Molecular Vibration Dynamics In Molecule Surface Interactions

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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).
Publications of the National Bureau of Standards ... Catalog - United States. National Bureau of Standards 1984

Electron Dynamics in Molecular Interactions - Frank Hagelberg 2013-12-23
This volume provides a comprehensive introduction to the theory of electronic motion in molecular processes — an increasingly relevant and rapidly expanding segment of molecular quantum dynamics. Emphasis is placed on describing and interpreting transitions between electronic states in molecules as they occur typically in cases of reactive scattering between molecules, photoexcitation or nonadiabatic coupling between electronic and nuclear degrees of freedom. Electron Dynamics in Molecular Interactions aims at a synoptic presentation of some very recent theoretical efforts to solve the electronic problem in quantum molecular dynamics, contrasting them with more traditional schemes. The presented models are derived from their roots in basic quantum theory, their interrelations are discussed, and their characteristic applications to concrete chemical systems are outlined. This volume also includes an assessment of the present status of electron dynamics and a report on novel developments to meet the current challenges in the field. Further, this monograph responds to a need for a systematic comparative treatise on nonadiabatic theories of quantum molecular dynamics, which are of considerably higher complexity than the more traditional adiabatic approaches and are steadily gaining in importance. This volume addresses a broad readership ranging from physics or chemistry graduate students to specialists in the field of theoretical quantum dynamics. Contents:Preparations:Ab Initio Theory of Electronic StructureThe Adiabatic and the Diabatic RepresentationBasic Concepts of Scattering TheorySemiclassical NotionsOpen Systems: Elements of Rate TheoryMethods:Time-Independent Theory of Molecular Collisions I: Multichannel ScatteringTime-Independent Theory of Molecular Collisions II: The Electronic ProblemThe Time-Dependent Self-consistent Field TheoryEvolution of Coherent Molecular States: Electron Nuclear Dynamics TheoryThe Classical Electron AnalogHopping and SpawningSemiclassical Propagator TechniquesQuantum Hydrodynamics I: Coupled Trajectories in Bohmian MechanicsQuantum Hydrodynamics II: The Semiclassical Liouville-Von Neumann EquationWavepacket Propagation MethodsDensity Functional DynamicsDecoherenceSpecial Topics:Ultrafast Optical SpectroscopyOptical Control of Electron Multistate Molecular DynamicsElectron Transfer in Condensed MediaElectronic Friction in Molecule-Surface Interactions Readership: Graduate students and researchers in physical chemistry and computational physics; industrial chemists and physicists interested in the field. Key Features:This book provides an overview of the recent nonadiabatic theories of quantum molecular dynamics that are widely used and highly acknowledged in the community of physical chemistsThere is currently no other book available in the market that shares the publication scope of this bookIt can be used as a supplementary textbook to graduate level course in quantum chemistry or chemical dynamicsKeywords:Nonadiabatic Processes;Electronic Transitions;Molecular Dynamics;Quantum Trajectories;Wavepacket Propagation
Electron Energy Loss Spectroscopy and Surface Vibrations - H. Ibach 2013-10-22
Electron Energy Loss Spectroscopy and Surface Vibrations is devoted to electron energy loss spectroscopy as a probe of the crystal surface. Electrons with energy in the range of a few electron volts sample only a few atomic layers. As they approach or exit from the crystal, they interact with the vibrational modes of the crystal surface, or possibly with other elementary excitations localized there. The energy spectrum of electrons back-reflected from the surface is thus a rich source of information on its dynamics. The book opens with a detailed analysis of the physics that controls the operation of the monochromator, which is the core of the experimental apparatus. Separate chapters follow on the interaction of electrons with vibrational modes of the surface region and with other elementary excitations in the vicinity; the lattice dynamics of clean and adsorbate-covered surfaces, with emphasis on those features of particular relevance to surface vibrational spectroscopy; and selected applications vibration spectroscopy in surface physics and chemistry.
Encyclopedia of Interfacial Chemistry - 2018-03-29
Encyclopedia of Interfacial Chemistry: Surface Science and Electrochemistry summarizes current, fundamental knowledge of interfacial chemistry, bringing readers the latest developments in the field. As the chemical and physical properties and processes at solid and liquid interfaces are the scientific basis of so many technologies which enhance our lives and create new opportunities, its important to highlight how these technologies enable the design and optimization of functional materials for heterogeneous and electro-catalysts in food production, pollution control, energy conversion and storage, medical applications requiring biocompatibility, drug delivery, and more. This book provides an interdisciplinary view that lies at the intersection of these fields. Presents fundamental knowledge of interfacial chemistry, surface science and electrochemistry and provides cutting-edge research from academics and practitioners across various fields and global regions
The Physics of Living Processes - Thomas Andrew Waigh 2014-08-08

This full-colour undergraduate textbook, based on a two semestercourse, presents the fundamentals of biological physics,introducing essential modern topics that include cells, polymers,polyelectrolytes, membranes, liquid crystals, phase transitions,self-assembly, photonics, fluid mechanics, motility, chemicalkinetics, enzyme kinetics, systems biology, nerves, physiology, thesenses, and the brain. The comprehensive coverage, featuring in-depth explanations ofrecent rapid developments, demonstrates this to be one of the mostdiverse of modern scientific disciplines. The Physics of Living Processes: A Mesoscopic Approach iscomprised of five principal sections: • Building Blocks • Soft Condensed Matter Techniques in Biology • Experimental Techniques • Systems Biology • Spikes, Brains and the Senses The unique focus is predominantly on the mesoscale —structures on length scales between those of atoms and themacroscopic behaviour of whole organisms. The connections betweenmolecules and their emergent biological phenomena provide a novelintegrated perspective on biological physics, making this animportant text across a variety of scientific disciplines includingbiophysics, physics, physical chemistry, chemical engineering andbioengineering. An extensive set of worked tutorial questions are included,which will equip the reader with a range of new physical tools toapproach problems in the life sciences from medicine,pharmaceutical science and agriculture.

Focus on Surface Science Research - Charles P. Norris 2006

This new book covers the physics and chemistry of surfaces. The scope includes the structure, thermodynamics, and mobility of clean surfaces, as well as the interaction of gas molecules with solid surfaces. The energetic particle interactions that are the basis for the majority of techniques developed to reveal the structure and chemistry of surfaces are explored including auger electron spectroscopy, photoelectron spectroscopy, inelastic scattering of electrons and ions, low energy electron diffraction, scanning probe microscopy, and interfacial segregation. Crystal nucleation and growth are also considered. Principles such as adsorption, desorption and reactions between adsorbates are examined, with coverage also of new developments in the growth of epitaxial, and Langmuir-Blodgett films, as well as treatment of the etching of surfaces. Modern analytical techniques and applications to thin films and nanostructures are included. The latest in-depth research from around the world is presented.

Dynamics of Gas-Surface Interaction - Giorgio Benedek 2012-12-06

In recent decades surface science has experienced a large growth in connection with the development of various experimental techniques which are able to characterize solid surfaces through the observation of the scattering of ions, electrons, photons or atoms. These methods of investigation, known under different labels such as LEED, AES, XPS, UPS, etc. have been extensively applied in describing the structure, morphology, and chemical and physical properties of crystal surfaces and interfaces of a large variety of materials of interest in solid-state physics, electronics, metallurgy, biophysics, and heterogeneous catalysis. Among these methods we wish to emphasize molecular beam scattering from solid surfaces. ~lolecular beam scattering has gone through a large development in the last ten years. In this decade a large number of laboratories have used this method to study various clean and adsorbate-covered surfaces. The technique is nonetheless quite old. It dates back to the beginning of the thirties, when Estermann and Stern performed the first atom diffraction experiment proving the wave nature of atoms. In the following years the entire subject of gas-surface interaction was considered a branch of rarefied gas dynamics and developed in connection with aerospace research. Attention was then given to the integral properties of gas-solid interactions (sticking and energy accomodation, mean momentum transfer) rather than to atom-surface scatter ing from well-characterized surfaces.

Laser Spectroscopy and Photochemistry on Metal Surfaces - Hai-Lung Dai 1995

Using lasers to induce and probe surface processes has the advantages of quantum state specificity, species selectivity, surface sensitivity, fast time-resolution, high frequency resolution, and accessibility to full pressure ranges. These advantages make it highly desirable to use light to induce, control, or monitor surface chemical and physical processes. Recent applications of laser based techniques in studying surface processes have stimulated new developments and enabled the understanding of fundamental problems in energy transfer and reactions. This volume will include discussions on spectroscopic techniques, energy transfer, desorption dynamics, and photochemistry.

Molecular Dynamics and Spectroscopy by Stimulated Emission Pumping - Hai-Lung Dai 1995

Since the first stimulated emission pumping (SEP) experiments more than a decade ago, this technique has proven powerful for studying vibrationally excited molecules. SEP is now widely used by increasing numbers of research groups to investigate fundamental problems in spectroscopy, intramolecular dynamics, intermolecular interactions, and even reactions. SEP provides rotationally pre-selected spectra of vibrationally highly excited molecules undergoing large amplitude motions. A unique feature of SEP is the ability to access systematically a wide variety of extreme excitations localized in various parts of a molecule, and to prepare populations in specific, high vibrational levels. SEP has made it possible to ask and answer specific questions about intramolecular vibrational redistribution and the role of vibrational excitation in chemical reactions.

Dynamics of Molecule Surface Interaction - Gert Due Billing 2000-01-03

Chemical reactions at surfaces do not follow the same reaction dynamics as atoms in the gas phase. The changes from "ideal" interactions depend on the electronic structure and the spatial and geometric shape of the surface. The dynamics of chemical reactions at surfaces have all the complexity of gas-phase molecules reaction dynamics, plus those associated with the additional phenomena due to the presence of a solid surface.

Publications of the National Institute of Standards and Technology ... Catalog - National Institute of Standards and Technology (U.S.) 1985

Scientific and Technical Aerospace Reports - 1994

Introduction to Surface Chemistry and Catalysis - Gabor A. Somorjai 2010-06-08

Now updated-the current state of development of modern surface science Since the publication of the first edition of this book, molecular surface chemistry and catalysis science have developed rapidly and expanded into fields where atomic scale and molecular information were previously not available. This revised edition of Introduction to Surface Chemistry and Catalysis reflects this increase of information in virtually every chapter. It emphasizes the modern concepts of surface chemistry and catalysis uncovered by breakthroughs in molecular-level studies of surfaces over the past three decades while serving as a reference source for data and concepts related to properties of surfaces and interfaces. The book opens with a brief history of the evolution of surface chemistry and reviews the nature of various surfaces and interfaces encountered in everyday life. New research in two crucial areas-nanomaterials and polymer and biopolymer interfaces-is emphasized, while important applications in tribology and catalysis, producing chemicals and fuels with high turnover and selectivity, are addressed. The basic concepts surrounding various properties of surfaces such as structure, thermodynamics, dynamics, electrical properties, and surface chemical bonds are presented. The techniques of atomic and molecular scale studies of surfaces are listed with references to up-to-date review papers. For advanced readers, this book covers recent developments in in-situ surface analysis such as high- pressure scanning tunneling microscopy, ambient pressure X-ray photoelectron spectroscopy, and sum frequency generation vibrational spectroscopy (SFG). Tables listing surface structures and data summarizing the kinetics of catalytic reactions over metal surfaces are also included. New to this edition: A discussion of new physical and chemical properties of nanoparticles Ways to utilize new surface science techniques to study properties of polymers, reaction intermediates, and mobility of atoms and molecules at surfaces Molecular-level studies on the origin of the selectivity for several catalytic reactions A microscopic understanding of mechanical properties of surfaces Updated tables of experimental data A new chapter on "soft" surfaces, polymers, and biointerfaces Introduction to Surface Chemistry and Catalysis serves as a textbook for undergraduate and graduate students taking advanced courses in physics, chemistry, engineering, and materials science, as well as researchers in surface science, catalysis science, and their applications.

Spectroscopy for Surface Science - R. J. H. Clark 1998-03-06

Surface analysis deals with characterizing and understanding the behavior of molecules which react on the surface between two substances. The latest self-contained volume in this long established and respected series of review articles on applications and instrumental developments in spectroscopy presents a high quality treatment of the frontiers of research occurring in modern spectroscopic methods. The

internationally renowned authors have taken care to make their work accessible to experts and non-experts alike.

Studying Complex Surface Dynamical Systems Using Helium-3 Spin-Echo Spectroscopy - Barbara A. J. Lechner 2014-04-23

Chemical reactions and growth processes on surfaces depend on the diffusion and re-orientation of the adsorbate molecules. A fundamental understanding of the forces guiding surface motion is thus of utmost importance for the advancement of many fields of science and technology. To date, our understanding of the principles underlying surface dynamics remains extremely limited, due to the difficulties involved in measuring these processes experimentally. The helium-3 spin-echo (HeSE) technique is uniquely capable of probing such surface dynamical phenomena. The present thesis extends the field of application of HeSE from atomic and small molecular systems to more complex systems. Improvements to the supersonic helium beam source, a key component of the spectrometer, as well as a detailed investigation of a range of five-membered aromatic adsorbate species are presented. The thesis provides a comprehensive description of many aspects of the HeSE method - instrumentation, measurement and data analysis - and as such offers a valuable introduction for newcomers to the field.

Molecular Reaction Dynamics - Raphael D. Levine 2009-06-04

Molecular reaction dynamics is the study of chemical and physical transformations of matter at the molecular level. The understanding of how chemical reactions occur and how to control them is fundamental to chemists and interdisciplinary areas such as materials and nanoscience, rational drug design, environmental and astrochemistry. This book provides a thorough foundation to this area. The first half is introductory, detailing experimental techniques for initiating and probing reaction dynamics and the essential insights that have been gained. The second part explores key areas including photoselective chemistry, stereochemistry, chemical reactions in real time and chemical reaction dynamics in solutions and interfaces. Typical of the new challenges are molecular machines, enzyme action and molecular control. With problem sets included, this book is suitable for advanced undergraduate and graduate students, as well as being supplementary to chemical kinetics, physical chemistry, biophysics and materials science courses, and as a primer for practising scientists.

Structures and Conformations of Non-Rigid Molecules - J. Laane 2012-12-06

From the beginnings of modern chemistry, molecular structure has been a lively area of research and speculation. For more than half a century spectroscopy and other methods have been available to characterize the structures and shapes of molecules, particularly those that are rigid. However, most molecules are at least to some degree non-rigid and this non-rigidity plays an important role in such diverse areas as biological activity, energy transfer, and chemical reactivity. In addition, the large-amplitude vibrations present in non-rigid molecules give rise to unusual low-energy vibrational level patterns which have a dramatic effect on the thermodynamic properties of these systems. Only in recent years has a coherent picture of the energetics and dynamics of the conformational changes inherent in non-rigid (and semi-rigid) molecules begun to emerge. Advances have been made in a number of different experimental areas: vibrational (infrared and Raman) spectroscopy, rotational (microwave) spectroscopy, electron diffraction, and, most recently, laser techniques probing both the ground and excited electronic states. Theoretically, the proliferation of powerful computers coupled with scientific insight has allowed both empirical and ab initio methods to increase our understanding of the forces responsible for the structures and energies of non-rigid systems. The development of theory (group theoretical methods and potential energy surfaces) to understand the unique characteristics of the spectra of these floppy molecules has also been necessary to reach our present level of understanding. The thirty chapters in this volume contributed by the key speakers at the Workshop are divided over the various areas. Both vibrational and rotational spectroscopy have been effective at determining the potential energy surfaces for non-rigid molecules, often in a complementary manner. Recent laser fluorescence work has extended these types of studies to electronic excited states. Electronic diffraction methods provide radial distribution functions from which both molecular structures and compositions of conformational mixtures can be found. Ab initio calculations have progressed substantially over the past few years, and, when carried out at a sufficiently high level, can accurately reproduce (or predict ahead of time) experimental findings. Much of the controversy of the ARW related to the question of when an ab initio is reliable. Since the computer programs are readily available, many poor calculations have been carried out. However, excellent results can be obtained from computations when properly done. A similar situation exists for experimental analyses. The complexities of non-rigid molecules are many, but major strides have been taken to understand their structures and conformational processes.

Frontiers in Surface Science and Interface Science - C.B. Duke 2002-05-21

Any notion that surface science is all about semiconductors and coatings is laid to rest by this encyclopedic publication: Bioengineered interfaces in medicine, interstellar dust, DNA computation, conducting polymers, the surfaces of atomic nuclei - all are brought up to date. Frontiers in Surface and Interface Science - a milestone publication deserving a wide readership. It combines a sweeping expert survey of research today with an educated look into the future. It is a future that embraces surface phenomena on scales from the subatomic to the galactic, as well as traditional topics like semiconductor design, catalysis, and surface processing, modeling and characterization. And, great efforts have been made to express sophisticated ideas in an attractive and accessible way. Nanotechnology, surfaces for DNA computation, polymer-based electronics, soft surfaces, interstellar surface chemistry - all feature in this comprehensive collection.

Laser Techniques for State-selected and State-to-state Chemistry - 1993

Government Reports Announcements & Index - 1989

Dynamics - 2008-10-09

This volume of the Handbook of Surface Science covers all aspects of the dynamics of surface processes. Two dozen world leading experts in this field address the subjects of energy exchange in gas atoms, surface collisions, the rules governing dissociative adsorption on surfaces, the formation of nanostructures on surfaces by self-assembly, and the study of surface phenomena using ultra-fast lasers. The chapters are written for both newcomers to the field as well as researchers. • Covers all aspects of the dynamics of surface processes • Provides understanding of this unique field utilizing a multitude of accurate experiments and advanced microscopic theory that allows quantum-level comparisons • Presents the concepts and tools relevant beyond surface science for catalysis, nanotechnology, biology, medicine, and materials

Surface Dynamics - 2003-11-07

While much of traditional surface science has been concerned with equilibrium properties and simple kinetics, there is a growing effort in the area of dynamical processes at surfaces. This book draws together a series of chapters written by acknowledged experts in the field, which describe progress in a range of specific topics. The emphasis is on chemical reaction dynamics, including both theoretical and experimental approaches and covering work on low index single crystal surfaces, on stepped surfaces and on supported metal clusters. Other processes, such as surface diffusion are also addressed. Further chapters discuss dynamical processes in electronically-induced desorption, and in surface diffusion on semiconductors and metals. - Presents considerable advances in surface science field - Collection of expert reviews in surface dynamics

Advances in Chemical Physics - Ilya Prigogine 2009-09-08

The Advances in Chemical Physics series provides the chemical physics and physical chemistry fields with a forum for critical, authoritative evaluations of advances in every area of the discipline. Filled with cutting-edge research reported in a cohesive manner not found elsewhere in the literature, each volume of the Advances in Chemical Physics series serves as the perfect supplement to any advanced graduate class devoted to the study of chemical physics.

Physics Briefs - 1994

Steric Effects in the Chemisorption of Vibrationally Excited Methane on Nickel - Bruce L. Yoder 2012-02-03

Bruce Yoder’s thesis outlines his investigation of the dissociative chemisorption of methane (CH4) on a nickel single crystal. In this work Bruce uses a molecular beam and infrared laser techniques to prepare

methane in excited rovibrational states. The excited methane molecules are aligned relative to the target nickel surface. Bruce describes the discovery and exploration of a previously unknown steric effect in the dissociation reaction between a vibrationally excited methane molecule and a nickel crystal. From these studies we see that methane molecules are up to twice as reactive when the vibration is aligned parallel rather than perpendicular to the surface. This discovery will help guide the development of detailed predictive models of methane chemisorption, which in turn may lead to better catalysts for the synthesis of several industrially relevant chemicals, including hydrogen fuel from natural gas.

Molecule Surface Interactions - K. P. Lawley 2009-09-08

This text is the first of a two-volume work on molecule surface interactions addressing topics in chemical physics, surface science, physical chemistry, materials science, and electronics and semiconductor manufacture. As with the other titles in the Advances in Chemical Physics series, the chapters are written by an international group of contributors and cover a wide range of important issues in the field.

Vibrational Dynamics Of Molecules - Joel M Bowman 2022-06-14

Vibrational Dynamics of Molecules represents the definitive concise text on the cutting-edge field of vibrational molecular chemistry. The chapter contributors are a Who's Who of world leaders in the field. The editor, Joel Bowman, is widely considered as one of the founding fathers of theoretical reaction dynamics. The included topics span the field, from fundamental theory such as collocation methods and vibrational CI methods, to interesting applications such as astrochemistry, supramolecular systems and virtual computational spectroscopy. This is a useful reference for theoretical chemists, spectroscopists, physicists, undergraduate and graduate students, lecturers and software developers.

Twelfth International Vacuum Congress, Eighth International Conference on Solid Surfaces - 1992

Vibrational Spectroscopy of Molecules on Surfaces - Theodore E. Madey 2013-11-11

The observation of the vibrational spectra of adsorbed species provides one of the most incisive methods for und erst an ding chemical and physical phenomena on surfaces. At the present time, many approaches may be applied to studies of molecular vibrations on surfaces. Some of these are used on high-area solids of technological importance (e.g., heterogeneous catalysts) while others are applied to single-crystal substrates to gain better understanding under conditions of controlled surface structure. This book has attempted to bring together in one place a discussion of the major methods used to measure vibrational spectra of surface species. The emphasis is on basic concepts and experimental methods rather than a current survey of the extensive literature in this field. Two introductory chapters describe the basic theoretical aspects of vibrational spectroscopy on surfaces, dealing with normal modes and excitation mechanisms in vibrational spectroscopy. The remaining seven chapters deal with various methods employed to observe surface vibra tions. These are arranged in an order that first treats the use of various methods on surfaces that are not of the single-crystal type. It is in this area that the field first got started in the late 1940s with pioneering work by Terenin and others in the Soviet Union, and by Eisehens and others in the United States in the 1950s. The last four chapters deal with relatively recent methods that permit vibrational studies to be made on single crystal substrates.

Laser Spectroscopy of Highly Vibrationally Excited Molecules - Vladilen Stepanovich Letokhov 2021-07-29

Laser spectroscopy has been perfected over the last fifteen years to become a precise tool for the investigation of highly vibrationally excited molecules. Intense infrared laser radiation permits both the multiple-photon resonant excitation and the dissociation of polyatomic molecules. In this book, the latest results of some of the foremost Soviet researchers are published for the first time in the West. Laser Spectroscopy of Highly Vibrationally Excited Molecules contains a comprehensive study of both the experimental and theoretical aspects of the basic photophysical interactions that occur in these processes. The book first focuses on the nonlinear interaction between the resonant vibrational mode and the intense infrared field and then examines the nonlinear interaction between the vibrational modes themselves due to anharmonicity. These interrelated processes determine all the characteristics of polyatomic molecules in an infrared field. The book also discusses related phenomena such as spectra broadening, optical resonance, photon echoes, and dynamical chaos. It includes examples of multiple-photon resonant excitation such as the excitation of OsO4 by CO^O2 laser radiation, which is detected by the visible luminescence that results. This book will be of great interest to researchers and postgraduate students in infrared laser spectroscopy and the laser chemistry of molecules and applications of isotope separation.

Air Force Research Resumés -

NBS Special Publication - 1968

Research in Progress - 1968

Energy Research Abstracts - 1990

Vibrations at Surfaces - C. R. Brundle 2000-04-01

Studies in Surface Science and Catalysis 14: Vibrations at Surfaces documents the proceedings of the third International Conference on ""Vibrations at Surfaces"" held at Asilomar, California, from September 1-4, 1982. Almost all of the 102 papers presented at the meeting are published in this volume. The topics chosen for the eight sessions held over a span of three days were: (I) Vibrational Frequency Shifts and Widths-Lateral Interactions; (II) Dynamical Processes at Surfaces; (III) and (IV) Electron Loss Spectroscopy; (V) Raman and Surface Enhanced Raman Scattering; (VI) Infrared Absorption and Reflection Spectroscopy; (VII) Beam Surface Scattering Surface Phonons; (VIII) Electron Tunneling Spectroscopy - Surface Enhanced Raman Studies in Electrochemistry. In addition, C. B. Duke presented an introductory keynote surveying progress in the field since the last meeting. In the final session H. Ibach and T. Grimley presented conference overviews and future prospects for the field from an experimental and theoretical perspective. Also included in the Proceedings are four literature surveys on Energy Loss, Inelastic Tunneling, Infrared and Raman (SERS) papers.

Dynamics of Gas-Surface Interactions - Ricardo Diez Muino 2013-02-26

This book gives a representative survey of the state of the art of research on gas-surface interactions. It provides an overview of the current understanding of gas surface dynamics and, in particular, of the reactive and non-reactive processes of atoms and small molecules at surfaces. Leading scientists in the field, both from the theoretical and the experimental sides, write in this book about their most recent advances. Surface science grew as an interdisciplinary research area over the last decades, mostly because of new experimental technologies (ultra-high vacuum, for instance), as well as because of a novel paradigm, the ‘surface science’ approach. The book describes the second transformation which is now taking place pushed by the availability of powerful quantum-mechanical theoretical methods implemented numerically. In the book, experiment and theory progress hand in hand with an unprecedented degree of accuracy and control. The book presents how modern surface science targets the atomic-level understanding of physical and chemical processes at surfaces, with particular emphasis on dynamical aspects. This book is a reference in the field.

Laser Spectroscopy and Photochemistry on Metal Surfaces - H-L Dai 1995-12-16

0Keywords:Surface Photochemistry;Photochemistry;Laser Spectroscopy;Surface Spectroscopy;Photodesorption;Surface Dynamics;Surface Femtochemistry;Surface Nonlinear Optics;Surface Analysis;Metal Surfaces

Horizons in World Physics - Albert Reimer 2004

This volume presents leading-edge research in physics from researchers around the world. Contents: Preface; Interface-Localised Mode in Bilayer Film Ferromagnetic Resonance Spectrum; On Similarity Waves in Compacting Media; Generalised Relativistic Dynamics of Charged Particle; Deviatoric Elasticity as a Mechanism describing Stable Shapes of Nanotubes; A Thermodynamic Approach for Predicting Micelle and Asphaltene-Micelle Formation; Asymptotic Theories for the Non-linear Analysis of Axisymmetric Laminated Cylindrical Shells; Statistical Dynamics of Energy Transfer in Direct Inelastic Gas-Surface Scattering within Dynamical Lie Algebraic Method; Topologically Charged Vortex in a Supersymmetric Kalb-Ramond Theory; The Effect of Fibre Curvature on Suspension Viscosity; Measurements of Reaction Cross-Sections and Determination of Nucleon Matter Density Distributions; Index.

Dynamics on Surfaces - A. Pullman 2012-12-06

Proceedings of the Seventeenth Jerusalem Symposium on Quantum Chemistry and Biochemistry, Jerusalem, Israel, April 30-May 3, 1984