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 discusssions 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 μm 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 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

sufficiently widespread in industrial and laboratory practice.

The author gives maximum attention to the various different melt-growth processes (chapters 3–5). The Bridgman, Czochralski and other melt-growth methods are described in detail, covering both theory and practice. Typical examples of current use are given for each production method.

Chapters 6–8 are devoted to solution growth processes. Chapter 6 looks first at solvent and solutions and then at the main classes of low-temperature solution growth methods. It is a short, but very full, account of the general principles of solution growth. High-temperature solution growth of semiconductors and ionic materials is considered in chapter 7. This chapter is very compact and gives basic information on all available methods. Hydrothermal growth is discussed in chapter 8. The author looks first at the technology and then at the effects of processes parameters on the growth of crystals – quartz in particular. It should be noted that some particular methods of crystal growth from hydrothermal solutions are not reflected in this chapter; also, this chapter seems to omit the connection between the type of solvent used and the character and distribution of the defects that occur in the crystal.

Chapters 9 and 10 are concerned with the method of chemical vapour transport and other vapour transport methods, which have undergone sensational developments lately, connected with electronic requirements. Chapter 11 describes the growth of single crystals from solid phases, including solid-state epitaxy and growth in gels.

The final chapter deals with the problems of method selection and optimization.

The book has good illustrations and extensive and useful bibliographies at the end of each chapter.

On the whole, this is a nicely produced and readable book. It will be valuable to readers from many backgrounds who need to know about crystal growth.

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P-симметрия и ее дальнейшее развитие. А. М. Заморзаев, Ю. С. Карпова, А. П. Лунгу, А. Ф. Палистрант. **(*P*-symmetry and its further development.** By A. M. ZAMORZAEV, YU. S. KARPOVA, A. P. LUNGU and A. F. PALISTRANT.) Pp. 156. Kishinev: Shtiintsa, 1986. Price 1r 60k.

P-symmetry is one of the broadest generalizations of antisymmetry and colour symmetry. This account describes the progress made in this field during the past decade. It is a succinct review of the underlying mathematical ideas, although references are provided for physical applications.

The book is prepared with great care, giving a large amount of information in 156 pages of small format. It gives an impression of the ever-expanding frontiers of the symmetry concept to the general reader, but it is those few experts working on the general theory of symmetry who can truly benefit from this first-hand account by some of the pioneers of the field, Professor Zamorzaev and his school.

The book includes a list of 164 references.

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Rates of phase transformations. By R. H. DOREMUS. Pp. x+176. Orlando, Florida: Academic Press, 1985. Price US $29.00, £26.00.

This new book by Doremus fills a gap in the existing literature, as almost fifty years have passed since M. Volmer's famous first extensive treatment of the subject under essentially the same title *Kinetik der Phasenbildung* (strangely enough this important work is nowhere mentioned or referred to in Doremus' book).

I have read the book with much interest and pleasure. It serves well the demand for an introductory treatment of the subject for both the research scientist and the graduate student in many fields, *inter alia* crystallography, solid-state physics, crystal growth, metallurgy, physical chemistry, and chemical engineering. A brief introduction and Chapters 2 (*Diffusion and phase change*) and 3 (*Thermodynamics of interfaces*) serve as the basis for the eight chapters following. Chapters 4 and 5 deal with nucleation of liquid droplets from the vapour and nucleation from condensed phases. Unfortunately, the important atomistic nucleation theory is not dealt with. Bubble nucleation should also be covered briefly. In a future edition, Chapter 6 (*Phase separation of liquids*), only six pages long, should be extended to cover more extensively the important phase separation of partly immiscible liquids, a field in which considerable progress has been made during the last few years. Chapter 7 (*Crystal growth from the vapour*) follows more or less the usual treatment. One misses mention of the books by Strickland-Constable and by Faktor and Garrett and would certainly appreciate some reference to applications, *e.g.* to crystal-growth techniques. In Chapter 8 (*Solidification*) one would perhaps like to read more about dendritic growth, surface melting (Menzel, Nenov, Lacmann) and constitutional supercooling. Chapter 9 deals with crystal growth from solution. I feel it needs some extension to cover in more detail such important subjects as adsorption and its influence on crystal habit and combination of forms and Ostwald ripening (*e.g.* recent papers by Kahlweit). The book ends with Chapters 10 (*Grain growth*; missing some treatment of sintering) and 11 (*Precipitation in metals*). In a future edition one would like to have a chapter on the important field of electro-crystallization included.

As the book is also intended to serve as a textbook, a future edition should avoid use of obsolete units (atm, kcal)