Electron Microscopy Of Thin Crystals

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Electron Microscopy Of Thin Crystals ***2023-09-23***

GRETCHEN MARISA

Advanced Transmission Electron Microscopy Springer
This volume expands and updates the coverage in the authors' popular 1992 book, Electron Microdiffraction. As the title implies, the focus of the book has changed from electron microdiffraction and convergent beam electron diffraction to all forms of advanced transmission electron microscopy. Special attention is given to electron diffraction and imaging, including high-resolution TEM and STEM imaging, and the application of these methods to crystals, their defects, and nanostructures. The authoritative text summarizes and develops most of the useful knowledge which has been gained over the years from the study of the multiple electron scattering problem, the recent development of aberration correctors and their applications to materials structure characterization, as well as the authors' extensive teaching experience in these areas. Advanced Transmission Electron Microscopy: Imaging and Diffraction in Nanoscience is ideal for use as an advanced undergraduate or graduate level text in support of course materials in Materials Science, Physics or Chemistry departments.
Structural refinement of single crystals using digital-large angle convergent beam electron diffraction Academic Press
Metallurgical Microscopy provides the general principles, methods, and techniques in metallurgical microscopy. The book initially provides the techniques for specimen preparation for macroscopic and microscopic examination. Subsequent chapters are devoted to the discussion of light-optical microscopy and photography, interferometry and contrast-raising methods, and microhardness measurement. Topics on high-temperature microscopy, a brief review of the electron microprobe and its applications, and the construction, properties and applications of the electron microscope are presented as well. Metallurgists and materials scientists will find the book very informative and useful.
Electron Microscopy Investigation of Silicon-on-insulator Structures Formed by Selective Epitaxial Growth of Silicon and Epitaxial Lateral Overgrowth of Oxide Macmillan International Higher Education
to the Second Edition Since the first (1986) edition of this book, the numbers of installations, researchers, and research publications devoted to electron energy-loss spec troscopy (EELS) in the electron microscope have continued to expand. There has been a trend towards intermediate accelerating voltages and field-emission sources, both favorable to energy-loss spectroscopy, and sev eral types of energy-filtering microscope are now available commercially. Data-acquisition hardware and software, based on personal computers, have become more convenient and user-friendly. Among university re searchers, much thought has been given to the interpretation and utilization of near-edge fine structure. Most importantly, there have been many practi cal applications of EELS. This may reflect an increased awareness of the potentialities of the technique, but in many cases it is the result of skill and persistence on the part of the experimenters, often graduate students. To take account of these developments, the book has been extensively revised (over a period of two years) and more than a third of it rewritten. I have made various minor changes to the figures and added about 80 new ones. Except for a few small changes, the notation is the same as in the first edition, with all equations in SI units.
Transmission Electron Microscopy Characterization of ZnO Thin Films and Bulk Single Crystals Krieger Publishing Company
As a complement to The Beginnings of Electron Microscopy, Advances in Imaging and Electron Physics is pleased to present Volume 96, The Growth of Electron Microscopy. This comprehensive collection of articles surveys the accomplishments of various national groups that comprise the International Federation of Societies of Electron Microscopy (IFSEM).
Domains in Ferroic Crystals and Thin Films John Wiley & Sons
Volume 27 of Reviews in Mineralogy provides a background to the TEM as a mineralogical tool, to give an introduction to the principles underlying its operation, and to explore mineralogical applications and ways in which electron microscopy can augment our knowledge of mineral structures, chemistry, and origin. Much time will be devoted to mineralogical applications. It provides sufficient information to allow mineralogists and petrologists to have an informed understanding of the data produced by transmission electron microscopy and to have enough knowledge and experience to undertake initial studies on their own. The opening chapters cover the principles of electron microscopy and chemical analysis using the TEM; while the following chapters consider mineralogical, petrological, and geochemical applications and their implications, for both low- and high-temperature geological environments. The Mineralogical Society of America sponsored a short courses in conjunction with their annual meetings with the Geological Society of America, and this volume represents the proceedings of the eighteenth in the sequence. This TEM course was convened October 23-25, 1992, at Hueston Woods State Park, College Comer, Ohio.
Advanced Scanning Electron Microscopy and X-Ray Microanalysis Macmillan International Higher Education
We explore the capability of digital-large angle convergent beam electron diffraction (D-LACBED) data for the structural refinement of single crystals. To achieve this, we use three materials as test cases. We use corundum for atomic position refi nement, copper and gallium arsenide for Debye-Waller factor (DWF) re finement. D-LACBED patterns are found to be extremely sensitive to atomic position, within 0.4 pm of reference X-ray values. The patterns are less sensitive to DWF (using the independent atom model - IAM) but nonetheless give good agreement to X-ray and Mossbauer radiation values for copper. We nd the IAM to be insufficient for accurate refinement of gallium arsenide due to the influence of previously suggested strong anharmonicity and bonding within the material. Finally, we use simulation to explore the sensitivity of D-LACBED patterns through most re fineable structural parameters, providing context to the aforementioned results. During the analysis we see that higher g-vector patterns within the D-LACBED data may be more sensitive to structural parameters in general.
The Growth of Electron Microscopy Oxford University Press
This groundbreaking text has been established as the market leader throughout the world. Profusely illustrated, the book provides the necessary instructions for successful hands-on application of this versatile materials characterization technique.
State of the Art and Strategies for the Future Springer
An up-to-date edition of the indispensable guide to electron microscopy and analysis.
Electron Microscopy of Thin Crystals, by P. B. Hirsch [and Others]. Springer Science & Business Media
This book is a practical guide to electron diffraction in the transmission electron microscope (TEM). Case studies and examples are used to provide an invaluable introduction to the subject for those new to the technique. The book explains the basic methods used to obtain diffraction patterns with the TEM. The numerous illustrations aid the understanding of the conclusions reached.
Metallurgical Microscopy Cambridge University Press
This book provides an introduction to the fundamental concepts, techniques, and methods used for electron microscopy at high resolution in space, energy, and even in time. It delineates the theory of elastic scattering, which is most useful for spectroscopic and chemical analyses. There are also discussions of the theory and practice of image calculations, and applications of HRTEM to the study of solid surfaces, highly disordered materials, solid state chemistry, mineralogy, semiconductors and metals. Contributors include J. Cowley, J. Spence, P. Buseck, P. Self, and M.A. O'Keefe. Compiled by experts in the fields of geology, physics and chemistry, this comprehensive text will be the standard reference for years to come.
Electron Microscopy of Thin Crystals OUP Oxford
Revision of: Experimental high-resolution electron microscopy. 2nd ed. 1988.
Electron Microscopy of Thin Crystals. By P.B. Hirsch [and Others], Etc. [Based on the Lectures Given at the Summer School of the Institute of Physics and the Physical Society, Held in Cambridge, July 1963. With Illustrations.]. Cambridge University Press
This book covers the fundamentals of conventional transmission electron microscopy (CTEM) as applied to crystalline solids. In addition to including a large selection of worked examples and homework problems, the volume is accompanied by a supplementary website (http://ctem.web.cmu.edu/) containing interactive modules and over 30,000 lines of free Fortran 90 source code. The work is based on a lecture course given by Marc De Graef in the Department of Materials Science and Engineering at Carnegie Mellon University.
Electron Microscopy of Thin Crystals Academic Press
The Beginnings of Electron Microscopy presents the technical development of electron microscope. This book examines the mechanical as well as the technical problems arising from the physical properties of the electron. Organized into 19 chapters, this book begins with an overview of the history of scanning electron microscopy and electron beam microanalysis. This text then explains the applications and capabilities of electron microscopes during the war. Other chapters consider the classical techniques of light microscopy. This book presents as well the schematic outline of the preparation techniques for investigation of nerve cells by electron microscopy. The final chapter deals with the historical account of the beginnings of electron microscopy in Russia. This book is a valuable resource for scientists, technologists, physicists, electrical engineers, designers, and technicians. Graduate students as well as researcher workers who are interested in the history of electron microscopy will also find this book extremely useful.
Electron Microscopy of Thin Crystals Springer Science & Business Media
The aim of this book is to outline the physics of image formation, electron specimen interactions and image interpretation in transmission electron mic roscopy. The book evolved from lectures delivered at the University of Munster and is a revised version of the first part of my earlier book Elek tronenmikroskopische Untersuchungs- und Priiparationsmethoden, omitting the part which describes specimen-preparation methods. In the introductory chapter, the different types of electron microscope are compared, the various electron-specimen interactions and their applications are summarized and the most important aspects of high-resolution, analytical and high-voltage electron microscopy are discussed. The optics of electron lenses is discussed in Chapter 2 in order to bring out electron-lens properties that are important for an understanding of the function of an electron microscope. In Chapter 3, the wave optics of elec trons and the phase shifts by electrostatic and magnetic fields are introduced; Fresnel electron diffraction is treated using Huygens' principle. The recogni tion that the Fraunhofer-diffraction pattern is the Fourier transform of the wave amplitude behind a specimen is important because the influence of the imaging process on the contrast transfer of spatial frequencies can be described by introducing phase shifts and envelopes in the Fourier plane. In Chapter 4, the elements of an electron-optical column are described: the electron gun, the condenser and the imaging system. A thorough understanding of electron-specimen interactions is essential to explain image contrast.
and Associated Techniques ASTM International
Adopting a didactical approach from fundamentals to actual experiments and applications, this handbook and ready reference covers real-time observations using modern scanning electron microscopy and transmission electron microscopy, while also providing information on the required stages and samples. The text begins with introductory material and the basics, before describing advancements and applications in dynamic transmission electron microscopy and reflection electron microscopy. Subsequently, the techniques needed to determine growth processes, chemical reactions and oxidation, irradiation effects, mechanical, magnetic, and ferroelectric properties as well as cathodoluminiscence and electromigration are discussed.
Electron Diffraction in the Electron Microscope Springer Science & Business Media
The discovery of the Nanotube in 1991 by electron microscopy has ushered in the era of Nanoscience. The atomic-resolution electron microscope has been a crucial tool in this effort. This book gives the basic theoretical background needed to understand how electron microscopes allow us to see atoms, together with highly practical advice for electron microscope operators. The book covers the usefulness of seeing atoms in the semiconductor industry, in materials science (where scientists strive to make new lighter,stronger, cheaper materials), and condensed matter physics (for example in the study of the new superconductors). Biologists have recently used the atomic-resolution electron microscope to obtain three-dimensional images of the Ribosome, work which is covered in this book. The books also shows how the ability to see atomic arrangements has helped us understand the properties of matter. This new third edition of the standard text retains the early section of the fundamentals of electron optics, linear imaging theory with partial coherence and multiple-scattering theory. Also preserved are updated earlier sections on practical methods, with detailed step-by-step accounts of the procedures needed to obtain the highest quality images of the arrangement of atoms in thin crystals using a modern electron microscope. The sections on applications of atomic resolution transmission electron microscopy (HREM) have been extensively

updated, including descriptions of HREM in the semiconductor industry, superconductor research, solid state chemistry and nanoscience, as well as metallurgy, mineralogy, condensed matter physics, materials science and biology. Entirely new sections have been added on electron holography , aberration correctors, field-emission guns, imaging filters, HREM in biology an don organic crystals,super-resolution methods, Ptychography, CCD cameras and Image plates. New chapters are devoted entirely to scanning transmission electron microscopy and Z-contrast, and also to associated techniques, such as energy-loss spectrocospy, Alchemi, nanodiffraction and cathodoluminescence. Sources of software for image interpretation and electron-optical design are also given.

Electron Microscopy of Thin Crystals Springer Science & Business Media

Electron Microscopy of Thin CrystalsKrieger Publishing CompanyElectron Microscopy of Thin CrystalsElectron Microscopy of Thin CrystalsBy P.B. Hirsch And OthersElectron Microscopy of Thin Crystals 4. ImprElectron microscopy of thin crystalsElectron Microscopy of Thin CrystalsElectron Microscopy of Thin Crystals, by P. B. Hirsch [and Others].Electron Microscopy of Thin CrystalsElectron Microscopy of Thin Crystals. By P.B. Hirsch [and Others], Etc. [Based on the Lectures Given at the Summer School of the Institute of Physics and the Physical Society, Held in Cambridge, July 1963. With Illustrations.].ELECTRON MICROSCOPY OF THIN CRYSTALS- LECTURES GIVEN AT A SUMMER SCHOOL- INSTITUTE OF PHYSICS AND THE PHYSICAL SOCIETY.The Growth of Electron MicroscopyAcademic Press

High Resolution Electron Microscopy of Thin Protein Crystals Springer Nature

This updated and revised edition of a classic work provides a summary of methods for numerical computation of high resolution conventional and scanning transmission electron microscope images. At the limits of resolution, image artifacts due to the instrument and the specimen interaction can complicate image interpretation. Image calculations can help the user to interpret and understand high resolution information in recorded electron micrographs. The book contains expanded sections on aberration correction, including a detailed discussion of higher order (multipole) aberrations and their effect on high resolution imaging, new imaging modes such as ABF (annular bright field), and the latest developments in parallel processing using GPUs (graphic processing units), as well as updated references. Beginning and experienced users at the advanced undergraduate or graduate level will find the book to be a unique and essential guide to the theory and methods of computation in electron microscopy.

Advanced Computing in Electron Microscopy University of Warwick

This book has its origins in the intensive short courses on scanning elec tron microscopy and x-ray microanalysis which have been taught annually at Lehigh University since 1972. In order to provide a textbook containing the materials presented in the original course, the lecturers collaborated to write the book Practical Scanning Electron Microscopy (PSEM), which was published by Plenum Press in 1975. The course con tinued to evolve and expand in the ensuing years, until the volume of material to be covered necessitated the development of separate intro ductory and advanced courses. In 1981 the lecturers undertook the project of rewriting the original textbook, producing the volume Scan ning Electron Microscopy and X-Ray Microanalysis (SEMXM). This vol ume contained substantial expansions of the treatment of such basic material as electron optics, image formation, energy-dispersive x-ray spectrometry, and qualitative and quantitative analysis. At the same time, a number of chapters, which had been included in the PSEM vol ume, including those on magnetic contrast and electron channeling con trast, had to be dropped for reasons of space. Moreover, these topics had naturally evolved into the basis of the advanced course. In addition, the evolution of the SEM and microanalysis fields had resulted in the devel opment of new topics, such as digital image processing, which by their nature became topics in the advanced course.

Imaging and Diffraction in Nanoscience Garland Science

Reviewed is the authors research on the nucleation, growth and epitaxy of condensed gas crystals. Briefly described are observations of various epitaxial systems, computations of the material parameters needed to understand the nucleation and growth of rare gases on graphite, and the theory of nucleation of thin films.