Powder Diffraction Theory And Practice

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The Interpretation of X-ray Diffraction Photographs Norman Fordyce McKerron Henry 1961

Structure Determination from Powder Diffraction Data W. I. F. David 2006-08-03 The art of solving a structure from powder diffraction data has developed rapidly over the last ten years to the point where numerous crystal structures, both organic and inorganic, have been solved directly from powder data. However, it is still an art and, in contrast to its single crystal equivalent, is far from routine. The art lies not only in the correct application of a specific experimental technique or computer program, but also in the selection of the optimal path for the problem at hand. Written and edited by experts active in the field, and covering both the fundamental and applied aspects of structure solution from powder diffraction data, this book guides both novices and experienced practitioners alike through the maze of possibilities.

Bijdragen Tot de Theorie en Praktijk Van Röntgenografische Quantitatieve Bepalingen Met de Poederdiffractiemethode. (Contributions to the Theory and Practice of Quantitative Determinations by the X-ray Powder Diffraction Method.) Proefschrift, Etc. Eng Pieter Maarten de WOLFF 1951

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.

Rietveld Refinement in the Characterization of Crystalline Materials Igor Djerdj 2019-01-28 This book is a printed edition of the Special Issue "Rietveld Refinement in the Characterization of Crystalline Materials" that was published in Crystals

Introduction to X-Ray Powder Diffractometry Ron Jenkins 1996-07-12 When bombarded with X-rays, solid materials produce distinct scattering patterns similar to fingerprints. X-ray powder diffraction is a technique used to fingerprint solid samples, which are then identified and cataloged for future use-much the way the FBI keeps fingerprints on file. The current database of some 70,000 material prints has been

put to a broad range of uses, from the analysis of moon rocks to testing drugs for purity. Introduction to X-ray Powder Diffractometry fully updates the achievements in the field over the past fifteen years and provides a much-needed explanation of the state-of-the-art techniques involved in characterizing materials. It covers the latest instruments and methods, with an emphasis on the fundamentals of the diffractometer, its components, alignment, calibration, and automation. The first three chapters outline diffraction theory in clear language, accessible to both students and professionals in chemistry, physics, geology, and materials science. The book's middle chapters describe the instrumentation and procedures used in X-ray diffraction, including X-ray sources, X-ray detection, and production of monochromatic radiation. The chapter devoted to instrument design and calibration is followed by an examination of specimen preparation methods, data collection, and reduction. The final two chapters provide in-depth discussions of qualitative and quantitative analysis. While the material is presented in an orderly progression, beginning with basic concepts and moving on to more complex material, each chapter stands on its own and can be studied independently or used as a professional reference. More than 230 illustrations and tables demonstrate techniques and clarify complex material. Self-contained, timely, and user-friendly, Introduction to X-ray Powder Diffractometry is an enormously useful text and professional reference for analytical chemists, physicists, geologists and materials scientists, and upper-level undergraduate and graduate students in materials science and analytical chemistry. X-ray powder diffraction-a technique that has matured significantly in recent years-is used to identify solid samples and determine their composition by analyzing the so-called "fingerprints" they generate when X-rayed. This unique volume fulfills two major roles: it is the first textbook devoted solely to X-ray powder diffractometry, and the first up-to-date treatment of the subject in 20 years. This timely, authoritative volume features: * Clear, concise descriptions of both theory and practice-including fundamentals of diffraction theory and all aspects of the diffractometer * A treatment that reflects current trends toward automation, covering the newest instrumentation and automation techniques * Coverage of all the most common applications, with special emphasis on qualitative and quantitative analysis * An accessible presentation appropriate for both students and professionals * More than 230 tables and illustrations Introduction to X-ray Powder Diffractometry, a collaboration between two internationally known and respected experts in the field, provides invaluable guidance to anyone using X-ray powder diffractometers and diffractometry in materials science, ceramics, the pharmaceutical industry, and elsewhere.

Rietveld Refinement Robert E. Dinnebier 2018-12-17 Almost 50 years have passed since the famous papers of Hugo Rietveld from the late sixties where he describes a method for the refinement of crystal structures from neutron powder diffraction data. Soon after, the potential of the method for laboratory X-ray powder diffraction was discovered. Although the method is now widely accepted, there are still many pitfalls in the theoretical understanding and in practical daily use. This book closes the gap with a theoretical introduction for each chapter followed by a practical approach.The flexible macro type language of the Topas Rietveld software can be considered as the defacto standard.

Powder Diffraction Robert E. Dinnebier 2008-01-01 A long awaited overview of the status of powder diffraction in modern research including essential theory and introductory material for students and researchers.

Powder Diffraction 1995

Industrial Applications of X-Ray Diffraction Frank Smith 1999-09-22 By illustrating a wide range of specific applications in all major industries, this work broadens the coverage of X-ray diffraction beyond basic tenets, research and academic principles. The book serves as a guide to solving problems faced

everyday in the laboratory, and offers a review of the current theory and practice of X-ray diffraction, major

Transmission Electron Microscopy and Diffractometry of Materials Brent Fultz 2012-10-14 This book explains concepts of transmission electron microscopy (TEM) and x-ray diffractometry (XRD) that are important for the characterization of materials. The fourth edition adds important new techniques of TEM such as electron tomography, nanobeam diffraction, and geometric phase analysis. A new chapter on neutron scattering completes the trio of x-ray, electron and neutron diffraction. All chapters were updated and revised for clarity. The book explains the fundamentals of how waves and wavefunctions interact with atoms in solids, and the similarities and differences of using x-rays, electrons, or neutrons for diffraction measurements. Diffraction effects of crystalline order, defects, and disorder in materials are explained in detail. Both practical and theoretical issues are covered. The book can be used in an introductory-level or advanced-level course, since sections are identified by difficulty. Each chapter includes a set of problems to illustrate principles, and the extensive Appendix includes laboratory exercises.

Applications of Neutron Powder Diffraction Erich H. Kisi 2012-09-27 This is the first book covering the theory, practicalities, and the extensive applications of neutron powder diffraction in materials science, physics, chemistry, mineralogy, and engineering. The broad coverage should be accessible to graduate students and senior undergraduates in science and engineering, as well as lecturers and researchers.

Developing Solid Oral Dosage Forms Yihong Qiu 2009-03-10 Developing Solid Oral Dosage Forms is intended for pharmaceutical professionals engaged in research and development of oral dosage forms. It covers essential principles of physical pharmacy, biopharmaceutics and industrial pharmacy as well as various aspects of state-of-the-art techniques and approaches in pharmaceutical sciences and technologies along with examples and/or case studies in product development. The objective of this book is to offer updated (or current) knowledge and skills required for rational oral product design and development. The specific goals are to provide readers with: Basics of modern theories of physical pharmacy, biopharmaceutics and industrial pharmacy and their applications throughout the entire process of research and development of oral dosage forms Tools and approaches of preformulation investigation, formulation/process design, characterization and scale-up in pharmaceutical sciences and technologies New developments, challenges, trends, opportunities, intellectual property issues and regulations in solid product development The first book (ever) that provides comprehensive and in-depth coverage of what's required for developing high quality pharmaceutical products to meet international standards It covers a broad scope of topics that encompass the entire spectrum of solid dosage form development for the global market, including the most updated science and technologies, practice, applications, regulation, intellectual property protection and new development trends with case studies in every chapter A strong team of more than 50 well-established authors/co-authors of diverse background, knowledge, skills and experience from industry, academia and regulatory agencies

The Basics of Crystallography and Diffraction Christopher Hammond 2009-05-07 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.

Elements of X Ray Diffraction B. D. Cullity 2018-11-10 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.

X-Ray Crystallography Gregory S. Girolami 2015-03-01 Intended for use in chemistry, biochemistry, materials science and physics departments and oriented toward the crystallography of small and biomolecules.

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 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.

Eleventh European Powder Diffraction Conference 2015-10-29 Zeitschrift für Kristallographie. Supplement Volume 30 presents the complete Proceedings of all contributions to the XI European Powder Diffraction Conference in Warsaw 2008:Method Development and Application, Instrumental, Software Development, MaterialsSupplement Series of Zeitschrift für Kristallographie publishes Proceedings and Abstracts of international conferences on the interdisciplinary field of crystallography.

Crystal Structure Analysis Alexander J Blake 2009-06-18 By choosing an approach that avoids undue emphasis on the mathematics involved, this book gives practical advice on topics such as growing crystals, solving and refining structures, and understanding and using the results.

Contribution to the theory and practice of quantitative determinations by the X-ray powder diffraction method Pieter Maarten de Wolff 1951

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-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.

X-Ray Scattering from Semiconductors Paul F Fewster 2003-07-07 This book presents a practical guide to the analysis of materials and includes a thorough description of the underlying theories and instrumental aberrations caused by real experiments. The main emphasis concerns the analysis of thin films and multilayers, primarily semiconductors, although the techniques are very general. Semiconductors can be very perfect composite crystals and therefore their study can lead to the largest volume of information, since X-ray scattering can assess the deviation from perfection. The description is intentionally conceptual so that the reader can grasp the real processes involved. In this way the analysis becomes significantly easier, making the reader aware of misleading artifacts and assisting in the determination of a more complete and reliable analysis. The theory of scattering is very important and is covered in such a way that the assumptions are clear. Greatest emphasis is placed on the dynamical diffraction theory including new developments extending its applicability to reciprocal space mapping and modelling samples with relaxed and distorted interfaces. A practical guide to the measurement of diffraction patterns, including the smearing effects introduced to the measurement, is also presented. Contents:An Introduction to Semiconductor MaterialsAn Introduction to X-Ray ScatteringEquipment for Measuring Diffraction PatternsA Practical Guide to the Evaluation of Structural Parameters Readership: Postgraduate researchers in crystallography, materials science, semiconductors and physics. Keywords:X-Ray;Diffraction;Scattering;Semiconductors;Rocking Curve;Reciprocal Space;Topography;High Resolution;Thin Films;Reflectometry;Dynamical Theory

Industrial Applications of X-Ray Diffraction Frank Smith 1999-09-22 By illustrating a wide range of specific applications in all major industries, this work broadens the coverage of X-ray diffraction beyond basic tenets, research and academic principles. The book serves as a guide to solving problems faced everyday in the laboratory, and offers a review of the current theory and practice of X-ray diffraction, major advances and potential uses.

Principles and Applications of Powder Diffraction Abraham Clearfield 2008-09-22 Powder diffraction is one of the primary techniques used to characterize materials, providing structural information even when the crystallite size is too small for single crystal x-ray diffraction methods. There has been a significant increase in the application of powder diffraction in recent years, both in research and manufacturing, fuelled by improved instrumentation, data processing and awareness of the information that can be obtained. Powder diffraction allows for rapid, non-destructive analysis of multi-component mixtures without the need for extensive sample preparation. This gives laboratories the ability to quickly analyse unknown materials and perform materials characterization in such fields as chemistry, materials science, geology, mineralogy, forensics, archaeology, and the biological and pharmaceutical sciences. This book provides a concise introduction to modern powder diffraction methods with particular emphasis on practical aspects. It covers the background theory of diffraction in a form approachable by those with an undergraduate degree. Whilst individual chapters are written as stand alone sections, the text is sufficiently focused so that it can be read in its entirety by the non-specialist who wants to gain a rapid overview of what they can do with modern powder diffraction methods.

Contributions to the Theory and Practice of Quantitative Determinations by the X-ray Powder Diffraction Method Pieter Maarten de Wolff 1951

Analytical Geomicrobiology Janice P. L. Kenney 2019-07-31 A comprehensive handbook outlining

state-of-the-art analytical techniques used in geomicrobiology, for advanced students, researchers and professional scientists.

Encyclopedia of Geoarchaeology Allan S. Gilbert 2016-08-15 Geoarchaeology is the archaeological subfield that focuses on archaeological information retrieval and problem solving utilizing the methods of geological investigation. Archaeological recovery and analysis are already geoarchaeological in the most fundamental sense because buried remains are contained within and removed from an essentially geological context. Yet geoarchaeological research goes beyond this simple relationship and attempts to build collaborative links between specialists in archaeology and the earth sciences to produce new knowledge about past human behavior using the technical information and methods of the geosciences. The principal goals of geoarchaeology lie in understanding the relationships between humans and their environment. These goals include (1) how cultures adjust to their ecosystem through time, (2) what earth science factors were related to the evolutionary emergence of humankind, and (3) which methodological tools involving analysis of sediments and landforms, documentation and explanation of change in buried materials, and measurement of time will allow access to new aspects of the past. This encyclopedia defines terms, introduces problems, describes techniques, and discusses theory and strategy, all in a format designed to make specialized details accessible to the public as well as practitioners. It covers subjects in environmental archaeology, dating, materials analysis, and paleoecology, all of which represent different sources of specialist knowledge that must be shared in order to reconstruct, analyze, and explain the record of the human past. It will not specifically cover sites, civilizations, and ancient cultures, etc., that are better described in other encyclopedias of world archaeology. The Editor Allan S. Gilbert is Professor of Anthropology at Fordham University in the Bronx, New York. He holds a B.A. from Rutgers University, and his M.A., M.Phil., and Ph.D. were earned at Columbia University. His areas of research interest include the Near East (late prehistory and early historic periods) as well as the Middle Atlantic region of the U.S. (historical archaeology). His specializations are in archaeozoology of the Near East and geoarchaeology, especially mineralogy and compositional analysis of pottery and building materials. Publications have covered a range of subjects, including ancient pastoralism, faunal quantification, skeletal microanatomy, brick geochemistry, and two co-edited volumes on the marine geology and geoarchaeology of the Black Sea basin.

Introduction to X-Ray Powder Diffractometry Ron Jenkins 1996-07-12 When bombarded with X-rays, solid materials produce distinct scattering patterns similar to fingerprints. X-ray powder diffraction is a technique used to fingerprint solid samples, which are then identified and cataloged for future use-much the way the FBI keeps fingerprints on file. The current database of some 70,000 material prints has been put to a broad range of uses, from the analysis of moon rocks to testing drugs for purity. Introduction to X-ray Powder Diffractometry fully updates the achievements in the field over the past fifteen years and provides a much-needed explanation of the state-of-the-art techniques involved in characterizing materials. It covers the latest instruments and methods, with an emphasis on the fundamentals of the diffractometer, its components, alignment, calibration, and automation. The first three chapters outline diffraction theory in clear language, accessible to both students and professionals in chemistry, physics, geology, and materials science. The book's middle chapters describe the instrumentation and procedures used in X-ray diffraction, including X-ray sources, X-ray detection, and production of monochromatic radiation. The chapter devoted to instrument design and calibration is followed by an examination of specimen preparation methods, data collection, and reduction. The final two chapters provide in-depth discussions of qualitative and quantitative analysis. While the material is presented in an orderly progression, beginning with basic concepts and moving on to more complex material, each chapter stands on its own and can be studied independently or used as a professional reference. More than 230 illustrations and tables demonstrate techniques and clarify complex material. Self-contained, timely, and

user-friendly, Introduction to X-ray Powder Diffractometry is an enormously useful text and professional reference for analytical chemists, physicists, geologists and materials scientists, and upper-level undergraduate and graduate students in materials science and analytical chemistry. X-ray powder diffraction-a technique that has matured significantly in recent years-is used to identify solid samples and determine their composition by analyzing the so-called "fingerprints" they generate when X-rayed. This unique volume fulfills two major roles: it is the first textbook devoted solely to X-ray powder diffractometry, and the first up-to-date treatment of the subject in 20 years. This timely, authoritative volume features: * Clear, concise descriptions of both theory and practice-including fundamentals of diffraction theory and all aspects of the diffractometer * A treatment that reflects current trends toward automation, covering the newest instrumentation and automation techniques * Coverage of all the most common applications, with special emphasis on qualitative and quantitative analysis * An accessible presentation appropriate for both students and professionals * More than 230 tables and illustrations Introduction to X-ray Powder Diffractometry, a collaboration between two internationally known and respected experts in the field, provides invaluable guidance to anyone using X-ray powder diffractometers and diffractometry in materials science, ceramics, the pharmaceutical industry, and elsewhere.

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.

Corrosion Mechanisms in Theory and Practice Philippe Marcus 2002-07-24 Called "a useful contribution to the current litereture on corrosion science, engineering, and technology" by Corrosion Review, this book offers real-world applications and problem-solving techniques to reduce the occurrence of pits, cracks, and deterioration in industrial, automotive, marine, and electronic structures. It details the electrochemic

Unified Theory and Practice Frank H. Chung, PhD 2020-01-20 Unified Theory and Practice: Polymer Adhesion, X-Ray Diffraction, & X-Ray Florescence By: Frank H. Chung, PhD There are seven adhesion theories scattered in the literature. Each explains adhesion strength loosely in words and figures. The unified theory of polymer adhesion derives a mathematical equation linking bond length, bond energy and bond strength (lb/in 2). It unifies and clarifies prior insights into a coherent concept. A set of guidelines is compiled on the effects of functional groups, solvent blends, pigments and filler, adhesion promotion, and the causes of adhesion loss. Due to the complex matrix effects, the quantitative XRD & XRF analyses of mixtures require calibration lines from standard, hence tedious and time-consuming. New insights reveal that both the matrix effects and calibration lines can be eliminated mathematically. A decoding formula applies to both XRD & XRF. One XRD or XRF scan quantifies the chemical elements or compounds in any mixture. The unified procedure reduces about 80% of work current practice with a precision of ± 5% or better.

Fundamentals of Crystallography Carmelo Giacovazzo 1992 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.

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.

Two-dimensional X-ray Diffraction Bob B. He 2018-06-26 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.

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Powder Diffraction R E Dinnebier 2015-11-09 Powder diffraction is a widely used scientific technique in the characterization of materials with broad application in materials science, chemistry, physics, geology, pharmacology and archaeology. Powder Diffraction: Theory and Practice provides an advanced introductory text about modern methods and applications of powder diffraction in research and industry. The authors begin with a brief overview of the basic theory of diffraction from crystals and powders. Data collection strategies are described including x-ray, neutron and electron diffraction setups using modern day apparatus including synchrotron sources. Data corrections, essential for quantitative analysis are covered before the authors conclude with a discussion of the analysis methods themselves. The information is presented in a way that facilitates understanding the information content of the data, as well as best practices for collecting and analyzing data for quantitative analysis. This long awaited book condenses the knowledge of renowned experts in the field into a single, authoritative, overview of the application of powder diffraction in modern materials research. The book contains essential theory and introductory material for students and researchers wishing to learn how to apply the frontier methods of powder diffraction

Modern Diffraction Methods E. J. Mittemeijer 2013-02-04 The role of diffraction methods for the solid-state sciences has been pivotal to determining the (micro)structure of a material. Particularly, the expanding activities in materials science have led to the development of new methods for analysis by diffraction. This book offers an authoritative overview of the new developments in the field of analysis of matter by (in particular X-ray, electron and neutron) diffraction. It is composed of chapters written by leading experts on 'modern diffraction methods'. The focus in the various chapters of this book is on the current forefront of research on and applications for diffraction methods. This unique book provides descriptions of the 'state of the art' and, at the same time, identifies avenues for future research. The book assumes only a basic knowledge of solid-state physics and allows the application of the described methods by the readers of the book (either graduate students or mature scientists).

Uniting Electron Crystallography and Powder Diffraction Ute Kolb 2012-12-20 The polycrystalline and nanocrystalline states play an increasingly important role in exploiting the properties of materials, encompassing applications as diverse as pharmaceuticals, catalysts, solar cells and energy storage. A knowledge of the three-dimensional atomic and molecular structure of materials is essential for understanding and controlling their properties, yet traditional single-crystal X-ray diffraction methods lose their power when only polycrystalline and nanocrystalline samples are available. It is here that powder diffraction and single-crystal electron diffraction techniques take over, substantially extending the range of applicability of the crystallographic principles of structure determination. This volume, a collection of teaching contributions presented at the Crystallographic Course in Erice in 2011, clearly describes the fundamentals and the state-of-the-art of powder diffraction and electron diffraction methods in materials characterisation, encompassing a diverse range of disciplines and materials stretching from archeometry to zeolites. As such, it is a comprehensive and valuable resource for those wishing to gain an understanding of the broad applicability of these two rapidly developing fields.