Q-switched pulses from systems (Nd glass and ruby) in which bleachable dyes are used.

The other two papers are concerned with the investigation of stimulated emission in pinched discharges and with the detailed physical processes occuring in pulsed gas-discharge lasers.

As is usual in the proceedings of this series, the articles are comprehensive and authoritatively written.

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Solid-state theory in metallurgy, By PETER WILKES. Pp. xii+453, Figs. 210, Tables 18. Cambridge Univ. Press, 1973. Price (cloth) £8·95, (paper) £3·20.

This is a book on solid-state physics written by a metallurgist for students in metallurgy and materials science.

The first part contains a simplified introduction to quantum theory to establish a basis for the subsequent discussion of electrons in metals. The free-electron model and properties are also treated here. That part of statistical physics that leads to the distributions of Fermi–Dirac, Bose–Einstein and Maxwell–Boltzmann is included.

The second part of the book is devoted to the crystal lattice and covers crystal binding, lattice symmetries, reciprocal space and crystal defects. There is also a chapter on experimental methods for investigating crystal structure, and finally an exceedingly simplified chapter on Fourier analysis.

In the third and final part the author returns to the electron problem: the effect of the periodic potential is now taken into account. To begin with this is done in an elementary way as a descriptive extension of the free-electron model. This is followed by a discussion of the important nearly-free electron theory containing recent development of pseudo-potential theory; electron microscopy is also included.

The aim of the book is supposed to be to bridge the gap between solid-state physics and metallurgy. I think that this is an important task but also a difficult one, especially if it must be carried out within the limits of ordinary undergraduate courses. It takes time, for example, for students who do not have a deeper knowledge in mathematics and the foundations of theoretical physics to obtain an understanding of quantum physics. What one can hope for is that the students should gain an insight intro the microscopic properties of matter and a feeling for the bases of the macroscopic characteristics. In that respect this book seems rather promising. The very simple treatment of quantum mechanics is just enough to make it possible to read the book, although I think that the third part can be rather arduous. The text covers many important aspects of solid-state physics in a concise and lucid way. I would, however, object to the presentation of some mathematical details, what I sometimes find too unorthodox. Instead of making the text simpler they can be confusing. Further, the definition of the Dirac δ-function in the chapter on Fourier methods should perhaps have been given in more detail. This certainly offers a good illustration of the great difficulties one has to face in the preparation of a text like this.

I am looking forward to trying out this book in our materials physics courses.

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The molecular replacement method. A collection of papers on the use of non-crystallographic symmetry. Edited by M. G. ROSSMANN. Pp. viii+267. New York: Gordon & Breach, 1972. Price $ 15.00, £ 6.25.

The molecular replacement method was first proposed by the editor of this volume in 1960. It consists of three separate steps:

A. The calculation of a rotation function which should show the relative orientation of crystallographically independent molecules or subunits of molecules within one crystal lattice or between different crystal forms.

B. The determination of the translation between the molecules or subunits.

C. After successful application of steps *A* and *B* the positions of the molecules or subunits in the crystal lattice are known. The condition that the electron-density distribution within them is identical should be sufficient to solve the molecular replacement equations leading to a complete set of phases for an unknown protein.

In collaboration with others, Rossmann has tenaciously worked on improving the method. Step *C* has not yet been accomplished for the solution of an unknown protein structure, although elegant approaches to the solution of structures with non-crystallographic symmetry have been developed by Crowther. Step *A* however is now accepted as a useful method to determine non-crystallographic symmetry and to relate molecules of the same protein or similar proteins from different species.

For those who wish to familiarize themselves with the molecular replacement method this volume gives an easy access to the relevant papers, including many applications. It is only a pity that the interests of the potential readership have been rather neglected. The manuscript languished somewhere between the publishers and binders for a period of two years, approximately 1969–1971. Fortunately the editor has added the important articles that were published in this period in an appendix.

The editor has presented with this book an important branch of protein crystallography and it deserves a better layout than the rather shabby one designed for it by the publishers.

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