

and diffraction physics, as well as other branches of science.

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Defects in insulating crystals. Edited by V. M. TUCHKEVICH and K. K. SHVARTS. Pp. 774. Berlin, Heidelberg, New York: Springer-Verlag, 1981. Price DM 99.00, US \$39.60.

The ninth conference on *Defects in insulating crystals* held in Riga in 1981 was attended by 350 participants, including 200 from the USSR. There were over 200 communications presented as posters. The Abstracts of these papers were published in a separate volume (544 pages) but the list of the titles and addresses of the authors are presented in this volume as a supplement. At the conference 37 review reports were delivered and 34 of them are the content of this book. The amount of work done on defects in insulating crystals is vast and because of the lack of recent books on the subject this collection of review papers can be well appreciated.

A chapter is devoted to the theory and models of defects with special emphasis on the vibrational structure. Then there are reviews on excitons in different types of solids. Another chapter about radiation effects in insulating crystals discusses different aspects of primary and secondary effects. A number of papers are grouped under the title *Spectroscopy*. In fact, this covers different subjects, such as color center lasers, picosecond spectroscopy, impurity centers and even Raman scattering in amorphous PbTiO_3 . Finally, two papers are concerned with ionic mobility in alkali halides.

Professor C. Lushchik gave the summary talk in which he pointed out some subjects for future research in this field. Although this series of conferences originally concentrated on defects in alkali halides, the scope was gradually broadened to other insulating crystals. Also, the topic of research has shifted from the identification of defects to such subjects as relaxation processes, the creation mechanisms of defects, joint consideration of excitons and defects, and migration of hot defects. More and more interest is also seen in defects as probes for phonons in crystals. Although the reports can often be considered as rather short for the subjects treated they usually put the accent on the most recent developments and contain an extensive list of references.

In conclusion, it can be said that this book will be useful for all those doing research in the field of defects in ionic crystals.

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Computational crystallography. Edited by D. SAYRE. Pp. viii + 539. Oxford University Press, 1982. Price £25.00.

In a great many papers, numerous researchers (H. Hauptman, J. Karle, M. M. Woolfson, and others) provide a comprehensive review of the mathematical and physical background of the computing involved in the current techniques of diffraction-based molecular imaging.

The scientific treatise begins with the computing involved in measuring the diffraction pattern. It then deals with the phasing of the pattern by direct, Patterson, heavy-atom, and phase-refinement methods, and the use of computer graphics in the display and manipulation of molecular images, the structure refinement process and other computations important to crystallographers. At the end there is a short section on the principles of implementation.

This is an excellent book for crystallographers and physicists.

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Advances in X-ray analysis. Vol. 25. Proceedings of the 30th annual conference on the applications of X-ray analysis, Denver, Colorado, 3–7 August 1981. Edited by JOHN C. RUSS, CHARLES S. BARRETT, PAUL K. PREDICKI and DONALD E. LEYDEN. Pp. xviii + 398. New York: Plenum Press, 1982. Price US \$49.50. ISBN 0-306-41008-7.

This volume constitutes the proceedings of the 1981 Denver Conference and provides a broad perspective of X-ray spectrometric and X-ray diffraction techniques, giving a valuable overview of the present-day state of the art in X-ray applications. The chosen subject of the plenary lectures was *New techniques for the future of X-ray spectrometry*. The invited speakers, who are all pre-eminent pioneers in the development of particular techniques, focus on fluorescence techniques that are at the forefront of our understanding. These techniques, which approach a full elucidation of theory and active development of practical hardware, will most probably be in commercial use by the end of the decade.

In recent years a trend has developed for the conference to alternate emphasis annually between X-ray spectrometry and X-ray diffraction. This volume contains fifty-six papers of which thirty-three are devoted to topics in X-ray spectrometry while the remainder deal with X-ray diffraction.

The contents of the book are divided into seven headed sections. The first section is devoted to XRF detectors and XRF instrumentation and include, amongst others, two papers on the performance of solid-state room-temperature energy-dispersive X-ray detectors. The current progress with

mercuric iodide as a room-temperature EDX detector is described and it is stated that its performance is almost comparable with the conventional cryogenically cooled-Si(Li) spectrometer.

Section two deals with practical and mathematical XRF methods and includes an invited paper on the use of polarized X-rays for improved detection limits in energy-dispersive X-ray spectrometry. The paper gives a comprehensive review of this excitation method and possibilities for the future, including comparisons with better known excitation methods. Some of the other papers in this section include techniques for the preparation of lithium tetraborate fused single and multielement standards as well as a paper on X-ray fluorescence of intermediate- to high-atomic-number elements using polarized X-rays.

Of special interest to those involved in the applications of X-ray fluorescence to mineralogy and geology is section three dealing with existing techniques and new developments in these fields. Some of the eight topics discussed here are: a resin-loaded paper X-ray fluorescence method of determining uranium in phosphate materials; a combined dilution and line-overlap coefficient solution for the determination of rare earths in monazite concentrates; X-ray analysis of uranium ores for iron sulphide minerals; and a statistical comparison of data obtained from pressed-disc and fused-bead preparation techniques for geological samples.

In section four, seven papers are presented which are concerned with XRF applications to metals, catalysts or oils. The topics include, amongst others, some elemental determinations of catalytic materials using a thin-film internal standard technique by radio-isotope-excited X-ray fluorescence; direct analysis of plutonium metal for gallium, iron and nickel by energy-dispersive X-ray spectrometry; while two papers deal with the analysis of lubricating oil additives.

The papers in section five constitute XRF applications to the environment and include topics like the measurement of low concentrations of organic and inorganic gaseous contaminants in occupational environments by X-ray spectrometry; the application of XRF and XRD to the characterization of environmental assessment samples; and energy-dispersive analysis of actinides, lanthanides and other elements in soil and sediment samples.

As may be expected a number of papers deal with computer searching of the JCPDS file and other data sources. These are discussed in eight papers in section six, dealing with X-ray diffraction search/match procedures and automation.

For those interested in X-ray diffraction methods and instrumentation the seventh and last section has something to offer in the form of fifteen papers on a diversity of topics. It ranges from the application of XRD to alteration mineral zoning studies, glass batch homogeneity determination, and analysis of pharmaceutical excipients to the use of energy-dispersive diffractometry in measuring the thickness of metal and glass thin films and the calibration of the diffractometer at low values of 2θ . Other papers in this section include differential X-ray diffraction by wavelength variation and X-ray diffraction quantitative analysis using intensity ratios and external standards. Three papers deal with diffractometric techniques on stress measurements of industrial materials – thus having a practical purpose in the commercial world.

All in all, Volume 25 of *Advances in X-ray analysis* is, just as its predecessors, a must for those interested in developments in X-ray techniques, instrumentation and application of X-ray methods.

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Books Received

The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.

Second-order phase transitions and the irreducible representation of space groups. By H. F. FRANZEN. Pp. 98. Springer-Verlag, 1982. Price DM 28.00, US \$11.20.

Structure and bonding in crystals. Vols. I and II. Edited by M. O'KEEFE and A. NAVROTSKY. Pp. 327 (I) and 357 (II), Figs. 226, Tables 86. New York: Academic Press, 1981. Price £31.80, US \$40.00 (I) and £33.80, US \$51.00 (II). A review of these books, by You-Chi Tang, has been published in the August issue of *Acta Crystallographica*, Section B, page 526.