The Theory of Crystal Structure Analysis

X-Ray Diffraction S. K. Chatterjee 2010-09-27 Designed for the undergraduate and postgraduate students of physics, materials science and metallurgical engineering, this text explains the theory of X-ray diffraction starting from an electron diffraction by that to an atom, and crystal, and finally ending with a diffraction by a conglomeration of atoms either in the single crystal or in the polycrystal.

The application of the methods of diffraction of crystals to the study of the molecular structure of chemical compounds was developed by the famous Russian scientists of the twenties and thirties of the last century, A. I. Kitaigorodskii and B. K. Vainshtein. These methods have found wide application in chemistry, biology, and physics, and their study is important and necessary for all scientists in these fields.

The work is intended for students, teachers, and chemists, physicists, and biologists interested in the determination of the molecular structure of chemical compounds by the method of X-ray and electron diffraction.

Theory of Crystal Structure Analysis

The Theory of Crystal Structure Analysis: K. Itaigorodskii 2012-05-04 Structure analysis is based on the phenomena of the diffraction of X-rays by crystals. In the first ten to twenty years after Laue's discovery, a very small number of scientists worked on X-ray diffraction analysis. This led to the method of comparison of the X-ray diffraction pattern to an X-ray powder pattern from a calcined sample of a mineral or a metal. The idea was to identify the unknown structure with known ones in the literature. This method was widely used and was called the powder method. It was only in the last ten years that all the rich possibilities of the methods of diffraction analysis were discovered.

The theory of crystal structure analysis-Aleksandr Isaakovich Kitaĭgorodskiĭ 1961

The Theory of Crystal Structure Analysis-Aleksandr Isaakovich Kitaĭgorodskiĭ 1961-03

Crystal structure analysis-A. I. Kitaigorodskii

Crystal Structure Analysis: A. I. Kitaigorodskii 1966

Crystal structure analysis-A. I. Kitaigorodskii

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.

Crystal Structure Analysis: Alexander J. Blake 2009-06-18

Landau Theory and Direct Methods for Crystal Structure Analysis-A. I. Kitaigorodskii

Theoretical Aspects of X-Ray Crystal Structure Analysis-Jacob Goodman 1952

Parametric X-Ray Radiation in Crystals-Vladimir G. Baryshevsky 2005-12-20 This systematic and comprehensive monograph is devoted to parametric X-ray radiation (PXR). This radiation is generated by the motion of electrical dipoles, or magnetic moments (spins). Considerable attention is devoted to the dislocation mechanisms as a basis of the theory of plasticity and numerous technological applications of crystalline materials. The book amply blends the theory with major applications of X-ray diffraction, including those of direct analysis of lattice defects by X-ray topography, orientation texture analysis, chemical analysis by diffraction as well as by fluorescence.

X-RAY DIFFRACTION S. K. CHATTERJEE 2010-09-27 Designed for the undergraduate and postgraduate students of physics, materials science and metallurgical engineering, this text explains the theory of X-ray diffraction starting from an electron diffraction by that to an atom, and crystal, and finally ending with a diffraction by a conglomeration of atoms either in the single crystal or in the polycrystal.

Ray and Crystal Structure-William Henry Bragg 1924 In writing this book I had in mind an audience of physicists and chemists with no previous exposure to the subject of crystal diffraction. It is devoted to the description of the methods of X-ray crystallography as they are applied in the study of the molecular structure of chemical compounds and in the investigation of the atomic structure of metals.

X Rays and Crystal Structure-William Henry Bragg 1924

Three-Dimensional Crystal Structures: A. M. Birman 2012-12-06 Reissue of Encyclopaedia of Physics/Sbandbuch der Physik, Vol. XXVII/2. This book is written to explain the basic concepts of crystallography, and to make it accessible to a wide audience, including students and researchers in various fields of science.

In ‘Crystal Structure Analysis for Biologists and Chemists’, the general principles of crystal structure are presented in a highly readable way. The book of Glusker, who is internationally renowned, provides good coverage of theory, including data and understanding their significance.

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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 this 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 for students of physics, chemistry, physics, and chemistry.

Crystal Structure Determination-Werner Massa 2013-03-09 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.

Modern X-Ray Analysis on Single Crystals-Peter Lager 2014-04-01 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.

Fifty Years of X-Ray Diffraction-P. P. Ewald 2012-12-06 Origin, Scope, and Plan of this Book In July 1962 the fifteenth 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, physicists, 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 and published, and by the International Union of Crystallography, which is the international organization of the National Committees of Crystallography formed in some 30 countries to repesent and advise the countries of the International Union concerning the activities in this field. In 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 of W. H. 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 of W. L. Bragg, then 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.

Structure on Different Time Scales-Theo Weiske 2018-03-05 This book presents theory and methods to study the structure of condensed matter on different time scales. The authors cover the structure analysis by X-ray diffraction methods from crystallography to amorphous materials, from static relaxed averaged structures to short-lived electronically excited structures, including detailed descriptions of the time-resolved experimental methods. Complementary, an overview of the theoretical description of condensed matter by static and time-dependent density functional theory is given, starting from the fundamental quantities that can be obtained by these methods through to the recent challenges in the description of time dependent phenomena such as optical excitations. Contents: Static structural analysis of condensed matter: from single-crystal to amorphous SPT calculations of solids in the ground state TDDFT, excitations, and spectroscopy Time-resolved structural analysis: probing condensed matter in motion Ultrafast science Fundamentals of X-ray Crystallography-Dongcai Liang 2011 FUNDAMENTALS OF X-RAY CRYSTALLOGRAPHY is based on the author's research and teaching experience over many years. Using geometric concepts and methods it systematically analyses and deduces the crystal symmetry principle and the crystal diffraction theory, establishing distinctive three-dimensional concepts which are easy to understand, grasp and apply. The whole book is divided into three parts: geometric Crystallography principles, micro-space symmetry principle and basic principle of X-ray diffraction in crystal. The first and second section carry an in-depth discussion and analysis on macro-symmetry, micro-symmetry and symmetrical composition law of crystal respectively using the principle that the symmetrical distribution of equivalent point in space is consistent space symmetry. The first two sections also systematically deduce the thirty two point groups and two hundred thirty micro-space symmetric combinations. Section three details Laue scattering equation and Prague reflection equation and describes practical use of several important single crystal diffraction methods and apparatus on the basis of mutual relations between crystal lattice and its reciprocal lattice, using reciprocal lattice and reflection mathematical model and their interaction relation. In addition, starting from the principle that reciprocal lattice point system disappearance caused by translation vector in microscopic crystal space, it states system extinction law of diffraction, and deduces one hundred twenty two micro-space groups. This book lays the foundation for study of crystallography, crystal structure analysis and protein crystallography. It is a must-have for undergraduate and postgraduate students and a very good reference for researchers engaged in relevant studies.

Incommensurate Crystallography-Sander van Smaalen 2007-06-07 For many years it was believed that translational symmetry would be the fundamental property of crystal structures of natural and synthetic compounds. It is now recognized that many compounds crystallize without translational symmetry of their atomic structures. "Incommensurate Crystallography" gives a comprehensive account of the superspace theory for the description of crystal structures and symmetries of these incommensurately modulated crystals and incommensurate composites crystals. It thus provides the necessary background for quantitative analysis of incommensurate crystals by methods in Solid State Chemistry and Solid State Physics. The second half of "Incommensurate Crystallography" is devoted to crystallographic methods of structural analysis of incommensurate compounds. Thorough accounts are given of the diffraction by incommensurate crystals, the choice of parameters in structure refinements, and the use of superspace in analysing crystal structures. The presentation of methods of structure determination include modern methods like the Maximum Entropy Method and Charge Flipping;

Crystal Structure Analysis-Jenny Pickworth Glusker 2010-05-27 The purpose of this book is to explain why molecular structure can be determined by single-crystal diffraction of X-rays. It is not an account of the practical procedures, but rather an account of the underlying physical principles, and the kinds of experiments and methods of handling the experimental data that are used. X-Ray and Neutron Structure Analysis in Materials Science-J. Hasek 2011-10-17 During the last few decades, crystallography has become a wide and economically important field of science with many interesting applications in materials research, in different branches of physics, chemistry, geology, pharmacology, biochemistry, electronics, in many technological processes, machinery, heavy industry, etc. Twenty Nobel prizes awarded for achievements belonging to this field only underline its importance. Crystallography has become a commonly used term, but, like a whale - it is much easier to recognize than to describe because of an extreme diversity of sub-jjects involved which range from highly sophisticated theories to the development of routine technological processes or testing of materials in production. It is apparent that only some aspects of selected topics could be included on a single occasion. The conference "ADVANCED METHODS IN X-RAY AND NEUTRON STRUCTURE ANALYSIS OF MATERIALS" held in Karlovy Vary (Czechoslovakia) on October 5-9, 1987, was intended to cover the most important crystallographic aspects of materials science. The conference was attended by 250 people from 16 countries (Bulgaria, Bulgaria, China, Czechoslovakia, Finland, France, FRG, GDR, Hungary, Italy, The Netherlands, Poland, Sweden, USA, USSR and Yugoslavia).

Theory Of Crystal Structure Analysis

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