production of X-rays by synchrotron sources (though only Soviet machines are described here). Furthermore, considerable discussion is provided on detectors, including solid-state and television detectors.

The section on photographic methods describes the usual Laue, Weissenberg, precession methods, and so on. But here again more detail is given than one usually finds in books. It is useful, too, to see a discussion on microdensitometry, a much neglected subject.

In the final section a very full explanation, complete with mathematical formulation, is given about all types of diffractometer geometries. This will perhaps be the most useful section of all to the working crystallographer, as this information is very difficult to get hold of elsewhere.

This book makes a valuable contribution to the literature, although, since it is in Russian, it can only have a limited international appeal. It would be a pity if it were not translated into English. There are 176 diagrams, all of them clearly and simply drawn, and the book is generally well written.

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Phase transformations in crystalline and amorphous solids. Edited by B. L. MORDIKE. Pp. v+257. Deutsche Gesellshaft für Metallkunde eV, Adenauerallee 21, D-6370 Oberursel 1, 1983. Price DM 92.00, US $45.00.

This book is a collection of papers presented at a one and a half day conference which had the form of a discussion meeting organized jointly by Deutsche Gesellschaft für Metallkunde eV and Lehrstuhl für Werkstoffkunde und Werkstofftechnik of the University of Clausthal, 1982.

There are nineteen contributions to the volume which represents a majority of the participants in the conference. The intention of the conference was to allow contact between specialists and this is reflected in the fact that almost all of the papers deal with transformation behaviour in rapidly solidified or rapidly quenched solid metallic materials. The authors are predominantly from European institutions so that the book provides an indication of the work in progress at these centres.

Comprehensive studies of the relaxation processes which occur on annealing metallic glasses are reported with the major emphasis being on structural changes detected by dilatometry. Two of the papers describe dilatometers designed specifically for studying these materials and one instrument is described which allows investigation of specimens in the micrometre size range. Results of studies using direct observations of relaxation effects by TEM, SEM and atom probe spectroscopy with field ion microscopy are also described. The studies of the structural aspects of the relaxation processes are complemented by papers which deal with thermodynamic measurements made principally by differential scanning calorimetry and with mathematical modelling to examine activation energy and enthalpy of relaxation.

The book is produced by reproduction of typed manuscript with the text in English although in some papers the figures are given with the wording in German.

The book would have appeal to those interested in the general field of rapid solidification processing and particularly those wishing to keep abreast of current techniques and materials being studied.

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Einfuehrung in die Kristallographie. By W. KLEBER. 15th ed. Foreword and edited by H.-J. BAUTSCH, J. BOHM and I. KLEBER. 384 pp., 370 Figs., 40 Tables, 2 Appendices. Berlin: VEB Verlag Technik, 1983, Price DM 29.

The 'Kleber' is still one of the classic and very useful textbooks on introductory crystallography. After going through many editions within a period of almost 30 years, this latest (15th) edition has been thoroughly revised again, up-dated, and supplemented with recent literature references (up to 1981). An English translation of the 10th edition of 'Kleber', by W. A. and M. A. Wooster, in 1971, has been reviewed in *Acta Cryst.* (1972) A**28**, 221. Since that time some major changes have been made, especially in the chapters on crystal chemistry and crystal physics. Various old terms like *UP*- and *M*-resonance structures have been replaced by a more conventional description of the covalent bond and of hybrid orbitals. There is also a modern and better organized presentation of the main structure types, including the silicates, especially chain silicates (but the formulae for anthophyllite and actinolite, on p. 154, are incomplete). One slight criticism here is that most of the old structure drawings are still used. These are quite heterogeneous and, in some cases, not informative: *e.g.* NiAs, scheelite or CdI_2 with S being assigned as the anion instead of I. Also, a somewhat more comprehensive treatment of polymorphism, compiling the various examples which are scattered throughout the text, might have been desirable.

The title of this book does not point out that it is intended primarily for use in earth sciences and also in material sciences. There is practically no coverage of the huge field of inorganic and organic chemical crystallography. The structure of the paraffins, anthracene and some polymers is discussed on two pages; proteins are not mentioned at all. Of course it is hardly possible to cover all topics of crystallography, crystal chemistry and crystal physics in only one book. This does not impair the value of this clearly written and well organized text.

Compared with the previous editions, there are now five main chapters instead of four, namely: 1. *Crystal symmetry and crystal morphology* (75 pp.), 2. *Crystal chemistry* (70 pp.), 3. *Physical-chemical crystallography* (55 pp.), 4. *Crystal*

physics (86 pp.) and 5. *Structure analysis of crystals* (55 pp.). The popularity of 'Kleber' is demonstrated by its many editions; probably because it contains a rather comprehensive account of classical crystallography together with many practical applications. The excellent printing and the very reasonable price have to be mentioned in particular.

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Fourier optics: an introduction. By E. G. STEWARD. Pp. 185. Chichester: Ellis Horwood Ltd (John Wiley & Sons), 1983. Price £15.00 (hard cover) £7.95, US $13.75 (paper).

This book bears an obvious similarity to the well-known text by Lipson & Taylor. The author suggests that the text is suitable for students at all undergraduate levels and for 'lecturers'. In fact, it attempts to present modern optical techniques for image processing in a reasonably elementary way.

Numerous references to historical papers abound and, in many cases, the nature of the theories or experiments to which they refer are discussed. All of this is to the good and, in general, is well done. What is less satisfactory is the very variable level of presentation. Quite sophisticated mathematical results such as the Wiener–Khinchin theorem are derived in a non-rigorous manner, whereas such standard optical techniques as the Fresnel integrals and the associated Cornu spiral are totally omitted.

The first section discusses coherence, image formation and interference. The material is conventional and vector methods are used where possible. A good feature of this chapter is the very detailed discussion of the experimental conditions needed to obtain good image contrast in interferometric experiments.

Chapter two considers Fraunhofer diffraction; slits, circular apertures, gratings and crystal diffraction are all examined. This leads naturally to a discussion of Fourier series and periodic structures in the third chapter.

The fourth chapter describes Fourier transforms, convolution and correlation, probably the most important cornerstones of modern optical instrumentation. The treatment is heuristic and elementary, often to the extent of inaccuracy. The introduction of the Dirac delta function on p. 68 is particularly objectionable.

The most interesting chapters are five on *Optical image processing* and six on *Interferometry and radiation sources.* As might be expected, holographic techniques receive detailed analysis as do fairly recent developments in microscopic image contrast enhancement. Here again the treatment is sloppy in places, for example on p. 93 where numerical aperture is misrepresented. The discussions of the Michelson stellar interferometer and of recent long base interferometric techniques are timely and will interest students.

There are five Appendices which describe elementary electromagnetic wave theory, Bragg reflection and elementary trigonometrcical formulae. There is also a useful bibliography.

The book is reasonably well written but is considerably overpriced. It may be of use in undergraduate physics courses but cannot be recommended for potential crystallographers.

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Yield, flow and fracture of polycrystals. Edited by T. N. BAKER. Pp. xiii+361. Barking, England: Applied Science Publishers, 1983. Price £42.00.

This book is an edited collection of 15 papers given at a meeting (September 1982) to honour the achievement of Professor H. J. Petch. The authors are mostly British, with a few from the USA, Canada and Denmark. The book consists of three parts: Part I deals with yield and flow, Part II with fracture, and Part III with the application of Hall–Petch and Cottrell–Petch relations to the mechanical properties of engineering materials. The papers are concerned almost exclusively with metals and alloys, particularly with steels.

The first paper in Part I is an instructive introduction to the Hall–Petch relation, and discusses the dislocation pile-up theory as the basis of the relation. It is explained how the relation, originally developed to explain the yield-point behaviour of α-iron polycrystals in terms of grain size, is applicable to the yield and flow of a variety of metals and alloys, including those with f.c.c. and h.c.p. structures. The second paper deals with experimental results on the plastic deformation of polycrystalline aluminium. The third and fourth papers discuss the plasticity of phase mixtures and porous materials, respectively, from essentially macroscopic standpoints.

In Part II, cleavage fracture and toughness of structural steels in relation to the Cottrell–Petch equation are discussed first. The plastic work of fracture is discussed in detail. Macroscopic fracture toughness values are shown to be related to the micromechanisms of cleavage fracture in the crack-tip region. The second paper describes the crack branching in the fracture of alumina. Conditions for crack branching are proposed. In the third paper, Cottrell discusses a problem involved in the brittle fracture from pile-ups in polycrystalline iron, *i.e.* the effective surface energy. The last paper in this part deals with the stability of fracture from a macroscopic standpoint.

Seven papers are given in Part III. In the first, the effect of grain size on the mechanical properties of ferrous materials is described. The authors give some comments on the Petch-type relation; these comments are important for the further clarification of the physical basis of the Petch-type relation and the extension of its application to engineering materials. The latter half of this paper describes the experimental formula of mechanical properties in terms of grain size and solute concentrations. Other papers in