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Point defects in solids

Defects in the Alkaline Earth Oxides. By B. Henderson and J. E. Wertz. Pp. 152 (Taylor and Francis: London, 1977.) £8.50.

THIS monograph is concerned mainly with the structure and properties of point defects studied primarily by the techniques of optical and paramagnetic resonance spectroscopy, a field of investigation to which the authors have themselves made significant contributions during its development over a period of nearly 20 years.

MgO and CaO have been extensively studied, the other oxides less so. Transition metal impurities occupy substitutional sites, sometimes in association with nearby impurity or defect sites, and detailed tabulations of data are given. Whereas early studies were often complicated by the unwanted presence of impurities, it has much more recently become apparent that impurities can play an important part in moderating the production of lattice defects by particle irradiation. The structure of anion vacancy defects

seems to be very well understood, although the interpretation of observations relating to cation vacancy defects still presents some problems. The power of double resonance techniques, both ENDOR and those involving simultaneous irradiation at optical and microwave frequencies, is beautifully illustrated. Compared with the extensive array of experimental results on anion and cation vacancy defects, the information available about point interstitial defects is still sparse.

The appearance of this review is timely as the subject has reached that stage of maturity at which a perspective view of the considerable amount of published work is of real value both as a summary of achievement and as an aid in directing attention to the nature of the most significant problems which remain to be solved. The selection of material is well balanced and concisely presented, and will serve not only as a useful compendium for those engaged in this field but also as a helpful guide and introduction for the newcomer.

T. P. P. Hall

T. P. P. Hall is Lecturer in Physics at the University of Essex, UK.

Electrochemical techniques

Electrochemistry of Biological Molecules. By Glenn Dryhurst. Pp. xii+601. (Academic: New York and London, 1977.) \$47; £33.35.

POLAROGRAPHY was invented in 1922 and soon became an important method of chemical analysis. At the end of the 1950s, there was a decline in the practical everyday use of this method, because direct current (d.c.) polarography, particularly its sensitivity, no longer met the demands then being made on modern analytical methods. Recent years have seen, however, a renaissance in polarographic and voltammetric analyses, and from classical d.c. polarography a number of modern electrochemical techniques have been derived. Of these, derivative (differential) pulse polarography has surpassed d.c. polarography in sensitivity by about two orders of magnitude, and has become increasingly applied to biological research. The publication of Dryhurst's book is therefore timely.

The content of this book covers a narrower research area than that suggested in the title. Of the compounds with biological significance, only nitrogen heterocycles are included. Electrochemistry is mainly limited to the

studies of these substances using polarography and related techniques. The introductory chapter summarises the theory and instrumentation of electro-analytical measurements in a way that will be easily understood even by readers with no experience of electrochemistry. Further chapters contain information on electrochemical reduction and/or oxidation of N-heterocycles, including purines, pyrimidines, pteridines, flavines, pyrroles, porphyrines and pyridines.

About 250 pages are given over to nucleic acids and their constituents. Although the electrochemical reduction of nucleic acid constituents and their analogues has already been studied in considerable detail (there is also quite a vast literature on purine oxidation), more detailed research on the electrochemical behaviour of oligonucleotides is still needed, representing the missing link between studies of polynucleotides and their monomeric units. Nevertheless, research on nucleic acid structure and properties using electrochemical analysis has developed rapidly in recent years. A correlation between the reducibility of nucleic acids in solution and their conformation is the basis for the application of polarographic techniques to the investigation of small changes in DNA double-helical structure. Changes in nucleic acid reducibility can also serve as an indication of conformational changes occurring in nucleic acids adsorbed at interfaces.