country) working in the candidate's field of specialization. (vi) An explanatory note (200 words) on the likely benefit to the candidate, with specific reference to the development of future research and development work to be carried out by him in the same field and its relevance to the country's development. Completed applications should be mailed so as to reach the COSTED Secretariat at least three months before the starting date of the proposed programme.

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (M. M. Woolfson, Physics Department, University of York, Heslington, York YO1 5DD, England). As far as practicable books will be reviewed in a country different from that of publication.

Electronic absorption and internal and external vibrational data of atomic and molecular ions doped in alkali halide crystals. By S. C. Jain, A. V. R. Warrier and S. K. Agarwal. Pp. 59. Springfield, Mass.: U.S. Department of Commerce, 1974. Price $0.95.

Spectral data for more than 70 atomic and molecular ions when incorporated in the lattice of alkali halide crystals are tabulated in this useful inclusion in the *National Standard Reference Data System series*. 55 tables are given in three sections, the first of which is devoted to electronic absorption wavelengths. The second gives the vibrational frequencies of the internal modes of complex ions whilst the third deals with external vibrational frequencies.

Each table gives the wavelength associated with the particular absorptive process for each centre in a number of alkali halides together with a group-theoretical assignment for the transition.

The data that appear in the tables were selected on the basis of consistency amongst different authors.

This relatively cheap publication will provide a useful addition to the library of solid state spectroscopists.

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Silicon carbide–1973. (Proceedings of the Third International Conference, Florida, 1973.) Edited by R. C. Marshall, J. W. Faust Jr & C. E. Ryan. Pp.xii + 692, Figs. and plates 423, Tables 53. Columbia: Univ. of South Carolina Press, 1974. Price $25 00.

Though the growth of silicon carbide has been studied for many years, it was only 16 years ago that a paper presented at a solid-state conference in Brussels, on the growth properties and potential of single-crystal SiC was received with considerable enthusiasm. So much so that in the following April a full conference was devoted to the material. It was not until 1968, when many of the technical problems were realized, that a further conference was devoted to SiC. The many advances that have been made since then are reflected in this collection of the 75 papers presented at the 1973 Miami Conference.

Although SiC was at first regarded solely as a semiconductor of considerable potential in the device field, its possible applications now range far, exploiting its refractory nature, chemical inertness, high tensile strength and high forbidden energy gap. The editors have accordingly arranged the conference papers into five distinct sections. Part I is devoted to the growth of SiC by various techniques associated with potential applications. Six papers each are devoted to expitaxic growth and vapour-phase deposition; a further paper describes new techniques. Both Laue and oscillation techniques are used to illustrate crystal quality and this section will be of interest to inorganic crystallographers. Other papers deal with growth kinetics and inclusion problems.

Part II is devoted to the study of polytypes which were discovered over sixty years ago. They are believed to be formed by molecular complexity at high growth temperatures. The use of etch pits to show up some polytypes is discussed and an atlas of the Laue patterns of known polytypes given. Other papers discuss solid-state transformations and evidence for a new 21-layer trigonal polytype.

The third part, concerned with physical properties, begins with a complete review of optical studies followed by papers on band structure calculations for polytypes. These are followed by reviews of both photo- and cathodoluminescence of polytypes.

The last two parts are devoted to non-electronic and electronic applications. The first group utilize the high tensile strength and moduli of SiC and include armour plating and the use of fibres with strengths as high as 4700MN m^{-2}. Other papers relate to the corrosion resistance of SiC when used as resistive heating elements. The last part deals with electronic applications, particularly as light-emitting diodes with brightnesses between 10 and 100 nits and with spectral emission in the blue to red. SiC cold cathodes with emissions of 200 μA cm^{-2} are also fully discussed. Further papers discuss materials such as Be_3P_2, Be_3C and Si_3N_4 which might develop into more useful materials than SiC.

Solid-state physicists with an interest in new materials with diverse applications will find this collection of papers of considerable interest. The book has been offset without reduction in size and is therefore a tome of massive dimensions, but one which should be read.

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Low energy electron diffraction. The theory and its application to determination of surface structure. By J. B. Pendry. New York: Academic Press, 1974. Price: £8.60; $22.25.

The study of low-energy electron diffraction (LEED) started in 1927 with the historic experiments of Davisson and Germer and their demonstration of the wave nature of the electron. It continued quietly with the studies of Farnsworth who was able to complete a remarkable amount of experimental work before the appropriate ultra-high vacuum technology was widely available. In the early 1960's LEED activity expanded rapidly all over the world largely because of the commercial availability of the appropriate apparatus and a widespread interest in the possibility of determining the atomic structure within the top few atomic monolayers of a solid. Although the strong scattering cross sections of atoms for low-energy electrons were widely appreciated at that time, the im-

plications of strong scattering for the interpretation of LEED measurements were not. Disillusion set in rapidly and widely and very few people continued trying to understand the theoretical and experimental implications of both multiple scattering of electrons and the effects of inelastic excitations upon the elastic scattering intensities.

Dr Pendry has played an important role at this stage in the development of LEED by making significant contributions to the establishment of a theoretical framework and the use of this theory to solve both the structures of the low-index faces of simple metals and the structures of ordered adsorbates upon these faces. This book describes these developments from the point of view of one of the major protagonists of LEED. It is quite clear that the community of scientists working on LEED have surmounted the first barriers towards using the technique to solve surface structures and Dr Pendry shows how the complicated theoretical treatment necessary is built up and then programmed for the computation of LEED intensities.

After a brief introduction dealing mostly with the elements of the experimental method the book contains descriptions of the theory of scattering processes for low-energy electrons, diffraction from rigid lattices, schemes of calculation and perturbation schemes which can save computational time, diffraction modified by thermal vibrations and, finally, the solution of the structure of simple ordered adlayers on low-index metal faces. There are substantial appendices containing programs in Fortran IV for the calculation of LEED intensities, the phase shifts for spherically symmetric ion cores and their temperature dependence and of the structure of simple adlayer systems.

The book is offered as a stimulus to the further application of LEED theories to new problems in surface science and it is for this reason that the computer programs have been appended. Although this is extremely useful it might have been wiser to include a clear warning to the potential surface crystallographer pointing out that the theory is not at the point where it can be simply used. These are long, complicated and sophisticated calculations with many approximations 'built-in' and the potential investigator should be aware that he is about to commit himself to many hundreds of hours of effort assessing the validity of the theory/experiment comparisons. He should not be lulled into a false sense of security.

Nevertheless, this is an important book which will be useful to anyone working with LEED of planning a start in the field because it makes clear many of the theoretical ideas in use now. It is marred by a moderately high incidence of typographical errors which means that the reader will need to check equations rather carefully.

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