envisaged. Thus much closer scrutiny seems warranted of the structure and location of the "free surface carbon" formed in the course of applying certain oxidation techniques to diamond (p. 120). Formation mechanisms of such 'carbon' may conceivably be related to basic features of the kinetics of migration of carbon atoms in diamond crystals, as well as in dislocation bundles, or in the gas/solid interface. Etching of diamond, by media which act as solvents for carbon, and not merely as oxidizing agents, could also yield complementary information about a number of structural problems.

As a development of this theme, it would clearly be useful to have more general information about the kinetics of graphitization of diamond, including experiments under conditions where the role of oxygen at the interfaces can be definitely excluded. Similarly, in this book discussion of thermal annealing of defects, whether natural or produced by irradiation, scarcely pays sufficiently detailed attention to kinetic aspects.

Since the inception, in 1949, of co-operative researches published in this book, technological mastery has been achieved of production of synthetic diamond. In view of this success, chapters on the chemical physics of its nucleation and growth from solvents or from graphite now seem definitely called for. But, despite various insufficiencies of chemical physics, the book has many admirable features. It is a worthy tribute to the originators of this programme of research on diamond, Sir Ernest Oppenheimer and Sir Francis Simon. The editor, Dr. R. Berman, also contributes a lucid chapter on the thermodynamic properties of diamond and on its thermal conductivity. This completes a fine task, in bringing a mettlesome team of contributors to such an effective goal.

A. R. UBBELOHDE

UNDERSTANDING SOLIDS

Principles of the Theory of Solids

By Prof. J. M. Ziman. Pp. xiii + 360. (Cambridge: At the University Press, 1964.) 45*s*. net; 8.50 dollars.

PRINCIPLES of the Theory of Solids is an admirable book. Though it will certainly reach a much wider audience, it is designed specifically as a text-book for graduate students in solid-state physics, and it is ideally suited for that purpose. As Prof. Ziman reminds us in his preface, the aim of a text-book should be to explain ideas, rather than to catalogue facts; by restricting himself to a few of the basic themes of solid-state physics—broadly speaking, electrons, phonons, and their interactions—he has been able to explore the ideas in considerable depth, explain them with admirable clarity, and bring out in full the underlying unity of the topic.

The reader is assumed to be familiar with the basic techniques of quantum mechanics, including time-dependent perturbation theory and scattering theory, and to have some idea of what creation and annihilation operators are; he is also assumed to know something of the basic experimental facts of solid-state physics. The book is exclusively concerned with theoretical concepts, rather than experimental facts: one will look in vain here for tables of Debye temperatures or electronic specific heats, and the copious figures—one hundred and seventy-four of them—are all designed to illustrate the theoretical argument; not one of them shows an experimental point. But the theoretical argument is beautifully developed, and the chapter on electron states, in particular, is a model of exposition. The approach is thoroughly contemporary throughout, so that, for example, electron–electron interactions are discussed entirely in terms of the dielectric function. No attempt is made to deal with Green's function techniques, bubble diagrams, and the other sophisticated abstractions of modern theoretical physics, but outside this highly specialized area most of the ideas now used in electron–phonon physics are discussed, analysed, and explained, so that after studying the book a student should be in a position to comprehend much of the present-day literature in this field.

Graduate text-books nowadays commonly include a set of problems at the end of each chapter, for the student to try his strength on. In the present text, there seem at first glance to be no problems, but the reader will rapidly find that the book, in fact, abounds in them: they are embedded in the text on almost every page. The author's technique is to sketch in lightly the steps in each theoretical argument, so that the line of thought is not too much obscured by algebraic detail, but to leave the reader enough clues to fill in the details for himself if he will. If he does, he will learn a great deal more about the subject.

He will also, it must be added, discover a good many obscurities and a good many minor errors in the text. Because the exposition is otherwise so excellent, these lapses may puzzle the unassisted student more than they would in a lesser book, and it may be worth giving a few examples. They are particularly frequent in the chapter on optical properties, where it is not always clear whether the author is talking about metals, or insulators, or both. If the reader has been taught to distinguish the ideas behind the Lorentz and Onsager treatments of the internal field problem, he may be a little puzzled by Fig. 114; he may or may not be puzzled by equation (8.12) and by the (spurious) argument leading to equation (8.80), but he should be. He will certainly be puzzled by equation (8.110), which—the author claims—reproduces (8.7). To see that this is so, the reader has first to detect and correct an error in sign in (8.110), and then to realize that N^2 in (8.7) becomes ε in (8.110), and ε in (8.7) becomes 1 in (8.110). All this is rather a lot to ask of the struggling graduate student. He is less likely to be puzzled by Fig. 91(*b*), which is clearly wrong.

The structural unity of the book is weakened, perhaps inevitably, by the penultimate chapter on magnetism. This discusses a whole miscellany of topics, ranging from the elementary Weiss theory of ferromagnetism through the Ising problem to a summary of the theory of ferromagnetic and antiferromagnetic spin waves. The latter topic is closest in spirit to the rest of the book, and it also serves to illustrate the use of creation and annihilation operators, in preparation for the excellent final chapter on superconductivity. But unhappily the treatment of spin waves is rather too brief to be useful, and just at this point the physical ideas, where they are most needed, tend to become submerged in the algebra: the graduate student will find this section rather heavy going.

Despite these minor criticisms, it remains true that this is an admirable book. Indeed, it scarcely needs my commendation: it is already being widely used as a graduate text on both sides of the Atlantic. It seems likely that a second edition will soon be called for, and we may hope that it will be even better than the first.

R. G. CHAMBERS

A BIOLOGIST'S GUIDE TO TRANSISTORS AND OTHER SEMICONDUCTORS

Instrumentation with Semiconductors for Medical Researchers

By Prof. Clinton C. Brown, in consultation with George N. Webb. (A Monograph in The Bannerstone Division of American Lectures in Objective Psychiatry.) Pp. xvii + 254. (Springfield, Ill.: Charles C. Thomas, 1964.) 10.50 dollars.

A LARGE proportion of handbooks which aim to provide information over a complete field are either written by a panel of authors with carefully defined terms of reference, or, if by a single author, represent a course of