used in solid-state lasers at extremely high power (terawatt scale), high energy (megajoules) multiple beam systems for inertial confinement fusion. Titanium doped sapphire is also widely used for its broad tunability. This book gathers new research in the field.

Solid State Physics Apr 16 2022 Solid State Physics, International Edition covers the fundamentals and the advanced concepts of solid state physics. The book is comprised of 18 chapters that tackle a specific aspect of solid state physics. Chapters 1 to 3 discuss the symmetry aspects of crystalline solids, while Chapter 4 covers the application of X-rays in solid state science. Chapter 5 deals with the anisotropic character of crystals. Chapters 6 to 8 talk about the five common types of bonding in solids, while Chapters 9 and 10 cover the free electron theory and band theory. Chapters 11 and 12 discuss the effects of movement of atoms, and Chapter 13 talks about the optical properties of crystals. Chapters 14 to 18 cover the other relevant areas of solid state physics, such as ferroelectricity, magnetism, surface science, and artificial structure. The book will be of great use both to novice and experienced researchers in the field of solid state physics.

Solid State NMR Mar 15 2022 Dipolar Recoupling, by Niels Chr. Nielsen, Lasse A. Strassø and Anders B. Nielsen.- Solid-State NMR Techniques for the Structural Determination of Amyloid Fibrils, by Jerry C. C. Chan.- Solid-State 19F-NMR of Peptides in Native Membranes, by Katja Koch, Sergii Afonin, Marco Ieronimo, Marina Berditsch and Anne S. Ulrich.- Probing Quadrupolar Nuclei by Solid-State NMR Spectroscopy: Recent Advances, by Christian Fernandez and Marek Pruski.- Solid State NMR of Porous Materials Zeolites and Related Materials, by Hubert Koller and Mark Weiß.- Solid-State NMR of Inorganic Semiconductors, by James P. Yesinowski.-

Solid State Laser Aug 20 2022 This book deals with theoretical and experimental aspects of solid-state lasers, including optimum waveguide design of end pumped and diode pumped lasers. Nonlinearity, including the nonlinear conversion, up frequency conversion and chirped pulse oscillators are discussed. Some new rare-earth-doped lasers, including double borate and halide crystals, and feedback in quantum dot semiconductor nanostructures are included.

Solid State Physics Jan 21 2020 This Second Edition is aimed at students taking a firstcourse in this subject, although it will also be of interest toprofessional physicists and electronic engineers requiring a graspof the fundamentals of this important area of physics. Basicconcepts are introduced in an easily accessible context: forexample, wave propagation in crystals is introduced using one-andtwo-dimensional geometries. Only when these basic ideas arefamiliar are generalisations to

three dimensions and the elegantframework of the reciprocal lattice made. Extensively rewritten,the Second Edition now includes new and expanded coverage ofsemiconductor devices, the quantum Hall effect, quasicrystals, hightemperature superconductors and techniques for the study of thesurfaces of solids. A chapter on dielectrics and ferroelectrics hasalso been added. Solid State Physics, Second Edition features: A carefully written and structured text to help students fullyunderstand this exciting subject. A flow diagram allowing topics to be studied in differentorders or omitted altogether. Optional "starred" and highlighted sections containing moreadvanced and specialised material for the more ambitiousreader. Carefully selected problems at the end of each chapter designedto assist learning. Solutions are provided at the end of thebook.

Solid State Physics Feb 14 2022 Solid State Physics opens with the adiabatic approximation to the many-body problem of a system of ions and valence electrons. After chapters on lattice symmetry, structure and dynamics, it then proceeds with four chapters devoted to the single-electron theory of the solid state. Semiconductors and dielectrics are covered in depth and chapters on m

Introduction to Solid State Physics and Crystalline Nanostructures May 05 2021 This textbook provides conceptual, procedural, and factual knowledge on solid state and nanostructure physics. It is designed to acquaint readers with key concepts and their connections, to stimulate intuition and curiosity, and to enable the acquisition of competences in general strategies and specific procedures for problem solving and their use in specific applications. To these ends, a multidisciplinary approach is adopted, integrating physics, chemistry, and engineering and reflecting how these disciplines are converging towards common tools and languages in the field. Each chapter discusses essential ideas before the introduction of formalisms and the stepwise addition of complications. Questions on everyday manifestations of the concepts are included, with reasoned linking of ideas from different chapters and sections and further detail in the appendices. The final section of each chapter describes experimental methods and strategies that can be used to probe the phenomena under discussion. Solid state and nanostructure physics is constantly growing as a field of study where the fascinating quantum world emerges and otherwise imaginary things can become real, engineered with increasing creativity and control: from tinier and faster technologies realizing quantum information concepts, to understanding of the fundamental laws of Physics. Elements of Solid State Physics and of Crystalline Nanostructures will offer the reader an enjoyable insight into the complex concepts of solid state physics.

Magnetism in the Solid State Apr 23 2020 This book presents a phenomenological approach to the field of solid state magnetism. It surveys the various theories and discusses their applicability in different types of materials. The text will be valuable as a text for graduate courses in magnetism and magnetic materials.

Handbook of Solid State Chemistry, 6 Volume Set Dec 24 2022 This most comprehensive and unrivaled compendium in the field provides an up-to-date account of the chemistry of solids, nanoparticles and hybrid materials. Following a valuable introductory chapter reviewing important synthesis techniques, the handbook presents a series of contributions by about 150 international leading experts -- the "Who's Who" of solid state science. Clearly structured, in six volumes it collates the knowledge available on solid state chemistry, starting from the synthesis, and modern methods of structure determination. Understanding and measuring the physical properties of bulk solids and the theoretical basis of modern computational treatments of solids are given ample space, as are such modern trends as nanoparticles, surface properties and heterogeneous catalysis. Emphasis is placed throughout not only on the design and structure of solids but also on practical applications of these novel materials in real chemical situations.

Elements of Solid State Physics Sep 09 2021 Problems after each chapter.

Multinuclear Solid-State Nuclear Magnetic Resonance of Inorganic Materials Jun 18 2022 Techniques of solid state nuclear magnetic resonance (NMR) spectroscopy are constantly being extended to a more diverse range of materials, pressing into service an ever-expanding range of nuclides including some previously considered too intractable to provide usable results. At the same

time, new developments in both hardware and software are being introduced and refined. This book covers the most important of these new developments. With sections addressed to non-specialist researchers (providing accessible answers to the most common questions about the theory and practice of NMR asked by novices) as well as a more specialised and up-to-date treatment of the most important areas of inorganic materials research to which NMR has application, this book should be useful to NMR users whatever their level of expertise and whatever inorganic materials they wish to study.

Solid State Physics Jan 13 2022 Solid State Physics opens with the adiabatic approximation to the many-body problem of a system of ions and valence electrons. After chapters on lattice symmetry, structure and dynamics, it then proceeds with four chapters devoted to the single-electron theory of the solid state. Semiconductors and dielectrics are covered in depth and chapters on magnetism and superconductivity follow. The book concludes with a chapter on solid surfaces. Every section is followed by solved problems, some of them illustrating areas of current interest in solid state physics, to give the student a practical working knowledge of the subject, and the text is illustrated by many supplementary examples.

Chemical Sensing with Solid State Devices Mar 23 2020 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 suggestionsfor 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

Solid State Chemistry Apr 28 2023 Intended for first- and second-year undergraduates, this introduction to solid-state chemistry includes practical examples of applications and modern developments to offer students the opportunity to apply their knowledge in real-life situations. It aims to provide students with a thorough understanding of the traditional knowledge of crystal structures: lattices, unit cells, close packing, and octahedral and tetrahedral holes and their occupation by various ions in the well-known crystal structures. This descriptive work is augmented by free-electron and band theory. Links to other branches of chemistry and practical examples are emphasized, as are the links back to band theory and crystal structures. For this second edition, the book has been updated throughout and has two new chapters, one on X-ray diffraction techniques and another on solid-state preparative methods, as well as new sections on symmetry and ferroelectrics.

Solid State Chemical Sensors Jun 25 2020 Solid State Chemical Sensors reviews the basic chemical and physical principles involved in the construction and operation of solid state sensors. A major portion of the book is devoted to explanation of the basic mechanism of operation and the many actual and potential applications of field effect transistors for gas and solution sensing. This text is comprised of four chapters; the first of which describes the basics of device fabrication. Emphasis is placed on the physical description of semiconductor devices with catalytic metal gates, along with their drawbacks and their promise. The behavior of hydrogen in the Pd-SiO2 system is also considered, and some applications of hydrogen-sensitive transistors, such as smoke detection

and biochemical reaction monitoring, are described. The second chapter focuses on chemically sensitive field effect transistors and their thermodynamics, while the third chapter explains the general fabrication procedure for solid state chemical sensors. The final chapter introduces the reader to piezoelectric and pyroelectric chemical sensors, paying particular attention to the sensor nature of piezoelectricity, the piezoelectric gravimetric sensor, and pyroelectric gas analysis. This book is intended to assist electrical engineers in understanding the chemistry involved in the construction and operation of solid state sensors and to educate chemists in solid state science.

Solid-State NMR IV Methods and Applications of Solid-State NMR Mar 03 2021 Solid-State NMR is a branch of Nuclear Magnetic Resonance which is presently experiencing a phase of strongly increasing popularity. The most striking evidence is the large number of contributions from Solid-State Resonance at NMR meetings, approaching that ofliquid state resonance. Important progress can be observed in the areas of methodological developments and applications to organic and inorganic matter. One volume devoted to more or less one of each of these areas has been published in the preceding three issues. This volume can be considered an addendum to this series. Selected methods and applications of Solid-State NMR are featured in three chapters. The first one treats the recoupling of dipolar interactions in solids, which are averaged by fast sample rotation. Following an introduction to effective Hamiltonians and Floquet theory, different types of experiment such as rotary resonance, dipolar chemical shift correlation spectroscopy, rotational resonance and multipulse recoupling are treated in the powerful Floquet formalism. In the second chapter, the different approaches to line narrowing of quadrupolar nuclei are reviewed in a. consistent formulation of double resonance (DaR) and dynamic angle spinning (DAS). Practical aspects of probe design are considered as well as advanced 2D experiments, sensitivity enhancement techniques, and spinning sideband manipulations. The use of such techniques dramatically increases the number of nuclei which can be probed in high resolution NMR spectroscopy. The final chapter describes new experimental approaches and results of structural studies of noncrystalline solids.

Solidification and Solid-State Transformations of Metals and Alloys Jul 19 2022 Solidification and Solid-State Transformations of Metals and Alloys describes solidification and the industrial problems presented when manufacturing structural parts by casting, or semi-products for forging, in order to obtain large, flat or specifically shaped parts. Solidification follows the nucleation and growth model, which will also be applied in solid-state transformations, such as those taking place because of changes in solubility and allotropy or changes produced by recrystallization. It also explains the heat treatments that, through controlled heating, holding and cooling, allow the metals to have specific structures and properties. It also describes the correct interpretation of phase diagrams so the reader can comprehend the behaviour of iron, aluminium, copper, lead, tin, nickel, titanium, etc. and the alloys between them or with other metallic or metalloid elements. This book can be used by graduate and undergraduate students, as well as physicists, chemists and engineers who wish to study the subject of Metallic Materials and Physical Metallurgy, specifically industrial applications where casting of metals and alloys, as well as heat treatments are relevant to the quality assurance of manufacturing processes. It will be especially useful for readers with little to no knowledge on the subject, and who are looking for a book that addresses the fundamentals of manufacturing, treatment and properties of metals and alloys. Uses theoretical formulas to obtain realistic data from industrial operations Includes detailed explanations of chemical, physical and thermodynamic phenomena to allow for a more accessible approach that will appeal to a wider audience Utilizes micrographs to illustrate and demonstrate different solidification and transformation processes

- Solid State Chemistry
- Reactions In The Solid State
- Basic Solid State Chemistry
- Solid State Chemistry And Its Applications
- Handbook Of Solid State Chemistry 6 Volume Set
- Defects In Solids
- Solid State NMR Spectroscopy

- Solid State Laser
- Solidification And Solid State Transformations Of Metals And Alloys
- Multinuclear Solid State Nuclear Magnetic Resonance Of Inorganic Materials
- Solid State Physics
- Solid State Physics
- Solid State NMR
- Solid State Physics
- Solid State Physics
- Solid State Physics
- Solid State Phenomena
- Introduction To Solid State Physics For Materials Engineers
- Elements Of Solid State Physics
- Physical Chemistry Of Ionic Materials
- Solid State Fermentation For Foods And Beverages
- Bonding Structure And Solid State Chemistry
- Introduction To Solid State Physics And Crystalline Nanostructures
- Space Groups For Solid State Scientists
- Solid State NMR IV Methods And Applications Of Solid State NMR
- Materials Chemistry
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- Solid State Physics
- Fundamentals Of Condensed Matter And Crystalline Physics