The book contains eight chapters, of which the first four are devoted to the theoretical aspects of photoferroelectric phenomena. In chapter 2 the thermodynamic treatment is given in which functions of photo-excited charge carriers are taken into account. In chapter 3, *Microscopic Theory of Photoferroelectric Phenomena*, Professor Fridkin explains the roles played by charge carriers in soft-mode lattice vibration, in the change of dipole moment induced on trap centres, and in the formation of a nucleus of a new phase near the first-order phase-transition point. Chapter 4 deals with the screening of spontaneous polarization by charge carriers. In chapter 5 experimental results are presented: descriptions of the photo-induced shift of the transition point, and of the induced crystal deformation are given. An anomalously large photovoltage is found in several ferroelectrics, the SbSI family of ferroelectrics and some oxide-type ferroelectrics; the phenomena are explained in chapter 6. Chapter 7 is devoted to photo-induced changes of refractive indices, and to the related photorefractive holographic recording. In the last chapter phenomena associated with the screening of a macroscopic electric field in ferroelectrics are described; upon photo-excitation of the carriers, changes are induced in the ferroelectric domain configuration, in domain switching, and in the behaviour of boundary walls between two coexisting phases at the first-order transition.

The book deals with rather specialized topics and some of the nomenclature used by the author is, unfortunately, unfamiliar to general readers. This makes the book a little difficult to follow at first reading. A few typographic errors remain; also, the introductory chapter is a little too short to give an adequate general idea of photoferroelectric phenomena. It seems that so much stress is laid on some theoretical results, which are obtained with the aid of several assumptions, that the readers would have misleading impressions; for example, the Curie point of any photoferroelectric showing a second-order phase transition falls with photo-excitation. As the author himself mentioned in the preface, the monograph is written with particular attention to the work of Soviet physicists. Nevertheless, this has not meant a limitation of information content. There are many references, properly cited, so that readers can take a general view of the present state of this subject, as practised throughout the world. The book will be very useful not only to those participating in ferroelectric research but also to those interested in learning about phenomena concerning the photo-excitation of charge carriers in dielectrics.

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Electron and magnetization densities in molecules and crystals. Edited by P. BECKER. Pp. xiii + 904. Plenum Press, 1980. Price $75.00.

The present book is the outcome of a very pleasant summer encounter between NATO and the crystallographers usually cooperating under the aegis of the Union's Commission on Spin, Charge and Momentum Density. The editor and one-time director of the summer school had collected an impressive list of authors, making sure that the outcome of the effort would represent the state of the art. In addition to the many lecture contributions, exercises were provided by the authors and other contributors. The result is a volume of 36 chapters by 24 authors, divided into the following parts: (I) Fundamental concepts and theory; (II) Diffraction physics and experimental problems; (III) Analysis of experimental densities; (IV) Related techniques; (V) Going to the real world.

Owing to the diversity of subjects and authors, the content is quite heterogeneous. In the first three parts we find chapters that have the quality of good textbooks, for example the chapters on electron density by V. H. Smith, on wave scattering by R. A. Bonham, on the fundamentals of magnetic neutron scattering by P. J. Brown, on the multipolar expansion of one-electron densities by R. F. Stewart. Often the usefulness of these chapters is enhanced by the added exercises. In a similar clear and comprehensive way M. S. Lehmann and J. B. Forsyth discuss experimental problems and errors in X-ray and neutron diffraction, respectively.

In excellent review articles, the interpretation of the measured quantities is discussed by J. Schweizer for magnetic and spin densities and by P. Coppens and E. D. Stevens for electron densities. P. Coppens continues by discussing thermal smearing and chemical bonding. The discussion is based mainly on the one-particle model for thermal vibration. One question keeps nagging me: how valid is the model and, consequently, how useful are the results?

In a thorough paper J. Epstein and R. F. Stewart discuss the effect of thermal vibration on the scattering by a diatomic molecule. The simplicity of the system makes it possible to analyse the quality of the assumptions that are usual in the analysis of dynamic densities. Crystals do not scatter purely kinematically and the atoms and molecules do not vibrate independently. So, the editor introduces a chapter on lattice dynamics and on dynamical theory. Unfortunately, one cannot cover these subjects adequately in such a short space. Regrettable is the omission of the work of P. J. E. Aldred and M. Hart, who used *Pendellösung* fringes to obtain very accurate structure factors. The contribution of N. Kato on the fundamentals of extinction theory is so nice that one does not notice that it is slightly out of place. Review-type contributions on the electron density distribution and its calculation are given by N. H. March, A. J. Freeman and by D. E. Ellis. The treatment is often more referring than self-contained, with many interesting points.

In part (IV) we encounter a nice introduction on Compton scattering by R. J. Weiss, and an excellent chapter by R. A. Bonham and M. Fink on the use of high-energy electron scattering for the study of charge densities in molecules. Part (IV) is concluded by an impressive, solid, but inaccessible chapter on magnetic resonance by J. Maruani; it seems that, for a short moment, the group of potential readers was out of sight to the editor. The final part contains a number of interesting personal views on the use of density studies, by R. Daudel, P. J. Brown, R. J. Weiss and F. L. Hirshfeld, followed by good reviews on density study of transition-metal compounds by E. N. Maslen and J. Forsyth, to be ended by I. Olovsson in an excellent survey on the effects of crystal forces and hydrogen bonding on the charge density distribution.

It is obvious that a book by so many authors contains much overlapping material. The deadlines, known and feared by each teacher at a summer school, cause some papers to be less careful than usual. Nevertheless, the coverage of the subject, the choice of authors and material and the level of the contributions is very good. Nowhere else can such a wealth of material on electron and magnetization densities be found in a single volume. Each scientist active in the field should have easy access to the book and no student doing research on the subject should continue without reading the appropriate chapters, if not all of it. The publisher has made this possible by bringing out a well printed book at an acceptable price.

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The nature of the surface chemical bond. Edited by T. N. RHODIN and G. ERTL. Pp. xii + 405, Figs. 105, Tables 22. Amsterdam, New York, Oxford: North-Holland Publishing Company, 1979. Price $58·50, Dfl 120.00.

This book deals with various theoretical and experimental aspects of the bond between metal surfaces and chemisorbed species. It contains an *Introduction* and five chapters, written by different authors. Two chapters (about 50 pages each) give theoretical considerations; one of 160 pages reviews the various electron spectroscopic techniques applied to chemisorption; one chapter (36 pages) deals with surface crystallography; the last part (68 pages) considers the energetics of chemisorption.

There are two main streams in the theoretical description of the electronic structure of surface–adsorbate systems: the solid-state physics point of view and the approach from quantum chemistry. T. B. Grimley, in the first chapter, gives a very lucid account of some theoretical techniques of importance within the first tradition, confining himself entirely to molecular orbital schemes, however; R. P. Mesmer in chapter 2 gives a nice overview on the theoretical methods originating from a quantum-chemical way of thinking. The latter author, after having given a comparison of the existing theoretical models, particularly considers the cluster-model theory and its application to some chemisorption systems.

The chapter on electron spectroscopy and surface chemical bonding written by T. N. Rhodin and J. W. Gadzuk reviews the most effective electron spectroscopic techniques as they are applied to obtain factual information on the surface chemical bond: ultraviolet photoelectron spectroscopy, X-ray excited photoelectron spectroscopy, Auger-electron spectroscopy and high-resolution electron energy-loss spectroscopy. The authors give a well-balanced overview on the theoretical and experimental principles of these spectroscopies. This is followed by a discussion of the experimental results obtained for typical gas–metal chemisorption systems, illustrating the specific types of information available.

M. A. Van Hove, in a chapter on surface crystallography and bonding, presents a systematic summary of the surface geometrical information obtained with low-energy electron diffraction.

The last contribution by G. Ertl on the energetics of chemisorption on metals is an account from a (physical) chemist's point of view. This author considers the microscopic features of the energetics of chemisorption. Basic subjects from catalysis such as the ensemble and ligand effect, surface stoichiometry, surface steps, activation barriers, interaction between adsorbed particles are extensively discussed within the context of the main theme.

The book as a whole gives a well integrated and documented account of the current areas of research around the central theme of the surface chemical bond. Although most of the contributions cover the literature until the end of 1977 only, the book may very well be used by graduate students and research scientists as a point of departure for entering the subject and for obtaining a good perspective on this area of intense scientific activity.

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Crystals – growth, properties and applications, Vol. 2. Edited by H. C. FREYHARDT. Pp. 199. Berlin, Heidelberg, New York: Springer-Verlag, 1980. Price DM 88.00, US $52.00.

This volume contains four dissimilar articles connected only by the thread that they are concerned with aspects of crystal growth.

The first article by K. & J. Nassau is a very timely review concerned with *The growth of synthetic and imitation gems.* This is a good introduction to the field which gemologists and those increasingly involved in relating natural minerals to controlled laboratory experiments will find very useful. Many others will find it a review of some fascination since it covers not only the techniques used for crystal growth but also the properties that make a material suitable for gem use. The fundamentals of gems and gemology are also usefully outlined.

The second article is by E. Schönherr and is an extremely practical review entitled *The growth of large crystals from the vapour phase.* Many workers in universities or research institutes commencing work on growing crystals sufficiently large for research study should find this a valuable aid in choosing the techniques and equipment most appropriate to their needs and in interpreting the crystal morphologies which can be produced. The discussion is restricted mainly to crystals which evaporate congruently but the methods described can also be applied to growth by dissociative sublimation and chemical transport.