

conversion of energy. Research on the fuel cell is described, but with optimism more restrained than that of Harvard Business School authors who predicted that fuel-cell locomotives will displace Diesel locomotives within eight years.

Physical Electronics. By G. F. Alfrey. 220 pp. Van Nostrand, Princeton, N. J., 1964. \$8.50.

Reviewed by L. Marton, National Bureau of Standards.

Reviewing a book is sometimes greatly facilitated by clear and concise statements of the author himself, indicating for whom the book is written and why the book is written. Direct quotations, therefore, are perhaps the best mirror against which to judge the performance of the author. In Dr. Alfrey's book, there are several such clear statements which I would like to quote directly, starting with one from his preface: "This book is an attempt to provide a concise and coherent introduction to the physical principles governing the operation of electronic devices. It is written for electrical engineers and for physicists who are interested in the way the principles of their subject are applied; pressure on the syllabus not uncommonly pushes this aspect beyond the reach of formal instruction." A little further in the preface he outlines two limitations of his book, "The first, relatively trivial, is that many topics of potential interest have to be excluded. . . . The second limitation is more serious. The treatment is largely qualitative and it will no doubt be possible to read the book and yet be defeated by a relatively simple problem, without having acquired that feel for the numerical magnitudes of the quantities concerned which is rightly regarded as an essential part of the scientist's intellectual equipment." At the end of his preface he adds, "I hope that it may continue to serve the reader in his more advanced studies as a kind of guide book relating his work to other aspects of a wide and expanding field."

I would like to add one more quotation from the text. On page 193, the author says, "The book discusses in the main those matters of electrical

engineering which follow directly from the physical properties of the electron." In many respects the author succeeds quite well in satisfying his own criteria. The treatment is quite concise, perhaps in some respects too concise to provide the basic training for electrical-engineering and applied-physics undergraduates. I do not know what the differences are between British and American curricula for these types of studies. If I were to teach the subject to electrical-engineering or applied-physics undergraduates, I might want to include a little more detail on many of the physical phases, and then perhaps make the treatment a little more mathematical than descriptive. Also, the definition of physical electronics, in my mind at least, covers more operations involving free electrons than the more solid-state aspects of electronic conduction in solids and in particular, in semiconductors. Chapters 12 and 13, on magnetic properties of matter and on dielectric materials, may be definitely excluded from the way I view physical electronics. The other chapters, which I would maintain are, Electrons in Atoms, Forces between Atoms, Emission of Electrons from Solids, Electron Optics, The Control of Electron Current in a Vacuum, Electrical Conduction in Gases, Gaseous Plasma, Electrical Noise, and Molecular Amplification.

The author starts out with a definition of the scope of electronics which I rather like because it is old-fashioned and it is in definite disagreement with the application of the word "electronics" to all kinds of high-frequency phenomena. The style of the book is extremely readable, in many places even almost florid—for instance, when he calls a process of measurement "intolerably clumsy" (page 63) or the first attempts toward advanced theory of solids, "heroism pushed to the extremes of folly" (page 119). There are places where I would be inclined to disagree with the author: for instance, at the beginning of Chapter 8 where he apologizes for including in his book a discussion of gaseous plasma, saying that gaseous plasma is an unfamiliar state under normal terrestrial conditions but is widespread in

nature once one moves away from the earth's surface. I don't believe any apology is needed. I am inclined to disagree also with a certain number of historical statements, such as, on page 18, where according to the author, "The nature of the rays was a matter of widespread speculation, but the only tangible idea that was put forward was a suggestion that the rays consisted of charged particles." The author is talking here about the nature of cathode rays and their interpretation during the second half of the last century and neglects to mention that for several decades there was a marked controversy between British and German physicists. The British represented the corpuscular idea whereas the Germans were definitely in favor of the wave concept.

There are a few minor items which I would have preferred not to discuss. I would say that there is a definite lack of good proofreading in the book. The number of misprints is far from negligible. Not many of them mar the text, but if the name of Mosotti is consistently spelled Misotti, it indicates a little deeper defect than just bad proofreading.

In spite of the minor defects, I do recommend the book as a good concise introduction into the subject of physical electronics.

Moderne Probleme der Metallphysik. A. Seeger, ed. Vol. 1, Fehlstellen, Plastizität, Strahlenschädigung und Elektronen-Theorie. 445 pp. Springer-Verlag, Berlin and New York, 1965. \$14.75.

Reviewed by Walter G. Mayer, Georgetown University.

Some time ago a meeting held in Stuttgart was concerned with modern topics of metal physics related to solid-state physics. The authors, most of whom are with the Technische Hochschule or the Max-Planck-Institut in Stuttgart, have rewritten and considerably enlarged their papers given during that meeting and have collected them in two volumes.

As the title indicates, the first volume deals with imperfections, plasticity, radiation damage, and electron theory of metals. Although it is assumed that the reader has a certain amount of general background information, the authors make an effort