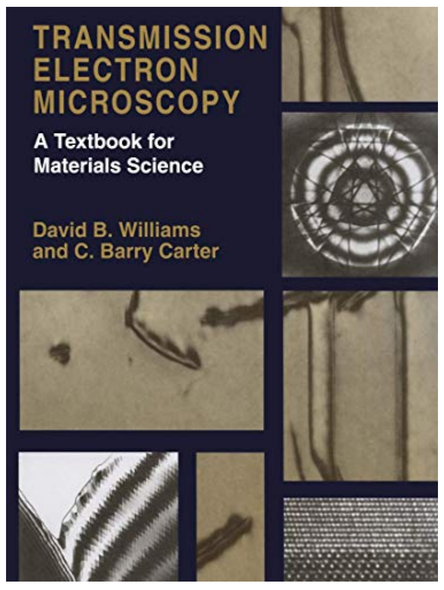

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Transmission Electron Microscopy-David B. Williams 2009-08-05 This groundbreaking text has been established as the market leader throughout the world. Profusely illustrated, the book provides the necessary instructions for successful hands-on application of this versatile materials characterization technique.

Transmission Electron Microscopy-David B. Williams 2013-03-09 Electron microscopy has revolutionized our understanding the extraordinary intellectual demands required of the mi of materials by completing the processing-structure-prop croscopist in order to do the job properly: crystallography, erties links down to atomistic levels. It now is even possible diffraction, image contrast, inelastic scattering events, and to tailor the microstructure (and meso structure) of materials spectroscopy. Remember, these used to be fields in them to achieve specific sets of properties; the extraordinary abili selves. Today, one has to understand the fundamentals ties of modem transmission electron microscopy-TEM of all of these areas before one can hope to tackle signifi instruments to provide almost all of the structural, phase, cant problems in materials science. TEM is a technique of and crystallographic data allow us to accomplish this feat. characterizing materials down to the atomic limits. It must Therefore, it is obvious that any curriculum in modem mate be used with care and attention, in many cases involving rials education must include suitable courses in electron mi teams of experts from different venues. The fundamentals croscopy. It is also essential that suitable texts be available are, of course, based in physics, so aspiring materials sci for the preparation of the students and researchers who must entists would be well advised to have prior exposure to, for carry out electron microscopy properly and quantitatively.

Transmission Electron Microscopy-C. Barry Carter 2016-08-24 This text is a companion volume to Transmission Electron Microscopy: A Textbook for Materials Science by Williams and Carter. The aim is to extend the discussion of certain topics that are either rapidly changing at this time or that would benefit from more detailed discussion than space allowed in the primary text. World-renowned researchers have contributed chapters in their area of expertise, and the editors have carefully prepared these chapters to provide a uniform tone and treatment for this exciting material. The book features an unparalleled collection of color figures showcasing the quality and variety of chemical data that can be obtained from today’s instruments, as well as key pitfalls to avoid. As with the previous TEM text, each chapter contains two sets of questions, one for self assessment and a second more suitable for homework assignments. Throughout the book, the style follows that of Williams & Carter even when the subject matter becomes challenging—the aim is always to make the topic understandable by first-year graduate students and others who are working in the field of Materials Science Topics covered include sources, in-situ experiments, electron diffraction, Digital Micrograph, waves and holography, focal-series reconstruction and direct methods, STEM and tomography, energy-filtered TEM (EFTEM) imaging, and spectrum imaging. The range and depth of material makes this companion volume essential reading for the budding microscopist and a key reference for practicing researchers using these and related techniques.

Transmission Electron Microscopy and Diffractometry of Materials-Brent Fultz 2002 Inelastic electron scattering and spectroscopy. Diffraction from crystals. Electron diffraction and crystallography.

Physical Principles of Electron Microscopy-Ray Egerton 2011-02-11 Scanning and stationary-beam electron microscopes are indispensable tools for both research and routine evaluation in materials science, the semiconductor industry, nanotechnology and the biological, forensic, and medical sciences. This book introduces current theory and practice of electron microscopy, primarily for undergraduates who need to understand how the principles of physics apply in an area of technology that has contributed greatly to our understanding of life processes and "inner space." Physical Principles of Electron Microscopy will appeal to technologists who use electron microscopes and to graduate students, university teachers and researchers who need a concise reference on the basic principles of microscopy.

Analytical Transmission Electron Microscopy-Jürgen Thomas 2014-04-17 This work is based on experiences acquired by the authors regarding often asked questions and problems during manifold education of beginners in analytical transmission electron microscopy. These experiences are summarised illustratively in this textbook. Explanations based on simple models and hints for the practical work are the focal points. This practically- oriented textbook represents a clear and comprehensible introduction for all persons who want to use a transmission electron microscope in practice but who are not specially qualified electron microscopists up to now.

Scanning Electron Microscopy and X-Ray Microanalysis-Joseph Goldstein 2012-12-06 This text provides students as well as practitioners with a comprehensive introduction to the field of scanning electron microscopy (SEM) and X-ray microanalysis. The authors emphasize the practical aspects of the techniques described. Topics discussed include user-controlled functions of scanning electron microscopes and x-ray spectrometers and the use of x-rays for qualitative and quantitative analysis. Separate chapters cover SEM sample preparation methods for hard materials, polymers, and biological specimens. In addition techniques for the elimination of charging in non-conducting specimens are detailed.

Electron Microscopy-S. Amelinckx 2008-09-26 Derived from the successful three-volume Handbook of Microscopy, this book provides a broad survey of the physical fundamentals and principles of all modern techniques of electron microscopy. This reference work on the method most often used for the characterization of surfaces offers a competent comparison of the feasibilities of the latest developments in this field of research. Topics include: * Stationary Beam Methods: Transmission Electron Microscopy/ Electron Energy Loss Spectroscopy/ Convergent Electron Beam Diffraction/ Low Energy Electron Microscopy/ Electron Holographic Methods * Scanning Beam Methods: Scanning Transmission Electron Microscopy/ Scanning Auger and XPS Microscopy/ Scanning Microanalysis/ Imaging Secondary Ion Mass Spectrometry * Magnetic Microscopy: Scanning Electron Microscopy with Polarization Analysis/ Spin Polarized Low Energy Electron Microscopy Materials scientists as well as any surface scientist will find this book an invaluable source of information for the principles of electron microscopy.

Sample Preparation Handbook for Transmission Electron Microscopy-Jeanne Ayache 2010-06-08 Successful transmission electron microscopy in all of its manifestations depends on the quality of the specimens examined. Biological specimen preparation protocols have usually been more rigorous and time consuming than those in the physical sciences. For this reason, there has been a wealth of scienti c literature detailing speci c preparation steps and numerous excellent books on the preparation of b- logical thin specimens. This does not mean to imply that physical science specimen preparation is trivial. For the most part, most physical science thin specimen pre- ration protocols can be executed in a matter of a few hours using straightforward steps. Over the years, there has been a steady stream of papers written on various aspects of preparing thin specimens from bulk materials. However, aside from s- eral seminal textbooks and a series of book compilations produced by the Material Research Society in the 1990s, no recent comprehensive books on thin specimen preparation have appeared until this present work, rst in French and now in English. Everyone knows that the data needed to solve a problem quickly are more imp- tant than ever. A modern TEM laboratory with supporting SEMs, light microscopes, analytical spectrometers, computers, and specimen preparation equipment is an investment of several million US dollars. Fifty years ago, electropolishing, chemical polishing, and replication methods were the principal specimen preparation me- ods.

Characterisation of Radiation Damage by Transmission Electron Microscopy-M.L Jenkins 2000-11-21 Characterization of Radiation Damage by Transmission Electron Microscopy details the electron microscopy methods used to investigate complex and fine-scale microstructures, such as those produced by fast-particle irradiation of metals or ion implantation of semiconductors. The book focuses on the methods used to characterize small point-defect clusters, such as dislocation loops, because the coverage in general microscopy textbooks is limited and omits many of the problems associated with the analysis of these defects. The book also describes in situ, high-resolution, and analytical techniques. Techniques are illustrated with examples, providing a solid overview of the contribution of TEM to radiation damage mechanisms. The book is most useful to researchers in, or entering into, the field of defect analysis in materials.

Scanning Transmission Electron Microscopy-Stephen J. Pennycook 2011-03-24 Scanning transmission electron microscopy has become a mainstream technique for imaging and analysis at atomic resolution and sensitivity, and the authors of this book are widely credited with bringing the field to its present popularity. Scanning Transmission Electron Microscopy(STEM): Imaging and Analysis will provide a comprehensive explanation of the theory and practice of STEM from introductory to advanced levels, covering the instrument, image formation and scattering theory, and definition and measurement of resolution for both imaging and analysis. The authors will present examples of the use of combined imaging and spectroscopy for solving materials problems in a variety of fields, including condensed matter physics, materials science, catalysis, biology, and nanoscience. Therefore this will be a comprehensive reference for those working in applied fields wishing to use the technique, for graduate students learning microscopy for the first time, and for specialists in other fields of microscopy.

Advanced Transmission Electron Microscopy-Jian Min Zuo 2016-10-26 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.

Transmission Electron Microscopy-David Bernard Williams 2009 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.

Scanning Electron Microscopy-Ludwig Reimer 2013-11-11 Scanning Electron Microscopy provides a description of the physics of electron-probe formation and of electron-specimen interactions. The different imaging and analytical modes using secondary and backscattered electrons, electron-beam-induced currents, X-ray and Auger electrons, electron channelling effects, and cathodoluminescence are discussed to evaluate specific contrasts and to obtain quantitative information.

The Transmission Electron Microscope-Khan Maaz 2015-09-02 This book The Transmission Electron Microscope abundantly illustrates necessary insight and guidance of this powerful and versatile material characterization technique with complete figures and thorough explanations. The second edition of the book presents deep understanding of new techniques from introduction to advance levels, covering in-situ transmission electron microscopy, electron and focused ion beam microscopy, and biological diagnostic through TEM. The chapters cover all major aspects of transmission electron microscopy and their uses in material characterization with special emphasis on both the theoretical and experimental aspects of modern electron microscopy techniques. It is believed that this book will provide a solid foundation of electron microscopy to the students, scientists, and engineers working in the field of material science and condensed matter physics.

Sample Preparation Handbook for Transmission Electron Microscopy-Jeanne Ayache 2010-07-03 Successful transmission electron microscopy in all of its manifestations depends on the quality of the specimens examined. Biological specimen preparation protocols have usually been more rigorous and time consuming than those in the physical sciences. For this reason, there has been a wealth of scienti?c literature detailing speci?c preparation steps and numerous excellent books on the preparation of b- logical thin specimens. This does not mean to imply that physical science specimen preparation is trivial. For the most part, most physical science thin specimen pre- ration protocols can be executed in a matter of a few hours using straightforward steps. Over the years, there has been a steady stream of papers written on various aspects of preparing thin specimens from bulk materials. However, aside from s- eral seminal textbooks and a series of book compilations produced by the Material Research Society in the 1990s, no recent comprehensive books on thin spe- men preparation have appeared until this present work, ?rst in French and now in English. Everyone knows that the data needed to solve a problem quickly are more imp- tant than ever. A modern TEM laboratory with supporting SEMs, light microscopes, analytical spectrometers, computers, and specimen preparation equipment is an investment of several million US dollars. Fifty years ago, electropolishing, chemical polishing, and replication methods were the principal specimen preparation me- ods.

Introduction to Conventional Transmission Electron Microscopy-Marc De Graef 2003-03-27 A graduate level textbook covering the fundamentals of conventional transmission electron microscopy, first published in 2003.

Diagnostic Electron Microscopy-John Stirling 2013-01-22 Diagnostic Electron Microscopy Diagnostic Electron Microscopy: A Practical Guide to Interpretation and Technique summarises the current interpretational applications of TEM in diagnostic pathology. This concise and accessible volume provides a working guide to the main, or most useful, applications of the technique including practical topics of concern to laboratory scientists, brief guides to traditional tissue and microbiological preparation techniques, microwave processing, digital imaging and measurement uncertainty. The text features both a screening and interpretational guide for TEM diagnostic applications and current TEM diagnostic tissue preparation methods pertinent to all clinical electron microscope units worldwide. Containing high-quality representative images, this up-to-date text includes detailed information on the most important diagnostic applications of transmission electron microscopy as well as instructions for specific tissues and current basic preparative techniques. The book is relevant to trainee pathologists and practising pathologists who are expected to understand and evaluate/screen tissues by TEM. In addition, technical and scientific staff involved in tissue preparation and diagnostic tissue evaluation/screening by TEM will find this text useful.

Aberration-Corrected Analytical Transmission Electron Microscopy-Rik Brydson 2011-08-02 The book is concerned with the theory, background, and practical use of transmission electron microscopes with lens correctors that can correct the effects of spherical aberration. The book also covers a comparison with aberration correction in the TEM and applications of analytical aberration corrected STEM in materials science and biology. This book is essential for microscopists involved in nanoscale and materials microanalysis especially those using scanning transmission electron microscopy, and related analytical techniques such as electron diffraction x-ray spectrometry (EDXS) and electron energy loss spectroscopy (EELS).

Biological Electron Microscopy-Michael J. Dykstra 2012-12-06 In this practical text, the author covers the fundamentals of biological electron microscopy - including fixation, instrumentation, and darkroom work - to provide an excellent introduction to the subject for the advanced undergraduate or graduate student.

Materials Characterization-Yang Leng 2009-03-04 This book covers state-of-the-art techniques commonly used in modern materials characterization. Two important aspects of characterization, materials structures and chemical analysis, are included. Widely used techniques, such as metallography (light microscopy), X-ray diffraction, transmission and scanning electron microscopy, are described. In addition, the book introduces advanced techniques, including scanning probe microscopy. The second half of the book accordingly presents techniques such as X-ray energy dispersive spectroscopy (commonly equipped in the scanning electron microscope), fluorescence X-ray spectroscopy, and popular surface analysis techniques (XPS and SIMS). Finally, vibrational spectroscopy (FTIR and Raman) and thermal analysis are also covered.

Transmission Electron Microscopy of Minerals and Rocks-Alex C. McLaren 2005-09-29 An introduction to the principles of transmission electron microscopy, written specifically for geologists and mineralogists.

Electron Microscopy and Analysis, Third Edition-Peter J. Goodhew 2000-11-30 Electron Microscopy and Analysis deals with several sophisticated techniques for magnifying images of very small objects by large amounts - especially in a physical science context. It has been ten years since the last edition of Electron Microscopy and Analysis was published and there have been rapid changes in this field since then. The authors have vastly updated their very successful second edition, which is already established as an essential laboratory manual worldwide, and they have incorporated questions and answers in each chapter for ease of learning. Equally as relevant for material scientists and bioscientists, this third edition is an essential textbook.

Springer Handbook of Microscopy-Peter W. Hawkes 2019-11-02 This book features reviews by leading experts on the methods and applications of modern forms of microscopy. The recent awards of Nobel Prizes awarded for super-resolution optical microscopy and cryo-electron microscopy have demonstrated the rich scientific opportunities for research in novel microscopies. Earlier Nobel Prizes for electron microscopy (the instrument itself and applications to biology), scanning probe microscopy and holography are a reminder of the central role of microscopy in modern science, from the study of nanostructures in materials science, physics and chemistry to structural biology. Separate chapters are devoted to confocal, fluorescent and related novel optical microscopies, coherent diffractive imaging, scanning probe microscopy, transmission electron microscopy in all its modes from aberration corrected and analytical to in-situ and time-resolved, low energy electron microscopy, photoelectron microscopy, cryo-electron microscopy in biology, and also ion microscopy. In addition to serving as an essential reference for researchers and teachers in the fields such as materials science, condensed matter physics, solid-state chemistry, structural biology and the molecular sciences generally, the Springer Handbook of Microscopy is a unified, coherent and pedagogically attractive text for advanced students who need an authoritative yet accessible guide to the science and practice of microscopy.

Electron Energy-Loss Spectroscopy in the Electron Microscope-R.F. Egerton 2013-03-09 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.

Controlled Atmosphere Transmission Electron Microscopy-Thomas Willum Hansen 2015-10-23 This book illustrates the practical workings of environmental transmission electron microscopy (ETEM) from history and instrument design through to solving practical problems. Aspects of instrument design, performance, and operating procedures are covered, together with common problems and pitfalls of the technique. Not only will a properly operated instrument and a carefully set up experiment provide new insight into your specimen, but the ability to observe the specimen in its natural habitat will be essential to meeting specific design criteria for the development of the next generation of materials. Over the past five decades, transmission electron microscopy (TEM) under environmental conditions relevant to a particular sample has been of increasing interest. Symposia dealing with the topic are now among the best attended at international microscopy conferences. Since typical operating modes for the ETEM require the sample be subjected to a harsh environment consisting of corrosive gases and high temperatures, the challenges of adapting and operating the instrument for observation under dynamic operating conditions are numerous. However, careful consideration of the interaction of the electrons with the gases and sample, as well as the gases with the microscope components, can lead to highly rewarding results. In Controlled Atmosphere Transmission Electron Microscopy, leading experts help you to perform successful experiments using the ETEM, and to interpret and understand the results.

Biological Specimen Preparation for Transmission Electron Microscopy-Audrey M. Glauert 2014-07-14 This book contains all the necessary information and advice for anyone wishing to obtain electron micrographs showing the most accurate ultrastructural detail in thin sections of any type of biological specimen. The guidelines for the choice of preparative methods are based on an extensive survey of current laboratory practice. For the first time, in a textbook of this kind, the molecular events occurring during fixation and embedding are analysed in detail. The reasons for choosing particular specimen preparation methods are explained and guidance is given on how to modify established techniques to suit individual requirements. All the practical methods advocated are clearly described, with accompanying tables and the results obtainable are illustrated with many electron micrographs. Portland Press Series: Practical Methods in Electron Microscopy, Volume 17, Audrey M. Glauert, Editor Originally published in 1999. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.

Practical Scanning Electron Microscopy-Joseph Goldstein 2012-12-06 In the spring of 1963, a well-known research institute made a market survey to assess how many scanning electron microscopes might be sold in the United States. They predicted that three to five might be sold in the first year a commercial SEM was available, and that ten instruments would saturate the marketplace. In 1964, the Cambridge Instruments Stereoscan was introduced into the United States and, in the following decade, over 1200 scanning electron microscopes were sold in the U. S. alone, representing an investment conservatively estimated at $50,000- $100,000 each. Why were the market surveyers wrongil Perhaps because they asked the wrong persons, such as electron microscopists who were using the highly developed transmission electron microscopes of the day, with resolutions from 5-10 A. These scientists could see little application for a microscope that was useful for looking at surfaces with a resolution of only (then) about 200 A. Since that time, many scientists have learned to appreciate that information content in an image may be of more importance than resolution per se. The SEM, with its large depth of field and easily that often require little or no sample prepara interpreted images of samples tion for viewing, is capable of providing significant information about rough samples at magnifications ranging from 50 X to 100,000 X. This range overlaps considerably with the light microscope at the low end, and with the electron microscope at the high end.

Transmission Electron Energy Loss Spectrometry in Materials Science and the EELS Atlas-Channing C. Ahn 2006-03-06 This book/CD package provides a reference on electron energy loss spectrometry (EELS) with the transmission electron microscope, an established technique for chemical and structural analysis of thin specimens in a transmission electron microscope. Describing the issues of instrumentation, data acquisition, and data analysis, the authors apply this technique to several classes of materials, namely ceramics, metals, polymers, minerals, semiconductors, and magnetic materials. The accompanying CD-ROM consists of a compendium of experimental spectra.

Introduction to Analytical Electron Microscopy-John Hren 2013-11-11 The birth of analytical electron microscopy (AEM) is somewhat obscure. Was it the recognition of the power and the development of STEM that signaled its birth? Was AEM born with the attachment of a crystal spectrometer to an otherwise conventional TEM? Or was it born earlier with the first analysis of electron loss spectra? It's not likely that any of these developments alone would have been sufficient and there have been many others (microdiffraction, EDS, microbeam fabrication, etc.) that could equally lay claim to being critical to the establishment of true AEM. It is probably more accurate to simply ascribe the present rapid development to the obvious: a combination of ideas whose time has come. Perhaps it is difficult to trace the birth of AEM simply because it remains a point of contention to even define its true scope. For example, the topics in this book, even though very broad, are still far from a complete description of what many call AEM. When electron beams interact with a solid it is well-known that a bewildering number of possible interactions follow. Analytical electron microscopy attempts to take full qualitative and quantitative advantage of as many of these interactions as possible while still preserving the capability of high resolution imaging. Although we restrict ourselves here to electron transparent films, much of what is described applies to thick specimens as well. Not surprisingly, signals from all possible interactions cannot yet (and probably never will) be attained simultaneously under optimum conditions.

A Practical Guide to Transmission Electron Microscopy-Zhiping Luo 2015-12-04 Transmission Electron Microscope (TEM) is a very powerful tool for characterizing various types of materials. Using a light microscope, the imaging resolution is at several hundred nanometers, and for a Scanning Electron Microscope (SEM) at several nanometers. The imaging resolution of the TEM, however, can routinely reach several angstroms on a modem instrument. In addition, the TEM can also provide material structural information, since the electrons penetrate through the thin specimens, and chemical compositional information due to the strong electron-specimen atom interactions. This book provides a concise practical guide to the TEM user, starting from the beginner level, including upper-division undergraduates, graduates, researchers, and engineers, on how to learn TEM efficiently in a short period of time. It covers most of the areas using TEM, including the instrumentation, sample preparation, diffraction, imaging, analytical microscopy, and some newly developed advanced microscopy techniques. This book may serve as a textbook for a TEM course or workshop, or a reference book for the TEM user to improve their TEM skills.

A Beginners' Guide to Scanning Electron Microscopy-Anwar Ul-Hamid 2018-10-26 This book was developed with the goal of providing an easily understood text for those users of the scanning electron microscope (SEM) who have little or no background in the area. The SEM is routinely used to study the surface structure and chemistry of a wide range of biological and synthetic materials at the micrometer to nanometer scale. Ease-of-use, typically facile sample preparation, and straightforward image interpretation, combined with high resolution, high depth of field, and the ability to undertake microchemical and crystallographic analysis, has made scanning electron microscopy one of the most powerful and versatile techniques for characterization today. Indeed, the SEM is a vital tool for the characterization of nanostructured materials and the development of nanotechnology. However, its wide use by professionals with diverse technical backgrounds—including life science, materials science, engineering, forensics, mineralogy, etc., and in various sectors of government, industry, and academia—emphasizes the need for an introductory text providing the basics of effective SEM imaging.A Beginners’ Guide to Scanning Electron Microscopy explains instrumentation, operation, image interpretation and sample preparation in a wide ranging yet succinct and practical text, treating the essential theory of specimen-beam interaction and image formation in a manner that can be effortlessly comprehended by the novice SEM user. This book provides a concise and accessible introduction to the essentials of SEM includes a large number of illustrations specifically chosen to aid readers' understanding of key concepts highlights recent advances in instrumentation, imaging and sample preparation techniques offers examples drawn from a variety of applications that appeal to professionals from diverse backgrounds.

Transmission Electron Microscopy-Ludwig Reimer 2013-11-11 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.

Scanning and Transmission Electron Microscopy-Stanley L. Flegler 1995 A core textbook for courses on electron microscopy Ideal for use in any laboratory, this book presents the practical and theoretical fundamentals of scanning and transmission electron microscopy. Clear and concise explanations coupled with instructive diagrams and photographs guide you through: * microscope operation * image production * analytical techniques Specimen preparation is discussed in detail with emphasis on specific parameters for biological specimens. This unique book covers the essentials of scanning and transmission electron microscopy while leaving the laboratory particulars to individual discretion. Unmatched in scope and clarity, this text offers the best introduction to scanning and transmission electron microscopy available.

Electron Crystallography-Xiaodong Zou 2011-08-18 Includes bibliographical references and index.

In-situ Electron Microscopy-Gerhard Dehm 2012-05-29 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.

The Principles and Practice of Electron Microscopy-Ian M. Watt 1997-01-30 An up-to-date edition of the indispensable guide to electron microscopy and analysis.

Transmission Electron Microscopy-David Bernard Williams 1996 This groundbreaking text provides the necessary instructions for hands-on application of this versatile materials characterization technique and is supported by over 600 illustrations and diagrams.

Image Formation in Low-voltage Scanning Electron Microscopy-Ludwig Reimer 1993 While most textbooks about scanning electron microscopy (SEM) cover the high-voltage range from 5-50 keV, this volume considers the special problems in low-voltage SEM and summarizes the differences between LVSEM and conventional SEM. Chapters cover the influence of lens aberrations and design on electron-probe formation; the effect of elastic and inelastic scattering processes on electron diffusion and electron range; charging and radiation damage effects; the dependence of SE yield and the backscattering coefficient on electron energy, surface tilt, and material as well as the angular and energy distributions; and types of image contrast and the differences between LVSEM and conventional SEM modes due to the influence of electron-specimen interactions.

Materials Characterization Using Nondestructive Evaluation (NDE) Methods-Gerhard Huebschen 2016-03-23 Materials Characterization Using Nondestructive Evaluation (NDE) Methods discusses NDT methods and how they are highly desirable for both long-term monitoring and short-term assessment of materials, providing crucial early warning that the fatigue life of a material has elapsed, thus helping to prevent service failures. Materials Characterization Using Nondestructive Evaluation (NDE) Methods gives an overview of established and new NDT techniques for the characterization of materials, with a focus on materials used in the automotive, aerospace, power plants, and infrastructure construction industries. Each chapter focuses on a different NDT technique and indicates the potential of the method by selected examples of applications. Methods covered include scanning and transmission electron microscopy, X-ray microtomography and diffraction, ultrasonic, electromagnetic, microwave, and hybrid techniques. The authors review both the determination of microstructure properties, including phase content and grain size, and the determination of mechanical properties, such as hardness, toughness, yield strength, texture, and residual stress. Gives an overview of established and new NDT techniques, including scanning and transmission electron microscopy, X-ray microtomography and diffraction, ultrasonic, electromagnetic, microwave, and hybrid techniques Reviews the determination of microstructural and mechanical properties Focuses on materials used in the automotive, aerospace, power plants, and infrastructure construction industries Serves as a highly desirable resource for both long-term monitoring and short-term assessment of materials