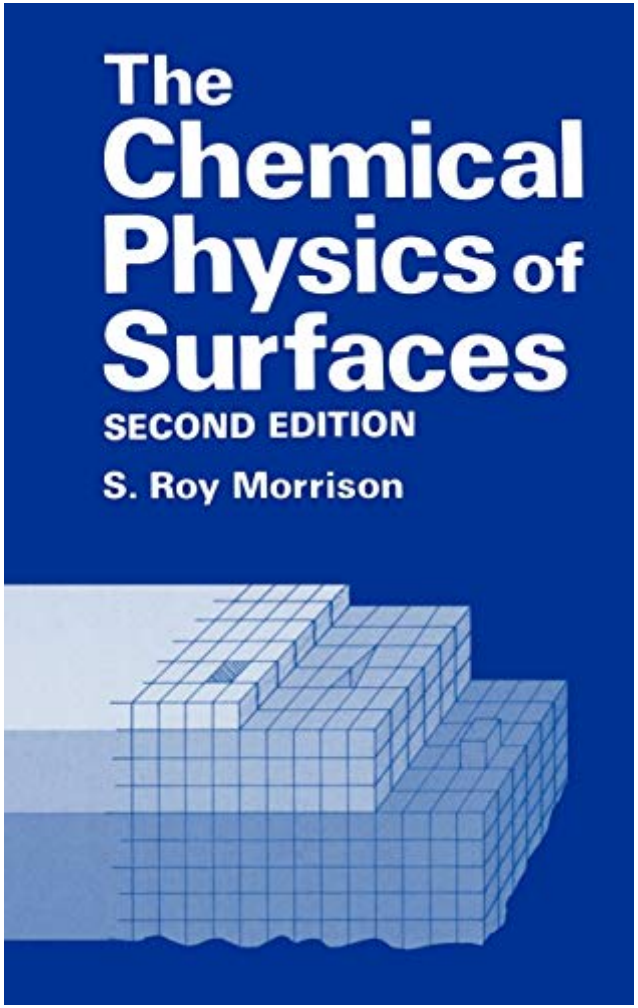

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The Chemical Physics of Surfaces-S.R. Morrison 2013-06-29 of available information. Even more importantly, some authors who have contributed substantially to an area may have been overlooked. For this I apologize. I have, however, not attempted to trace techniques or observa tions historically, so there is no implication (unless specified) that the authors referred to were or were not the originators of a given method or observation. I would like to acknowledge discussions with co-workers at SFU for input relative to their specialties, to acknowledge the help of students who have pointed out errors and difficulties in the earlier presentation, and to acknowledge the infinite patience of my wife Phyllis while I spent my sabbatical and more in libraries and punching computers. S. Roy Morrison 0 1 Contents Notation XV 1. Introduction 1 1. 1. Surface States and Surface Sites . 1 1. 1. 1. The Chemical versus Electronic Representation of the Surface. 1 1. 1. 2. The Surface State on the Band Diagram 4 1. 1. 3. The Fermi Energy in the Surface State Model. 6 1. 1. 4. Need for Both Surface Site and Surface State Models 6 1. 2. Bonding of Foreign Species to the Solid Surface 7 1. 2. 1. Types of Interaction. 7 1. 2. 2. The Chemical Bond . 10 1. 2. 3. Acid and Basic Surface Sites on Solids . 13 1. 2. 4. Adsorbate Bonding on Various Solid Types. 16 1. 2. 5. Movement of Surface Atoms: Relaxation, Reconstruction, and Relocation .

The Chemical Physics of Solid Surfaces-D.A. King 2012-12-02 The Chemical Physics of Solid Surfaces, Volume 6: Coadsorption, Promoters, and Poisons focuses on the processes, reactions, and approaches involved in coadsorption and the functions of promoters and poisons in synthesis and reactions. The selection first offers information on adsorbate-adsorbate interactions on metal surfaces and interaction between alkali metal adsorbates and adsorbed molecules. Discussions focus on coadsorption of alkali metals and other molecules; model experiments of catalyst promotion; effective medium theory; direct and indirect hybridization effects; and elastic interaction between adsorbates. The publication then ponders on coadsorption of carbon monoxide and hydrogen on metal surfaces and adsorption on bimetallic surfaces. The manuscript examines the chemical properties of alloy single crystal surfaces and promotion in ammonia synthesis. Topics include substrate dependence of nitrogen adsorption and ammonia synthesis; effects of promotion on nitrogen dissociation and ammonia synthesis; and theoretical modeling. The text then elaborates on promotion in the Fischer-Tropsch hydrocarbon synthesis, promoters and poisons in the water-gas shift reaction, and strong metal-support interactions. The selection is a recommended reference for physicists and readers interested in coadsorption, promoters, and poisons.

Physics at Surfaces-Andrew Zangwill 1988-03-24 Physics at Surfaces is a unique graduate-level introduction to the physics and chemical physics of solid surfaces, and atoms and molecules that interact with solid surfaces. A subject of keen scientific inquiry since the last century, surface physics emerged as an independent discipline only in the late 1960s as a result of the development of ultra-high vacuum technology and high speed digital

computers. With these tools, reliable experimental measurements and theoretical calculations could at last be compared. Progress in the last decade has been truly striking. This volume provides a synthesis of the entire field of surface physics from the perspective of a modern condensed matter physicist with a healthy interest in chemical physics. The exposition intertwines experiment and theory whenever possible, although there is little detailed discussion of technique. This much-needed text will be invaluable to graduate students and researchers in condensed matter physics, physical chemistry and materials science working in, or taking graduate courses in, surface science.

The Chemical Physics of Solid Surfaces and Heterogeneous Catalysis-D.A. King 2012-12-02 Surface Properties of Electronic Materials is the fifth volume of the series, The Chemical Physics of Solid Surfaces and Heterogeneous Catalysis. This volume indicates the present state of some basic properties of semiconductor surfaces. Chapter one summarizes the general problems in electronic materials and the areas affected by the surface science methods. The next two chapters illustrate the existing perception of the electronic and structural properties of elemental and compound semiconductor surfaces. This volume also deals with the properties of adsorption of semiconductors relating to both relevant gas phase species and metals. Chapters four to six of this volume explore compound semiconductors and elemental semiconductors. The remaining chapters of this volume explore the adsorption of metals on elemental semiconductors; aspects of growth kinetics and dynamics involved in molecular beam epitaxy; molecular beam epitaxy of silicon; insulators; and metastable phases. The last chapter covers the surface chemistry of dry etching processes.

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 Chemical Physics of Solid Surfaces and Heterogeneous Catalysis-David Anthony King 1984

The Chemical Physics of Solid Surfaces and Heterogeneous Catalysis-David Anthony King 1984

Physics and Chemistry at Oxide Surfaces-Claudine Noguera 1996-09-28 Summarises the present state of knowledge on the microscopic behaviour of oxide surfaces.

Chemical Bonding at Surfaces and Interfaces-Anders Nilsson 2011-08-11 Molecular surface science has made enormous progress in the past 30 years. The development can be characterized by a revolution in fundamental knowledge obtained from simple model systems and by an explosion in the number of experimental techniques. The last 10 years has seen an equally rapid development of quantum mechanical modeling of surface processes using Density Functional Theory (DFT). Chemical Bonding at Surfaces and Interfaces focuses on phenomena and concepts rather than on experimental or theoretical techniques. The aim is to provide the common basis for describing the interaction of atoms and molecules with surfaces and this to be used very broadly in science and technology. The book begins with an overview of structural information on surface adsorbates and discusses the structure of a number of important chemisorption systems. Chapter 2 describes in detail the chemical bond between atoms or molecules and a metal surface in the observed surface structures. A detailed description of experimental information on the dynamics of bond-formation and bond-breaking at surfaces make up Chapter 3. Followed by an in-depth analysis of aspects of heterogeneous

catalysis based on the d-band model. In Chapter 5 adsorption and chemistry on the enormously important Si and Ge semiconductor surfaces are covered. In the remaining two Chapters the book moves on from solid-gas interfaces and looks at solid-liquid interface processes. In the final chapter an overview is given of the environmentally important chemical processes occurring on mineral and oxide surfaces in contact with water and electrolytes. Gives examples of how modern theoretical DFT techniques can be used to design heterogeneous catalysts This book suits the rapid introduction of methods and concepts from surface science into a broad range of scientific disciplines where the interaction between a solid and the surrounding gas or liquid phase is an essential component Shows how insight into chemical bonding at surfaces can be applied to a range of scientific problems in heterogeneous catalysis, electrochemistry, environmental science and semiconductor processing Provides both the fundamental perspective and an overview of chemical bonding in terms of structure, electronic structure and dynamics of bond rearrangements at surfaces

Chemistry and Physics of Solid Surfaces-Chemical Rubber Company 1977

Physics and Chemistry of Surfaces-Jacques Oudar 1975

Principles of Surface Physics-Friedhelm Bechstedt 2012-12-06 An innovative, unified, and comprehensive treatment of the geometric and electronic structure of surfaces. The book emphasizes fundamental aspects, such as the principles of surface crystallography and thermodynamics, the forces driving the rearrangement of the atoms, and the relationship between bonding and electronic structure. It especially illuminates the relationship between surface orientation, chemistry, energetics, and the resulting properties. Principles of Surface Physics develops general physical arguments and methods that enable readers to analyse novel surfaces and interfaces of new materials. This makes the book an indispensable reference to all those studying growth, surface-molecule interactions, self-assembled structures, and materials engineering.

Solids and Surfaces-Roald Hoffmann 2021-01-29

Introduction to Surface Magnetism-Takahito Kaneyoshi 1990-12-13 This book has been designed as an introductory text to surface magnetism for physics and material science students. General topics discussed include the physical characteristics of magnetically ordered systems, the structural aspects of surfaces, magnetic surfaces, the Weiss molecular field and other effective field theories, the scaling concept and scaling relations, ferro- and ferrimagnetism, and spin waves. Introduction to Surface Magnetism includes 85 figures and 6 tables to help summarize information presented in the book.

Chemical Physics of Surfaces, Catalysis and Membranes-Per-Olov Löwdin 1978

Atomic Clusters- 2007-06-07 Atomic Clusters: From Gas Phase to Deposited brings together a series of chapters, prepared by acknowledged experts in their fields. Both fundamental and practical aspects are addressed of the physics and chemistry of a novel state of matter, namely clusters of small numbers of atoms of nanometre dimensions. This is a field of nanoscience that existed before the word was invented, but has particularly achieved major advances in the recent years. * Contributions from leading experts in solid surfaces research * Cluster science is concerned with the properties of materials on the nano-metre scale * Brings together work on both free (gas-phase) clusters and those deposited on surfaces

Growth and Properties of Ultrathin Epitaxial Layers- 1997-06-18 Although there has been steady progress in understanding aspects of epitaxial growth throughout the last 30 years of modern surface science,

work in this area has intensified greatly in the last 5 years. A number of factors have contributed to this expansion. One has been the general trend in surface science to tackle problems of increasing complexity as confidence is gained in the methodology, so for example, the role of oxide/metal interfaces in determining the properties of many practical supported catalysts is now being explored in greater detail. A second factor is the recognition of the potential importance of artificial multilayer materials not only in semiconductor devices but also in metal/metal systems because of their novel magnetic properties. Perhaps even more important than either of these application areas, however, is the newly-discovered power of scanning probe microscopies, and most notably scanning tunneling microscopy (STM), to provide the means to study epitaxial growth phenomena on an atomic scale under a wide range of conditions. These techniques have also contributed to revitalised interest in methods of fabricating and exploiting artificial structures (lateral as well as in layers) on a nanometre scale. This volume, on Growth and Properties of Ultrathin Epitaxial Layers, includes a collection of articles which reflects the present state of activity in this field. The emphasis is on metals and oxides rather than semiconductors.

Quantum Theory of Scattering Processes-John Edward George Farina 1973

Operando Research in Heterogeneous Catalysis-Joost Frenken 2016-12-26 This book is devoted to the emerging field of techniques for visualizing atomic-scale properties of active catalysts under actual working conditions, i.e. high gas pressures and high temperatures. It explains how to understand these observations in terms of the surface structures and dynamics and their detailed interplay with the gas phase. This provides an important new link between fundamental surface physics and chemistry, and applied catalysis. The book explains the motivation and the necessity of operando studies, and positions these with respect to the more traditional low-pressure investigations on the one hand and the reality of industrial catalysis on the other. The last decade has witnessed a rapid development of new experimental and theoretical tools for operando studies of heterogeneous catalysis. The book has a strong emphasis on the new techniques and illustrates how the challenges introduced by the harsh, operando conditions are faced for each of these new tools. Therefore, one can also read this book as a collection of recipes for the development of operando instruments. At present, the number of scientific results obtained under operando conditions is still limited and mostly focused on a simple test reaction, the catalytic oxidation of CO. This reaction thus forms a natural binding element between the chapters, linking the demonstrations of new techniques, and also connecting the theoretical and experimental studies. Some first results on other reactions are also presented. If there is one thing that can be concluded already in this early stage, it is that the catalytic conditions themselves can have dramatic effects on the structure and composition of the surfaces of catalysts, which, in turn can greatly affect the mechanisms, the activity, and the selectivity of the chemical reactions that they catalyze.

Physical Chemistry of Surfaces-Arthur W. Adamson 1982

Research Methodology on Interfaces of Physics and Chemistry in Micro and Nanoscale Materials-Nekane Guarrotxena 2014-08-04 This book covers a selection of recent research studies and new developments in physics and chemistry in micro and nanoscale materials. It brings together research contributions from eminent experts in the field from both academic and industry, providing the latest developments in advanced materials chemical domains.

Chemical Physics of Nanostructured Semiconductors-Alexander I. Kokorin 2003-07-31 Deep and detailed discussions on chemistry, chemical physics, photoelectrochemistry, photophysics, photocatalysis and possible applications of nanostructured semiconductor materials have shown increasing interest in the matter by scientists representing various research areas as well as industrial enterprises. Indeed, solar energy conversion and ch

Statistical Thermodynamics Of Surfaces, Interfaces, And Membranes-Samuel Safran 2018-03-08 Understanding the structural and thermodynamic properties of surfaces, interfaces, and membranes is important for both fundamental and practical reasons. Important applications include coatings, dispersants, encapsulating agents, and biological materials. Soft materials, important in the development of new materials and the basis of many biological systems, cannot be designed using trial and error methods due to the multiplicity of components and parameters. While these systems can sometimes be analyzed in terms of microscopic mixtures, it is often conceptually simpler to regard them as dispersions and to focus on the properties of the internal interfaces found in these systems. The basic physics centers on the properties of quasi-two-dimensional systems embedded in the three-dimensional world, thus exhibiting phenomena that do not exist in bulk materials. This approach is the basis behind the theoretical presentation of Statistical Thermodynamics of Surfaces, Interfaces, and Membranes. The approach adapted allows one to treat the rich diversity of phenomena investigated in the field of soft matter physics (including both colloid/interface science as well as the materials and macromolecular aspects of biological physics) such as interfacial tension, the roughening transition, wetting, interactions between surfaces, membrane elasticity, and self-assembly. Presented as a set of lecture notes, this book is aimed at physicists, physical chemists, biological physicists, chemical engineers, and materials scientists who are interested in the statistical mechanics that underlie the macroscopic, thermodynamic properties of surfaces, interfaces, and membranes. This paperback edition contains all the material published in the original hard-cover edition as well as additional clarifications and explanations.

Surface and Interface Chemistry of Clay Minerals-Robert Schoonheydt 2018-11-05 Surface and Interface Chemistry of Clay Minerals, Volume 9, delivers a fundamental understanding of the surface and interface chemistry of clay minerals, thus serving as a valuable resource for researchers active in the fields of materials chemistry and sustainable chemistry. Clay minerals, with surfaces ranging from hydrophilic, to hydrophobic, are widely studied and used as adsorbents. Adsorption can occur at the edges and surfaces of clay mineral layers and particles, and in the interlayer region. This diversity in properties and the possibility to tune the surface properties of clay minerals to match the properties of adsorbed molecules is the basis for study. This book requires a fundamental understanding of the surface and interface chemistry of clay minerals, and of the interaction between adsorbate and adsorbent. It is an essential resource for clay scientists, geologists, chemists, physicists, material scientists, researchers, and students. Presents scientists and engineers with a resource they can rely on for their own research and work involving clay minerals Includes an in-depth look at ion exchange, adsorption of inorganic and organic molecules, including polymers and proteins, and catalysis occurring at the surfaces of clay minerals Includes materials chemistry of clay minerals with chiral clay minerals, optical materials and functional films

Physics of Solid Surfaces-G. Chiarotti 2018-02-02 The reader will get an overview of the past and present research in all fields of Surface Science. Readers not familiar with a given field will benefit from the tutorial character of the Introductions, as a rule present in every chapter. Throughout the book emphasis is mainly given to clean surfaces although sometimes adsorbate-covered surfaces are also accounted for. Many readers will be particularly interested in chapters dealing with recently developed topics (graphene, nanotubes, metal oxides, solid-liquid interfaces, theoretical simulations, manipulation of atoms at surfaces with the methods of scanning probe microscopy, Casimir effect, etc.), for which research is continuously evolving. As it is customary in the LB Series, the results obtained in a given field are quoted as thoroughly as possible. The most relevant among them are presented in the form of figures (or tables), and comments or comparisons with other results are usually provided.

Introduction to Surface Physical Chemistry-K. Christmann 2013-06-29

Reactions at Solid Surfaces-Gerhard Ertl 2010-06-17 Expanding on the ideas first presented in Gerhard Ertl's acclaimed Baker Lectures at Cornell University, Reactions at Solid Surfaces comprises an authoritative, self-

contained, book-length introduction to surface reactions for both professional chemists and students alike. Outlining our present understanding of the fundamental processes underlying reactions at solid surfaces, the book provides the reader with a complete view of how chemistry works at surfaces, and how to understand and probe the dynamics of surface reactions. Comparing traditional surface probes with more modern ones, and bringing together various disciplines in a cohesive manner, Gerhard Ertl's Reactions at Solid Surfaces serves well as a primary text for graduate students in introductory surface science or chemistry, as well as a self-teaching resource for professionals in surface science, chemical engineering, or nanoscience.

Colloid and Surface Chemistry-E.D. Shchukin 2001-12-19 This book covers major areas of modern Colloid and Surface Science (in some countries also referred to as Colloid Chemistry) which is a broad area at the intersection of Chemistry, Physics, Biology and Material Science investigating the disperse state of matter and surface phenomena in disperse systems. The book arises of and summarizes the progress made at the Colloid Chemistry Division of the Chemistry Department of Lomonosov Moscow State University (MSU) over many years of scientific, pedagogical and methodological work. Throughout the book the presentation of fundamental theoretical and experimental approaches and results is combined with discussion of general scientific basis of their role in nature and applications in various technological processes.

Interaction of Atoms and Molecules with Solid Surfaces-V. Bortolani 2013-11-22 There is considerable interest, both fundamental and technological, in the way atoms and molecules interact with solid surfaces. Thus the description of heterogeneous catalysis and other surface reactions requires a detailed understand ing of molecule-surface interactions. The primary aim of this volume is to provide fairly broad coverage of atoms and molecules in interaction with a variety of solid surfaces at a level suitable for graduate students and research workers in condensed matter physics, chemical physics, and materials science. The book is intended for experimental workers with interests in basic theory and concepts and had its origins in a Spring College held at the International Centre for Theoretical Physics, Miramare, Trieste. Valuable background reading can be found in the graduate-Ievel introduction to the physics of solid surfaces by ZangwilI(1) and in the earlier works by Garcia Moliner and F1ores(2) and Somorjai.(3) For specifically molecule-surface interac tions, additional background can be found in Rhodin and Ertl(4) and March.(S) V. Bortolani N. H. March M. P. Tosi References 1. A. Zangwill, Physics at Surfaces, Cambridge University Press, Cambridge (1988). 2. F. Garcia-Moliner and F. Flores, Introduction to the Theory of Solid Surfaces, Cambridge University Press, Cambridge (1979). 3. G. A. Somorjai, Chemistry in Two Dimensions: Surfaces, Cornell University Press, Ithaca, New York (1981). 4. T. N. Rhodin and G. Erd, The Nature of the Surface Chemical Bond, North-Holland, Amsterdam (1979). 5. N. H. March, Chemical Bonds outside Metal Surfaces, Plenum Press, New York (1986).

Research Methodology in Physics and Chemistry of Surfaces and Interfaces-Nekane Guarrotxena 2016-04-19 This book covers a selection of recent research studies and new developments in physics and chemistry in micro and nanoscale materials. It brings together research contributions from eminent experts in the field from both academic and industry, providing the latest developments in advanced materials chemical domains.

Liquid Surfaces and Interfaces-Peter S. Pershan 2012-08-02 A practical guide for graduate students and researchers on all aspects of x-ray scattering experiments on liquid surfaces and interfaces.

Introduction to Surface Physics-M. Prutton 1994 This text provides a broad introduction to surface physics, covering key areas of surface studies. It is intended for final year undergraduates and recent graduates.

Handbook of Surfaces and Interfaces of Materials: Surface and interface phenomena-Hari Singh Nalwa 2001 This handbook brings together, under a single cover, all aspects of the chemistry, physics, and engineering of surfaces and interfaces of materials currently studied in

academic and industrial research. It covers different experimental and theoretical aspects of surfaces and interfaces, their physical properties, and spectroscopic techniques that have been applied to a wide class of inorganic, organic, polymer, and biological materials. The diversified technological areas of surface science reflect the explosion of scientific information on surfaces and interfaces of materials and their spectroscopic characterization. The large volume of experimental data on chemistry, physics, and engineering aspects of materials surfaces and interfaces remains scattered in so many different periodicals, therefore this handbook compilation is needed. The information presented in this multivolume reference draws on two decades of pioneering research on the surfaces and interfaces of materials to offer a complete perspective on the topic. These five volumes-Surface and Interface Phenomena; Surface Characterization and Properties; Nanostructures, Micelles, and Colloids; Thin Films and Layers; Biointerfaces and Applications-provide multidisciplinary review chapters and summarize the current status of the field covering important scientific and technological developments made over past decades in surfaces and interfaces of materials and spectroscopic techniques with contributions from internationally recognized experts from all over the world. Fully cross-referenced, this book has clear, precise, and wide appeal as an essential reference source long due for the scientific community. The complete reference on the topic of surfaces and interfaces of materials The information presented in this multivolume reference draws on two decades of pioneering research Provides multidisciplinary review chapters and summarizes the current status of the field Covers important scientific and technological developments made over past decades in surfaces and interfaces of materials and spectroscopic techniques Contributions from internationally recognized experts from all over the world.

Surface Science-Kurt W. Kolasinski 2012-03-30 Surface science has evolved from being a sub-field of chemistry or physics, and has now established itself as an interdisciplinary topic. Knowledge has developed sufficiently that we can now understand catalysis from a surface science perspective. No-where is the underpinning nature of surface science better illustrated than with nanoscience. Now in its third edition, this successful textbook aims to provide students with an understanding of chemical transformations and the formation of structures at surfaces. The chapters build from simple to more advanced principles with each featuring exercises, which act not only to demonstrate concepts arising in the text but also to form an integral part of the book, with the last eight chapters featuring worked solutions. This completely revised and expanded edition features: More than 100 new pages of extensive worked solutions New topics, including: Second harmonic generation (SHG), Sum Frequency Generation (SFG) at interfaces and capillary waves An expanded treatment of charge transfer and carbon-based materials including graphene Extended ‘Frontiers and Challenges’ sections at the end of each chapter. This text is suitable for all students taking courses in surface science in Departments of Chemistry, Physics, Chemical Engineering and Materials Science, as well as for researchers and professionals requiring an up-to-date review of the subject.

Surface Properties-Ilya Prigogine 1997-12-02 The study of surfaces has experienced dramatic growth over the past decade. Now, the editors of the internationally celebrated series Advances in Chemical Physics have brought together in this self-contained, special topic volume contributions from leading researchers in the field treating some of the most crucial aspects of the experimental and theoretical study of surfaces. This work delves into such core issues as: * Kinetics and dynamics of hydrogen adsorption on silicon surfaces. * Potential energy surfaces of transition-metal-catalyzed chemical reactions. * High-resolution helium atom scattering as a proof of surface vibrations. * Ordering and phase transitions in adsorbed monolayers of diatomic molecules. * The influence of dimensionality on static and dynamic properties of a system. * New applications to fields as varied as catalysts and the passage of molecules through membranes. This valuable resource provides important insights into the current state of knowledge about surface properties. Prigogine and Rice's latest work will stimulate the imagination and motivate the exploration of other aspects of this fascinating subject.

Electronic Structure and the Properties of Solids-Walter A. Harrison 2012-03-08 This text offers basic understanding of the electronic structure of covalent and ionic solids, simple metals, transition metals and their compounds; also explains how to calculate dielectric, conducting, bonding

properties.

Physics and Chemistry of Interfaces-Hans-Jürgen Butt 2013-04-15 The third edition of this excellent textbook for advanced students in material science, chemistry, physics, biology, engineering, or for researchers needing background knowledge in surface and interface science. The general yet comprehensive introduction to this field focuses on the essential concepts rather than specific details, on intuitive understanding rather than learning facts. The text reflects the many facets of this discipline by linking physical fundamentals, especially those taken from thermodynamics, with application-specific topics. Similarly, the theory behind important concepts is backed by clearly explained scientific-engineering aspects, as well as by a wide range of high-end applications from microelectronics and biotechnology. Manifold high-end applications from surface technology, biotechnology, and microelectronics are used to illustrate the basic concepts. New to this edition are such hot topics as second harmonic generation spectroscopy, surface diffusion mechanisms and measurement of surface diffusion, optical spectroscopy of surfaces, atomic layer deposition, superlubricity, bioadhesion, and spin coating. At the same time, the discussions of liquid surfaces, the Marangoni effect, electric double layer, measurement of surface forces, wetting, adsorption, and experimental techniques have been updated, while the number and variety of exercises are increased, and the references updated.

Modern Techniques of Surface Science-Delchasss Woodruff 1994-03-03 Revised and expanded second edition of the standard work on new techniques for studying solid surfaces.

Atomic Clusters- 2007-05-24 Atomic Clusters: From Gas Phase to Deposited brings together a series of chapters, prepared by acknowledged experts in their fields. Both fundamental and practical aspects are addressed of the physics and chemistry of a novel state of matter, namely clusters of small numbers of atoms of nanometre dimensions. This is a field of nanoscience that existed before the word was invented, but has particularly achieved major advances in the recent years. * Contributions from leading experts in solid surfaces research * Cluster science is concerned with the properties of materials on the nano-metre scale * Brings together work on both free (gas-phase) clusters and those deposited on surfaces

Surface Crystallography by LEED-M.A. van Hove 2012-12-06 Surface science has experienced an impressive growth in the last two decades. The attention has focussed mainly on single-crystal surfaces with, on the atomic scale, relatively simple and well-defined structures (for example, clean surfaces and such surfaces with limited amounts of additional foreign atoms and molecules). One of the most fundamental types of information needed about solid surfaces concerns the relative atomic positions. The geometrical arrangement of surface atoms influences most physical and chemical properties of surfaces, the list of which is long and includes a number of important technological applications: electronic surface states, contact potentials, work functions, oxidation, heterogeneous catalysis, friction, adhesion, crys tal growth etc. Surface crystallography - the determination of relative atomic positions at surfaces - has found a successful tool in Low-Energy Electron Diffraction (LEED): this technique has now determined the atomic positions for nearly a hundred surfaces, whether in the clean state or with additional foreign atoms or molecules. The main aim of this book is to publish a set of computer pro grams that has been specifically designed for and extensively used in surface crystallography by LEED. These programs are based on the dynamical (i.e.