Techniques, Theory and Physical Applications of the Scanning Electron Microscope and, together with Vol. II (which covers biological applications), it contains the proceedings of the SEM 1978 meetings held in Los Angeles in April 1978. These meetings were organised by SEM Inc. under the direction of Dr Om Johari, and continue the tradition of the annual symposia previously sponsored by the I.I.T. Research Institute, the proceedings of which are well known and respected by scanning electron microscopists. The present volume retains the format and maintains the high standards of the earlier publications. The papers, bibliographies and reviewers' comments contain a wealth of information for the novice and the experienced SEM user alike.

The 99 contributions include 8 review papers and 11 tutorials and cover a very wide range of topics, including specimen-preparation techniques, X-ray microanalysis (both in the SEM and the STEM), various methods of examining semiconductor devices, energy-loss spectroscopy, Auger electron spectroscopy, backscattered electron detectors, Kossel diffraction patterns, and a bibliography on cathodoluminescence. A majority of SEM users will probably not use more than a few of the techniques described, but it is nevertheless important that one should have at least some awareness of the possibilities and limitations of the apparatus avaialable, if only so that one can realistically assess some of the more optimistic claims contained in some manufacturers' brochures!

From this reviewer's viewpoint, over 40% of the contributions were of sufficient interest to be read in some detail. The papers on X-ray microanalysis are of particular relevance, and the current widespread interest in environmental dusts is reflected in the emphasis on the identification and quantitative analysis of individual micro-particles and fibres, with papers on mounting techniques, standard materials and analysis methods with varying degrees of sophistication and accuracy. From among the other contributions, one which seems immediately worthy of further investigation is the description by Moll *et al.* (pp. 303–310) of a very simple (and cheap) modification which enables the secondary electron detector to be used to obtain non-directional, back-scattered electron images at low beam current (10^{-11} A range) and small spot sizes.

One small criticism is that the contributions appear to be arranged in random order. Although a rigid subdivision under subject headings would probably be unnecessarily restrictive, it would be helpful to the reader if the several papers on a single topic such as, for example, energy-loss spectroscopy or the examination of coal samples could be grouped together instead of separated by several hundred pages.

S. A. BUTLER

British Steel Corporation
Teesside Laboratories
Ladgate Lane
PO Box 74
Middlesbrough
Cleveland TS8 9EG
England

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Surface crystallography by LEED. Theory, computation and structural results. By *M. A. Van Hove* and *S. Y. Tong*. Pp. ix + 286. Berlin, Heidelberg, New York: Springer-Verlag, 1979. Price, DM 59.00, US $ *ca* 32.50.

The chapters are (1) *Introduction*; (2) *The physics of LEED*; (3) *Basic aspects of the programs*; (4) *Symmetry and its use*; (5) *Calculation of diffraction matrices for single Bravais-lattice layers*; (6) *The combined space method for composite layers: by matrix inversion*; (7) *The combined space method for composite layers: by reverse scattering perturbation*; (8) *Stacking layers by layer doubling*; (9) *Stacking layers by renormalized forward scattering (RFS) perturbation*; (10) *Assembling programs: the main program and the input*; (11) *Subroutine listings*; (12) *Structural results of LEED crystallography*. The appendices are (*A*) *Symmetry among plane waves*; (*B*) *Lattice sums over sublattices*; (*C*) *A line-printer plotting program.*

The main part of this book explains the use of a set of computer programs that have been specially designed for surface-structure determinations by LEED. The structures of the programs are conceived in a building-block form to allow the selection of the most efficient combination of several theoretical methods in a given situation. They include a number of features which reduce computing time and computer-store requirements. They provide a practical technique for using available symmetries of bulk and overlayer (or underlayer) lattices. The authors emphasize that the programs include the use of the combined space method which removes many limitations on the kind of surface the calculation can handle. As many as fifty subroutines in Fortran are presented in Chapter 11. Detailed explanations of all variables and arrays appearing in each subroutine are given by many lines of comment which are helpful in explaining the internal organization of the programs. In order to give the user of the programs some guidelines as to which of the various possible methods to use, and what kind of values to give for input parameters in a given situation, several sample programs are presented in Chapter 8. They will be especially useful as starting points to generate programs to be used for other surface structures. It is also convenient for readers that Chapter 12 is devoted to describing and referencing many surface structures so far confirmed by LEED investigations. The authors supplement the basic theory with a more phenomenological description of the diffraction of electrons at surfaces.

The detailed derivations of the formulae which are used for calculations are not given in this book. The readers may have to consult some of the literature cited. It will be a little inconvenient for readers that indexing of basic variables and arrays is not provided. Indexes of subroutines are provided in addition to their listings.

The programming for surface structure analysis by LEED has been considered a hard and laborious task for experimentalists. Such a book as this has long been needed. It is hoped that this book will encourage the LEED experimentalists to prepare their own programs, and to extend further applications of LEED and other related fields.

YASUYOSHI WATANABE

Departments of Physics
Faculty of Science
Chiba University
1–33 Yayoicho
Chiba
260 Japan

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High pressure science and technology: 6th AIRAPT conference. Vols I & II. Edited by *K. D. Timmerhaus* and *M. S. Barker*. Pp. Vol I, xxvi + 1053; Vol. II, xxii + 1025. New York: Plenum Press, 1979. Price US $75.00 each (separately), $ 140.000 (Both volumes together).

This book collects the papers that were

presented at the 6th AIRAPT Meeting in Boulder, Colorado (July 1977). In keeping with the role of AIRAPT, the Conference dealt with the full spectrum of high-pressure investigations.

High pressure is basically a tool, but the particularity of the technology brings together almost all scientific branches. The present book does not elude this difficulty and, as every field is concerned, the reader can find in his own speciality the up-to-date position of high-pressure investigations.

The book is voluminous (about 1000 pages for each volume), but reading is greatly facilitated by the classification employed by the editors, although many papers belong to a section different from that specified in the book. However, this feature is unavoidable and the editors deserve much credit, considering their enormous task.

Starting with an excellent paper of Drickamer on high-pressure studies of electronic phenomena, the contributions examine the important field of equations of state, pressure-induced phase transitions in solids and phase diagrams, then thermal properties such as low temperature and melting phenomena. Spectroscopic studies (Raman and infra-red) are reported up to very high pressures. The third section deals with high-pressure phase equilibria and separation processes (for example, chromatography using compressed gases). Chemistry is the subject of the next section (organic, inorganic, macromolecular and biochemistry), with particular emphasis on applications in industry. The wide field of metrology and instrumentation is thoroughly examined and is certainly of great value for anyone wishing to perform his own measurements with techniques as various as viscometry, interferometry, X-ray diffraction, etc. Material and hydrothermal synthesis has become for many years an important application area for high pressures (synthesis of *A* 15-type materials, diamond, carbonado–diamond, boron nitride, dense borides, oxides, sulfides, hydrothermal synthesis of quartz, fayalite, coesite, etc.).

Volume 2 begins with the field of high-pressure geological applications (mantle and core geochemistry and geophysics) which represents at least one third of the volume and is followed by an interesting section constrained by actuality on high pressure in energy resource recovery. Mechanical properties are considered from a plastic and elastic point of view and are intimately connected with the design of high-pressure vessels. In the next section, we find industrial applications of high pressure (isostatic processing, hydrostatic extrusion, explosive welding and forming). The volume ends with a discussion of the future directions in high-pressure applications (metallic hydrogen in the megabar range, shock waves, future materials and techniques) and exotic methods for generation of very high pressures (pulsed magnetic fields, photonic compression).

244 papers are reported in both volumes selected from among 300 proposed contributions. The general quality is good, although there appears sometimes a lack of originality. In the opinion of the reviewer, the book should certainly find its place in all high-pressure laboratories, but runs the risk of being of restricted utility for people outside high-pressure technology, except in some special cases (for example in biochemistry, chemistry, geophysics and geochemistry).

G. JENNER

Institut de Chemie
Université Louis Pasteur
1 rue Blaise Pascal
67008 Strasbourg
France

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Crystals: growth, properties and applications. Vol. 1. Crystals for magnetic applications. Edited by *C. J. M. Rooijmans*. Pp. iv + 139. Berlin, Heidelberg, New York: Springer-Verlag, 1978. Price DM 58.00, US$ 31.90.

All the chapters of this book are so well written that reading is most pleasurable and comprehension is easy. The book is most timely because of the growing interest in crystals for magnetic applications and it will be of value to experienced crystal growers and magneticians as well as newcomers to these fields. The various techniques which are used to grow single crystals or epitaxial films of these materials are indicative of the restraints imposed by thermodynamic considerations as well as practical aspects. Adequate reviews of recent developments are given, together with the reasons for the choice of the particular growth technique used to grow each type of crystal. Most of the crystal growth techniques are explained in such detail that one could readily grow crystals from the descriptions. The difficulties encountered in crystal growth and crystalline defects are fully discussed.

More details on the properties as related to device needs or applications would be useful, as well as more information about the composition and deviations from stoichiometry. The aims of this new series, as outlined in the foreword of this book, have been well met in this first book and there is hope that subsequent volumes will be of equal quality. The publisher, editors and authors are to be congratulated on a job well done.

SIDNEY G. PARKER

Texas Instruments Inc
PO Box 225936
Dallas
Texas 75265
USA