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X-ray Diffraction Procedures Harold P. Klug 1959
Nanoscale Materials Luis M. Liz-Marzán 2007-05-08 Organized nanoassemblies of inorganic nanoparticles and organic molecules are building blocks of nanodevices, whether they are designed to perform molecular level computing, sense the environment or improve the catalytic properties of a material. The key to creation of these hybrid nanostructures lies in understanding the chemistry at a fundamental level. This book serves as a reference book for researchers by providing fundamental understanding of many nanoscopic materials.
CGPDTM Exam PDF-Examiners Of Patents & Designs Exam PDF eBook Combined eBook Chandresh Agrawal 2023-07-11 SGN.The CGPDTM Exam PDF-Examiners Of Patents & Designs Exam PDF eBook Combined eBook Covers All Sections Of The Exam Except Current Affairs.
X-Ray Diffraction by Polycrystalline Materials René Guinebretière 2013-03-01 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.
Thin Film Analysis by X-Ray Scattering Mario Birkholz 2006-05-12 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.
X Rays and Crystal Structure William Henry Bragg 1924
X-Ray Diffraction Crystallography Yoshio Waseda 2011-03-18 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.
Elements of X-ray Crystallography Leonid V. Azároff 1968
Small-Angle Scattering of X-Rays Andre Guinier 1974
Elements of Modern X-ray Physics Jens Als-Nielsen 2011-04-04 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
X-ray Structure Determination George H. Stout 1968
Basic Concepts of X-Ray Diffraction Emil Zolotoyabko 2014-02-10 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.
Elements of X-ray Diffraction Bernard Dennis Cullity 1978 Intended to acquaint the reader with the theory of x-ray diffraction, the experimental methods involved, and the main applications. The book is a collection of principles and methods stressing X-ray diffraction rather than metallurgy. The book is written entirely in terms of the Bragg law and can be read without any knowledge of the reciprocal lattice. It is divided into three main parts— Fundamentals; experimental methods; and applications. Designed for beginners, not as a reference tool for the advanced reader.
X-ray Diffraction Methods in Polymer Science Leroy Elbert Alexander 1979
Elements of X-Ray Diffraction: Pearson New International Edition PDF eBook S.R. Stock 2013-10-03 Designed for Junior/Senior undergraduate courses. This revision of a classical text is intended to acquaint the reader, who has no prior knowledge of the subject, with the theory of x-ray diffraction, the experimental methods involved, and the main applications. The text is a collection of principles and methods designed directly for the student and not a reference tool for the advanced reader
Concrete Solutions Michael Grantham 2009-06-10 Concrete repair continues to be a subject of major interest to engineers and technologists worldwide. The concrete repair budget for the UK alone currently runs at some UKP 220 per annum. Some estimates have indicated that, worldwide, in 2010 the expenditure for maintenance and repair work will represent about 85% of the total expenditure in the co
Two-dimensional X-ray Diffraction Bob B. He 2018-05-18 An indispensable resource for researchers and students in materials science, chemistry, physics, and pharmaceuticals Written by one of the pioneers of 2D X-Ray Diffraction, this updated and expanded edition of the definitive text in the field provides comprehensive coverage of the fundamentals of that analytical method, as well as state-of-the art experimental methods and applications. Geometry convention, x-ray source and optics, two-dimensional detectors, diffraction data interpretation, and configurations for various applications, such as phase identification, texture, stress, microstructure analysis, crystallinity, thin film analysis, and combinatorial screening are all covered in detail. Numerous experimental examples in materials research, manufacture, and pharmaceuticals are provided throughout. Two-dimensional x-ray diffraction is the ideal, non-destructive analytical method for examining samples of all kinds including metals, polymers, ceramics, semiconductors, thin films, coatings, paints, biomaterials, composites, and more. Two-Dimensional X-Ray Diffraction, Second Edition is an up-to-date resource for understanding how the latest 2D detectors are integrated into diffractometers, how to get the best data using the 2D detector for diffraction, and how to interpret this data. All those desirous of setting up a 2D diffraction in their own laboratories will find the author’s coverage of the physical principles, projection geometry, and mathematical derivations extremely helpful. Features new contents in all chapters with most figures in full color to reveal more details in illustrations and diffraction patterns Covers the recent advances in detector technology and 2D data collection strategies that have led to dramatic increases in the use of two-dimensional detectors for x-ray diffraction Provides in-depth coverage of new innovations in x-ray sources, optics, system configurations, applications and data evaluation algorithms Contains new methods and experimental examples in stress, texture, crystal size, crystal orientation and thin film analysis Two-Dimensional X-Ray Diffraction, Second Edition is an important working resource for industrial and academic researchers and developers in materials science, chemistry, physics, pharmaceuticals, and all those who use x-ray diffraction as a characterization method. Users of all levels, instrument technicians and X-ray laboratory managers, as well as instrument developers, will want to have it on hand.
Handbook of X-Ray Data Günter H. Zschornack 2007-01-24 This is the only handbook available on X-ray data. In a concise and informative manner, the most important data connected with the emission of characteristic X-ray lines are tabulated for all elements up to Z = 95 (Americium). The tabulated data are characterized and, in most cases, evaluated. Furthermore, all important processes and phenomena connected with the production, emission and detection of characteristic X-rays are discussed.
Environmentally Friendly (Bio)Technologies for the Removal of Emerging Organic and Inorganic Pollutants from Water Eldon R. Rene 2019-08-15 This book highlights the impacts of emerging pollutants (both organic and inorganic) in water bodies and the role and performances of different water and wastewater treatment approaches that are presently being employed in the field of environmental engineering. Some of these approaches are focused on ‘end-of-pipe’ treatment, while most of these approaches are focused on the application of novel physic-chemical and biological techniques for wastewater treatment and reuse. The goal of this book is to present the emerging technologies and trends in the field of water and wastewater treatment. The papers in this book provide clear proof that environmentally friendly (bio)technologies are becoming more and more important and playing a critical role in removing a wide variety of organic and inorganic pollutants from water. In Focus – a book series that showcases the latest accomplishments in water research. Each book focuses on a specialist area with papers from top experts in the field. It aims to be a vehicle for in-depth understanding and inspire further conversations in the sector.
X-Ray Structure Determination George H. Stout 1989-05-08 Closely follows an actual structural determination. After some introductory material on the nature of x-rays, the diffraction process, and the internal geometry of crystals, the selection and preparation of a crystal are considered. Techniques of measuring raw x-ray data are covered, plus their reduction into a useable form. The second part discusses both traditional and novel methods of solving the ``phase'' problem, the principal difficulty in x-ray structure determination. The third part considers how to extract the most information from the data and how to evaluate its reliability. Finally, there is a discussion of sources of error in practice and interpretation.
Mineral Scales and Deposits Zahid Amjad 2015-05-21 Mineral Scales and Deposits: Scientific and Technological Approaches presents, in an integrated way, the problem of scale deposits (precipitation/crystallization of sparingly-soluble salts) in aqueous systems, both industrial and biological. It covers several fundamental aspects, also offering an applications’ perspective, with the ultimate goal of helping the reader better understand the underlying mechanisms of scale formation, while also assisting the user/reader to solve scale-related challenges. It is ideal for scientists/experts working in academia, offering a number of crystal growth topics with an emphasis on mechanistic details, prediction modules, and inhibition/dispersion chemistry, amongst others. In addition, technologists, consultants, plant managers, engineers, and designers working in industry will find a field-friendly overview of scale-related challenges and technological options for their mitigation. Provides a unique, detailed focus on scale deposits, includes the basic science and mechanisms of scale formation Present a field-friendly overview of scale-related challenges and technological options for their mitigation Correlates chemical structure to performance Provides guidelines for easy assessment of a particular case, also including solutions Includes an extensive list of industrial case studies for reference
Answers to Problems Bernard Dennis Cullity 1978 Answer booklet for problems found in the textbook.
Ceramic Materials C. Barry Carter 2013-01-04 Ceramic Materials: Science and Engineering is an up-to-date treatment of ceramic science, engineering, and applications in a single, comprehensive text. Building on a foundation of crystal structures, phase equilibria, defects, and the mechanical properties of ceramic materials, students are shown how these materials are processed for a wide diversity of applications in today's society. Concepts such as how and why ions move, how ceramics interact with light and magnetic fields, and how they respond to temperature changes are discussed in the context of their applications. References to the art and history of ceramics are included throughout the text, and a chapter is devoted to ceramics as gemstones. This course-tested text now includes expanded chapters on the role of ceramics in industry and their impact on the environment as well as a chapter devoted to applications of ceramic materials in clean energy technologies. Also new are expanded sets of text-specific homework problems and other resources for instructors. The revised and updated Second Edition is further enhanced with color illustrations throughout the text.
Elements of X Ray Diffraction B D Cullity 2018-10-15 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.
Handbook of X-rays Emmett Frank Kaelble 1967
X-Ray Diffraction C. Suryanarayana 2013-06-29 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.
Structure of Materials Marc De Graef 2012-11-15 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.
Theory of XRF : getting acquainted with the principles Peter Brouwer 2006
An Introduction to X-ray Crystallography Michael M. Woolfson 1997-01-13 A textbook for the student beginning a serious study of X-ray crystallography.
Fundamentals of Powder Diffraction and Structural Characterization of Materials Vitalij Pecharsky 2005-12-05 Requires no prior knowledge of the subject, but is comprehensive and detailed making it useful for both the novice and experienced user of the powder diffraction method. Useful for any scientific or engineering background, where precise structural information is required. Comprehensively describes the state-of-the-art in structure determination from powder diffraction data both theoretically and practically using multiple examples of varying complexity. Pays particular attention to the utilization of Internet resources, especially the well-tested and freely available computer codes designed for processing of powder diffraction data.
Structure Determination by X-Ray Crystallography M. F. C. Ladd 2012-12-06 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.

X Ray Wavelengths Joyce Alvin Bearden 1964

Understanding Single-Crystal X-Ray Crystallography Dennis W. Bennett 2010-03-08 The first textbook for teaching this method to users with little mathematical background logically presents the theory and fundamentals in an easily comprehensible, self-contained way. The result is a must-have for advanced undergraduate students, as well as masters and graduate students and other users of single-crystal X-ray crystallography from many various disciplines.

Advances in X-Ray Analysis Camden R. Hubbard 1983-06 At the Denver X-Ray Conference, the topic for the plenary lectures alternates annually between x-ray diffraction and x-ray fluorescence. This year is a "diffraction" year, and the theme is accuracy in powder diffraction. Instead of comprehensive cover age, such as was attempted at the Accuracy in Powder Diffraction Meeting held at the National Bureau of Standards in 1978, this meeting focuses on recent developments in measurement accuracy of two-theta and intensity. The focus on accuracy, from the practical point of view, is important in a wide range of x-ray diffraction measurements. Accu rate data improve our ability to identify phases in a mixture using the Powder Diffraction File. Improved accuracy is essential for better characterization of the lattice, crystallite size, strain and structure. Finally, the accuracy of quantitative analysis is of great concern in many laboratories. The five invited papers of the plenary session give a broad perspective of recent activity throughout the world on uses of more accurate data, on methods to achieve greater accuracy, and on fundamental factors affecting the accuracy. The scope of the conference, however, is much broader than that of the plenary session. The workshops lead off with many practical aspects of x-ray analysis. Many of the contributed papers expand on the theme of accuracy in x-ray powder diffraction. In particular, the s.ession on XRD quantitative phase analysis provides an exception al coverage of the limitations in quantitative analysis and of the techniques being employed to improve the results.

High-Resolution X-Ray Scattering Ullrich Pietsch 2004-08-27 During the last 20 years interest in high-resolution x-ray diffractometry and reflectivity has grown as a result of the development of the semiconductor industry and the increasing interest in material research of thin layers of magnetic, organic, and other materials. For example, optoelectronics requires a subsequent epitaxy of thin layers of different semiconductor materials. Here, the individuallayer thicknesses are scaled down to a few atomic layers in order to exploit quantum effects. For reasons of electronic and optical confinement, these thin layers are embedded within much thicker cladding layers or stacks of multilayers of slightly different chemical composition. It is evident that the interface quality of those quantum weHs is quite important for the function of devices. Thin metallic layers often show magnetic properties which do not ap pear for thick layers or in bulk material. The investigation of the mutual interaction of magnetic and non-magnetic layers leads to the discovery of colossal magnetoresistance, for example. This property is strongly related to the thickness and interface roughness of covered layers.

Computer Simulation Tools for X-ray Analysis Sérgio Luiz Morelhão 2015-10-05 This book teaches the users on how to construct a library of routines to simulate scattering and diffraction by almost any kind of samples. The main goal of this book is to break down the huge barrier of difficulties faced by beginners from many fields (Engineering, Physics, Chemistry, Biology, Medicine, Material Science, etc.) in using X-rays as an analytical tool in their research. Besides fundamental concepts, MatLab routines are provided, showing how to test and implement the concepts. The major difficult in analysing materials by X-ray techniques is that it strongly depends on simulation software. This book teaches the users on how to construct a library of routines to simulate scattering and diffraction by almost any kind of samples. It provides to a young student the knowledge that would take more than 20 years to acquire by working on X-rays and relying on the available textbooks. The scientific productivity worldwide is growing at a breakneck pace, demanding ever more dynamic approaches and synergies between different fields of knowledge. To master the fundamentals of X-ray physics means the opportunity of working at an infiniteness of fields, studying systems where the organizational understanding of matter at the atomic scale is necessary. Since the discovery of X radiation, its usage as investigative tool has always been under fast expansion afforded by instrumental advances and computational resources. Developments in medical and technological fields have, as one of the master girders, the feasibility of structural analysis offered by X-rays. One of the major difficulties faced by beginners in using this fantastic tool lies in the analysis of experimental data. There are only few cases where it is possible to extract structural information directly from experiments. In most cases, structure models and simulation of radiation-matter interaction processes are essential. The advent of intense radiation sources and rapid development of nanotechnology constantly creates challenges that seek solutions beyond those offered by standard X-ray techniques. Preparing new researchers for this scenario of rapid and drastic changes requires more than just teaching theories of physical phenomena. It also requires teaching of how to implement them in a simple and efficient manner. In this book, fundamental concepts in applied X-ray physics are demonstrated through available computer simulation tools. Using MatLab, more than eighty routines are developed for solving the proposed exercises, most of which can be directly used in experimental data analysis. Therefore, besides X-ray physics, this book offers a practical programming course in modern high-level language, with plenty of graphic and mathematical tools.

NBS Technical Note 1980-06

X-Ray Diffraction for Materials Research Myeongkyu Lee 2017-03-16 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.

Advances in X-Ray Analysis Camden R. Hubbard 1983-06-01 At the Denver X-Ray Conference, the topic for the plenary lectures alternates annually between x-ray diffraction and x-ray fluorescence. This year is a "diffraction" year, and the theme is accuracy in powder diffraction. Instead of comprehensive cover age, such as was attempted at the Accuracy in Powder Diffraction Meeting held at the National Bureau of Standards in 1978, this meeting focuses on recent developments in measurement accuracy of two-theta and intensity. The focus on accuracy, from the practical point of view, is important in a wide range of x-ray diffraction measurements. Accu rate data improve our ability to identify phases in a mixture using the Powder Diffraction File. Improved accuracy is essential for better characterization of the lattice, crystallite size, strain and structure. Finally, the accuracy of quantitative analysis is of great concern in many laboratories. The five invited papers of the plenary session give a broad perspective of recent activity throughout the world on uses of more accurate data, on methods to achieve greater accuracy, and on fundamental factors affecting the accuracy. The scope of the conference, however, is much broader than that of the plenary session. The workshops lead off with many practical aspects of x-ray analysis. Many of the contributed papers expand on the theme of accuracy in x-ray powder diffraction. In particular, the s.ession on XRD quantitative phase analysis provides an exception al coverage of the limitations in quantitative analysis and of the techniques being employed to improve the results.

Structure Analysis by Small-Angle X-Ray and Neutron Scattering L.A. Feigin 2013-11-11 Small-angle scattering of X rays and neutrons is a widely used diffraction method for studying the structure of matter. This method of elastic scattering is used in various branches of science and technology, includ ing condensed matter physics, molecular biology and biophysics, polymer science, and metallurgy. Many small-angle scattering studies are of value for pure science and practical applications. It is well known that the most general and informative method for investigating the spatial structure of matter is based on wave-diffraction phenomena. In diffraction experiments a primary beam of radiation influences a studied object, and the scattering pattern is analyzed. In principle, this analysis allows one to obtain information on the structure of a substance with a spatial resolution determined by the wavelength of the radiation. Diffraction methods are used for studying matter on all scales, from elementary particles to macro-objects. The use of X rays, neutrons, and electron beams, with wavelengths of about 1 A, permits the study of the condensed state of matter, solids and liquids, down to atomic resolution. Determination of the atomic structure of crystals, i.e., the arrangement of atoms in a unit cell, is an important example of this line of investigation.