

Basic Concepts Of Crystallography

The advances in and applications of x-ray and neutron crystallography form the essence of this new edition of this classic textbook, while maintaining the overall plan of the book that has been well received in the academic community since the first edition in 1977. X-ray crystallography is a universal tool for studying molecular structure, and the complementary nature of neutron diffraction crystallography permits the location of atomic species in crystals which are not easily revealed by X-ray techniques alone, such as hydrogen atoms or other light atoms in the presence of heavier atoms. Thus, a chapter discussing the practice of neutron diffraction techniques, with examples, broadens the scope of the text in a highly desirable way. As with previous editions, the book contains problems to illustrate the work of each chapter, and detailed solutions are provided. Mathematical procedures related to the material of the main body of the book are not discussed in detail, but are quoted where needed with references to standard mathematical texts. To address the computational aspect of crystallography, the suite of computer programs from the fourth edition has been revised and expanded. The programs enable the reader to participate fully in many of the aspects of x-ray crystallography discussed in the book. In particular, the program system XRAY is interactive, and enables the reader to follow through, at the monitor screen, the computational techniques involved in single-crystal structure determination, albeit in two dimensions, with the data sets provided. Exercises for students can be found in the book, and solutions are available to instructors.*

Crystals and Crystal Structures is an introductory text for students and others who need to understand the subject without necessarily becoming crystallographers. Using the book will enable students to read scientific papers and articles describing a crystal structure or use crystallographic databases with confidence and understanding. Reflecting the interdisciplinary nature of the subject the book includes a variety of applications as diverse as the relationship between physical properties and symmetry, and molecular and protein crystallography. As well as covering the basics the book contains an

introduction to areas of crystallography, such as modulated structures and quasicrystals, and protein crystallography, which are the subject of important and active research. A non-mathematical introduction to the key elements of the subject Contains numerous applications across a variety of disciplines Includes a range of problems and exercises Clear, direct writing style "...the book contains a wealth of information and it fulfils its purpose of providing an interesting and broad introduction to the terpenes."

CHEMISTRY WORLD, February 2007

As a self-study guide, course primer or teaching aid, Borchardt-Ott's Crystallography is the perfect textbook for students and teachers alike. In fact, it can be used by crystallographers, chemists, mineralogists, geologists and physicists. Based on the author's more than 25 years of teaching experience, the book has numerous line drawings designed especially for the text and a large number of exercises - with solutions - at the end of each chapter. This 2nd edition is the translation of the fifth German edition. The heart of the book is firmly fixed in geometrical crystallography. It is from the concept of the space lattice

A comprehensive and approachable introduction to crystallography – now updated in a valuable new edition The Second Edition of this well-received book continues to offer the most concise, authoritative, and easy-to-follow introduction to the field of crystallography. Dedicated to providing a complete, basic presentation of the subject that does not assume a background in physics or math, the book's content flows logically from basic principles to methods, such as those for solving phase problems, interpretation of Patterson maps and the difference Fourier method, the fundamental theory of diffraction and the properties of crystals, and applications in determining macromolecular structure. This new edition includes a vast amount of carefully updated materials, as well as two completely new chapters on recording and compiling X-ray data and growing crystals of proteins and other macromolecules. Richly illustrated throughout to clarify difficult concepts, this book takes a non-technical approach to crystallography that is ideal for professionals and graduate students in structural biology, biophysics, biochemistry, and molecular biology who are studying the subject for

the first time.

Understanding the International Tables

Electron Crystallography

Springer Handbook of Condensed Matter and Materials Data

Basic Elements of Crystallography

Structure Determination by X-Ray Crystallography

A fresh approach to teaching crystallographic symmetry. Rather than being swamped by heavy algebraic notation, the reader is taken through a series of simple and beautiful examples from the visual arts, and taught how to analyse them employing the 'pictorial' diagrams used in the International Tables of Crystallography.

Basic Crystallography J. -J. Rousseau Department of Physics, University of Maine, Le Mans, France Translated from the French by A. James, University of Picardie, France Basic Crystallography deals with the basic principles of geometrical crystallography which are introduced through the study of lattices, symmetry operations and the enumeration and construction of point groups and space groups. Stereographic projection is used to enable students to visualise crystallographic structures in real space. The author devotes the second part of the book to X-ray crystallography, showing how different diffraction directions depend on the lattice and how spot intensities are related to the unit-cell. To give students an understanding of the principles of structural determination, the classical techniques of diffraction and methods of interpreting spectra are examined. To tackle the more challenging aspects of the subject, help is given to the student in the form of exercises with answers and a computer disk accompanies the book allowing readers to work through exercises and plot their own crystallographic data. Written primarily for final year undergraduate students of physics, chemistry, materials science and geometry the book will also be useful for engineering students.

Crystallography is one of the most multidisciplinary sciences, with roots in fields as varied as mathematics, physics, chemistry, biology, materials science, computation and earth and planetary science. The structural knowledge gained from crystallography has been instrumental in acquiring new levels of understanding in numerous scientific areas. Perspectives in Crystallography provides an overview of the current state of the field, reviews its historical origins and explains how crystallography contributes to the sustainability of life. This book resonates with the recent United Nations and UNESCO International Year of Crystallography, a celebration of its achievements and importance, undertaken with the International Union of Crystallography. The author of this book is the editor in chief of Crystallography Reviews, where some of the contents have been previously published. Here, subjects of interest to specialists and non-specialists have been brought together in a single

source. The book opens with a description of the ways to explain crystallography to diverse general audiences. It also addresses various topics in crystallography, including: The evolution and importance of synchrotron radiation to crystallography The structural chemistry and biology of colouration in marine crustacea Predicting protonation states of proteins versus crystallographic experimentation The book then offers a projection of crystal structure analysis in the next 100 years and concludes by emphasizing the societal impacts of crystallography that allow for sustainability of life. Perspectives in Crystallography offers a threefold look into the past, present and long-term development and relevance of crystal structure analysis. It is concerned not only with the state of the field, but with its role in the perpetuation of life on earth. As such, it is a reference of vital interest to a broad range of analytical and practical sciences.

Crystallography Made Crystal Clear is designed to meet the need for an X-ray analysis that is between brief textbook sections and complete treatments. The book provides non-crystallographers with an intellectually satisfying explanation of the principles of how protein models are gleaned from X-ray analysis. The understanding of these concepts will foster wise use of the models, including the recognition of the strengths and weaknesses of pictures or computer graphics. Since proteins comprise the majority of the mass of macromolecules in cells and carry out biologically important tasks, the book will be of interest to biologists. Provides accessible descriptions of principles of x-ray crystallography, built on simple foundations for anyone with a basic science background Leads the reader through clear, thorough, unintimidating explanations of the mathematics behind crystallography Explains how to read crystallography papers in research journals If you use computer-generated models of proteins or nucleic acids for: Studying molecular interactions Designing ligands, inhibitors, or drugs Engineering new protein functions Interpreting chemical, kinetic, thermodynamic, or spectroscopic data Studying protein folding Teaching macromolecule structure, and if you want to read new structure papers intelligently; become a wiser user of macromolecular models; and want to introduce undergraduates to the important subject of x-ray crystallography, then this book is for you.

Structure Determination by X-ray Crystallography

International Tables for Crystallography, Crystallography of Biological Macromolecules

Symmetry in Crystallography

Geometry of Crystals, Polycrystals, and Phase Transformations

Basic Elements of Crystallography, Second Edition

From tilings to quasicrystal structures and from surfaces to the n-dimensional approach, this book gives a full, self-contained in-depth description of the crystallography of quasicrystals. It aims not only at conveying the concepts and a precise picture of the structures of quasicrystals, but it also enables the interested reader to enter the field of quasicrystal structure analysis. Going beyond metallic

quasicrystals, it also describes the new, dynamically growing field of photonic quasicrystals. The readership will be graduate students and researchers in crystallography, solid-state physics, materials science, solid-state chemistry and applied mathematics.

The pharmaceutical industry has become acutely aware of the importance of the solid state, but pharmaceutical scientists often lack specific training in topics related to solid-state structure and crystallography. This book provides needed support in this topical area. Taking an intuitive and informal approach to solid-state structure and crystallographic concepts, this book is written for anyone who needs a clear understanding of modern crystallography, with specific reference to small-molecule pharmaceutical solids. The author describes molecular crystals and crystal structures, symmetry, space groups, single-crystal and powder X-ray diffraction techniques and the analysis and interpretation of crystallographic data. Useful technical details are presented where necessary and case studies from the pharmaceutical literature put theory into a practical context. Written by an internationally leading figure and with its focus on molecular crystals, this book is equally applicable to chemists with a need to understand and apply X-ray crystal-structure determination.

A Course On Crystallography Is A Necessary Beginning For All Solid State Physics Courses, Since The Student Must Have A Clear Concept Of The Crystallographic Methods And Principles Before Proceeding To Learn The Physics Of Solids. The Present Authors Have Earlier Written The Book Entitled Crystallography For The Solid State Physics (Wiley 1982). The Book Proved Very Popular With The Students And Reviewers Also Highly Commended The Book, (E.G. One Of The Reviewers Termed It As A Treasure Chest Of Knowledge In Crystallography). However, It Has Been Felt That Solid State Physics Component In The Earlier Book Was Rather Too Little In Content. The Present Book Is An Attempt To Enlarge This Content So As To Provide Solid State Portion Its Due Share. To Accomplish This Already Existing Chapters On Solid State Have Been Enlarged And Some New Chapters Have Been Added. The Book S Intended To Serve As An Introductory Text For All Graduate And Undergraduate Students Whose Eventual Aim Is To Specialise In Solid State Physics.

Crystallography may be described as the science of the structure of materials, using this word in its widest sense, and its ramifications are apparent over a broad front of current scientific endeavor. It is not surprising, therefore, to find that most universities offer some aspects of crystallography in their undergraduate courses in the physical sciences. It is the principal aim of this book to present an introduction to structure determination by X-ray crystallography that is appropriate mainly to both final-year undergraduate studies in crystallography, chemistry, and chemical physics, and introductory post graduate work in this area of crystallography. We believe that the book will be of interest in other disciplines, such as physics, metallurgy, biochemistry, and geology, where crystallography has an important part to play. In the space of one book, it is not possible either to cover all aspects of crystallography or to treat all the subject matter completely rigorously. In particular, certain mathematical results are assumed in order that their applications may be discussed. At the end of each chapter, a short bibliography is given, which may be used to extend

the scope of the treatment given here. In addition, reference is made in the text to specific sources of information. We have chosen not to discuss experimental methods extensively, as we consider that this aspect of crystallography is best learned through practical experience, but an attempt has been made to simulate the interpretive side of experimental crystallography in both examples and exercises.

Introduction to Macromolecular Crystallography

Introduction to Condensed Matter Physics

Crystallography Applied to Solid State Physics

International Tables for Crystallography, Volume C

Volume 1

Taking a straightforward, logical approach that emphasizes symmetry and crystal relationships, Foundations of Crystallography with Computer Applications, Second Edition provides a thorough explanation of the topic for students studying the solid state in chemistry, physics, materials science, geological sciences, and engineering. It is also written

Springer Handbook of Condensed Matter and Materials Data provides a concise compilation of data and functional relationships from the fields of solid-state physics and materials in this 1200 page volume. The data, encapsulated in 914 tables and 1025 illustrations, have been selected and extracted primarily from the extensive high-quality data collection Landolt-Börnstein and also from other systematic data sources and recent publications of physical and technical property data. Many chapters are authored by Landolt-Börnstein editors, including the prominent Springer Handbook editors, W. Martienssen and H. Warlimont themselves. The Handbook is designed to be useful as a desktop reference for fast and easy retrieval of essential and reliable data in the lab or office. References to more extensive data sources are also provided in the book and by interlinking to the relevant sources on the enclosed CD-ROM. Physicists, chemists and engineers engaged in fields of solid-state sciences and materials technologies in research, development and application will appreciate the ready access to the key information coherently organized within this wide-ranging Handbook. From the reviews: "...this is the most complete compilation I have ever seen... When I received the book, I immediately searched for data I never found elsewhere..., and I found them rapidly... No doubt that this book will soon be in every library and on the desk of most solid state scientists and engineers. It will never be at rest." -Physicalia Magazine

International Tables for Crystallography Volume F is an expert guide to macromolecular crystallography for the structural biologist. It was commissioned by the International Union of Crystallography in recognition of the

extraordinary contributions that knowledge of macromolecular structure has made, and will make, to the analysis of biological systems, from enzyme catalysis to the workings of a whole cell. The volume covers all stages of a crystallographic analysis from the preparation of recombinant proteins, through crystallization, diffraction data collection, phase determination, structure validation and structure analysis. Although the volume is written for experienced scientists, it is recognized that the reader is more likely to be a biologist interested in structure than a classical crystallographer interested in biology. Thus, there are chapters on the fundamentals, history and current perspectives of macromolecular crystallography, as well as on useful programs and databases such as the Protein Data Bank. Each chapter is written by one or more internationally recognized experts. This second edition features 19 new articles and many articles from the first edition have been revised. The new articles cover topics such as standard definitions for quality indicators, expression of membrane proteins, protein engineering, high-throughput crystallography, radiation damage, merohedral twinning, low-resolution ab initio phasing, robotic crystal loading, whole-cell X-ray diffraction imaging and halogen interactions in biological crystal structures. There are also new articles on relevant software, including software for electron microscopy. These enhancements will ensure that Volume F continues to be a key reference for macromolecular crystallographers and structural biologists. More information on the series can be found at: <http://it.iucr.org>

This is volume 1 of two-volume book that presents an excellent, comprehensive exposition of the multi-faceted subjects of modern condensed matter physics, unified within an original and coherent conceptual framework. Traditional subjects such as band theory and lattice dynamics are tightly organized in this framework, while many new developments emerge spontaneously from it. In this volume, • Basic concepts are emphasized; usually they are intuitively introduced, then more precisely formulated, and compared with correlated concepts. • A plethora of new topics, such as quasicrystals, photonic crystals, GMR, TMR, CMR, high T_c superconductors, Bose-Einstein condensation, etc., are presented with sharp physical insights. • Bond and band approaches are discussed in parallel, breaking the barrier between physics and chemistry. • A highly accessible chapter is included on correlated electronic states — rarely found in an introductory text. • Introductory chapters on tunneling, mesoscopic phenomena, and quantum-confined nanostructures constitute a sound foundation for nanoscience and nanotechnology. • The text is profusely illustrated with about 500 figures.

Foundations of Crystallography with Computer Applications

Essentials of Crystallography

Principles, Practice, and Application to Structural Biology

Concepts, Methods and Structures

Electron Microscopy and Electron Diffraction

Authored by a university professor deeply involved in X-ray diffraction-related research, this textbook is based on his lectures given to graduate students for more than 20 years. It adopts a well-balanced approach, describing basic concepts and experimental techniques, which make X-ray diffraction an unsurpassed method for studying the structure of materials. Both dynamical and kinematic X-ray diffraction is considered from a unified viewpoint, in which the dynamical diffraction in single-scattering approximation serves as a bridge between these two parts. The text emphasizes the fundamental laws that govern the interaction of X-rays with matter, but also covers in detail classical and modern applications, e.g., line broadening, texture and strain/stress analyses, X-ray mapping in reciprocal space, high-resolution X-ray diffraction in the spatial and wave vector domains, X-ray focusing, inelastic and time-resolved X-ray scattering. This unique scope, in combination with otherwise hard-to-find information on analytic expressions for simulating X-ray diffraction profiles in thin-film heterostructures, X-ray interaction with phonons, coherent scattering of Mössbauer radiation, and energy-variable X-ray diffraction, makes the book indispensable for any serious user of X-ray diffraction techniques. Compact and self-contained, this textbook is suitable for students taking X-ray diffraction courses towards specialization in materials science, physics, chemistry, or biology. Numerous clear-cut illustrations, an easy-to-read style of writing, as well as rather short, easily digestible chapters all facilitate comprehension.

Clear, concise explanation of logical development of basic crystallographic concepts. Topics include crystals and lattices, symmetry, x-ray diffraction, and more. Problems, with answers. 114 illustrations. 1969 edition.

International Tables for Crystallography are no longer available for purchase from Springer. For further information please contact Wiley Inc. (follow the link on the right hand side of this page). Volume B presents accounts of the numerous aspects of reciprocal space in crystallographic research. After an introductory chapter, Part 1 presents the reader with an account of structure-factor formalisms, an extensive treatment of the theory, algorithms and crystallographic applications of Fourier methods, and fundamental as well as advanced treatments of symmetry in reciprocal space. In Part 2, these general accounts are followed by detailed expositions of crystallographic statistics, the theory of direct methods, Patterson techniques, isomorphous replacement and anomalous scattering, and treatments of the role of electron microscopy and diffraction in crystal structure determination, including applications of direct methods to electron crystallography. Part 3 deals with applications of reciprocal space to molecular geometry and 'best'-plane calculations, and contains a treatment of the principles of molecular graphics and modelling and their applications. A convergence-acceleration method of importance in the computation of approximate lattice sums is presented and the part concludes with a discussion of the Ewald method. Part 4 contains treatments of various diffuse-scattering phenomena arising from crystal dynamics, disorder and low dimensionality (liquid crystals), and an exposition of the underlying theories and/or experimental evidence. Polymer crystallography and reciprocal-space images of aperiodic crystals are also treated. Part 5 of the volume contains introductory treatments of the theory of the interaction of radiation with matter (dynamical theory) as applied to X-ray, electron and neutron diffraction techniques. The simplified trigonometric expressions for the structure factors in the 230 three-dimensional space groups, which appeared in Volume I of International Tables for X-ray Crystallography, are now given in Appendix 1.4.3 to Chapter 1.4 of this volume. Volume B is a vital addition to the library of scientists engaged in crystal structure determination, crystallographic computing, crystal physics and other fields of crystallographic research. Graduate students specializing in crystallography will find much material suitable for self-study and a rich source of references to the relevant literature.

This book is intended to be a complete and clear introduction to the field of crystallography. It includes an extensive discussion on the 14 Bravais lattices and the reciprocal to them, basic concepts of point- and space-group symmetry, the crystal structure of elements and binary compounds, and much more. The purpose of this textbook is to illustrate rather than describe "using many words" the structure of materials. Even readers who are completely not familiar with the topic, but still want to learn how the atoms are arranged in crystal structures, will find this book useful. Each chapter is accompanied by exercises designed in such a way to encourage students to explore the different crystal structures they are learning about. The solutions to exercises are provided at the end of the textbook.

Solid State Chemistry and its Applications

Diffraction Analysis of Ordered and Disordered Crystals

Crystallography

Reciprocal Space

Crystallography Made Crystal Clear

This book provides a clear introduction to topics which are essential to students in a wide range of scientific disciplines but which are otherwise only covered in specialised and mathematically detailed texts. It shows how crystal structures may be built up from simple ideas of atomic packing and co-ordination, it develops the concepts of crystal symmetry, point and space groups by way of two dimensional examples of patterns and tilings, it explains the concept of the reciprocal lattice in simple terms and shows its importance in an understanding of light, X-ray and electron diffraction. Practical examples of the applications of these techniques are described and also the importance of diffraction in the performance of optical instruments. The book is also of value to the general reader since it shows, by biographical and historical references, how the subject has developed and thereby indicates some of the excitement of scientific discovery.

Solid State Chemistry and its Applications, 2nd Edition: Student Edition is an extensive update and sequel to the bestselling textbook Basic Solid State Chemistry, the classic text for undergraduate teaching in solid state chemistry worldwide. Solid state chemistry lies at the heart of many significant scientific advances from recent decades, including the discovery of high-temperature superconductors, new forms of carbon and countless other developments in the synthesis, characterisation and applications of inorganic materials. Looking forward, solid state chemistry will be crucial for the development of new functional materials in areas such as energy, catalysis and electronic materials.

This revised edition of Basic Solid State Chemistry has been completely rewritten and expanded to present an up-to-date account of the essential topics and recent developments in this exciting field of inorganic chemistry. Each section commences with a gentle introduction, covering basic principles, progressing seamlessly to a more advanced level in order to present a comprehensive overview of the subject. This new Student Edition includes the following updates and new features: Expanded coverage of bonding in solids, including a new section on covalent bonding and more extensive treatment of metallic bonding. Synthetic methods are covered extensively and new topics include microwave synthesis, combinatorial synthesis, mechano-synthesis, atomic layer deposition and spray pyrolysis. Revised coverage of electrical, magnetic and optical properties, with additional material on semiconductors, giant and colossal magnetoresistance, multiferroics, LEDs, fibre optics and solar cells, lasers, graphene and quasicrystals. Extended chapters on crystal defects and characterisation techniques. Published in full colour to aid comprehension. Extensive coverage of crystal structures for important families of inorganic solids is complemented by access to CrystalMaker® visualization software, allowing readers to view and rotate over 100 crystal structures in three dimensions. Solutions to exercises and supplementary lecture material are available online. Solid State Chemistry and its Applications, 2nd Edition: Student Edition is a must-have textbook for any undergraduate or new research worker studying solid state chemistry.

Provides the tools needed to master and apply the fundamentals of polymer crystallography. Using core concepts in physics, chemistry, polymer science and engineering, this book sheds new light on the complex field of polymer crystallography, enabling readers to evaluate polymer crystallization data and determine the best methods to use for their investigations. The authors set forth a variety of tested and proven methods for analyzing ordered and disordered structures in polymer crystals, including X-ray diffraction, electron diffraction, and microscopy. In addition to the basics, the book explores several advanced and emerging topics in the field such as symmetry breaking, frustration, and the principle of density-driven phase formation. Crystals and Crystallinity in Polymers

introduces two new concepts in crystallinity and crystals in synthetic polymers. First, crystallinity in polymeric materials is compatible with the absence of true three-dimensional long-range order. Second, the disorder may be described as a structural feature, using the methods of X-ray scattering and electron diffraction analysis. The book begins by introducing the basic principles and methods for building structural models for the conformation of polymer crystal chains. Next, it covers: Packing of macromolecules in polymer crystals Methods for extracting structural parameters from diffraction data Defects and disorder in polymer crystals Analytical methods for diffuse scattering from disordered polymer structures Crystal habit Influence of crystal defects and structural disorder on the physical and mechanical properties of polymeric materials Crystals and Crystallinity in Polymers examines all the possible types of structural disorder generally present in polymer crystals and describes the influence of each kind of disorder on X-ray and electron diffraction patterns. Its comprehensive, expert coverage makes it possible for readers to learn and apply the fundamentals of polymer crystallography to solve a broad range of problems.

This book is the first book dealing with structural crystallography of inorganic oxysalts in general. A special emphasis is placed upon structural topology and methods of its description. The latter include graph theory, nets, 2-D and 3-D tilings, polyhedra, etc. The structures considered range from minerals to organically templated oxysalts, for all of which this book provides a unified approach to structure interpretation and classification. Most of the structures have been analysed from the proposed viewpoint for the first time and it has been shown that they possess the same topological genealogy and relationships, sometimes despite their obvious chemical differences. In order to expand the range of oxysalts considered, the book offers not only traditional schemes but also alternative approaches such as anion topologies, anion-centered polyhedra and cation arrays. As such, this book can be considered as a comprehensive introduction into the amazingly complex and diverse world of inorganic oxysalts.

Crystals and Crystal Structures

From Basics to Tools for Materials Creation

Pharmaceutical Crystallography

Analysis by X-rays and Neutrons

Mathematical, Physical and Chemical Tables

Synthesizing over thirty years of advances into a comprehensive textbook, Biomolecular Crystallography describes the fundamentals, practices, and applications of protein crystallography. Deftly illustrated in full-color by the author, the text describes mathematical and physical concepts in accessible and accurate language. It distills key co

Organized into a two-part structure aimed at readers of differing experience levels, Geometry of Crystals, Polycrystals, and Phase Transformations is accessible to both newcomers and advanced researchers within the field of crystallography. The first part of the text covers what any reader in the material sciences, physics, chemistry, earth sciences and natural sciences in general should know about crystallography. It is intentionally concise and covers sufficient material to form a firm foundation. The second part is aimed at researchers and discusses phase transformations, deformations, and interface crystallography in depth. The phase transformations are limited to those dominated by crystallography. The entire book contains worked examples and uniquely deals not just with crystals but aggregates of crystals and solid-state transformations between crystals.

Crystallography and Crystal Defects Revised Edition A. Kelly, Churchill College, Cambridge, UK G. W. Groves, Exeter College, Oxford, UK and P. Kidd, Queen Mary and Westfield College, University of London, UK The concepts of crystallography are introduced here in such a way that the physical properties of crystals, including their mechanical behaviour, can be better understood and quantified. A unique approach to the treatment of crystals and their defects is taken in that the often separate disciplines of crystallography, tensor analysis, elasticity and dislocation theory are combined in such a way as to equip materials scientists with knowledge of all the basic principles required to interpret data from their experiments. This is a revised and updated version of the widely acclaimed book by Kelly and Groves that was first published nearly thirty years ago. The material remains timely and relevant and the first edition still holds an unrivalled position at the core of the teaching of crystallography and crystal defects today. Undergraduate readers will acquire a rigorous grounding, from first principles, in the crystal classes and the concept of a lattice and its defects and their descriptions using vectors. Researchers will find here all the theorems of crystal structure upon which to base their work and the equations necessary for calculating interplanar spacings, transformation of indices and manipulations involving the stereographic projection and transformations of tensors and matrices. Devoted to a diverse group of solid state scientists, the book has two objectives, both relating to structural chemistry: (i) a progressive analytic familiarization with the main parameters that govern

the organization of crystallized matter and related crystal structures, (ii) a study of what are the various ways to 'read' a structure far beyond its representation in scientific articles. Hence, the reader will, from numerous examples illustrated in color, analyze what are the main characteristics of these structures, from their geometric characteristics, their coordination polyhedra, their connections with the resulting dimensionalities of these solids, including also the defects they exhibit, before looking at possibilities to classify structures, within which recurrence laws can emerge. Chemists are required to understand the potentials of a new structure for becoming future materials scientists. The first part of the book is by no means a database for known structures, but facilitates a progressive understanding of the organization of the solid state. With these tools in hand, the reader is invited in the later part of the book to analyze new structures, and to also use new concepts for viewing structures in a more synthetic way for the future. Such new vision is already leading to the creation of completely new solids with outstanding characteristics that find applications in societal problems concerning energy, energy savings, environment and health. The content is not exclusively academic but relates to the creation of innovative materials, through a more physical approach, that might condition the future of materials.

Crystallography of Quasicrystals

Structure of Materials

Introduction to Crystallography

An Introduction to Crystallography, Diffraction and Symmetry

Basic Crystallography

This highly readable, popular textbook for upper undergraduates and graduates comprehensively covers the fundamentals of crystallography and symmetry, applying these concepts to a large range of materials. New to this edition are more streamlined coverage of crystallography, additional coverage of magnetic point group symmetry and updated material on extraterrestrial minerals and rocks. New exercises at the end of chapters, plus over 500 additional exercises available online, allow students to check their understanding of key concepts and put into practice what they have learnt. Over 400 illustrations within the text help students visualise crystal structures and more abstract mathematical objects, supporting more difficult topics like point group symmetries. Historical and biographical sections add colour and interest by giving an insight into those who have contributed significantly to the field. Supplementary online material includes password-protected solutions, over 100 crystal structure data files, and Powerpoints of figures from the book.

This text takes the reader step by step through the basic concepts of crystallography, and provides an account of symmetry and crystal structures. This revised edition features a final chapter on the geometrical construction of diffraction patterns.

Includes bibliographical references and index.

This book invites you on a systematic tour through the fascinating world of crystals and their symmetries. The reader will gain an understanding of the symmetry of external crystal forms (morphology) and become acquainted with all the symmetry elements needed to classify and describe crystal structures. The book explains the context in a very vivid, non-mathematical way and captivates with clear, high-quality illustrations. Online materials

accompany the book; including 3D models the reader can explore on screen to aid in the spatial understanding of the structure of crystals. After reading the book, you will not only know what a space group is and how to read the International Tables for Crystallography, but will also be able to interpret crystallographic specifications in specialist publications. If questions remain, you also have the opportunity to ask the author on the book's website.

Structural Crystallography of Inorganic Oxysalts

Basic Concepts of X-Ray Diffraction

Biomolecular Crystallography

The Basics of Crystallography and Diffraction

Fundamentals of Crystallography

Written by an experienced university teacher, this textbook is based on the author's lectures, and is designed to answer students' questions rather than delving into obscure details. The well-balanced approach gives precedence to a visual, intuitive understanding, with only as much math as is necessary. The author covers the topic of symmetry in crystals from basic elements to physical properties, backed by numerous clear-cut illustrations and easy-to-read crystallographic tables. The result is a compact and self-contained treatment suitable for crystallography courses in physics, chemistry, materials science and biology - irrespective of the academic background.

X-ray crystallography provides a unique opportunity to study the arrangement of atoms in a molecule. This book's modern computer-graphics centered approach facilitates the extrapolation of these valuable observations. A unified treatment of crystal systems, the book explains how atoms are arranged in crystals using the metric matrix. Featuring the International Tables for Crystallography Volume G, Definition and exchange of crystallographic data, describes the standard data exchange and archival file format (the Crystallographic Information File, or CIF) used throughout crystallography. It provides in-depth information vital for small-molecule, inorganic and macromolecular crystallographers, mineralogists, chemists, materials scientists, solid-state physicists and others who wish to record or use the results of a single-crystal or powder diffraction experiment. The volume also provides the detailed data ontology necessary for programmers and database managers to design interoperable computer applications. The accompanying CD-ROM contains the CIF dictionaries in machine-readable form and a collection of libraries and utility programs. This

volume is an essential guide and reference for programmers of crystallographic software, data managers handling crystal-structure information and practising crystallographers who need to use CIF.

International Tables for Crystallography are no longer available for purchase from Springer. For further information please contact Wiley Inc. (follow the link on the right hand side of this page). The purpose of Volume C is to provide the mathematical, physical and chemical information needed for experimental studies in structural crystallography. The volume covers all aspects of experimental techniques, using all three principal radiation types, from the selection and mounting of crystals and production of radiation, through data collection and analysis, to interpretation of results. As such, it is an essential source of information for all workers using crystallographic techniques in physics, chemistry, metallurgy, earth sciences and molecular biology.

Crystallography and Crystal Defects

A Guide to Structure and Analysis

Crystals and Crystallinity in Polymers

Perspectives in Crystallography

International Tables for Crystallography, Definition and Exchange of Crystallographic Data

Crystallography and diffraction are widely used throughout many branches of science for studying structure. However, many students find these subjects abstruse and difficult. The aim of this book is to show, through relevant examples and without relying on complex mathematics, that the basic ideas behind crystallography and diffraction are simple and easily comprehensible. It is written by an experienced teacher with the needs of the student to the fore.

Offers a rigorous treatment of the theory of crystallography and detailed descriptions of experimental applications in a wide range of sciences, including computational aspects, protein crystallography and crystal physics.

This textbook is a complete and clear introduction to the field of crystallography. It includes an extensive discussion on the 14 Bravais lattices and their reciprocals, the basic concepts of point- and space-group symmetry, the crystal structure of elements and binary compounds, and much more. The purpose of this textbook is to illustrate rather than describe "using many words" the structure of materials. Even readers who are completely unfamiliar with the topic, but still interested in learning how the atoms are arranged in crystal structures, will find this book immensely useful. Each chapter is accompanied by exercises designed to encourage students to explore the different crystal structures they are learning about. The solutions to the exercises are also provided at the end of the book.

A Guide for Users of Macromolecular Models

Basic Concepts of Crystallography

Crystal Chemistry

International Tables for Crystallography, Volume B