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preciate. Although III-V compounds will not soon replace silicon, they might be entering a development that in 10 or 20 years could make them and heterojunctions dominant in electronics: They have higher carrier mobility as well as the capability to be semi-insulating; their band structure (direct or indirect) is more interesting and flexible; and they are capable of informing heterojunctions (and artificial quantum wells and superlattices). Besides having immediate usefulness in the study of heterostructure lasers, Thompson's book, just like that of Casey and Panish, will probably be useful for some time in more general research and development of heterojunction devices.

Thompson's book is a good reference for device engineers, scientists and graduate studies, but is too expensive (\$65.00) to be considered as a textbook.

NICK HOLONYAK JR.
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A User's Guide to Vacuum Technology

J. F. O'Hanlon

414 pp. Wiley, New York, 1980. \$24.95

For a large variety of reasons, the uses of vacuum environments for various scientific, engineering and industrial applications are increasing dramatically, and it is expected that this trend will continue at an ever-accelerating rate. To most users of vacuum equipment, the production, measurement and manipulation of vacua are of secondary importance, only worthy of study when something goes awry. Often the reasons that vacuum systems develop problems are related to improper selection of materials or components and/or improper practice. Due to increasingly sophisticated requirements for vacuum-related enterprises, there is need for practical information that positions one to select and operate vacuum equipment rationally. *A User's Guide to Vacuum Technology* provides this information, in a clearly written, practical way.

The book is divided into five main sections. The first of these covers the elements of the kinetic theory of gases needed to understand gas flow and transport phenomena. The treatment gives a good physical picture of the elements required to understand how vacuum systems work along with the main equations required to do routine vacuum-related computations.

The second section covers vacuum measurements of all kinds (total pressure gauges and residual gas analyzers). The basic physics of the various

instruments is explained simply, and many practical tips are offered, particularly on techniques for leak detection. The third section covers the behavior of materials in vacuum. Again, much practical information is included after a section on the fundamentals of how gases are removed from solids in vacuum. The fourth section describes the principal types of mechanical, diffusion and entrainment pumps in a very clear fashion.

The final section is perhaps the most valuable one in the book. While numerous books contain what is in the first four sections, little has been published in book form about the construction and operation of complete systems. This section covers complete pumping systems for high and ultra-high vacua and for those that utilize high inlet-gas flows (for example, plasma processes). It contains a wealth of practical material bearing on the selection of a complete pumping system for a particular application and on the proper use of each system to ensure reliable, trouble-free operation. It also includes a chapter analyzing the economics of pumping systems, which complements the technical considerations for system selection. There are also useful appendices.

In general, the book is an ideal reference and handbook for scientists, engineers and technicians who use vacuum technology but who are not vacuum specialists. It is also an excellent resource for anyone who must select a complete vacuum system for a particular application.

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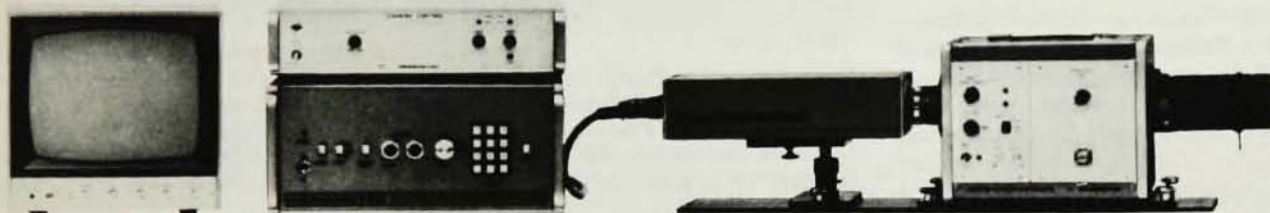
Organic Molecular Crystals: Their Electronic States

E. A. Silinsh

406 pp. Springer, New York, 1980 (Russian ed., 1978). \$54.50

The study of the organic solid state has enjoyed a renaissance during recent years both because of the increased technological applications of organic solids and because these materials constitute ideal systems to test the limitations of traditional energy band models caused by disorder and by the quasi-one-dimensional nature of polymers and certain charge-transfer salts. A central issue is the specification of the conditions under which charge carriers injected into organic solids are described by extended "Bloch" states as opposed to localized "trap" states. Edgar Silinsh, the author of *Organic Molecular Crystals*, has made significant contributions to this topic with his demonstration of the predominant role

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of trap states associated with structural defects in space-charge-limited conduction in homomolecular van der Waals crystals and films. This book contains a comprehensive account of his work on this topic carried out during the past decade and makes his results readily available for the first time in English.

Organic Molecular Crystals is translated by J. Eiduss of a revised version of a 1978 Russian monograph by Silinsh. The literature references have been updated through early 1980. The major subjects considered by the author are the electrostatics of charges in dielectric crystals, the nature of structural defects in van der Waals crystals, the generation of localized trap states by these defects, and the experimental consequences of such trap states on exciton spectroscopy and charge carrier space-charge-limited transport. His examination of structural defects and exciton spectroscopy is confined to planar aromatic hydrocarbons, with heavy emphasis on anthracene. A generous sampling of data and analyses of space-charge-limited conduction includes a consideration of several heterocyclic species as well as aromatic hydrocarbons.

As Silinsh himself stresses, this monograph is a personal account of his own work rather than a review or text. Citations of the contributions of others are often incomplete, and these contributions are rarely discussed in depth or incorporated in figures and tables. In spite of the generality of its title, the book does not include any systematic consideration of topics like thermal motions and thermodynamic properties. Moreover, many of the interpretations and concepts advanced by the author are subjects of controversy. Hence, the monograph is not well suited for use as a text even at the graduate level. Its primary audience is professionals working on transport in organic solids. For this group the monograph is a useful and convenient synopsis of the author's contributions to the subject: contributions which are considerable in both breadth and importance and which previously were largely unavailable in the English literature.

CHARLES B. DUKE

Xerox Webster Research Center
Rochester, N. Y.

new books

Particles, Nuclei and High-Energy Physics

Giant Resonance Phenomena in Intermediate-Energy Nuclear Reactions (Springer Tracts in Modern Physics, Vol.

89). F. Cannata, H. Überall. 112 pp. Springer, New York, 1980. \$29.80

Unification of the Fundamental Particle Interactions (Ettore Majorana International Science Series 7, Physical Science). S. Ferrara, J. Ellis, P. van Nieuwenhuizen, eds. 727 pp. Plenum, New York, 1980. \$79.50

Nuclear Chemistry. Theory and Applications. C. R. Choppin, J. Rydberg. 667 pp. Pergamon, New York, 1980. \$87.00 cloth, \$29.50 paper.

From Collective States to Quarks in Nuclei (Workshop on Nuclear Physics with Real and Virtual Photons, Bologna, Italy, 25-28 November 1980). 69 pp. CNEN, Bologna, 1980. price not stated

Positron Annihilation. (Proceedings of a National Symposium on Positron Annihilation, Delhi, India 2-4 April 1979). P. C. Jain, R. M. Singru, eds. 375 pp. South Asian, Madras, India, 1980. Rs. 120

Strong and Electromagnetic Interactions of Elementary Particles and Nuclei. N. G. Basov, ed. 213 pp. Consultants Bureau, New York, 1980. \$45.00

Atomic, Molecular and Chemical Physics

Atoms and Molecules (Student Edition). M. Weissbluth. 713 pp. Academic, New York, 1980. \$24.50

Atoms in External Fields. S. Fraga, J. Muszynska. 557 pp. Elsevier, Amsterdam, The Netherlands, 1981. \$119.50

Radiationless Processes (NATO Advanced Study Institute Series B: Physics). B. DiBartolo, ed. 545 pp. Plenum, New York, 1979. \$65.00

Optics and Acoustics

Ultrasonic Imaging. P. Greguss. 224 pp. Focal Press, New York, 1980. \$15.00

Experimental High-Resolution Electron Microscopy. J. C. H. Spence. 382 pp. Oxford U. P., New York, 1981. \$74.00

Photoacoustics and Photoacoustic Spectroscopy. A. Rosencwaig. 321 pp. Wiley, New York, 1980. \$35.00

Methods of Digital Holography. L. P. Yaroslavskii, N. S. Merzlyakov. 182 pp. Consultants Bureau, New York, 1980. \$45.00

Electro-Optics/Laser International '80 UK (conf. proc.). H. G. Jerrard, ed. 402 pp. IPC Science and Technology, Guildford, UK, 1980. \$22.50

Physiological Optics. Springer Series in Optical Sciences, Vol. 13. Y. Le Grand, S. G. El Hage. 338 pp. Springer-Verlag, Heidelberg, 1980. \$46.00

Electricity, Magnetism and Fields

Dielectric Physics. A. Chelkowski. 408 pp. Elsevier, New York, 1980. \$80.50

Physics. A General Course, Vol. II. Electricity and Magnetism, Waves and Op-

tics. I. A. Savelyev. 508 pp. Mir, Moscow (US dist: Imported Publ., Chicago, 1980). \$9.00

Light Scattering in Liquids and Macromolecular Solutions. V. Degiorgio, M. Corti, M. Giglio, eds. 304 pp. Plenum, New York, 1980. \$35.00

Topics in Current Physics, Vol. 22. Electromagnetic Theory of Gratings. R. Petit, ed. 291 pp. Springer-Verlag, Heidelberg, 1980. \$38.35

Physics in High Magnetic Fields (Proceedings of the Oji International Seminar, Hakone, Japan, 10-13 September 1980) (Springer Series in Solid-State Sciences, Vol. 24). S. Chikazumi, N. Miura, eds. 358 pp. Springer, New York, 1981. \$43.70

Fluids and Plasmas

Reviews of Plasma Physics, Vol. 8. M. A. Leontovich, ed. 471 pp. Consultants Bureau, New York, 1980. \$42.50

Liquid and Amorphous Metals. E. Luscher and H. Coufal, eds. 683 pp. Sijthoff & Noordhoff, Germantown, Md., 1980. \$75.00

Materials Science and Condensed Matter

Crystal Growth (Second Edition). B. R. Pamplin, ed. 627 pp. Pergamon, New York, 1980. \$140.00

Electrochemistry at Semiconductor and Oxidized Metal Electrodes. S. R. Morrison. 415 pp. Plenum, New York, 1980. \$27.50

Introduction to the Magnetic Properties of Solids. A. S. Chakravarty. 711 pp. Wiley, New York, 1980. \$65.00

Rheometry. Industrial Applications. K. Walters, ed. 426 pp. Wiley, New York, 1980. \$75.00

Electrons in Solids. An Introductory Survey. R. H. Bube. 241 pp. Academic, New York, 1980. \$25.00

Filamentary A15 Superconductors. M. Suenaga, A. F. Clark, eds. 383 pp. Plenum, New York, 1980. \$45.00

The Physics of MOS Insulators (proc. int. conf., Raleigh, N. Car., 18-20 June, 1980). G. Lucovsky, S. T. Pantelides, F. L. Galeener, eds. 380 pp. Pergamon, New York, 1980. \$50.00

Floating-Zone Silicon. Preparation and Properties of Solid State Materials Series, Vol. 5. W. Keller, A. Mühlbauer. 264 pp. Dekker, New York, 1980. \$39.76

Langmuir-Blodgett Films. W. A. Barlow, ed. 296 pp. Elsevier/North Holland, New York, 1980. \$75.50

Semi-Insulating III-V Materials. Nottingham, 1980. G. J. Rees, ed. 374 pp. Shiva (US dist: Imprint Ed., Ft. Collins, Colo., 1980). \$18.00

Characterization of Crystal Growth Defects by X-Ray Methods. B. K. Tanner, D. K. Bowen, eds. 589 pp. Plenum, New York, 1980. \$65.00

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