The Chemistry Of Imperfect Crystals

The Chemistry of Imperfect Crystals-Ferdinand Anne Kröger 1964
The Chemistry of Imperfect Crystals: Preparation, purification, crystal growth and phase theory-Ferdinand Anne Kröger 1973
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Crystal Growth Bibliography-A. M. Keesee 2012-11-17 Coverage This bibliography of over 5000 references is restricted to the crystal growth of inorganic materials and is largely drawn from the literature collection of the Research Materials Information Center, although other sources were used in the attempt to attain (an always unattainable) completeness. It includes theoretical, review, and experimental, or "recipe," papers, technical reports, and books. The period covered is from 1972 through 1977, with several hundred more recent and earlier references, for var ious reasons, added. (I nformation on specific materials not I isted may be requested from R M C.) I The coverage of epitaxy presented a problem, since authors do not always make it clear whether or not the epitaxial growth described resulted in single or polycrystalline structures. Papers are of course included where single crystallinity was claimed or illustrated by a definite electron diffraction pattern. Stated attempts to grow single crystals, even when failures, are included. As for the many where a decision could not be made, exclusion was the general rule. Theoretical and review papers are included. Two books, ofthe many good books on crystal growth, are essential complements to this bibliography: The Chemistry of Imperfect Crystals, 2nd Revised Edition. Volume 1, Preparation, Purification, Crystal Growth and Phase Theory Kroger, F. A. North-Holland Publishing Company, Amsterdam-London; American Elsevier Publishing Company, Inc. , New York (1973) (Includes an extensive

tabulation of crystals grown by a variety of methods, with over 1100 references for the table alone.) Crystal Growth Wilke, K. -T. X-Ray Diffraction-A. Guinier 2013-01-17 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.

Preparation and Crystal Growth of Materials with Layered Structures-R.M.A. Lieth 2013-06-29 The goal of the series Physics and Chemistry of Materials with Layered Structures is to give a critical survey of our present knowledge on a large family of materials which can be described as solids containing molecules which in two dimensions extend to infinity and which are loosely stacked on top of each other to form three dimensional crystals. Of course, the physics and chemistry of these crystals are specific chapters in ordinary solid state science, and many a scientist hunting for new phenomena has in the past been disappointed to find that materials with layered structures are not entirely exotic. Their electron and phonon states are not two dimensional, and the high hopes held by some for spectacular dimensionality effects in superconductivity were shattered. Nevertheless, the structural features and their physical and chemical consequences singularize layered structures sufficiently to make them a fascinating subject of research. This is all the more true since they are met in insulators and semiconductors as well as in normal and superconducting metals. Although for the time being the series is intentionally limited to cover inorganic materials only, the many known organic layered structures may well be the subject of future volumes. Among the noteworthy peculiarities of layered structures, we mention specific growth mechanisms and crystal habits. Polytypism is very common and it is fasci nating indeed to find up to 240 different polytypes in the same chemical substance.

Defects and Transport in Oxides-Robert Jaffee 2013-05-16

DEFECTS AND TRANSPORT IN OXIDES is the proceedings of the eighth Battelle Colloquium in the Materials Sciences, held in Columbus and Salt Fork, Ohio, September 17-22, 1973. It took as its theme the relationship between defects and transport of both mass and charge in oxides. Applications of defect-controlled transport to a number of important processes in oxides also were covered. In selecting this topic, the Organizing Committee thought that 1973 was timely to bring together the leading theoretical and experimental researchers in the oxide transport field to review its status in a critical way, and to consider current major research directions and how research in the future might be guided into fruitful areas. The meeting was highlighted by the presentation of several papers which suggest that major advances in our understanding of transport in oxides appear to be imminent. These papers dealt with the results of new theoretical approaches whereby the energies and configurations of defects may be calculated, and with new experimental techniques for indirectly observing these defects, previously thought to be below the limits of experimental resolving power. Other papers, dealing with the application of defect chemistry to technological processes, served to demonstrate the successes and to point out yet unresolved problems associated with ix x PREFACE understanding the chemistry of imperfect crystals.

Solid State Chemistry and Its Applications-Anthony R. West 1991-01-08 The first broad account offering a non-mathematical, unified treatment of solid state chemistry. Describes synthetic methods, X-ray diffraction, principles of inorganic crystal structures, crystal chemistry and bonding in solids; phase diagrams of 1, 2 and 3 component systems; the electrical, magnetic, and optical properties of solids; three groups of industrially important inorganic solids--glass, cement, and refractories; and certain aspects of organic solid state chemistry, including the ``organic metal'' of new materials.

Crystallography and Crystal Chemistry of Materials with Layered

Structures-F.A. Lévy 2012-12-06 In the last ten years, the chemistry and physics of materials with layered structures became an intensively investigated field in the study of the solid state. Research into physical properties of these crystals and especially investigations of their physical anisotropy related to the structural anisotropy has led to remarkable and perplexing results. Most of the layered materials exist in several polytypic modifications and can include stacking faults. The crystal structures are therefore complex and it became apparent that there was a great need for a review of the crystallographic data of materials approximating two-dimensional solids. This second volume in the series 'Physics and Chemistry of Materials with Layered Structures' has been written by specialists of different classes of layered materials. Structural data are reviewed and the most important relations between the structure and the chemical and physical properties are emphasized. The first three contributions are devoted to the transition metal dichalcogenides whose physical properties have been investigated in detail. The crystallographic data and crystal growth conditions are presented in the first paper. The second paper constitutes an incisive review of the phase transformations and charge density waves which have been observed in the metallic dichalcogenides. In two contributions the layered structures of newer ternary compounds are de scribed and the connection between structure and non-stoichiometry is discussed.

Fundamentals of Crystal Chemistry-T. R. N. Kutty 2001-07

Electrochemistry of Solids-Hans Rickert 2012-12-06 This book is the completely revised and extended version of the German edition "Einfiihrung in die Elektrochemie fester Stoffe" which appeared in 1973. Since then, the subject of the electro chemistry of solids has developed further and a large number of new solid electrolytes have been discovered. With the help of solid electrolytes, i. e. solid ionic conductors, galvanic cells are constantly being built for thermodynamic or kinetic investigations

and for technical applications. Though the book takes these new develop ments into consideration, its main aim is to provide an introduction to the electrochemistry of solids, emphasizing the principles of the subject but not attempting to present a complete account of the existing literature. The latter can be found in handbooks and specialists' reports of conferences in this field; these are referred to in the text. This book is written for scientists and graduate stu dents who require an approach that will familiarize them with this field. It is assumed that the reader will be acquainted with the fundamentals of physical chemistry. The various chapters have been written so that most of them can be read independently of each other. Parts which may be omitted during a first reading are printed in small type. Of vital importance for the publication of this English edition have been the comments, suggestions and the help of colleagues and co-workers. I would particularly like to express my thanks to Dr. Holzapfel, Dl'. Lohmar, Professor Mitchell, Dr.

Fundamentals of Crystal Growth I-Franz E. Rosenberger 2012-12-06 The intrinsic properties of a solid, i. e. , the properties that result from its specific structure, can be largely modified by crystallographic and chem ical defects. The formation of these defects is governed by the heat and mass transfer conditions which prevail on and near a crystal-nutrient in terface during crystallization. Hence, both the growth of highly perfect crystals and the preparation of samples having predetermined defect-induced (extrinsic) properties require a thorough understanding of the reaction and transport mechanisms that govern crystallization from vapors, solutions and melts. Crystal growth, as a science, is therefore mostly concerned with the chemistry and physics of heat and mass transport in these fluid-solid phase transitions. Solid-solid transitions are, at this time, not widely employed for high quality single-crystal production. Transport concepts are largely built upon equilibrium considerations, i. e. , on thermodynamic and phase equilibrium concepts. Hence to

supply a "workable" foundation for the succeeding discussions, this text begins in Chapter 2 with a concise treatment of thermodynamics which emphasizes applications to mate rials preparation. After working through this chapter, the reader should feel at ease with often (particularly among physicists) unfamiliar entities such as chemical potentials, fugacities, activities. etc. Special sections on ther mochemical calculations (and their pitfalls) and compilations of thermochemi cal data conclude the second chapter. Crystal growth can be called. in a wide sense, the science and technology of controlling phase transitions that lead to (single crystalline) solids.

Defects and Transport in Oxides-Martin S. Seltzer 1974-10

DEFECTS AND TRANSPORT IN OXIDES is the proceedings of the eighth Battelle Colloquium in the Materials Sciences, held in Columbus and Salt Fork, Ohio, September 17-22, 1973. It took as its theme the relationship between defects and transport of both mass and charge in oxides. Applications of defect-controlled transport to a number of important processes in oxides also were covered. In selecting this topic, the Organizing Committee thought that 1973 was timely to bring together the leading theoretical and experimental researchers in the oxide transport field to review its status in a critical way, and to consider current major research directions and how research in the future might be guided into fruitful areas. The meeting was highlighted by the presentation of several papers which suggest that major advances in our understanding of transport in oxides appear to be imminent. These papers dealt with the results of new theoretical approaches whereby the energies and configurations of defects may be calculated, and with new experimental techniques for indirectly observing these defects, previously thought to be below the limits of experimental resolving power. Other papers, dealing with the application of defect chemistry to technological processes, served to demonstrate the successes and to point out yet unresolved problems associated with ix x PREFACE

understanding the chemistry of imperfect crystals.
TEXTBOOK OF PHYSICAL CHEMISTRY-H. K. MOUDGIL 2014-10-21 This comprehensive textbook, now in its second edition, is mainly written as per the latest syllabi of physical chemistry of all the leading universities of India as well as the new syllabus recommended by the UGC. This thoroughly revised and updated edition covers the principal areas of physical chemistry, such as thermodynamics, quantum chemistry, molecular spectroscopy, chemical kinetics, electrochemistry and nanotechnology. In a methodical and accessible style, the book discusses classical, irreversible and statistical thermodynamics and statistical mechanics, and describes macroscopic chemical systems, steady states and thermodynamics at a molecular level. It elaborates the underlying principles of quantum mechanics, molecular spectroscopy, X-ray crystallography and solid state chemistry along with their applications. The book explains various instrumentation techniques such as potentiometry, polarography, voltammetry, conductometry and coulometry. It also describes kinetics, rate laws and chemical processes at the electrodes. In addition, the text deals with chemistry of corrosion and nanomaterials. This text is primarily designed for the undergraduate and postgraduate students of chemistry (B.Sc. and M.Sc.) for their course in physical chemistry. Key Features • Gives a thorough treatment to ensure a solid grasp of the material. • Presents a large number of figures and diagrams that help amplify key concepts. • Contains several worked-out examples for better understanding of the subject matter. • Provides numerous chapter-end exercises to foster conceptual understanding.
Engineering Crystallography: From Molecule to Crystal to Functional Form-Kevin J. Roberts 2017-07-18 This book highlights the current state-of-the-art regarding the application of applied crystallographic methodologies for understanding, predicting and controlling the transformation from the molecular to crystalline

state with the latter exhibiting pre-defined properties. This philosophy is built around the fundamental principles underpinning the three inter-connected themes of Form (what), Formation (how) and Function (why). Topics covered include: molecular and crystal structure, chirality and ferromagnetism, supramolecular assembly, defects and reactivity, morphology and surface energetics. Approaches for preparing crystals and nano-crystals with novel physical, chemical and mechanical properties include: crystallisation, seeding, phase diagrams, polymorphic control, chiral separation, ultrasonic techniques and mechano-chemistry. The vision is realised through examination of a range of advanced analytical characterisation techniques including in-situ studies. The work is underpinned through an unprecedented structural perspective of molecular features, solid-state packing arrangements and surface energetics as well as in-situ studies. This work will be of interest to researchers, industrialists, intellectual property specialists and policy makers interested in the latest developments in the design and supply of advanced high added-value organic solid-form materials and product composites.

Treatise on Solid State Chemistry-N. Hannay 2012-12-06 The last quarter-century has been marked by the extremely rapid growth of the solid-state sciences. They include what is now the largest subfield of physics, and the materials engineering sciences have likewise flourished. And, playing an active role throughout this vast area of science and engineer ing have been very large numbers of chemists. Yet, even though the role of chemistry in the solid-state sciences has been a vital one and the solid-state sciences have, in turn, made enormous contributions to chemical thought, solid-state chemistry has not been recognized by the general body of chemists as a major subfield of chemistry. Solid-state chemistry is not even well defined as to content. Some, for example, would have it include only the quantum chemistry of solids and would reject thermodynamics and phase equilibria; this

is nonsense. Solid-state chemistry has many facets, and one of the purposes of this Treatise is to help define the field. Perhaps the most general characteristic of solid-state chemistry, and one which helps differentiate it from solid-state physics, is its focus on the chemical composition and atomic configuration of real solids and on the relationship of composition and structure to the chemical and physical properties of the solid. Real solids are usually extremely complex and exhibit almost infinite variety in their compositional and structural features.

Bulletin of the Chemical Society- 1969

Modern Aspects of Solid State Chemistry-C.N.R. Rao 2012-12-06 The three natural streams of present-day chemistry are Structure, Dynamics and Synthesis and all these three elements are essential for the study of materials, particularly in the solid state. The solid state provides challenging opportunities for illustrating and applying principles of chemistry to systems of academic interest and technological importance. There are several practising solid state chemists in universities and research laboratories, but the subject has not yet become part of the formal training program in chemistry. Being one of the new frontiers of chemistry, Solid State Chemistry has a tremendous future and undoubtedly demands the active involvement of many more chemists. A Winter School in Solid State Chemistry was organized at the Indian Institute of Technology, Kanpur, to promote this area and to develop curricular material. Solid State Chemistry being lighly interdisciplinary in nature, the lecturers and participants at the Winter School had widely different backgrounds and interests. It was my great desire that the lecture material from the Winter School should become available to a larger body of students, teachers and research workers interested in the solid state and hence this volume.

Thermodynamic Basis of Crystal Growth-Jacob Greenberg 2013-03-09 This book presents a new and promising technique to grow single crystalline compound semiconductor materials with

defined stoichometry. The technique is based on the high-precision experimental determination of the boundaries of the single-phase volume of the solid in the pressure-temperature-composition P-T-X phase space. Alongside test results obtained by the author and his colleagues, the P-T-X diagrams of other important materials (e.g., III-V, V-VI semiconductors) are also discussed.

Handbook of Solid State Electrochemistry-P. J. Gellings 2019-04-24 The Handbook of Solid State Electrochemistry is a one-stop resource treating the two main areas of solid state electrochemistry: electrochemical properties of solids such as oxides, halides, and cation conductors; and electrochemical kinetics and mechanisms of reactions occurring on solid electrolytes, including gas-phase electrocatalysis. The fund

Sintering-Suk-Joong L. Kang 2004-11-27 Sintering is the process of forming materials and components from a powder under the action of thermal energy. It is a key materials science subject: most ceramic materials and many specialist metal powder products for use in key industries such as electronics, automotive and aerospace are formed this way. Written by one of the leading experts in the field, this book offers an unrivalled introduction to sintering and sintering processes for students of materials science and engineering, and practicing engineers in industry. The book is unique in providing a complete grounding in the principles of sintering and equal coverage of the three key sintering processes: densification, grain growth and microstructure. Students and professional engineers alike will be attracted by the emphasis on developing a detailed understanding of the theory and practical processes of sintering, the balanced coverage of ceramic and metal sintering, and the accompanying examination questions with selected solutions. Delivering unrivalled depth of coverage on the basis of sintering, science, including thermodynamics and polycrystalline microstructure. Unique in its balanced coverage of the three key sintering

elements - densification, grain growth and microstructure. A key reference for students and engineers in materials science and engineering, accompanied by examination questions and selected solutions.

Materials Science for Structural Geology-Mervyn S. Paterson 2012-11-28 This book sets out the basic materials science needed for understanding the plastic deformation of rocks and minerals. Although at atmospheric pressure or at relatively low environmental pressures, these materials tend to be brittle, that is, to fracture with little prior plastic deformation when non-hydrostatically stressed, they can undergo substantial permanent strain when stressed under environmental conditions of high confining pressure and high temperature, such as occur geologically in the Earth's crust and upper mantle. Thus the plastic deformation of rocks and minerals is of fundamental interest in structural geology and geodynamics. In mountain-building processes and during convective stirring in the Earth's mantle, rocks can undergo very large amounts of plastic flow, accompanied by substantial changes in microstructure. These changes in microstructure remain in the rocks as evidence of the past deformation history. There are a number of types of physical processes whereby rock and minerals can undergo deformation under geological conditions. The physics of these processes is set out in this book.

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