

Imperfections and Active Centres in Semiconductors

By R. G. Rhodes. (International Series of Monographs on Semiconductors, Vol. 6.) Pp. xii + 373. (London and New York: Pergamon Press, 1964.) 90s. net.

ALTHOUGH the word "semiconductors" is used in the title, this book is in reality a review of certain properties of germanium and silicon, and mention of other materials is extremely brief. The topics covered are the detection, geometry and motion of dislocations including plastic deformation and twinning, crystal growing and the behaviour of impurities incorporated during growth and by diffusion techniques. A final chapter deals with the chemistry of etching of germanium and silicon and a discussion of the formation of etch pits produced by defects. The general theme is the interactions between various defects including dislocations, vacancies and impurities and the effects of such reactions on the electrical properties of the bulk material; there is no discussion of such effects in thin films prepared by vapour phase growth.

R. G. Rhodes states that the book should be useful in teaching, as well as of practical help to the specialist, and for this reason brief elementary discussions are given as introductions to some of the chapters. The teaching value, however, appears to be rather limited, since the main subject-matter is quite definitely specialized. The space devoted to the elementary preambles which are covered more generally and in more detail in other texts could have been used to amplify other sections which are treated in only a cursory manner. For example, although considerable space is devoted to the detection of dislocations by X-ray methods, the technique of electron microscopy is dealt with in one page; the wealth of information on the behaviour of impurities and their interactions with one another and defects, such as vacancies as determined by electron spin resonance, is scarcely mentioned. In addition there is virtually no mathematical formulation of the various elastic interactions and kinetics of diffusion and precipitation which are discussed.

Imperfections and Active Centres in Semiconductors is, therefore, rather disappointing because of its incompleteness. It should, however, be of value to technologists and new research workers entering this field, since it gives a factual survey of the literature up to and including 1962 with adequate references apart from the deficiencies noted here.

R. C. NEWMAN

Trace Analysis of Semiconductor Materials

Edited by J. Paul Cali. (International Series of Monographs on Analytical Chemistry, Vol. 11.) Pp. ix + 282. (Oxford, London, New York and Paris: Pergamon Press, 1964.) 70s.

TRACE analysis of semiconductor materials presents problems of exceptional severity because of the extremely low levels at which impurities can have a significant effect on the properties of these materials. *Trace Analysis of Semiconductor Materials* aims to give an account, up to 1961, of the battle being fought by the semiconductor analyst to achieve the necessary sensitivities.

The book essentially consists of four chapters, each by specialist authors. The first, and perhaps appropriately the longest, chapter is on activation analysis, by J. P. Cali. A short second chapter, by P. E. Lightly and E. W. Currier, is concerned with emission spectroscopy, and Chapter 3, by R. E. Honig, deals with mass spectrometry. Chapter 4, by C. A. Parker and W. T. Rees, comprises three sections on absorptometric, fluorimetric and polarographic methods.

The book therefore in effect consists of a series of monographs on the six particular analytical techniques which have been found most rewarding in semiconductor trace analysis. It is perhaps a pity that the coverage was not extended to consider a number of matters common

to the various techniques of trace analysis, for example, the vexed problem of sample preparation, and the difficulties of preparing ultra-pure reagents to permit the analysis of ultra-pure materials. On the other hand, there is much to commend. The emphasis throughout is on information of practical value; in particular the radio-chemical separations and the table of published analyses in Chapter 1, and the analytical methods detailed in Chapter 4, are most useful compilations. The book could also be of value to many analysts not concerned with semiconductor materials.

H. J. CULLEY

Genetics of Forest Tree Improvement

By J. W. Wright. Pp. xvi + 399. (Rome: Food and Agriculture Organization of the United Nations; London: H.M.S.O., 1964.) 20s.; 4 dollars.

IT is some two hundred years since Duhamel du Monceau published his observations on hereditary behaviour in forest trees, and although later workers have interested themselves in freak forms of trees, in hybrids and in provenance trials, no serious attempt was made to bring about improvement in forest trees until the present century. In fact, credit must be given to the Americans for first adopting "Tree Breeding" in the name of a forest research station. This was in 1925. Many developments have taken place since then and the silviculturist realizes the useful tool he has in the subject of forest genetics. The recent publication, *Genetics of Forest Tree Improvement*, prepared by J. W. Wright and issued by the Food and Agriculture Organization of the United Nations, deals with the subject in a most comprehensive way. It is said in the foreword that the book is aimed at three types of readers—experienced professional tree breeders, students and practising foresters. There is no doubt that these aims have been achieved in the subject-matter and its lay-out.

For obvious reasons much of the genetic improvement work must be expected in species which are commonly planted rather than in those in which natural reproduction is the rule. The rate of improvement is usually more spectacular in species planted outside their natural range, such as *Pinus sylvestris* in the United States, *P. radiata* in the southern hemisphere and eucalypts in the Mediterranean countries. But genetic gains are also being demonstrated in species which are planted within their native ranges, such as Douglas fir in the Pacific north-west. All this is a very different story from what has happened when trees have been raised from unknown provenances and planted in the wrong sites. The result has been a waste of time and money.

After giving illustrations of basic genetic principles, the author deals with population genetics, pollen migration rates, tree selection and selective tree breeding. There are general remarks on geographic variation in forest trees and examples are quoted for a number of species. The professional breeder will find much interest in the chapter on species and racial hybridization. The importance of exotic trees for afforestation and reforestation schemes is well known and the author claims that species introduction is best considered as a part of forest genetics because differences between species and ecotypes are a matter of degree and therefore tests of new species and new ecotypes should be organized as part of a tree-breeding programme. He adds that the present generation of foresters is largely dependent on tree breeders for most of their detailed knowledge of exotics. There are also fascinating chapters on polyploidy, experimental design and analysis, controlled pollination and vegetative propagation. Finally, there is a most useful, and essential, glossary.

Much more could be said about this book, but it can be summed up by saying that it is ably presented and is a very valuable contribution to forestry literature.

C. J. TAYLOR