X Ray Diffraction In Crystals Imperfect Crystals And Amorphous Bodies Dover Books On Physics

X Rays and Crystal StructureNanostructured Immiscible Polymer BlendsPrinciples of Protein X-ray CrystallographyMultiple Diffraction of X-Rays in CrystalsStructure Determination by X-Ray CrystallographyTheory of X-Ray Diffraction in CrystalsX-Ray DiffractionUniversity PhysicsX-Ray DiffractionElectron Density and Bonding in CrystalsDynamical Scattering of X-Rays in CrystalsX-ray DiffractionEarly Days of X-ray CrystallographyAn Introduction to Green NanotechnologyElements of X Ray DiffractionX-Ray and Neutron DiffractionBiomolecular CrystallographyX-ray Diffraction ProceduresX-Ray Diffraction for Materials ResearchX-Ray and Neutron Diffraction in Nonideal CrystalsDynamical Theory of X-ray DiffractionPrinciples of Protein X-Ray CrystallographyThin Film Analysis by X-Ray ScatteringX-Ray Diffraction TopographyModern X-Ray Analysis on Single CrystalsX-Ray Diffraction by Polycrystalline MaterialsStructure Determination by X-ray CrystallographyX-Ray DiffractionNovel Microstructures for SolidsMetal Nanoparticles and NanoalloysX-Ray and Neutron Dynamical DiffractionElements of Modern X-ray PhysicsPharmaceutical CrystallographyHigh Energy X-ray Diffraction on Ultrasound Excited CrystalsCrystallography Made Crystal ClearX-Ray Diffraction by MacromoleculesCrystal Structure DeterminationFifty Years of X-Ray DiffractionX-Ray Diffraction Study of Nematic Smectic A and C Liquid CrystalsX-Ray Diffraction

Crystallography

X Rays and Crystal Structure

In this, the only book available to combine both theoretical and practical aspects of x-ray diffraction, the authors emphasize a "hands on" approach through experiments and examples based on actual laboratory data. Part I presents the basics of x-ray diffraction and explains its use in obtaining structural and chemical information. In Part II, eight experimental modules enable the students to gain an appreciation for what information can be obtained by x-ray diffraction and how to interpret it. Examples from all classes of materials -- metals, ceramics, semiconductors, and polymers -- are included. Diffraction patterns and Bragg angles are provided for students without diffractometers. 192 illustrations.

Nanostructured Immiscible Polymer Blends

The audience for this thorough overview includes advanced undergraduates and postgraduate researchers in macromolecular sciences who can benefit from more familiarity with the use of X-ray diffraction for obtaining structural information on biological substances, natural and synthetic high polymeric materials. X-Ray Diffraction by Macromolecules comprises three parts: fundamental, experimental

and analytical, and the volume as a whole may serve as an intermediate textbook to bridge the treatments found in primers and specialist works. It presents a thorough treatment of principles and applications, and gives full, practical details on experimental methods and the treatment of results, along with many examples of actual analysis.

Principles of Protein X-ray Crystallography

Rigorous graduate-level text stresses modern applications to nonstructural problems such as temperature vibration effects, order-disorder phenomena, crystal imperfections, more. Problems. Six Appendixes include tables of values. Bibliographies.

Multiple Diffraction of X-Rays in Crystals

This volume collects the proceedings of the 23rd International Course of Crystallography, entitled "X-ray and Neutron Dynamical Diffraction, Theory and Applications," which took place in the fascinating setting of Erice in Sicily, Italy. It was run as a NATO Advanced Studies Institute with A. Authier (France) and S. Lagomarsino (Italy) as codirectors, and L. Riva di Sanseverino and P. Spadon (Italy) as local organizers, R. Colella (USA) and B. K. Tanner (UK) being the two other

members of the organizing committee. It was attended by about one hundred participants from twenty four different countries. Two basic theories may be used to describe the diffraction of radiation by crystalline matter. The first one, the so-called geometrical, or kinematical theory, is approximate and is applicable to small, highly imperfect crystals. It is used for the determination of crystal structures and describes the diffraction of powders and polycrystalline materials. The other one, the so-called dynamical theory, is applicable to perfect or nearly perfect crystals. For that reason, dynamical diffraction of X-rays and neutrons constitutes the theoretical basis of a great variety of applications such as: • the techniques used for the characterization of nearly perfect high technology materials, semiconductors, piezoelectric, electrooptic, ferroelectric, magnetic crystals, • the X-ray optical devices used in all modem applications of Synchrotron Radiation (EXAFS, High Resolution X-ray Diffractometry, magnetic and nuclear resonant scattering, topography, etc.), and • X-ray and neutron interferometry.

Structure Determination by X-Ray Crystallography

This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it. This work is in the public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we

concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. To ensure a quality reading experience, this work has been proofread and republished using a format that seamlessly blends the original graphical elements with text in an easy-to-read typeface. We appreciate your support of the preservation process, and thank you for being an important part of keeping this knowledge alive and relevant.

Theory of X-Ray Diffraction in Crystals

The three-dimensional arrangement of atoms and molecules in crystals and the comparable magnitude of x-ray wavelengths and interatomic distances make it possible for crystals to have more than one set of atomic planes that satisfy Bragg's law and simultaneously diffract an incident x-ray beam - this is the so-called multiple diffraction. This type of diffraction should, in prin ciple, reflect three-dimensional information about the structure of the dif fracting material. Recent progress in understanding this diffraction phenome non and in utilizing this diffraction technique in solid-state and materials sciences reveals the diversity as well as the importance of multiple diffraction of x-rays in application. Unfortunately, there has been no single book written that gives a sys tematic review of this type of diffraction, encompasses its diverse applica tions, and foresees future trends gf development. It is for this purpose that this book is designed. It is hoped that its appearance may possibly turn more attention of

condensed-matter physicists, chemists and material scientists toward this particular phenomenon, and that new methods of non-destructive analysis of matter using this diffraction technique may be developed in the future.

X-Ray Diffraction

University Physics

Origin, Scope, and Plan of this Book In July 1962 the fiftieth anniversary of Max von Laue's discovery of the Diffraction of X-rays by crystals is going to be celebrated in Munich by a large international group of crystallographers, physi cists, chemists, spectroscopists, biologists, industrialists, and many others who are employing the methods based on Laue's discovery for their own research. The invitation for this celebration will be issued jointly by the Ludwig Maximilian University of Munich, where the discovery was made, by the Bavarian Academy of Sciences, where it was first made public, and by the International Union of Crystallo graphy, which is the international organization of the National Committees of Crystallography formed in some 30 countries to repre sent and advance the interests of the 3500 research workers in this field. The year 1912 also is the birth year of two branches of the physical sciences which developed promptly from Laue's discovery, namely

X-ray Crystal Structure Analysis which is most closely linked to the names ofW. H. (Sir William) Bragg and W. L. (Sir Lawrence) Bragg, and X-ray Spectroscopy which is associated with the names of W. H. Bragg, H. G. J. Moseley, M. de Broglie and Manne Siegbahn. Crystal Structure Analysis began in November 1912 with the first papers ofW. L. Bragg, then still a student in Cambridge, in which, by analysis of the Laue diagrams _of zinc blende, he determined the correct lattice upon which the structure of this crystal is built.

X-Ray Diffraction

X-ray diffraction crystallography for powder samples is a well-established and widely used method. It is applied to materials characterization to reveal the atomic scale structure of various substances in a variety of states. The book deals with fundamental properties of X-rays, geometry analysis of crystals, X-ray scattering and diffraction in polycrystalline samples and its application to the determination of the crystal structure. The reciprocal lattice and integrated diffraction intensity from crystals and symmetry analysis of crystals are explained. To learn the method of X-ray diffraction crystallography well and to be able to cope with the given subject, a certain number of exercises is presented in the book to calculate specific values for typical examples. This is particularly important for beginners in X-ray diffraction crystallography. One aim of this book is to offer guidance to solving the problems of 90 typical substances. For further convenience, 100 supplementary

exercises are also provided with solutions. Some essential points with basic equations are summarized in each chapter, together with some relevant physical constants and the atomic scattering factors of the elements.

Electron Density and Bonding in Crystals

University Physics is designed for the two- or three-semester calculus-based physics course. The text has been developed to meet the scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science, or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building upon what students have already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize concepts, but to work with them

in ways that will be useful in later courses and future careers. The organization and pedagogical features were developed and vetted with feedback from science educators dedicated to the project. VOLUME III Unit 1: Optics Chapter 1: The Nature of Light Chapter 2: Geometric Optics and Image Formation Chapter 3: Interference Chapter 4: Diffraction Unit 2: Modern Physics Chapter 5: Relativity Chapter 6: Photons and Matter Waves Chapter 7: Quantum Mechanics Chapter 8: Atomic Structure Chapter 9: Condensed Matter Physics Chapter 10: Nuclear Physics Chapter 11: Particle Physics and Cosmology

Dynamical Scattering of X-Rays in Crystals

Exploration of fundamentals of x-ray diffraction theory using Fourier transforms applies general results to various atomic structures, amorphous bodies, crystals, and imperfect crystals. 154 illustrations. 1963 edition.

X-ray Diffraction

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

Early Days of X-ray Crystallography

X-Ray Diffraction Topography presents an elementary treatment of X-ray topography which is comprehensible to the non-specialist. It discusses the development of the principles and application of the subject matter. X-ray topography is the study of crystals which use x-ray diffraction. Some of the topics covered in the book are the basic dynamical x-ray diffraction theory, the Berg-Barrett method, Lang's method, double crystal methods, the contrast on x-ray topography, and the analysis of crystal defects and distortions. The crystals grown from solution are covered. The naturally occurring crystals are discussed. The text defines the meaning of melt, solid state and vapour growth. An analysis of the properties of inorganic crystals is presented. A chapter of the volume is devoted to the characteristics of metals. Another section of the book focuses on the production of ice crystals and the utilization of oxides as laser materials. The book will provide useful information to chemists, scientists, students and researchers.

An Introduction to Green Nanotechnology

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.

Elements of X Ray Diffraction

For many years, evidence suggested that all solid materials either possessed a

periodic crystal structure as proposed by the Braggs or they were amorphous glasses with no long-range order. In the 1970s, Roger Penrose hypothesized structures (Penrose tilings) with long-range order which were not periodic. The existence of a solid phase, known as a quasicrystal, that possessed the structure of a three dimensional Penrose tiling, was demonstrated experimentally in 1984 by Dan Shechtman and colleagues. Shechtman received the 2011 Nobel Prize in Chemistry for his discovery. The discovery and description of quasicrystalline materials provided the first concrete evidence that traditional crystals could be viewed as a subset of a more general category of ordered materials. This book introduces the diversity of structures that are now known to exist in solids through a consideration of quasicrystals (Part I) and the various structures of elemental carbon (Part II) and through an analysis of their relationship to conventional crystal structures. Both quasicrystals and the various allotropes of carbon are excellent examples of how our understanding of the microstructure of solids has progressed over the years beyond the concepts of traditional crystallography.

X-Ray and Neutron Diffraction

Crystallography may be described as the science of the structure of materi als, 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 crystal lography 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 bibliog raphy 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.

Biomolecular Crystallography

An excellent book for professional crystallographers! In 2012 the crystallographic community celebrated 100 years of X-ray diffraction in honour of the pioneering experiment in 1912 by Max von Laue, Friedrich and Knipping. Experimental

developments e.g. brilliant X-ray sources, area detection, and developments in computer hardware and software have led to increasing applications in X-ray analysis. This completely revised edition is a guide for practical work in X-ray analysis. An introduction to basic crystallography moves quickly to a practical and experimental treatment of structure analysis. Emphasis is placed on understanding results and avoiding pitfalls. Essential reading for researchers from the student to the professional level interested in understanding the structure of molecules.

X-ray Diffraction Procedures

The modern applications of X-ray crystallography range from drug design to characterisation of high technology materials. This book tells the story of its pioneers and relates how the first crystal structures were determined.

X-Ray Diffraction for Materials Research

Nanostructured Immiscible Polymer Blends: Migration and Interface covers a wide range of nanoparticle types, emphasizing the mechanisms and parameters involved in the migration of nanofillers inside immiscible polymer blends. This book explores the influence of nanoparticle migration on the localization, and hence, morphology development, electrical conductivity, and met-rheological properties of

blended composite materials. As the influence of solid particles, ranging in size from several hundred nanometers to a few microns in immiscible polymer blends has been extensively studied for use as compatibilizers, morphology stabilizers, and reinforcement agents, this book is a timely resource. Outlines techniques used to prepare nanoparticles-modified immiscible polymer blend composites Explains the structural and morphological development, and melt-state rheological behaviors of nanoparticles-modified immiscible polymer blend composites Discusses major industrial applications

X-Ray and Neutron Diffraction in Nonideal Crystals

(Historical Survey) The discovery of X-ray diffraction in crystals by LAUE, FRIDRICH and KNIPPING in 1912 [1.1] served as the starting pOint for the development of scientific research along a number of important lines. We shall discuss just a few of them. The above discovery convincingly demonstrated the wave properties of X-rays. This, together with the previously established electromagnetic nature of radiation, confirmed the hypothesis that X-rays form the short-wave part of the electromagnetic spectrum. Further, this discovery was the first and decisive experimental proof of the periodic structure of crystals. In fact, theoretical crystallography had already arrived at this conclusion, mainly as an outcome of the theory of the space groups of symmetry elaborated by FEDOROV [1.2] and SCHOENFLIES [1.3]. From the optics of visible light we know that the radiation of a

wave length of the same order as, and preferably less than, the period of a grat ing suffers diffraction on periodic objects of the type of optical grating. Thus, the discovery proved that the wavelength of an X-ray must be of the order of interatomic distances. It became clear why the visible light of wavelengths exceeding the crystal lattice periods by about 500 to 1000 times failed to reveal the periodic structure of crystals in diffraction experi ments.

Dynamical Theory of X-ray Diffraction

With contributions by Paul F. Fewster and Christoph Genzel While X-ray diffraction investigation of powders and polycrystalline matter was at the forefront of materials science in the 1960s and 70s, high-tech applications at the beginning of the 21st century are driven by the materials science of thin films. Very much an interdisciplinary field, chemists, biochemists, materials scientists, physicists and engineers all have a common interest in thin films and their manifold uses and applications. Grain size, porosity, density, preferred orientation and other properties are important to know: whether thin films fulfill their intended function depends crucially on their structure and morphology once a chemical composition has been chosen. Although their backgrounds differ greatly, all the involved specialists a profound understanding of how structural properties may be determined in order to perform their respective tasks in search of new and modern materials, coatings and functions. The author undertakes this in-depth introduction

to the field of thin film X-ray characterization in a clear and precise manner.

Principles of Protein X-Ray Crystallography

X-ray diffraction is a useful and powerful analysis technique for characterizing crystalline materials commonly employed in MSE, physics, and chemistry. This informative new book describes the principles of X-ray diffraction and its applications to materials characterization. It consists of three parts. The first deals with elementary crystallography and optics, which is essential for understanding the theory of X-ray diffraction discussed in the second section of the book. Part 2 describes how the X-ray diffraction can be applied for characterizing such various forms of materials as thin films, single crystals, and powders. The third section of the book covers applications of X-ray diffraction. The book presents a number of examples to help readers better comprehend the subject. X-Ray Diffraction for Materials Research: From Fundamentals to Applications also • provides background knowledge of diffraction to enable nonspecialists to become familiar with the topics • covers the practical applications as well as the underlying principle of X-ray diffraction • presents appropriate examples with answers to help readers understand the contents more easily • includes thin film characterization by X-ray diffraction with relevant experimental techniques • presents a huge number of elaborately drawn graphics to help illustrate the content The book will help readers (students and researchers in materials science, physics, and

chemistry) understand crystallography and crystal structures, interference and diffraction, structural analysis of bulk materials, characterization of thin films, and nondestructive measurement of internal stress and phase transition. Diffraction is an optical phenomenon and thus can be better understood when it is explained with an optical approach, which has been neglected in other books. This book helps to fill that gap, providing information to convey the concept of X-ray diffraction and how it can be applied to the materials analysis. This book will be a valuable reference book for researchers in the field and will work well as a good introductory book of X-ray diffraction for students in materials science, physics, and chemistry.

Thin Film Analysis by X-Ray Scattering

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.

X-Ray Diffraction Topography

X-ray crystallography is an established method for studying the structure of proteins and other macromolecules. As the importance of proteins grows, researchers in many fields have found that a working knowledge of X-ray diffraction is an indispensable tool. In this new edition of his essential work, the internationally recognized researcher Dr. Jan Drenth offers an up-to-date and technically rigorous introduction to the subject, providing the theoretical background necessary to understand how the structure of proteins is determined

at atomic resolution. New material in the 3rd edition includes a section on twinning, an additional chapter on crystal growth and a discussion of single-wavelength anomalous dispersion.

Modern X-Ray Analysis on Single Crystals

The field of nanoscience has undergone tremendous growth in the past decade as the number of applications of nanoparticles and nanostructured materials have proliferated. Metal nanoparticles have attracted particular interest due to their potential for applications in areas as diverse as catalysis, medicine and opto-electronics. The chemical and physical properties of metal nanoparticles can vary smoothly or discontinuously with nanoparticle size, depending on the size regime and the property. In the case of bi- or multimetallic nanoparticles ("nanoalloys"), these properties also depend on the elemental composition and the chemical ordering - how the metals are distributed in the nanoparticles.It is this tunability of behavior that makes metal nanoparticles and nanoalloys so versatile and appealing. This book begins with a tutorial introducing the theoretical ideas and models that have been developed to understand metal nanoparticles. It gives an overview of experimental methods for generating and characterizing metal nanoparticles and nanoalloys and of their properties and applications, providing an introduction to material covered in more depth in subsequent chapters. A major theme of all the chapters is the effect of nanoparticle size, shape and surface

chemistry on their properties - especially optical and catalytic properties. A unified discussion of the inter-relations between modelling, synthesis and physical properties of nanoparticles and nanoalloys A discussion of the most promising new catalytic and photocatalytic applications of nanoparticles and the approaches used to achieve these goals A tutorial introduction which provides a basis for understanding the subsequent specialized chapters

X-Ray Diffraction by Polycrystalline Materials

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.

Structure Determination by X-ray Crystallography

A concise introduction to modern crystal structure determination, emphasizing both the crystallographic background and the successive practical steps. In the theoretical sections, more importance is attached to a good understanding, than to a rigorous mathematical treatment. The most important measuring techniques, including the use of modern area detectors, and the methods of data reduction, structure solution and refinement are discussed from a practical point of view. Special emphasis is put on the ability to recognize and avoid possible errors and traps, and to judge the quality of results.

X-Ray Diffraction

Novel Microstructures for Solids

Metal Nanoparticles and Nanoalloys

New textbooks at all levels of chemistry appear with great regularity. Some fields such as basic biochemistry, organic reaction mechanisms, and chemical thermodynamics are well represented by many excellent texts, and new or revised editions are published sufficiently often to keep up with progress in research. However, some areas of chemistry, especially many of those taught at the graduate level, suffer from a real lack of up to-date textbooks. The most serious needs occur in fields that are rapidly changing. Textbooks in these subjects usually have to be written by scientists actually involved in the research that is advancing the field. It is not often easy to persuade such individuals to set time aside to help spread the knowledge they have accumulated. Our goal, in this series, is to pinpoint areas of chemistry where recent progress has outpaced what is covered in any available textbooks, and then seek out and persuade experts in these fields to produce relatively concise but instructive intro ductions to their fields. These should serve the needs of one-semester or one-quarter graduate courses in chemistry and biochemistry. In some cases, the availability of texts in active research areas should help stimulate the creation of new courses. Charles R. Cantor v Preface to the Second Edition Since the publication of the previous edition in 1994, X-ray crystallography of proteins has advanced by improvements in existing techniques and by addition of new techniques.

X-Ray and Neutron Dynamical Diffraction

Reviews recent studies of X-ray scattering phenomena in liquid crystals, in particular their relationship to phase-transition physics. Also explored are the main approximations which are used to obtain structural information from the scattering spectre of liquid crystals and to determine the short-range order in the molecule arrangement.

Elements of Modern X-ray Physics

This classic by one of the great figures in x-ray structure analysis provides a vigorous mathematical treatment of its subject. Addresses such fundamentals as crystal faces and edges, the lattice postulate, lattice rows and panes, as well as point, translation,and space groups. 1945 edition.

Pharmaceutical Crystallography

An Introduction to Green Nanotechnology, Volume 28, provides students, scientists and chemical engineers with an overview of several types of nanostructures, discusses the synthesis and characterization of nanostructures, and provides applications of nanotechnology in daily life. The book offers a foundation to green nanotechnology by explaining why green nanotechnology is important. Covers biological sources in green nanotechnology, antioxidants, green nanostructures,

mechanism, synthesis and characterization. The book ends with an evaluation of the risks of nanotechnology in human life and future perspectives. Introduces novel sources of plants having a high potential to be used as bio media to synthesize nanostructures Provides phytochemical properties and antioxidant potential, and their effects on stability, morphology and size of green nanostructures Includes a medicinal and technological comparison of green synthesized nanostructures to nano-products from non-green methods Uses accessible language, avoiding complex concepts of mathematics, biology and chemistry

High Energy X-ray Diffraction on Ultrasound Excited Crystals

Eagerly awaited, this second edition of a best-selling text comprehensively describes from a modern perspective the basics of x-ray physics as well as the completely new opportunities offered by synchrotron radiation. Written by internationally acclaimed authors, the style of the book is to develop the basic physical principles without obscuring them with excessive mathematics. The second edition differs substantially from the first edition, with over 30% new material, including: A new chapter on non-crystalline diffraction - designed to appeal to the large community who study the structure of liquids, glasses, and most importantly polymers and bio-molecules A new chapter on x-ray imaging - developed in close cooperation with many of the leading experts in the field Two new chapters covering non-crystalline diffraction and imaging Many important

changes to various sections in the book have been made with a view to improving the exposition Four-colour representation throughout the text to clarify key concepts Extensive problems after each chapter There is also supplementary book material for this title available online (http://booksupport.wiley.com). Praise for the previous edition: “The publication of Jens Als-Nielsen and Des McMorrow’s Elements of Modern X-ray Physics is a defining moment in the field of synchrotron radiation… a welcome addition to the bookshelves of synchrotron–radiation professionals and students alike. The text is now my personal choice for teaching x-ray physics…” – Physics Today, 2002

Crystallography Made Crystal Clear

X-Ray Diffraction by Macromolecules

Mikhail Alexandrovich Krivoglaz died unexpectedly when he was preparing the English edition of his two-volume monograph on diffraction and diffuse scatter ing of X-rays and neutrons in imperfect crystals. His death was a heavy blow to all who knew him, who had worked with him and to the world science community as a whole. The application of the diffraction techniques for the study of imperfections of crystal structures was the major field of Krivoglaz' work throughout his career in

science. He started working in the field in the mid-fifties and since then made fundamental contributions to the theory of real crystals. His results have largely determined the current level of knowledge in this field for more than thirty years. Until the very last days of his life, Krivoglaz continued active studies in the physics of diffraction effects in real crystals. His interest in the theory aided in the explanation of the rapidly advancing experimental studies. The milestones marking important stages of his work were the first mono graph on the theory of X-ray and neutron scattering in real crystals which was published in Russian in 1967 (a revised English edition in 1969), and the two volume monograph published in Russian in 1983-84 (this edition is the revised translation of the latter).

Crystal Structure Determination

A useful reference work for graduate students, lecturers and researchers, this text provides an introduction on the subject of dynamic theory of x-ray diffraction, followed by a detailed treatment of perfect and slightly and highly deformed crystals.

Fifty Years of X-Ray Diffraction

Electron Density and Bonding in Crystals: Principles, Theory and X-Ray Diffraction

Experiments in Solid State Physics and Chemistry provides a comprehensive, unified account of the use of diffraction techniques to determine the distribution of electrons in crystals. The book discusses theoretical and practical techniques, the application of electron density studies to chemical bonding, and the determination of the physical properties of condensed matter. The book features the authors' own key contributions to the subject as well a thorough, critical summary of the extensive literature on electron density and bonding. Logically organized, coverage ranges from the theoretical and experimental basis of electron density determination to its impact on investigations of the nature of the chemical bond and its uses in determining electromagnetic and optical properties of crystals. The main text is supplemented by appendices that provide clear, concise guidance on aspects such as systems of units, quantum theory of atomic vibrations, atomic orbitals, and creation and annihilation operators. The result is a valuable compendium of modern knowledge on electron density distributions, making this reference a standard for crystallographers, condensed matter physicists, theoretical chemists, and materials scientists.

X-Ray Diffraction Study of Nematic Smectic A and C Liquid Crystals

X-Ray and Neutron Diffraction describes the developments of the X-ray and the

various research done in neutron diffraction. Part I of the book concerns the principles and applications of the X-ray and neutrons through their origins from classical crystallography. The book explains the use of diffraction methods to show the highly regular arrangement of atoms that forms a continuous pattern in three-dimensional space. The text evaluates the limitations and benefits of using the different types of radiation sources, whether these are X-rays, neutrons, or electrons. Part II is a collection of reprints discussing the development of techniques that includes a modification of the Bragg method, which is a method of X-ray crystal analysis. One paper presents an improved numerical method of two-dimensional Fourier synthesis for crystals. This method uses a greatly reduced process of arrangement of sets of figures found in the two-dimensional Fourier series. The book also notes the theoretical considerations and the practical details, and then addresses precautions against possible inclusions of errors in this method. The text deals as well with the magnetic scattering of neutrons, and one paper presents a simple method of gathering information about the magnetic moment of the neutron besides the traditional Stern-Gerlach method. Nuclear scientists and physicists, atomic researchers, and nuclear engineers will greatly appreciate the book.

X-Ray Diffraction Crystallography

This book presents a physical approach to the diffraction phenomenon and its

applications in materials science. An historical background to the discovery of X-ray diffraction is first outlined. Next, Part 1 gives a description of the physical phenomenon of X-ray diffraction on perfect and imperfect crystals. Part 2 then provides a detailed analysis of the instruments used for the characterization of powdered materials or thin films. The description of the processing of measured signals and their results is also covered, as are recent developments relating to quantitative microstructural analysis of powders or epitaxial thin films on the basis of X-ray diffraction. Given the comprehensive coverage offered by this title, anyone involved in the field of X-ray diffraction and its applications will find this of great use.