

Chapter Solid State Chemistry

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Solid State Physics - Philip Hofmann 2022-06-20

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.

Physical Chemistry of Ionic Materials - Joachim Maier 2004-08-13

Defects play an important role in determining the properties of solids. This book provides an introduction to chemical bond, phonons, and thermodynamics; treatment of point defect formation and reaction, equilibria, mechanisms, and kinetics; kinetics chapters on solid state processes; and electrochemical techniques and applications. * Offers a coherent description of fundamental defect chemistry and the most common applications. * Up-to-date trends and developments within this field. * Combines electrochemical concepts with aspects of semiconductor physics.

Defects in Solids - Richard J. D. Tilley 2008-10-10

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.

Handbook of Solid State Chemistry, 6 Volume Set - Richard Dronskowski 2017-10-23

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.

Organic Molecular Solids - William Jones 2019-09-17

Interest in organic molecular solids extends to a range of fields including chemistry, physics, electrical engineering, and materials science. In chemistry, it applies to such topics as solid state reactivity, crystal engineering, theoretical approaches to crystal structure determination, and morphology control. In physics, electrical engineering, and materials science, the possibility of producing organic-based materials (such as crystals, polymers, thin films, or liquid crystals) with potential electronic, opto-electronic, and magnetic uses is a major area of current research interest throughout the world. Organic Molecular Solids examines the uses of organic-based materials over a wide range of applications and interests. Each chapter surveys a relevant topic, providing appropriate introductory background information and modern developments.

Treatise on Solid State Chemistry - N. Hannay 2012-12-06

The last quarter-century has been marked by the extremely rapid growth of the solid-state sciences. They include what is now the largest subfield of physics, and the materials engineering sciences have likewise flourished. And, playing an active role throughout this vast area of science and engineering have been very large numbers of chemists. Yet, even though the role of chemistry in the solid-state sciences has been a vital one and the solid-state sciences have, in turn, made enormous contributions to chemical thought, solid-state chemistry has not been recognized by the general body of chemists as a major subfield of chemistry. Solid-state chemistry is not even well defined as to content. Some, for example, would have it include only the quantum chemistry of solids and would reject thermodynamics and phase equilibria; this is nonsense. Solid-state chemistry has many facets, and one of the purposes of this Treatise is to help define the field. Perhaps the most general characteristic of solid-state chemistry, and one which helps differentiate it from solid-state physics, is its focus on the chemical composition and atomic configuration of real solids and on the relationship of composition and structure to the chemical and physical properties of the solid. Real solids are usually extremely complex and exhibit almost infinite variety in their compositional and structural features.

Solid State Chemistry - Aaron Wold 2012-12-06

The subject matter of solid state chemistry lies within the spheres of both physical and inorganic chemistry. In addition, there is a large overlap with solid state physics and materials engineering. However, solid state chemistry has still to be recognized by the general body of chemists as a legitimate subfield of chemistry. The discipline is not even well defined as to content and has many facets that make writing a textbook a formidable task. The early studies carried out in the United States by Roland Ward and his co workers emphasized the synthesis of new materials and the determination of their structure. His work on doped alkaline earth sulfides formed the basis for the development of infrared phosphors and his pioneering studies on oxides were important in understanding the structural features of both the perovskite oxides as well as the magnetoplumbites. In 1945, A. F. Wells published the first edition of Structural Inorganic Chemistry. This work attempts to demonstrate that the synthesis, structure, and properties of solids form an important part of inorganic chemistry. Now, after almost 50 years during which many notable advances have been made in solid state chemistry, it is still evident that the synthesis, structure determination, and properties of solids receive little attention in most treatments of inorganic chemistry. The development of

the field since the early studies of Roland Ward (early 1940s) has been rapid.

Solid State Electrochemistry I - Vladislav V. Kharton 2009-07-10

The only comprehensive handbook on this important and rapidly developing topic combines fundamental information with a brief overview of recent advances in solid state electrochemistry, primarily targeting specialists working in this scientific field. Particular attention is focused on the most important developments performed during the last decade, methodological and theoretical aspects of solid state electrochemistry, as well as practical applications. The highly experienced editor has included chapters with critical reviews of theoretical approaches, experimental methods and modeling techniques, providing definitions and explaining relevant terminology as necessary. Several other chapters cover all the key groups of the ion-conducting solids important for practice, namely cationic, protonic, oxygen-anionic and mixed conductors, but also conducting polymer and hybrid materials. Finally, the whole is rounded off by brief surveys of advances in the fields of fuel cells, solid-state batteries, electrochemical sensors, and other applications of ion-conducting solids. Due to the very interdisciplinary nature of this topic, this is of great interest to material scientists, polymer chemists, physicists, and industrial scientists, too.

Solid State Polymerization - Constantine D. Papaspyrides 2009-04-27

The most current guide to solid state polymerization Solid State Polymerization (SSP) is an indispensable tool in the design, manufacture, and study of polymers, plastics, and fibers. SSP presents significant advantages over other polymerization techniques due to low operating temperatures, inexpensive equipment, and simple and environmentally sound procedures. Combining fundamentals of polymer science, chemistry, physical chemistry, and engineering, SSP also offers many research applications for a wide range of students and investigators. Gathering and filtering the latest literature on SSP, Solid State Polymerization offers a unique, one-stop resource on this important process. With chapters contributed by leaders in the field, this text summarizes SSP, and provides essential coverage that includes: An introduction to SSP, with chemical and physical steps, apparatus, advantages, and parameters SSP physical chemistry and mechanisms Kinetic aspects of polyesters and polyamides SSP Catalysis in SSP processes Application of SSP under high pressure conditions in the laboratory Engineering aspects regarding process modeling and industrial application Recent developments and future possibilities Solid State Polymerization provides the most up-to-date coverage of this constantly developing field to academic and industry professionals, as well as graduate and postgraduate-level students in chemical engineering, materials science and engineering, polymer chemistry, polymer processing and polymer engineering.

From Solid State Chemistry to Heterogeneous Catalysis - Svetlana Ivanova 2021-10

Heterogeneous catalysis is deeply founded on solid state chemistry, but the relationship between the two often appears to be elusive in many cases. It is generally difficult to relate the allusion of symmetry to the crystal structure and the defect chemistry or acid-base properties to the surface reconstruction and extended defects that in most cases are the basis of physicochemical properties and solids applications. This book provides insights into solid state chemistry in order to widen the vision of heterogeneous catalysis. It covers a broad range of solid state related topics, including symmetry and structure organization, bonding, and methods for structure elucidation, as well as defects formation and their implications in heterogeneous catalysis.

Solid-State Properties of Pharmaceutical Materials - Stephen R. Byrn 2017-07-12

Presents a detailed discussion of important solid-state properties, methods, and applications of solid-state analysis Illustrates the various phases or forms that solids can assume and discusses various issues related to the relative stability of solid forms and tendencies to undergo transformation Covers key methods of solid state analysis including X-ray powder diffraction, thermal analysis, microscopy, spectroscopy, and solid state NMR Reviews critical physical attributes of pharmaceutical materials, mainly related to drug substances, including particle size/surface area, hygroscopicity, mechanical properties, solubility, and physical and chemical stability Showcases the application of solid state material science in rational selection of drug solid forms, analysis of various solid forms within drug substance and the drug product, and pharmaceutical product development Introduces appropriate manufacturing and control procedures using Quality by Design, and other strategies that lead to safe and effective products with a minimum of resources and time

Chemical Sensing with Solid State Devices - Marc J. Madou 2012-12-02

This book is a lucid presentation for chemists, electrical engineers, surface scientists, and solid-state physicists, of the fundamentals underlying the construction of simple and small chemical sensors. The first part of the book is a review of the theoretical background in solid state physics, chemistry and electronics. Semiconductor and solid electrolyte bulk models are reviewed as well as solid/gas and solid/liquid interface models. Membranes and catalysis theory are also covered expansively. The second part is a discussion of more complete sensor devices, their essential components, and of the important developments in this area over the last fifteen to twenty years. The book provides guidance through the multidisciplinary world of chemical sensors. It should be understandable to students with some training in physics and chemistry and a general knowledge of electronics. Finally, comments on economic considerations in the development of new sensor products and suggestions for future research and development should be of value to company R&D planners. Key Features * Introduction * Solid State Background * Solid/Gas Interfaces * Solid/Liquid Interfaces * Catalysis Background * Membrane Background * Biosensor Principles * Principles of Chemfet Operation * Silicon Based Chemical Sensors * Thin Film Gas Sensors * Solid Electrolytes-Devices * Gas Sensors Based on Semiconductor Powders * Application of Solid State Chemical Sensors

Handbook of Solid State Electrochemistry - P. J. Gellings 2019-04-24

The Handbook of Solid State Electrochemistry is a one-stop resource treating the two main areas of solid state electrochemistry: electrochemical properties of solids such as oxides, halides, and cation conductors; and electrochemical kinetics and mechanisms of reactions occurring on solid electrolytes, including gas-phase electrocatalysis. The fund

Understanding Intermolecular Interactions in the Solid State - Deepak Chopra 2018-09-04

Technological and computational advances in the past decade have meant a vast increase in the study of crystalline matter in both organic, inorganic and organometallic molecules. These studies revealed information about the conformation of molecules and their coordination geometry as well as the role of intermolecular interactions in molecular packing especially in the presence of different intermolecular interactions in solids. This resulting knowledge plays a significant role in the design of improved medicinal, mechanical, and electronic properties of single and multi-component solids in their crystalline state. Understanding Intermolecular Interactions in the Solid State explores the different techniques used to investigate the interactions, including hydrogen and halogen bonds, lone pair- π , and π - π interactions, and their role in crystal formation. From experimental to computational approaches, the book covers the latest techniques in crystallography, ranging from high pressure and in situ crystallization to crystal structure prediction and charge density analysis. Thus this book provides a strong introductory platform to those new to this field and an overview for those already working in the area. A useful resource for higher level undergraduates, postgraduates and researchers across crystal engineering, crystallography, physical chemistry, solid-state chemistry, supramolecular chemistry and materials science.

Basic Solid State Chemistry - Anthony R. West 1999-07-30

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.

Solid State Chemistry and Its Applications - Anthony R. West 1991-01-08

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.

Mass Spectrometry - Ian Howe 1981

Solid State Electrochemistry - Peter G. Bruce 1997-06-12

This book describes, for the first time in a modern text, the fundamental principles on which solid state electrochemistry is based. In this sense it is in contrast to other books in the field which concentrate on a description of materials. Topics include solid (ceramic) electrolytes, glasses, polymer electrolytes, intercalation electrodes, interfaces and applications. The different nature of ionic conductivity in ceramic, glassy and polymer electrolytes is described as are the thermodynamics and kinetics of intercalation reactions. The interface between solid electrolytes and electrodes is discussed and contrasted with the more conventional liquid state electrochemistry. The text provides an essential foundation of understanding for postgraduates or others entering the field for the first time and will also be of value in advanced undergraduate courses.

Descriptive Inorganic, Coordination, and Solid State Chemistry - Glen E. Rodgers 2011-01-19

This proven book introduces the basics of coordination, solid-state, and descriptive main-group chemistry in a uniquely accessible manner, featuring a less is more approach. Consistent with the less is more philosophy, the book does not review topics covered in general chemistry, but rather moves directly into topics central to inorganic chemistry. Written in a conversational prose style that is enjoyable and easy to understand, this book presents not only the basic theories and methods of inorganic chemistry (in three self-standing sections), but also a great deal of the history and applications of the discipline. This edition features new art, more diversified applications, and a new icon system. And to better help readers understand how the seemingly disparate topics of the periodical table connect, the book offers revised coverage of the author's Network of Interconnected Ideas on new full color endpapers, as well as on a convenient tear-out card. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Solid State Chemical Sensors - Jiri Janata 2012-12-02

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.

Modern Methods in Solid-state NMR - Paul Hodgkinson 2018-04-05

Solid-state NMR covers an enormous range of material types and experimental techniques. Although the basic instrumentation and techniques of solids NMR are readily accessible, there can be significant barriers, even for existing experts, to exploring the bewildering array of more sophisticated techniques. In this unique volume, a range of experts in different areas of modern solid-state NMR explain about their area of expertise, emphasising the "practical aspects" of implementing different techniques, and illustrating what questions can and cannot be addressed. Later chapters address complex materials, showing how different NMR techniques discussed in earlier chapters can be brought together to characterise important materials types. The volume as a whole focusses on topics relevant to the developing field of "NMR crystallography" - the use of solids NMR as a complement to diffraction crystallography. This book is an ideal complement to existing introductory texts and reviews on solid-state NMR. New researchers wanting to understand new areas of solid-state NMR will find each chapter to be the equivalent to spending time in the laboratory of an internationally leading expert, learning the hints and tips that make the difference between knowing about a technique and being ready to put it into action. With no equivalent on the market,

it will be of interest to every solid-state NMR researcher (academic and postgraduate) working in the chemical sciences.

Preparative Methods in Solid State Chemistry - Paul Hagenmuller 2012-12-02

Preparative Methods in Solid State Chemistry deals with the preparative methods used in solid state chemistry and highlights the importance of the chemist's role in preparing materials of desired quality as well as obtaining materials according to the requirements of the user such as the physicist. Topics covered range from high-pressure techniques in preparative chemistry to methods of growing single crystals of high-melting-point oxides. This book is comprised of 14 chapters and begins with an overview of possibilities for high-pressure synthesis, as well as the methods used to obtain high pressures, including transmission by gaseous or liquid fluids or in the solid state. The method of shock waves is then considered both from the point of view of thermodynamics and thermoelasticity, along with the possibility of using superpressures for evidently revolutionary applications. Subsequent chapters focus on the synthesis of single crystals of refractory oxides either at high temperatures (essentially liquid-solid transformations) or at lower temperatures in the presence of a solvent or a chemical reagent. The production of single crystals by electrolytic reduction in molten salts is also described. Numerous examples of vapor transport reactions in a temperature gradient are presented. This monograph should be of interest to chemists and students of solid state chemistry.

Solid State Development and Processing of Pharmaceutical Molecules - Michael Gruss 2021-11-15

Solid State Development and Processing of Pharmaceutical Molecules A guide to the latest industry principles for optimizing the production of solid state active pharmaceutical ingredients Solid State Development and Processing of Pharmaceutical Molecules is an authoritative guide that covers the entire pharmaceutical value chain. The authors—noted experts on the topic—examine the importance of the solid state form of chemical and biological drugs and review the development, production, quality control, formulation, and stability of medicines. The book explores the most recent trends in the digitization and automation of the pharmaceutical production processes that reflect the need for consistent high quality. It also includes information on relevant regulatory and intellectual property considerations. This resource is aimed at professionals in the pharmaceutical industry and offers an in-depth examination of the commercially relevant issues facing developers, producers and distributors of drug substances. This important book: Provides a guide for the effective development of solid drug forms Compares different characterization methods for solid state APIs Offers a resource for understanding efficient production methods for solid state forms of chemical and biological drugs Includes information on automation, process control, and machine learning as an integral part of the development and production workflows Covers in detail the regulatory and quality control aspects of drug development Written for medicinal chemists, pharmaceutical industry professionals, pharma engineers, solid state chemists, chemical engineers, Solid State Development and Processing of Pharmaceutical Molecules reviews information on the solid state of active pharmaceutical ingredients for their efficient development and production.

Solid State Chemistry - Lesley E. Smart 2012-05-29

Building a foundation with a thorough description of crystalline structures, Solid State Chemistry: An Introduction, Fourth Edition presents a wide range of the synthetic and physical techniques used to prepare and characterize solids. Going beyond basic science, the book explains and analyzes modern techniques and areas of research. The book covers: A range of synthetic and physical techniques used to prepare and characterize solids Bonding, superconductivity, and electrochemical, magnetic, optical, and conductive properties STEM, ionic conductivity, nanotubes and related structures such as graphene, metal organic frameworks, and FeAs superconductors Biological systems in synthesis, solid state modeling, and metamaterials This largely nonmathematical introduction to solid state chemistry includes basic crystallography and structure determination, as well as practical examples of applications and modern developments to offer students the opportunity to apply their knowledge in real-life situations and serve them well throughout their degree course. New in the Fourth Edition Coverage of multiferroics, graphene, and iron-based high temperature superconductors, the techniques available with synchrotron radiation, and metal organic frameworks (MOFs) More space devoted to electron microscopy and preparative methods New discussion of conducting polymers in the expanded section on carbon nanoscience

Focus on Solid State Chemistry - Arte M. Newman 2007

This book on solid state chemistry presents studies of chemical, structural, thermodynamic, electronic, magnetic, and optical properties and processes in solids. Research areas include: bonding in solids, crystal chemistry, crystal growth mechanisms, diffusion epitaxy, high-pressure processes, magnetic properties of materials, optical characterisation of materials, order-disorder, phase equilibria and transformation mechanisms, reactions at surfaces, statistical mechanics of defect interactions, structural studies and transport phenomena.

Solid State NMR Spectroscopy - Melinda J. Duer 2008-04-15

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.

Reactions in the Solid State - Michael E. Brown 1980-01-01

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 - Richard C. Ropp 2003-06-12

Solid State Chemistry is a general textbook, composed for those with little background knowledge of the subject, but who wish to learn more about the various segments of solid state theory and technology. The information is presented in a form that can easily be understood and will be useful to readers wishing to build on their own store of knowledge and experience. Well presented in easy to understand format Informative textbook aimed primarily at the novice Comprehensively covers the segments of solid state theory and technology

Solid State Chemistry - Elaine A. Moore 2020-08-03

"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 companion website which offers accessible resources for students and instructors alike, featuring topics and tools such as quizzes, videos, web links and more 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.

Solid State Chemistry - Lesley E. Smart 2016-04-19

Building a foundation with a thorough description of crystalline structures, *Solid State Chemistry: An Introduction*, Fourth Edition presents a wide range of the synthetic and physical techniques used to prepare and characterize solids. Going beyond basic science, the book explains and analyzes modern techniques and areas of research. The book covers: A range of synthetic and physical techniques used to prepare and characterize solids Bonding, superconductivity, and electrochemical, magnetic, optical, and conductive properties STEM, ionic conductivity, nanotubes and related structures such as graphene, metal organic frameworks, and FeAs superconductors Biological systems in synthesis, solid state modeling, and metamaterials This largely nonmathematical introduction to solid state chemistry includes basic crystallography and structure determination, as well as practical examples of applications and modern developments to offer students the opportunity to apply their knowledge in real-life situations and serve them well throughout their degree course. New in the Fourth Edition Coverage of multiferroics, graphene, and iron-based high temperature superconductors, the techniques available with synchrotron radiation, and metal organic frameworks (MOFs) More space devoted to electron microscopy and preparative methods New discussion of conducting polymers in the expanded section on carbon nanoscience

Solid State Chemistry - Chintamani Nagesa Ramachandra Rao 1995

Solid State Chemistry today is a frontier area of mainstream chemistry, and plays a vital role in the development of materials. The present work, consisting of a selection of Prof. C N R Rao's papers, covers most of the important aspects of solid state chemistry and provides the flavor of the subject, showing how the subject has evolved over the years. The book is up-to-date, and will be useful to students, teachers, beginning researchers and practitioners in solid state chemistry as well as in the broader area of materials science.

Synthesis Methods and Crystallization - Riadh Marzouki 2020-10-07

New crystalline materials (organic, inorganic, hybrid) are promising for various applications, including electrical, piezoelectric, ferroelectric, magnetic, and catalytic processes. In addition, given their remarkable structural richness, these materials exhibit several interesting physical properties, such as ionic

conduction, ion exchange, and others. Crystal growth, morphology, and grain size are factors influencing these physical properties. This book examines methods of synthesis of the most common crystalline materials and describes nucleation and crystal growth of various materials.

Solid-state Chemistry of Drugs - Stephen R. Byrn 1999

Heterogeneous Catalytic Materials - Guido Busca 2014-05-23

Heterogeneous Catalytic Materials discusses experimental methods and the latest developments in three areas of research: heterogeneous catalysis; surface chemistry; and the chemistry of catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts Covers widely used instrumental techniques for catalyst characterization, such as x-ray photoelectron spectroscopy, scanning electron microscopy, and more Includes characterization methods and lists all catalytic behavior of the solid state catalysts Discusses new developments in nanocatalysts and their advantages over conventional catalysts

Computational Chemistry of Solid State Materials - Richard Dronskowski 2008-01-08

This is the first book to present both classical and quantum-chemical approaches to computational methods, incorporating the many new developments in this field from the last few years. Written especially for "non"-theoretical readers in a readily comprehensible and implemental style, it includes numerous practical examples of varying degrees of difficulty. Similarly, the use of mathematical equations is reduced to a minimum, focusing only on those important for experimentalists. Backed by many extensive tables containing detailed data for direct use in the calculations, this is the ideal companion for all those wishing

to improve their work in solid state research.

Solid State Materials Chemistry - Patrick M. Woodward 2021-04

A modern and thorough treatment of the field for upper-level undergraduate and graduate courses in materials science and chemistry.

Inorganic Solids - David Michael Adams 1974

For undergraduate students of chemistry, physics crystallography, electronics and material sciences.

Computational Pharmaceutical Solid State Chemistry - Yuriy A. Abramov 2016-04-18

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 Chemistry and Physics - Paul F. Weller 1973

From Solid State Chemistry to Heterogeneous Catalysis - Svetlana Ivanova 2021-09-30

Heterogeneous catalysis is deeply founded on solid state chemistry, but the relationship between the two often appears to be elusive in many cases. It is generally difficult to relate the allusion of symmetry to the crystal structure and the defect chemistry or acid-base properties to the surface reconstruction and extended defects that in most cases are the basis of physicochemical properties and solids applications. This book provides insights into solid state chemistry in order to widen the vision of heterogeneous catalysis. It covers a broad range of solid state related topics, including symmetry and structure organization, bonding, and methods for structure elucidation, as well as defects formation and their implications in heterogeneous catalysis.