1. Record Nr. UNINA9910298587303321

Autore	Goldstein Joseph I
Titolo	Scanning Electron Microscopy and X-Ray Microanalysis / / by Joseph I. Goldstein, Dale E. Newbury, Joseph R. Michael, Nicholas W.M. Ritchie, John Henry J. Scott, David C. Joy
Pubbl/distr/stampa	New York, NY : , : Springer New York : , : Imprint : Springer, , 2018
ISBN	1-4939-6676-6
Edizione	[4th ed. 2018.]
Descrizione fisica	1 online resource (XXIII, 550 p. 546 illus., 409 illus. in color.)
Disciplina	620.11
Soggetti	Materials science Spectroscopy Microscopy Physical measurements Measurement Characterization and Evaluation of Materials Spectroscopy and Microscopy Biological Microscopy Spectroscopy/Spectrometry Measurement Science and Instrumentation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Preface -- Scanning Electron Microscopy and Associated Techniques: Overview -- Electron Beam – Specimen Interactions: Interaction Volume -- Backscattered Electrons -- Secondary Electrons -- X-rays -- SEM Instrumentation -- Image Formation -- SEM Image Interpretation -- The Visibility of Features in SEM Images -- Image Defects -- High resolution imaging -- Low Beam Energy SEM -- Variable Pressure Scanning Electron Microscopy (VPSEM) -- ImageJ and Fiji -- SEM Imaging checklist -- SEM Case Studies -- Energy Dispersive X-ray Spectrometry: Physical Principles and User-Selected Parameters -- DTSA-II EDS Software -- Qualitative Elemental Analysis by Energy Dispersive X-ray Spectrometry -- Quantitative Analysis: from k-ratio to Composition -- Quantitative analysis: the SEM/EDS elemental

microanalysis k-ratio procedure for bulk specimens, step-by-step -- Trace Analysis by SEM/EDS -- Low Beam Energy X-ray Microanalysis -- Analysis of Specimens with Special Geometry: Irregular Bulk Objects and Particles -- Compositional Mapping -- Attempting Electron-Excited X-ray Microanalysis in the Variable Pressure Scanning Electron Microscope (VP-SEM) -- Energy Dispersive X-ray Microanalysis Checklist -- X-ray Microanalysis Case Studies -- Cathodoluminescence -- Characterizing crystalline materials in the SEM -- Focused Ion Beam Applications in the SEM laboratory -- Ion Beam Microscopy -- Appendix – A Database of Electron-Solid Interactions -- Index.

Sommario/riassunto

This thoroughly revised and updated Fourth Edition of a time-honored text provides the reader with a comprehensive introduction to the field of scanning electron microscopy (SEM), energy dispersive X-ray spectrometry (EDS) for elemental microanalysis, electron backscatter diffraction analysis (EBSD) for micro-crystallography and focused ion beams. Students and academic researchers will find the text to be an authoritative and scholarly resource, while SEM operators and a diversity of practitioners — engineers, technicians, physical and biological scientists, clinicians, and technical managers — will find that every chapter has been overhauled to meet the more practical needs of the technologist and working professional. In a break with the past, this Fourth Edition de-emphasizes the design and physical operating basis of the instrumentation, including the electron sources, lenses, detectors, etc. In the modern SEM, many of the low level instrument parameters are now controlled and optimized by the microscope’s software, and user access is restricted. Although the software control system provides efficient and reproducible microscopy and microanalysis, the user must understand the parameter space wherein choices are made to achieve effective andmeaningful microscopy, microanalysis, and micro-crystallography. Therefore, special emphasis is placed on beam energy, beam current, electron detector characteristics and controls, and ancillary techniques such as energy dispersive x-ray spectrometry (EDS) and electron backscatter diffraction (EBSD). With 13 years between the publication of the third and fourth editions, new coverage reflects the many improvements in the instrument and analysis techniques. The SEM has evolved into a powerful and versatile characterization platform in which morphology, elemental composition, and crystal structure can be evaluated simultaneously. Extension of the SEM into a "dual beam" platform incorporating both electron and ion columns allows precision modification of the specimen by focused ion beam milling. New coverage in the Fourth Edition includes the increasing use of field emission guns and SEM instruments with high resolution capabilities, variable pressure SEM operation, theory, and measurement of x-rays with high throughput silicon drift detector (SDD-EDS) x-ray spectrometers. In addition to powerful vendor- supplied software to support data collection and processing, the microscopist can access advanced capabilities available in free, open source software platforms, including the National Institutes of Health (NIH) ImageJ-Fiji for image processing and the National Institute of Standards and Technology (NIST) DTSA II for quantitative EDS x-ray microanalysis and spectral simulation, both of which are extensively used in this work. However, the user has a responsibility to bring intellect, curiosity, and a proper skepticism to information on a computer screen and to the entire measurement process. This book helps you to achieve this goal. Realigns the text with the needs of a diverse audience from researchers and graduate students to SEM operators and technical managers Emphasizes practical, hands-on operation of the microscope,

particularly user selection of the critical operating parameters to achieve meaningful results Provides step-by-step overviews of SEM, EDS, and EBSD and checklists of critical issues for SEM imaging, EDS x-ray microanalysis, and EBSD crystallographic measurements Makes extensive use of open source software: NIH ImageJ-FIJI for image processing and NIST DTSA II for quantitative EDS x-ray microanalysis and EDS spectral simulation. Includes case studies to illustrate practical problem solving Covers Helium ion scanning microscopy Organized into relatively self-contained modules – no need to "read it all" to understand a topic Includes an online supplement—an extensive "Database of Electronic–Solid Interactions"—which can be accessed on SpringerLink, in Chapter 3.