to an understanding of ferroelectrics is by a knowledge of their structure, though she points out that this approach can be made quantitative only when considerably more is known about the nature of covalent bonds.

In short, this book will be found useful for its good coverage of the structural properties and the various theories of ferroelectrics but it does not contain, and its author did not intend it to contain, a comprehensive record of the electrical properties.

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Dislocations and Mechanical Properties of Crystals. By J. C. FISHER, W. G. JOHNSTON, R. THOMSON and T. VREELAND, Jr. Pp. xiv+634 with many figs. New York: Wiley; London: Chapman and Hall. 1957. Price £6.

This book consists of a series of papers (with discussion) presented at a small International Conference on Dislocations and Mechanical Properties of Crystals held at Lake Placid, on September 6th–8th, 1956. The conference was attended by 41 experts in this field, and by limiting the attendance to such a small number, it was possible to have useful stimulating discussions. There is little doubt that small conferences of this type are ideal for interchange of information and ideas between experts. The value of the conference is, however, enhanced enormously by recording the proceedings, and so enabling other research workers to become acquainted with the most recent developments. The editors of this report are to be congratulated on the very fine book which they have produced, which will be of great value to every research worker in this field.

The report is divided into eight parts corresponding to different subjects discussed at the conference. The first part deals with methods of direct observations of dislocations; studies are described in which dislocations are observed by 'decoration', etching, or transmission electron microscopy. These techniques of observation of individual dislocations have helped to put dislocation theory on a firm foundation. Many predictions of dislocation theory have been confirmed.

The second part consists of papers on the deformation of single crystals including a remarkable paper by Blewitt and his colleagues on twinning and low temperature deformation in copper. The next part, on work-hardening and recovery, contains a comprehensive review by Seeger (85 pages) on glide and work-hardening in f.c.c. and h.c.p. metals. On reading this paper one feels that whereas the properties of isolated dislocations are understood and have been confirmed in some detail, much remains to be done theoretically in relating the bulk mechanical properties to the behaviour of assemblies of dislocations, and experimentally in testing those theories which have been suggested. The paper by Boas on stored energy, resistivity, and density measurements on cold-worked metals underlines again the discrepancy between the observed resistivity and that calculated for unextended dislocations. Seeger attributes the discrepancy to stacking faults, but a full theoretical treatment is still required on this point.

A section on alloys includes a theoretical paper by H. Susuki on the yield strength of binary alloys as well as a number of experimental papers, in particular one on the deformation of alloy single crystals by Garstone and Honeycombe. It appears that more studies of this type are needed to elucidate the nature of hardening mechanisms in alloys.

The next part includes a review of internal friction phenomena due to dislocations (Lücke and Granato); this technique is extremely sensitive to the presence of dislocations and promises to be a powerful tool in the study of dislocations. Two papers on fatigue underline our lack of understanding of this phenomenon.

The short section on dislocation theory includes an important paper by Leibfried on thermal motion of dislocation lines, which has applications to the problems of thermal activation of dislocations at obstacles.

A few papers on whiskers are followed by a section on radiation damage, including papers by the Urbana and Oak Ridge Schools on annealing. The detailed interpretation of the complicated annealing characteristics and the precise nature of the damage are far from clear.

The nature of the papers presented at this conference is characteristic of the present trends in this subject. The theory of many of the basic properties of dislocations has been worked out, and it is clear that 'Dislocation Physics' is becoming an 'experimental' subject. It is now up to the experimentalists to test directly the predictions of theory and to suggest new directions in which the theory might be developed. On the other hand there is plenty of scope for the theorist in the study of the properties of assemblies of dislocations and of bulk properties of metals, as well as in the field of radiation damage.

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Splitting of Terms in Crystals. By HANS A. BETHE. Pp. 69. New York: Consultants Bureau, Inc. New York 11. 1958. Price $3·00.

It is a testimony for the solid and informative work published in this 1929 paper by H. Bethe that there is now sufficient demand for an English translation to be made. In fact, in re-reading the paper after a long period, one is all the more impressed by the author's sovereign application of group theory to the problem of the splitting of atomic levels caused by placing an atom in the electrical field of crystallographic symmetry which is created by the charges of the surrounding atoms. This predictable effect prepares the way for the discussion of further changes of the energy level scheme by electron exchange between neighbours. The main advance made recently beyond Bethe's treatment is the inclusion of spin interaction in the group theoretical treatment by Fiek (*Zs. f. Phys.* **147**, 1957, p. 307).

The translation is clear and adequate, and the price moderate.

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