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The Handbook of Surface and Nanometrology explains and challenges current concepts in nanotechnology. It covers in great detail surface metrology and nanometrology and more importantly the areas where they overlap, thereby providing a quantitative means of controlling and predicting processes and performance. Trends and mechanisms are explained with

Since the publication of the first edition, miniaturization and nanotechnology have become inextricably linked to traditional surface geometry and metrology. This interdependence of scales has had profound practical implications. Updated and expanded to reflect many new developments, Handbook of Surface and Nanometrology, Second Edition determines how the reduction in scale of size from macro to nano has affected all aspects of surface use and measurement. The book discusses how this shift has extended through characterization, standardization, manufacture, and performance. With nanotechnology now permeating the text, this edition covers new methods of production and measurement as well as new performance requirements. Described as the father of digital metrology by the American Society for Precision Engineering, author David J. Whitehouse explores the range of surface size scales—macro, micro, nano, atomic, and combinations of these. He examines traditional, structured, patterned, and free-form surfaces, emphasizing the growing need to understand the behavior of multiple surfaces. Still the definitive reference in the field, the second edition of this handbook continues to provide in-depth, extensive coverage of the engineering, physics, materials, mathematics, and computing involved in surface metrology and nanometrology. Nothing concerning current surface geometry escapes inclusion or scrutiny in this book.

The importance of surface metrology has long been acknowledged in manufacturing and mechanical engineering, but has now gained growing recognition in an expanding number of new applications in fields such as semiconductors, electronics and optics. Metrology is the scientific study of measurement, and surface metrology is the study of the measurement of rough surfaces. In this book, Professor David Whitehouse, an internationally acknowledged subject expert, covers the wide range of theory and practice, including the use of new methods of instrumentation. Written by one of the world's leading metrologists. Covers electronics and optics applications as well as mechanical. Written for mechanical and manufacturing engineers, tribologists and precision engineers in industry and academia

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Handbook of Optical Metrology: Principles and Applications begins by discussing key principles and techniques before exploring practical applications of optical metrology. Designed to provide beginners with an introduction to optical metrology without sacrificing academic rigor, this comprehensive text: Covers fundamentals of light sources, lenses, prisms, and mirrors, as well as optoelectronic sensors, optical devices, and optomechanical elements Addresses interferometry, holography, and speckle methods and applications Explains Moiré metrology and the optical heterodyne measurement method Delves into the specifics of diffraction, scattering, polarization, and near-field optics Considers applications for measuring length and size, displacement, straightness and parallelism, flatness, and three-dimensional shapes This new Second Edition is fully revised to reflect the latest developments. It

also includes four new chapters—nearly 100 pages—on optical coherence tomography for industrial applications, interference microscopy for surface structure analysis, noncontact dimensional and profile metrology by video measurement, and optical metrology in manufacturing technology.

This third volume of Gyllenbok's encyclopaedia of historical metrology comprises the second part of the compendium of measurement systems and currencies of all sovereign states of the modern World (J-Z). Units of measurement are of vital importance in every civilization through history. Since the early ages, man has through necessity devised various measures to assist him in everyday life. They have enabled and continue to enable us to trade in commonly and equitably understood amounts, and to investigate, understand, and control the chemical, physical, and biological processes of the natural world. The encyclopaedia will be of use not only to historians of science and technology, but also to economic and social historians and should be in every major academic and national library as standard reference work on the topic.

This book introduces the exciting and fast-moving field of MOEMS to graduate students, scientists, and engineers by providing a foundation of both micro-optics and MEMS that will enable them to conduct future research in the field. Born from the relatively new fields of MEMS and micro-optics, MOEMS are proving to be an attractive and low-cost solution to a range of device problems requiring high optical functionality and high optical performance. MOEMS solutions include optical devices for telecommunication, sensing, and mobile systems such as v-grooves, gratings, shutters, scanners, filters, micromirrors, switches, alignment aids, lens arrays, and hermetic wafer-scale optical packaging. An international team of leading researchers contributed to this book, and it presents examples and problems employing cutting-edge MOEM devices. It will inspire researchers to further advance the design, fabrication, and analysis of MOEM systems.

This book offers a genuinely practical introduction to the most commonly encountered optical and non-optical systems used for the metrology and characterization of surfaces, including guidance on best practice, calibration, advantages and disadvantages, and interpretation of results. It enables the user to select the best approach in a given context. Most methods in surface metrology are based upon the interaction of light or electromagnetic radiation (UV, NIR, IR), and different optical effects are utilized to get a certain optical response from the surface; some of them record only the intensity reflected or scattered by the surface, others use interference of EM waves to obtain a characteristic response from the surface. The book covers techniques ranging from microscopy (including confocal, SNOM and digital holographic microscopy) through interferometry (including white light, multi-wavelength, grazing incidence and shearing) to spectral reflectometry and ellipsometry. The non-optical methods comprise tactile methods (stylus tip, AFM) as well as capacitive and inductive methods (capacitive sensors, eddy current sensors). The book provides: Overview of the working principles Description of advantages and disadvantages Currently achievable numbers for resolutions, repeatability, and reproducibility Examples of real-world applications A final chapter discusses examples where the combination of different surface metrology techniques in a multi-sensor system can reasonably contribute to a better understanding of surface properties as well as a faster characterization of surfaces in industrial applications. The book is aimed at scientists and engineers who use such methods for the measurement and characterization of surfaces across a wide range of fields and industries, including electronics, energy, automotive and medical engineering.

Topics in this volume include: comparison of interferometric contouring techniques; comparison of visibility of standard scratches; and near-grazing illumination and shadowing of rough surfaces.

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