

Rank-three tensors: piezoelectricity and piezomagnetism.

Rank-four tensors: elastic modulus and elastic constants.

It is worth mentioning the presence of a list of some 350 references for the reader who wishes to go beyond the treatment presented. In summary, the book gives a clear and easily comprehensible view of tensor properties in crystals supplemented with informative discussions of the physical background. It would be suitable as a text book in a course at graduate level. For working scientists it can be used as a very good first reference book to be consulted before going further into the subject. It would certainly be worthwhile to consider an English edition.

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**X-ray instrumentation for the Photon Factory: dynamic analyses of micro structures in matter.** Edited by S. HOSOYA, Y. IITAKA and H. HASHIZUME. Pp. xiv+357. Tokyo: KTK Scientific Publishers; and Dordrecht: D. Reidel Publishing Company, 1986. Price Dfl 228.00, US \$94.50, £66.50.

In the late 1970s, Japanese crystallographers initiated a program, supported by grants-in-aid from the Ministry of Education, Science and Culture, to promote the development of new experimental techniques and instrumentation for all aspects of structure analysis. The particular intention was to ensure that these techniques should be available as soon as possible after the commissioning of the 'Photon Factory', the dedicated Japanese synchrotron radiation facility. The main emphasis was on X-ray optics, high-count-rate position-sensitive detectors, new diffractometers and X-ray cameras and on the provision of high- and low-temperature and high-pressure environments for the specimen. The program was highly successful and visitors to the Photon Factory have been impressed by the beautiful engineering and the finished appearance of the instruments there.

The stated intention of the present monograph is to help overseas readers to improve their understanding of the techniques in the various fields which have been developed in Japan. Individual chapters devoted to the fields mentioned above contain separate articles by different authors. These accounts are well written and the excellent quality of the drawings of instruments, in particular, enables the reader to study details of construction. Japanese workers have been particularly active in the field of real-time topography and in the application of energy-resolving solid-state detectors. There are full descriptions of the 5  $\mu\text{m}$  resolution X-ray-sensitive TV camera tube developed for X-ray topographical work at the NHK Laboratories and also of a versatile topography camera embodying a more orthodox video camera with an external phosphor. The use of position-sensitive solid-state detectors is discussed in

several articles. Other Japanese specialities described in the monograph are the integrating multi-wire detectors of Hasegawa, Mochiki and Sekiguchi, the multi-layer-line-screen Weissenberg camera of Sakabe and his co-workers and the use of toroidal X-ray imaging mirrors by Sakayanagi. Even where closely comparable work is being done in other countries the specialist will find much to interest him in such diverse accounts as those of the construction of a diffractometer designed to operate with single-crystal samples in magnetic fields up to 20 kOe ( $1590 \text{ A m}^{-1}$ ) at temperatures below 1 K, the use of flexure hinges in the design of high-resolution goniometers or the layout of a fibre-diffraction scattering bench.

The monograph presents the state of the art as it was at the Photon Factory in about 1982 and so contains little which has not found its way into the literature in other publications. Indeed, there are some omissions, such as the recent development of image plates which have been utilized in the Sakabe Weissenberg camera and in the muscle diffractometer, both of which are described here in earlier forms. The advantage of the present collection, however, is that the diverse topics are discussed here in a readily accessible form which enables one to gain a general impression of the Japanese effort in the field. The impression is one of very sound rather than very innovative engineering, coupled with very elegant design. It must be a pleasure to use some of the instruments described here.

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**Crystal growth processes.** By J. C. BRICE. Pp. x+298. Glasgow, London: Blackie; New York: Halsted Press, 1986. Price £29.00.

This book is devoted to the scientific and practical problems of large-scale crystal growth. It is intended for research workers for whom the formation of crystals is not their major speciality. As acknowledged by the author, the book gives an introduction to what is known about crystal growth and the methods of growth which are in commercial use.

The first part of the book (chapters 1 and 2) discusses the basic modern concepts of the fundamental phenomena of crystal growth. The author begins with a brief exposition of the history of the subject, then describes some of the current uses of single crystals and gives a classification of growth methods. Chapter 2 looks systematically at those aspects of the theory which have wide application, starting with some crystallographic concepts. The formation of defects in crystals is considered in detail in this chapter, with the introduction of some thermodynamic ideas; also, phase relations and growth kinetics - the driving force for crystallization and transport processes - are described here. The choice of literature sources for these chapters testifies to a good knowledge of the subject.

More specialized theory is given, as appropriate, in chapters 3-11, which discuss methods of growth which are