

Karsten Hinrichs  
Klaus-Jochen Eichhorn *Editors*

# Ellipsometry of Functional Organic Surfaces and Films

# Ellipsometry Of Functional Organic Surfaces And Films

## Springer Series In Surface Sciences

**Karl Riedling**



## **Ellipsometry Of Functional Organic Surfaces And Films Springer Series In Surface Sciences:**

Ellipsometry of Functional Organic Surfaces and Films Karsten Hinrichs, Klaus-Jochen Eichhorn, 2013-10-24 Ellipsometry is the method of choice to determine the properties of surfaces and thin films. It provides comprehensive and sensitive characterization in contactless and non-invasive measurements. This book gives a state-of-the-art survey of ellipsometric investigations of organic films and surfaces from laboratory to synchrotron applications with a special focus on in situ use in processing environments and at solid liquid interfaces. In conjunction with the development of functional organic meta and hybrid materials for new optical electronic sensing and biotechnological devices and fabrication advances the ellipsometric analysis of their optical and material properties has progressed rapidly in the recent years. **Polymer Surface**

**Characterization** Luigia Sabbatini, Elvira De Giglio, 2022-01-19 This fully updated edition provides a broad approach to the surface analysis of polymers being of high technological interest. Modern analytical techniques, potential applications and recent advances in instrumental apparatus are discussed. The self-consistent chapters are devoted to spectroscopic and microscopic techniques which represent powerful tools for the characterization of morphology and chemical physical mechanical properties of polymer surfaces, interfaces and thin films. Selection of techniques which can properly address very shallow depth of surfaces spanning from few angstroms to tens of nanometers. Interaction of polymer surfaces with their surroundings is pointed out as a critical issue for specific applications. *Advanced Green Chemistry - Part 1: Greener Organic Reactions And Processes* Istvan T Horvath, Max Malacria, 2017-12-15 Green Chemistry has evolved in response to several environmental issues in the second half of the last century, mostly due to the almost freely expanding chemical, petrochemical and pharmaceutical industries. During the past two decades, Green Chemistry grew rapidly and we can now consider this area as a mature and powerful field. Tremendous development has taken place in many important areas including renewable energy and resources, reaction environments, catalysis, synthesis, chemical biology, green materials, in situ monitoring and facile recycling. The combination of Green Chemistry with engineering, biology, toxicology and physics will lead to novel interdisciplinary systems which can now lift Green Chemistry to the next advanced level. The editors of this book have assembled as authors among the best specialists of this growing area of research. This collection of reviews and perspectives provides an exciting vision of the more recent developments in Green Chemistry. It illustrates the breath of the field and its role to address environmental issues. This volume will serve as a book of reference showing a panoramic view of the field and a preview of its future direction as well as a book of inspiration for those aiming to further advance its frontiers.

**Introduction to Experimental Biophysics** Jay L. Nadeau, 2017-10-10 Praise for the First Edition: essential reading for any physical scientist who is interested in performing biological research. Contemporary Physics: an ambitious text. Each chapter contains protocols and the conceptual reasoning behind them, which is often useful to physicists performing biological experiments for the first time. Physics Today: This fully updated and expanded text is the best starting point for any

student or researcher in the physical sciences to gain firm grounding in the techniques employed in molecular biophysics and quantitative biology It includes brand new chapters on gene expression techniques advanced techniques in biological light microscopy super resolution two photon and fluorescence lifetime imaging holography and gold nanoparticles used in medicine The author shares invaluable practical tips and insider s knowledge to simplify potentially confusing techniques The reader is guided through easy to follow examples carried out from start to finish with practical tips and insider s knowledge The emphasis is on building comfort with getting hands wet with basic methods and finally understanding when and how to apply or adapt them to address different questions Jay L Nadeau is a scientific researcher and head of the Biomedical Engineering in Advanced Applications of Quantum Oscillatory and Nanotechnological Systems BEAQONS lab at Caltech and was previously associate professor of biomedical engineering and physics at McGill University **Journal American Chemical Society,2003** Physics of Surfaces and Interfaces Harald Ibach,2006-10-06 This graduate level textbook covers the major developments in surface sciences of recent decades from experimental tricks and basic techniques to the latest experimental methods and theoretical understanding It is unique in its attempt to treat the physics of surfaces thin films and interfaces surface chemistry thermodynamics statistical physics and the physics of the solid electrolyte interface in an integral manner rather than in separate compartments It is designed as a handbook for the researcher as well as a study text for graduate students Written explanations are supported by 350 graphs and illustrations *The Structure of Surfaces II* Johannes Friso Veen,Michael A. Van Hove,1988 Characterization of Polymer Surfaces and Thin Films K. Grundke,M. Stamm,H.-J. Adler,2006-05-09 This volume includes contributions to the 10th Dresden Polymer Discussion which was held in Mei en near Dresden from April 10 to 13 2005 organized by the Leibniz Institute of Polymer Research Dresden and the Institute of Macromolecular and Textile Chemistry of the Technische Universit t Dresden The meeting was focussed on Characterization of Polymer Surfaces and Thin Films Comprehensive characterization of surfaces and interfaces is essential to relate surface and thin film properties to micro structure and molecular origin which is on the other hand the key to technological control and improvement of materials The contributions in this volume cover a representative spectrum of surface sensitive techniques and their application to polymer surface and thin film characterization as well as recent examples of technologically relevant materials and process development **Ellipsometry in the Measurement of Surfaces and Thin Films** Elio Passaglia,Robert R. Stromberg,Jerome Kruger,1964 *The Structure of Surfaces* Michael A. Van Hove,1985 **Ellipsometry for Industrial Applications** Karl Riedling,2012-12-06 During the past years ellipsometry a non destructive and contact less optical surface analysis technique has gained increased importance in industrial areas such as the technology of electronic devices when simple instruments many of them computer controlled and automated became available The potential users of such instruments are however frequently aware neither of the inherent possibilities of this technique nor of its accuracy limitations This book endeavors to point out some of the less obvious features and

possibilities of ellipsometry particularly of dynamic in situ measurements and reviews its applications in research and manufacturing of semiconductor and thin film devices A comprehensive discussion of various error effects typical particularly for simple ellipsometers and of their impact on measured sample parameters is provided Error correction or numerical calibration procedures are given wherever possible and design and operation guidelines for high speed instruments suitable for dynamic in situ measurements are suggested *Springer Handbook of Surface Science* Mario Rocca,Talat Rahman,Luca Vattuone,2021-01-15 This handbook delivers an up to date comprehensive and authoritative coverage of the broad field of surface science encompassing a range of important materials such metals semiconductors insulators ultrathin films and supported nanoobjects Over 100 experts from all branches of experiment and theory review in 39 chapters all major aspects of solid state surfaces from basic principles to applications including the latest ground breaking research results Beginning with the fundamental background of kinetics and thermodynamics at surfaces the handbook leads the reader through the basics of crystallographic structures and electronic properties to the advanced topics at the forefront of current research These include but are not limited to novel applications in nanoelectronics nanomechanical devices plasmonics carbon films catalysis and biology The handbook is an ideal reference guide and instructional aid for a wide range of physicists chemists materials scientists and engineers active throughout academic and industrial research **Springer Series in Surface Sciences** Ralf W. Vanselow (Chemist, Germany, United States),1986 **Theoretical Surface Science** Axel Groß,2013-03-09 Recent years have witnessed tremendous progress in the theoretical treatment of surfaces and processes on surfaces A variety of surface properties can now be described from first principles i e without invoking any empirical parameters In this book the theoretical concepts and computational tools necessary and relevant for a microscopic approach to the theoretical description of surface science is presented Based on the fundamental theoretical entity the Hamiltonian a hierarchy of theoretical methods is introduced Furthermore a detailed discussion of surface phenomena is given and comparisons made to experimental results made making the book suitable for both graduate students and for experimentalists seeking an overview of the theoretical concepts in surface science **Concepts in Surface Physics** M.-C. Desjonqueres,D. Spanjaard,2012-12-06 Concepts in Surface Physics presents a tutorial treatment of the main concepts and phenomena of the physics of crystal surfaces Emphasis is placed on simplified calculations and the corresponding detailed analytical derivations that are able to throw light on the most important physical mechanisms More rigorous techniques which often require a large amount of computer time are also explained The topics treated include thermodynamic and statistical properties of clean and adsorbate covered surfaces atomic structure vibrational properties electronic structure and the theory of physisorption and chemisorption As well as including some improvements on the original book this second edition has been supplemented with problems to encourage students to investigate the subject more thoroughly Solid Surfaces, Interfaces and Thin Films Hans Lüth,2014-11-18 This book emphasises both experimental and theoretical aspects

of surface interface and thin film physics As in previous editions the preparation of surfaces and thin films their atomic and morphological structure their vibronic and electronic properties as well as fundamentals of adsorption are treated Because of their importance in modern information technology and nanostructure research particular emphasis is paid to electronic surface and interface states semiconductor space charge layers and heterostructures A special chapter of the book is devoted to collective phenomena at interfaces and in thin films such as superconductivity and magnetism The latter topic includes the meanwhile important issues giant magnetoresistance and spin transfer torque mechanism both effects being of high interest in information technology In this new edition for the first time the effect of spin orbit coupling on surface states is treated In this context the class of the recently detected topological insulators materials of significant importance for spin electronics are discussed Particular emphasis hereby is laid on the new type of topologically protected surface states with well defined spin orientation Furthermore some important well established experimental techniques such as X ray diffraction XRD and reflection anisotropy spectroscopy RAS which were missing so far in earlier editions were added in this new 6th edition of the book

**The Physics of Thin Film Optical Spectra** Olaf Stenzel, 2005-10-10 The present monograph represents itself as a tutorial to the field of optical properties of thin solid films It is neither a handbook for the thin film practitioner nor an introduction to interference coatings design nor a review on the latest developments in the field Instead it is a textbook which shall bridge the gap between ground level knowledge on optics electrodynamics quantum mechanics and solid state physics on one hand and the more specialized level of knowledge presumed in typical thin film optical research papers on the other hand In writing this preface I feel it makes sense to comment on three points which all seem to me equally important They arise from the following mutually interconnected three questions 1 Who can benefit from reading this book 2 What is the origin of the particular material selection in this book 3 Who encouraged and supported me in writing this book Let me start with the first question the intended readership of this book It should be of use for anybody who is involved into the analysis of optical spectra of a thin film sample no matter whether the sample has been prepared for optical or other applications Thin film spectroscopy may be relevant in semiconductor physics solar cell development physical chemistry optoelectronics and optical coatings development to give just a few examples The book supplies the reader with the necessary theoretical apparatus for understanding and modelling the features of the recorded transmission and reflection spectra

**A User's Guide to Ellipsometry** Harland G. Tompkins, 2012-12-02 This book is specifically designed for the user who wishes expanded use of ellipsometry beyond the relatively limited number of turn key applications The book provides a concise discussion of theory and instrumentation before describing how to use optical parameters to determine material properties and optical parameters for inaccessible substrates and unknown films and how to measure extremely thin films The book also addresses polysilicon a material commonly used in the microelectronics industry and the effect of substrate roughness This book's concepts and applications are reinforced through the 14 case studies that illustrate specific applications of

ellipsometry from the semiconductor industry as well as studies involving corrosion and oxide growth Allows the user to optimize turn key operation of ellipsometers and move beyond limited turn key applications Provides comprehensive discussion of the measurement of film thickness and optical constants in film Discusses the trajectories of the ellipsometric parameters  $\Delta$  and  $\Psi$  and how changes in the materials affect the parameter Includes 14 case studies to reinforce specific applications Includes three appendices for helpful references

**Introduction to Spectroscopic Ellipsometry of Thin Film Materials** Andrew T. S. Wee, Xinmao Yin, Chi Sin Tang, 2022-03-08 A one of a kind text offering an introduction to the use of spectroscopic ellipsometry for novel material characterization In Introduction to Spectroscopic Ellipsometry of Thin Film Materials Instrumentation Data Analysis and Applications a team of eminent researchers delivers an incisive exploration of how the traditional experimental technique of spectroscopic ellipsometry is used to characterize the intrinsic properties of novel materials The book focuses on the scientifically and technologically important two dimensional transition metal dichalcogenides 2D TMDs magnetic oxides like manganite materials and unconventional superconductors including copper oxide systems The distinguished authors discuss the characterization of properties like electronic structures interfacial properties and the consequent quasiparticle dynamics in novel quantum materials Along with illustrative and specific case studies on how spectroscopic ellipsometry is used to study the optical and quasiparticle properties of novel systems the book includes Thorough introductions to the basic principles of spectroscopic ellipsometry and strongly correlated systems including copper oxides and manganites Comprehensive explorations of two dimensional transition metal dichalcogenides Practical discussions of single layer graphene systems and nickelate systems In depth examinations of potential future developments and applications of spectroscopic ellipsometry Perfect for master s and PhD level students in physics and chemistry Introduction to Spectroscopic Ellipsometry of Thin Film Materials will also earn a place in the libraries of those studying materials science seeking a one stop reference for the applications of spectroscopic ellipsometry to novel developed materials

*Surface Science* R.J. MacDonald, Edmund C. Taglauer, Klaus Wandelt, 2011-12-23 Modern technologies increasingly rely on low dimensional physics at interfaces and in thin films and nano structures Surface science holds a key position in providing the experimental methods and theoretical models for a basic understanding of these effects This book includes case studies and status reports about research topics such as surface structure determination by tensor LEED and surface X ray diffraction the preparation and detection of low dimensional electronic surface states quantitative surface compositional analysis the dynamics of adsorption and reaction of adsorbates e g kinetic oscillations the characterization and control of thin film and multilayer growth including the influence of surfactants a critical assessment of the surface physics approach to heterogeneous catalysis

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