the zero layer line at $\psi = 10°$; the results of this calculation were insignificantly different from those with $\psi = 0$, and thus confirmed our assumption that $F(R, \psi, l/c)$ can be closely approximated by $F(R, l/c)_{\psi=0}$. It should, however, be emphasized that for helical structures having a symmetry axis of lower order it will probably be necessary to evaluate the form factors at more than one value of ψ.

We have evaluated the expression

$$\sum_j f_j J_n(2\pi R r_j) \exp [i(2\pi l z_j/c - n\varphi_j)]$$

for values of l up to 28 (corresponding to $c/l = 0{\cdot}95$ Å) and values of R $(= (4 \sin^2 \theta/\lambda^2 - l^2/c^2)^{\frac{1}{2}})$ up to $\sin \theta/\lambda = 0{\cdot}60$ ($d = 0{\cdot}83$ Å). Atomic coordinates for the atoms included in the calculation are listed in Table 1. These coordinates are very nearly the same as those formulated by Pauling & Corey (1951), and are consistent with a planar peptide group and an N---H···O hydrogen bond with length 2·78 Å. The coordinates as listed correspond to a left-handed helix. Two sets of calculations were carried out, corresponding to the β-carbon atom in position 1 (d configuration for the left-handed helix) and in position 2 (l configuration). The atomic form factors used were those of James & Brindley (1935).

The calculated values of F_h^2 are listed in Table 2. These values are large only for layer lines involving low-order Bessel functions. In Fig. 1 F_h^2 values for these prominent layer lines are plotted against R for easier comparison with diffraction photographs. However, it should be pointed out that no temperature factor has been applied to the calculated values, and they have not been corrected for Lorentz or polarization factors and hence cannot be quantitatively compared with a fiber photograph without the corresponding corrections.

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Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 2, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Report of the Conference on Defects in Crystalline Solids. Pp. 429 with many figs. and plates. London: The Physical Society. 1955. Price 40*s*.

This work is the report of a conference held in Bristol in July 1954. It consists of 47 papers besides a small number of discussion remarks.

Imperfections of the crystalline lattice have a profound influence on many physical properties of solids. Emphasis has been given today mainly to research on those properties which allow discrimination between different kinds of lattice faults. Since imperfections are often coupled to each other, the task of unravelling the structure of imperfect solids remains formidable.

It seems that modern magnetic resonance techniques are especially suited to distinguish between lattice imperfections. More than 90 pages, about one-fourth of the space of the volume, are devoted to resonance experiments. Several papers show that paramagnetic resonance in insulators and semiconductors gives detailed information on impurity states and colour centres. Experiments are dealt with by Kittel which furnish direct evidence of the charge distribution around F-centres. The contribution of nuclear magnetic resonance experiments to the study of crystal imperfections is most impressive. Bloembergen gives a systematic survey of the information which nuclear magnetic resonance can furnish on various imperfections such as dislocations, vacancies and interstitials, foreign atoms, electrons and holes etc. The influence of magnetic dipole-interaction and of quadrupole effects is dealt with separately. The energy levels of nuclei with quadrupole moments are affected by the inhomogeneity of the local electric field. Therefore it becomes possible to measure, for instance, the variations of the stress field in the immediate surroundings of an impurity atom. The measurement of more conventional quantities can be extended and refined. The narrowing of the line width which occurs when the spin phase-memory time of a rigid lattice is of the order of the mean time which a nucleus spends at a given site leads to an elegant and consistent determination of the constants of self diffusion for the alkali metals (Slichter). The association of impurity atoms and vacancies to which they give rise is also reflected in the nuclear resonance line width (Cohen & Reif). The same phenomenon is dealt with in more conventional careful experiments (Haven) and has been treated theoretically (Lidiard).

A set of papers deals with the effect of different lattice faults on the optical and electrical properties of nonmetals both experimentally and theoretically. The lattice faults in part of this work have been introduced by high-energy particle and γ ray irradiation.

It is remarkable that no fewer than nine papers deal with the physical effect of radiation disarrangement. This kind of experiment is often rather complicated by the simultaneous occurrence of different lattice imperfections and also of 'radiation anneal'. Its scientific interest lies in the special kinds of imperfection produced, such as 'thermal spikes', and in the considerable deviations from equilibrium which can be reached. The volume contains a review article on radiation disarrangement by Koehler & Seitz.

Among other interesting work on diffusion, attention must be directed to Turnbull's paper on precipitation, which shows that several precipitation processes are many orders of magnitude too rapid to be accounted for by volume diffusion. Diffusion short circuits must then be rate-controlling. In the case of cellular precipitation the cell boundary acts as such. In the case of Guinier–Preston zones, dislocation channels may be responsible.

It is not unexpected that a Bristol Conference report contains new important work on the geometry of dislocations and on the physical effects of dislocations. Some of the subjects which have been theoretically treated are: stacking faults in close-packed lattices (Seegers), jogs in dislocation lines (Seeger, Thompson), dislocation sources and two-dimensional arrays of dislocations (Bilby), dislocation networks (Frank).

Among the experimental work, beautiful microphotographs (Dekeyser) and electron microphotographs (Wilsdorf & Kuhlmann-Wilsdorf) of dislocations are presented. In the latter paper traces of the dislocation network present in an undeformed single crystal are probably made visible. An extension of Mitchell's work on AgBr crystals demonstrates the intimate connexion between dislocations and photographic sensitivity.

Naturally, only a limited number of the Bristol Conference papers could be referred to here. The *Report* as a whole seems a most valuable account, carefully edited, of a physical domain which is being extensively studied along different lines.

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Praktische Edelsteinkunde. By W. FISCHER. Pp. 187 with 96 figs. and 3 plates. Kettwig/Ruhr: Gustav Feller-Nottuln. 2nd ed. 1954. Price DM. 16·80; 30*s*.; $4·00.

One half of the volume presents an outline of the morphology, general physical properties and optical properties of crystals; the remainder is a descriptive account of some sixty types of gemstones and gem materials. Designed to appeal especially to working lapidaries and jewellers, the book gives details of many grinding and polishing media and of their suitability for different materials, and there is a section on the preparation of quartz oscillator plates. Synthetic stones and pastes are mentioned, and figure in the determinative tables. It has unfortunately not proved feasible to add the full range of illustrations withheld from the first edition on the score of cost, and this second edition is a reprint of the 1953 volume.

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Die Stereographische Projektion in der Kristallkunde. By H. TERTSCH. Pp. iv+122 with 71 figs. Wiesbaden: Verlag für Angewandte Wissenschaften. 1954. Price DM. 14·80.

The material of this little book is divided as follows: properties of the stereographic projection and graphical constructions (29 pages); graphical solutions of crystallographic problems (34 pages); crystal drawing, using the stereographic projection (43 pages); applications of the stereographic projection in crystal physics (14 pages).

The description of the projection is full and well-done, and the section on graphical solutions contains some very useful constructions. No example, however, is taken from X-ray work, and the whole balance of the work is 'classical' rather than 'modern'; this is especially noticeable in the allocation of one-third of the book to crystal drawing. The last section contains some further useful and interesting constructions, but the treatment is summary compared with that given to crystal drawing.

The book is reproduced photographically from typescript and the result is confused and far from pleasing in appearance; with more careful attention to lay-out a much more attractive presentation could have been achieved. The figures, too, are poor: some are absurdly large while others are minute and quite illegible, a fault which appears to have been recognized at a late stage because several of the diagrams are reproduced a second time, somewhat enlarged, at the end of the book. There is a full table of contents, which does not, however, correspond in detail with the sectional headings in the text, but the omission of an index is a serious shortcoming.

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X-Ray Diffraction by Polycrystalline Materials. Edited by H. S. PEISER, H. P. ROOKSBY and A. J. C. WILSON. Pp. 725 with 263 illustrations. London: Institute of Physics. 1955. Price 63*s*.; $9.

The appearance of this book is eloquent testimony to the fact that X-ray diffraction has come of age. It is a very fine book, a veritable encyclopedia of the theory and technique of powder diffraction. There are three parts, followed by a very useful appendix of tables and a carefully prepared, and therefore useful, subject and author index.

Part 1, entitled 'Introduction and Experimental Techniques for Polycrystalline Materials', edited by Rooksby, contains 12 chapters on such subjects as monochromators and focusing cameras, low-angle cameras, high- and low-temperature methods, as well as on the more common techniques.

Part 2, 'Interpretation of X-ray Diffraction Data from Polycrystalline Materials', edited by Wilson, consists of 10 chapters, some dealing with the better known topics such as identification, determination of unit-cell dimensions and of accurate lattice parameters, others of a more specialized character treating subjects such as background scattering, scattering by non-crystalline media and preferred orientation.

Part 3, edited by Peiser, contains 10 chapters, each an essay on results obtained by powder diffraction techniques in various fields.

This reviewer is delighted at the uniformly high quality of the book. It is apparent that the editors have chosen their authors carefully, and wisely; it is also apparent that much editorial supervision has gone into its making. There is very little duplication: where it exists it is clearly deliberate and desirable. This book belongs in the working library of every X-ray crystallographer, even those who never deign to study anything but single crystals. It will serve them well.

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