the action of ultrashort pulses have been studied, when the temperature gradients attain values of 10^{10} K/m, while the duration of the process is $\sim 10^{-9}$ s.

Devices have been constructed which enable one to study nonthermal distribution of optical excitation by utilizing light pulses of 60 fs duration and with a "compressed" pulse—down to 10 fs. This enables one to study the dynamics of thermalization using absorption spectra. Phenomena of superheating of semiconductors and the dynamics of nonequilibrium carriers, the relaxation of excitons in the picosecond time range, photorefraction in gallium arsenide, photoluminescence developing in time, formation of nonequilibrium structures of a lattice type and many nonlinear optical and other physical phenomena in solids have been studied, which without the technique of ultrashort light pulses could not have been observed and studied.

Ultrashort light pulses have given us the possibility of studying the most subtle and ultrafast processes in chemical reactions. In this book considerable space is devoted to such questions. Potential barriers are observed in the course of changes of molecular structure in solutions—the dynamics of photoisomerization, the dynamics of solvation processes, femtosecond investigations of the localization of an electron and solvation in pure water, processes of recombination, processes of induction of light, intramolecular transfer of an electron, rapid photochemical processes in aromatic nitrocompounds in solutions and many other problems of chemical dynamics.

The application of the technique of femtosecond and picosecond pulses to the study of the dynamics of processes in biological molecules has turned out to be fruitful. Processes of electron transfer have been studied. Femtosecond spectroscopy of the development of bacterial photosynthesis, of the transfer of excitation energy and division of charge in reaction centers of photosynthesizing bacteria, and the spectroscopy of time resolution of absorption in green plants in the picosecond range have been created. Other problems have been studied as well.

The use of ultrashort light pulses for the study of energy transfer and relaxation phenomena, transfer of energy and electrons in adsorbed dye molecules in single crystals and other materials, picosecond fluorescence and absorption on Langmuir films, the spectroscopy of ultrashort infrared pulses of nonlinear absorption in liquids, femtosecond relaxation dynamics of large molecules, optical destruction of molecular crystals and for many other investigations has proved very effective.

In the last part of the book articles are placed which are devoted to the study of relaxation and other properties of different media, in particular by means of creating in the medium non-steady-state phase lattices and analyzing their decay in time, to the use of nonlinear response in the four-wave shift for the determination of the line shape of Raman scattering of light and for a study of third order nonlinearities in thin films, to the use of picosecond spectroscopy for studying phase reversal in Raman scattering, time resolution in the picosecond range of CARS-spectroscopy, direct measurement of the dependence of the energy of polaritons on the wave vector, the stimulated, Rayleigh, Mandel shtam-Brillouin and Raman scattering of light and certain other articles.

The articles contained in this and similar books, as a rule, are distinguished by brevity, but all the important information on the formulation of the problem, the methods of its solution and the results are contained in them. A great merit of these books is their rapid appearance in publication. If we have in mind materials of a conference, as in our case, then the book appears in the same six month period in which the conference took place. Thus the reader can at once become acquainted with the state of a particular field as of today. For this one can easily forgive the occasionally occurring carelessness in formulation, which does not affect the content of the book. One would wish that this experience would be taken into account also in our country.

Physics of surfaces

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Lectures on Surface Science: Proceedings of the Fourth Latin-American Symposium. Caracas, Venezuela, July 14–18, 1986. Eds. G. R. Castro and M. Cardona, Springer-Verlag, Berlin; Heidelberg; New York; London; Paris; Tokyo, 1987, pp. 329.

The book contains the proceedings of the IV Latin-American Symposium on Surface Physics which took place at the Central University of Venezuela in Caracas between 14 and 18 July 1986. Forty-nine papers were presented; 9 of them are of a general review nature, while the rest are devoted to more particular problems. The papers were presented at the symposium primarily by Latin American authors.

Physics of surfaces is a field of infinite variety in its subject matter. The study of free surfaces, interfaces and structures associated with them, the tremendous variety of materials being studied, modern experimental methods—all

this found a place in this book, and as a result the book, of course, turned out to be quite inhomogeneous. This is what usually happens when the theme of a conference is too broad.

The book has four parts: 1) thin films and superlattices (14 papers); 2) the theory of clean surfaces and chemisorption (13 papers); 3) spectroscopic methods of investigating surfaces (12 papers); 4) structure and determination of properties of surfaces (10 papers).

The first part begins with a long article by M. Cardona devoted to vibrational modes in semiconductor superlattices. The author, however, does not repeat previous reviews but instead examines in detail the key questions, for example, selection rules and their relaxation in superlattices as a result of the lowering of crystal symmetry; the confinement of optical phonons in definite layers of the superlattice etc. The other articles of this section are of a more particular nature, they are devoted to structural, electronic and optical properties of thin films, primarily of CdTe and also of silicon and silicon dioxide. In one of the most significant papers of this section adsorbates of metals on surfaces are examined. It is shown that even incomplete monotonic metallic layers adsorbed on a surface lead to noticeable effects on Raman scattering and optical absorption.

The second section begins with the theoretical article by G. Blyholder concerning the calculations of geometrical and electronic properties of adsorbed atoms and molecules with the aid of the theory of molecular orbitals. A brief review is given of the calculation of the structure of clusters of transition metals on different surfaces. Practically all the papers of this section are either of a theoretical or a review nature; they are brief presentations of models or results of calculations of the interaction of adsorbates with surfaces, primarily metallic ones. New models are presented of order-disorder phase transitions in a layer of hydrogen atoms adsorbed on nickel and metal-dielectric transitions in a system of atoms of a metal on the surface of a dielectric.

The third section contains almost exclusively experimental papers. The section begins with a general article by G. Doyen, D. Drakova, and F. von Trentini on the theoretical bases of the methods of electron spectroscopies of atoms adsorbed on a surface. A model Hamiltonian is proposed for different spectroscopic methods with the aid of which spectra of emitted electrons are calculated. Surfaces of alkali (which satisfy the conditions of the model particularly well) and transition metals are examined.

A brief discussion is given of the problems of applying spectroscopic methods at their modern level, the apparatus and electron sources for such methods, and results are presented of particular experiments using specific materials.

Of quite a different character is the article by J. Kuppers devoted to the catalytic action of metallic surfaces. Modern spectroscopic methods, as a rule, are inapplicable to the investigation of a surface involved in a real chemical process. The author models the competition of the processes of adsorption, desorption and decomposition of simple molecules near the surface in a high vacuum. Experimental data on the absorption of C_2H_2, H_2O, NH_3, CO on the surface are also presented.

The fourth section includes quite different articles devoted to the investigation of the structure of adsorbed layers and of the surface itself, the application of different experimental methods, the properties of grain boundaries in a polycrystalline material, etc. Among these there are three long articles. The paper by G. M. Lamble and D. King describes an experimental investigation of structures of layers of Cl and Cs adsorbed on the (111) surface of Ag. It is shown that adsorbates of opposite sign form quite different structures. The article by K. Wandelt analyzes the special features of the use of the method of electron photoemission for the investigation of inhomogeneous surfaces. Curious information is contained in the article of C. R. Brundle "Investigations of surfaces and their technological applications carried out by IBM". The article certainly has an advertising and popular character, but it does give an idea of the breadth of investigations of their directions and applications. For illustration the author provides two particular examples of practical applications of investigations which appear to be highly academic.

On the whole the collection of articles reflects the modern state of physics of surfaces, gives an idea of the breadth of the research front, contains a number of papers which are of interest for specialists.

Magnetic properties of free radicals

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Landolt-Börnstein. Numerical Data and Functional Relations in Science and Technology. New Series.—Group II: Atomic and Molecular Physics. V.17: Magnetic Properties of Free Radicals. Ed. H. Fischer, Springer-Verlag, Berlin; Heidelberg; New York; London; Paris; Tokyo, 1987. pp. 551.

Volume 17 of this well-known scientific-technical encyclopedia is completely devoted to the magnetic properties of free radicals, with the radicals here denoting paramagnetic particles (chemically stable or unstable shortlived ones)—atoms, fragments of molecules, ion-radicals, complexes of transition metals with paramagnetic ligands, polyradicals