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The Auger Effect and Other Radiationless Transitions The Theory of Auger Transitions Auger Electron Spectroscopy Reference Manual The Auger Effect and Other Radiationless Transitions Auger- and X-Ray Photoelectron Spectroscopy in Materials Science Auger Electron Spectroscopy Auger Electron Spectroscopy Auger Effect in Astatine Photoelectron and Auger Spectroscopy Electron Capture and the Auger Effect in the Heaviest Elements The Auger Effect and Other Radiationless Transmissions Auger Electron Spectroscopy Auger Spectroscopy and Electronic Structure Leed and Auger Electron Spectroscopy Study of Oxygen Adsorption on Tungsten (110) Scanning Auger Electron Microscopy Angle and Spin Resolved Auger Emission Corpuscles and Radiation in Matter I, Anglais Auger Electron Spectroscopy Study of Surface Segregation in Copper-aluminum Alloys Auger Electron Spectroscopy Surface Analysis by Electron Spectroscopy ELECTRON CAPTURE AND THE AUGER EFFECT IN THE

HEAVIEST ELEMENTS (thesis). An Introduction to Surface Analysis by XPS and AES DNA Damage by Auger Emitters Electron Spectrometry of Atoms Using Synchrotron Radiation Metallic Transfer Between Metals in Sliding Contact Examined by Auger Emission Spectroscopy Proceedings of the 2nd International Workshop on Auger Spectroscopy and Electronic Structure (IWASES-II), Malmö, Sweden, September 4-6, 1991 Theoretical Study of the Auger Effect in the Light to Medium Range of Atomic Number Advances in Electronics and Electron Physics Atomic Inner-Shell Processes Ultraviolet Photoelectron and Photoion Spectroscopy, Auger Electron Spectroscopy, Plasma Excitation in Spectrochemical Analysis Handbook of Auger Electron Spectroscopy The Auger Effect in Relative Intensities and Widths of X-ray Lines Ionization of Solids by Heavy Particles Auger Electron Dosimetry The Auger Effect in Heavy Elements Synchrotron Radiation Studies of Resonance Auger Processes in Solid Rare Earths and in Some Molecules Photoelectron Spectroscopy and Auger Electron Spectroscopy of Solids and Surfaces The Auger effect Secondary Electron Emission Spectroscopy of Diamond Surfaces Auger Electron Spectroscopy

Auger electron spectroscopy (AES) is based on the Auger total secondary electron energy distribution, and an ion gun to process, which involves the core-level ionization of an atom with provide depth profiling capability. subsequent deexcitation occurring by an outer-level electron de The high surface sensitivity of Auger spectroscopy which dictates caying to fill the core hole. The excess energy is transferred to the need for an ultrahigh-vacuum system is due to the limited and causes the ejection of another electron, which is by definition mean free path of electrons in the 0-3000 e V kinetic energy an Auger electron. The Auger electron transition, denoted by range. The Auger peaks decay exponentially with overlayer cov the electron levels involved, is independent of the excitation erage, which is consistent with an exponential dependence of source and leaves the atom with a constant kinetic energy. The escape probability on the depth of the parent atom. A compila kinetic energy is given by the differences in binding energies for tion of data from a variety of sources has been used to generate the three levels (for example, EK-E L, - EL) minus a correction 2 an escape depth curve which falls in the range of 5-30 A in the term for the work function and electron wave

function relaxation. energy range from 0 to 3000 eV. The observed escape depth does When the Auger transition occurs within a few angstroms of the not show a strong dependence on the matrix. Treatise on Materials Science and Technology, Volume 30: Auger Electron Spectroscopy examines Auger electron spectroscopy and its various uses, emphasizing both theoretical and experimental studies. This book discusses the historical development of auger electron spectroscopy, studies of surface segregation kinetics by auger electron spectroscopy, and local electronic structure information in auger electron spectroscopy. The metallurgical applications of auger electron spectroscopy and auger photoelectron coincidence spectroscopy are also elaborated. Other topics include the measurement of surface segregation kinetics by Auger electron spectroscopy, tempered martensite embrittlement, embrittlement of nonferrous alloys, and analysis of particle-matrix interfaces. The high-resolution scanning Auger electron spectroscopy, corrosion and stress corrosion cracking, and APECS instrumentation are likewise covered in this publication. This volume is suitable for researchers and electrical engineering

students conducting work on Auger electron spectroscopy. The NASDAQ Stock Market has been reengineered in recent years. The broader NASDAQ marketplace has also experienced substantial growth and development. This conference brought together leading buy-side and sell-side participants and NASDAQ executives to put these changes into sharper focus. The resulting book assesses both the current market structure and the direction in which the new NASDAQ marketplace is heading. This book discusses the use of AES and SAM for the characterization of a wide range of technological materials. These include metals and alloys, semiconductors, nanostructures, and insulators. Its value as a tool for high-resolution elemental imaging and compositional depth profiling is illustrated. The application of the technique for obtaining compositional information from the surfaces, interfaces, and thin film structures of technological and engineering materials is demonstrated. This volume also describes the basic physical principles of AES in simple, largely qualitative, terms understandable by any undergraduate science or engineering student. Major components of typical Auger spectrometers are also described because an

understanding of the instrumentation is important to anyone wishing to become a skilled analyst. Mention is also made of other types of analysis for which an Auger electron spectrometer may be used, for example, secondary electron microscopy, backscattered electron imaging, X-ray spectroscopy. The relationship between AES and other analysis techniques is also discussed. Ultraviolet Photoelectron and Photoion Spectroscopy, Auger Electron Spectroscopy, Plasma Excitation in Spectrochemical Analysis Auger electron spectroscopy is rapidly developing into the single most powerful analytical technique in basic and applied science.for investigating the chemical and structural properties of solids. Its ex plosive growth beginning in 1967 was triggered by the development of Auger analyzers capable of de tecting one atom layer of material in a fraction of a second. Continued growth was guaranteed firstly by the commercial availability of apparatus which combined the capabilities of scanning electron mi croscopy and ion-mill depth profiling with Auger analysis, and secondly by the increasing need to know the atomistics of many processes in fundamental research and engineering applications. The expanding use of Auger

analysis was accompanied by an increase in the number of publications dealing with it. Because of the developing nature of Auger spectroscopy, the articles have appeared in many different sources covering diverse disciplines, so that it is extremely difficult to discover just what has or has not been subjected to Auger analysis. In this situation, a comprehensive bibliography is obviou-sly useful to those both inside and outside the field. For those in the field, this bibliography should be a wonderful time saver for locating certain references, in researching a particular topic, or when considering various aspects of instrumentation or data analysis. This bibliography not only provides the most complete listing of references pertinent to surface Auger analysis available today, but it is also a basis for extrapolating from past trends to future expectations. This eagerly-awaited volume has been edited by two academic researchers with extensive and reputable experience in this field. Emphasis is given to the underlying science of the method of Auger microscopy, and its instrumental realization, the visualization and interpretation of the data in the sets of the images that form the output of the measurements and the methods used to

quantify the images. Imaging artefacts in Auger microscopy and methods to correct them are also detailed. The authors describe the technique of Multi-Spectral Auger Microscopy (MULSAM) and demonstrate its advantages in mapping complex multi-component surfaces. The book concludes with an outlook for the future of Auger microscopy. This report presents the results of the secondary electron emission spectroscopy study of hydrogenated diamond surfaces for single crystals and chemical vapor-deposited polycrystalline films. One-electron calculations of Auger spectra of diamond surfaces having various hydrogen coverages are presented, the major features of the experimental spectra are explained, and a theoretical model for Auger spectra of hydrogenated diamond surfaces is proposed. An energy shift and a change in the line shape of the carbon core-valence-valence (KVV) Auger spectra were observed for diamond surfaces after exposure to an electron beam or by annealing at temperatures higher than 950°C. This change is related to the redistribution of the valence-band local density of states caused by hydrogen desorption from the surface. A strong negative electron affinity (NEA) effect, which appeared as a large, narrow peak in the

low-energy portion of the spectrum of the secondary electron energy distribution, was also observed on the diamond surfaces. A fine structure in this peak, which was found for the first time, reflected the energy structure of the bottom of the conduction band. Further, the breakup of the bulk excitons at the surface during secondary electron emission was attributed to one of the features of this structure. The study demonstrated that the NEA type depends on the extent of hydrogen coverage of the diamond surface, changing from the true type for the completely hydrogenated surface to the effective type for the partially hydrogenated surface. This book is t~e fifth in aseries of scientific textbooks designed to cover advances in selected research fields from a basic and general view point. The reader is taken carefully but rapidly through the introductory material in order that t~e significance of recent developments can be understood with only limited initial knowledge. The inclusion in the Appendix of the abstracts of many of the more important papers in the field provides further assistance for the non-specialist, and acts as aspringboard to supplementary reading for those who wish to consult the original liter ature. Surface analysis has been the subject

of numerous books and review articles, and the fundamental scientific principles of t~e more popular techniques are now reasonably well established. This book is concerned with the very powerful techniques of Auger electron and X-ray photoelectron spectroscopy (AES and XPS), with an emphasis on how they may be performed as part of a modern analytical facility. Since the development of AES and XPS in the late 1960s and early 1970s there have been great strides forward in the sensitivities and resolutions of the instrumentation. Simultaneously, these spectroscopies have undergone a veritable explosion, both in their acceptance alongside more routine ana1ytical techniques and in the range of problems and materials to which they are applied. As a result, many researchers in industry and in academia now come into contact with AES and XPS not as specialists, but as users. Provides a concise yet comprehensive introduction to XPS and AES techniques in surface analysis This accessible second edition of the bestselling book, An Introduction to Surface Analysis by XPS and AES, 2nd Edition explores the basic principles and applications of X-ray Photoelectron Spectroscopy (XPS) and Auger Electron Spectroscopy (AES) techniques. It starts with

an examination of the basic concepts of electron spectroscopy and electron spectrometer design, followed by a qualitative and quantitative interpretation of the electron spectrum. Chapters examine recent innovations in instrument design and key applications in metallurgy, biomaterials, and electronics. Practical and concise, it includes compositional depth profiling; multi-technique analysis; and everything about samples—including their handling, preparation, stability, and more. Topics discussed in more depth include peak fitting, energy loss background analysis, multi-technique analysis, and multi-technique profiling. The book finishes with chapters on applications of electron spectroscopy in materials science and the comparison of XPS and AES with other analytical techniques. Extensively revised and updated with new material on NAPXPS, twin anode monochromators, gas cluster ion sources, valence band spectra, hydrogen detection, and quantification Explores key spectroscopic techniques in surface analysis Provides descriptions of latest instruments and techniques Includes a detailed glossary of key surface analysis terms Features an extensive bibliography of key references and additional

reading Uses a non-theoretical style to appeal to industrial surface analysis sectors An Introduction to Surface Analysis by XPS and AES, 2nd Edition is an excellent introductory text for undergraduates, first-year postgraduates, and industrial users of XPS and AES. This book collects the papers presented at the NATO Advanced Research Workshop on "Ionization of Solids by Heavy Particles", held in Giardini-Naxos (Taormina), Italy, on June 1 -5, 1992. The meeting was the first to gather scientists to discuss the physics of electron emission and other ionization effects occurring during the interaction of heavy particles with condensed matter. The central problem in the field is how to use observations of electron emission and final radiation damage to understand what happens inside the solid, like excitation mechanisms, the propagation of the electronic excitation along different pathways, and surface effects. The ARW began with a brief survey of the field, stressing the unknowns. It was pointed out that ionization theories can only address the very particular case of weak perturbations. For this problem, this meant high speed, low-charged projectiles (a perturbation treatment of interactions with slow, highly charged ions was later

presented). Only semi-empirical models exist for velocities lower than the Fermi velocity in the solid, which can be used to predict kinetic electron emission yields. These models, however, do not address the basic questions about the mechanisms for electron excitation, transport and escape through the surface layer. In 1970 when I first seriously contemplated writing a book on electron spectroscopy, I recognized the impossibility of completely reaching my desired goals. First, the field was expanding (and still is) at such a rate that a definitive statement of the subject is not possible. The act of following the literature comprehensively and summarizing its essential content proved to be a diver gent series. On the other hand, the field has increased to such a size that violent changes in its basic makeup no longer occur with the frequency that was present in its early days. Furthermore, the excitement of electron spectro scopy lies in its many-faceted interrelationships. In the era of specialization, electron spectroscopy is an open-ended subject continually bringing together new aspects of science. I wished to discuss not just one type of electron spectro scopy, but as many as would be possible. The book as it stands concentrates its attention on x-ray

photoelectron spectroscopy, but also presents the basis of Auger electron spectroscopy and uv photoelectron spectroscopy, as well as mentioning many of the other branches of the field. A large, many-author volume might be an answer to some of these problems. However, though anyone person possesses only a limited amount of expertise, I have always enjoyed books by a single author since what they lack in detailed knowledge they gain in a unified viewpoint. I hope the final product, though limited in its attainment of these goals, will still be of some merit. To anyone who is interested in surface chemical analysis of materials on the nanometer scale, this book is prepared to give appropriate information. Based on typical application examples in materials science, a concise approach to all aspects of quantitative analysis of surfaces and thin films with AES and XPS is provided. Starting from basic principles which are step by step developed into practically useful equations, extensive guidance is given to graduate students as well as to experienced researchers. Key chapters are those on quantitative surface analysis and on quantitative depth profiling, including recent developments in topics such as surface excitation parameter and backscattering

correction factor. Basic relations are derived for emission and excitation angle dependencies in the analysis of bulk material and of fractional nano-layer structures, and for both smooth and rough surfaces. It is shown how to optimize the analytical strategy, signal-to-noise ratio, certainty and detection limit. Worked examples for quantification of alloys and of layer structures in practical cases (e.g. contamination, evaporation, segregation and oxidation) are used to critically review different approaches to quantification with respect to average matrix correction factors and matrix relative sensitivity factors. State-of-the-art issues in quantitative, destructive and non-destructive depth profiling are discussed with emphasis on sputter depth profiling and on angle resolved XPS and AES. Taking into account preferential sputtering and electron backscattering corrections, an introduction to the mixing-roughness-information depth (MRI) model and its extensions is presented. Several aspects of oxygen adsorption on W(110) have been examined. Quantitative oxygen coverage as a function of oxygen exposure was determined in an Auger electron spectroscopy study. In particular coverages down to less than 0.02 monolayer of oxygen were

detectable. The initial slope of the coverage against exposure curve provided a value of 0.23[+/-]0.05 for the initial sticking coefficient. Exposure dependence of the elastically back-scattered electrons and the electrons that suffered only a surface plasmon energy loss was found to be approximately the same as for the oxygen coverage. The total electron-impact cross section for the desorption of oxygen from an oxygen-saturated W(110) surface was determined to be ~1. 5x10 [to the power of -20] cm [squared] for 1365-eV electrons. Originally published in 1952, this book discusses the contemporary state of research into the Auger Effect and the internal conversion of gamma radiation. Burhop also addresses internal pair production and radiationless transitions in molecular spectra, and photographic images of Auger electrons in action. Advances in Electronics and Electron Physics The Theory of Auger Transitions reviews the Auger effect theory, relating it to the broad spectrum of atomic and physical theory. This book discusses the Auger effect involving discrete and continuous states of the atomic system, which can be used as a good testing ground for fundamental atomic theory, such as the various atomic models and their concomitant

wave functions. The application of Auger spectroscopy to surface chemical analysis is also elaborated. Other topics include the symmetry and invariance, theory of the Auger process, coulomb field and coulomb wave functions, and symmetry-breaking and classification of states. The central-field calculations, many-electron atom, advances in Auger theory, and Auger electron spectroscopy and its application to surface science are likewise covered in this text. This publication is intended for scientists and atomic physicists, but is also useful to theoreticians and graduate student specializing in atomic physics. Angle and spin resolved Auger emission physics deals with the theoretical and numerical description, analysis and interpretation of such types of experiments on free atoms and molecules. This monograph derives the general theory applying the density matrix formalism and, in terms of irreducible tensorial sets, so called state multipoles and order parameters, for parameterizing the atomic and molecular systems, respectively. It is the first book on angle and spin-resolved Auger emission. Ionization and Transition Probabilities is the first volume in Atomic Inner Shell Processes which describes the relative status of the

physics of atomic inner shells. Both volumes can be applied and used in various traditional scientific disciplines. Volume I consists of 11 chapters written by different authors, each an expert in the field. The book discusses mainly the inner-shell excitation by electrons, heavy-charged particles, and photons and the atomic excitation as seen in nuclear decay. The theory of radiative and radiationless transitions is also explored in terms of single-particle descriptions and many-body approaches. Other major concepts covered in this comprehensive volume include the developments in theory of multiple decay processes; transition energies and their calculations; and energy shifts that are results of chemical environment and hyperfine interactions. This first volume serves as a valuable reference to many scientists and researchers in various fields like atomic and nuclear physics, astrophysics, chemistry, surface and materials science, and engineering or radiation shields. Surface segregation of aluminum has been observed in copper-aluminum alloys by use of LEED and Auger electron spectroscopy studies. The alloys were solid solutions of aluminum in copper having compositions of 1, 5, and 10 atomic percent aluminum. All samples were

single crystals oriented in the (111) direction. Surface concentrations five times that in the bulk were observed. LEED and characteristic loss data gave confirming evidence of surface composition changes. Surface concentration increased with temperature on heating to 700 [degree] C. The study of electron spectrometry using synchrotron radiation is a growing field of research driven by the increasing availability of advanced synchrotron radiation light sources and improved theoretical methods for solving the many-electron problem in atoms. This balanced account, by a leading researcher in this field, will be of value to both theorists and experimentalists in atomic, molecular and chemical physicists. Metallic transfer between polycrystalline metals in sliding contact was examined. Hemispherical riders of iron, nickel, and cobalt were slid on tungsten, tantalum, niobium, and molybdenum disks in ultrahigh vacuum. Auger emission spectroscopy was used to monitor the elemental composition of the disk surfaces. Iron, nickel, and cobalt transferred to tungsten, whereas only cobalt transferred to tantalum, niobium, and molybdenum. The results of this investigation are discussed in terms of the cohesive energy and strain hardening characteristics of the

specimen materials.

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