

with his introductory remarks on the hydrogen atom and hydroxyl radical, is a textbook model of clear writing.

How can molecules collect electromagnetic radiation energy and convey it into the synthesis of other molecules? Current answers are given in G. Tollin's paper on physical mechanisms in photosynthesis. The precise mechanisms by which ionizing radiations disrupt biological molecules are discussed in the paper on radiation inactivation of enzymes by Augenstein, Brustad and Mason.

In an entirely different direction is Forsberg's paper on effects of small doses of ionizing radiations, which discusses, among other remarkable biological items, the extreme sensitivity of certain molds. Measurable changes in growth rate are caused by 0.45 r given in 3 sec, and other responses are elicited by 10^{-3} r air dose.

The editors are to be commended for the thoroughness and compactness attained. The documentation is adequate. The table of contents, author index and subject index make the excellent material readily accessible to the reader.

Physics and engineering

PHOTOELECTRONIC MATERIALS AND DEVICES. Simon Larach, ed. 434 pp. Van Nostrand, Princeton, N.J., 1965. \$12.00.

by *Ladislav Marton*

The collection of papers presented in this book is based "in large part on a series of interdisciplinary papers in the general area of Photoelectronics, which appeared in the *R.C.A. Review* of December 1959." The foreword of the volume says, "Since this volume is an attempt to present a coherent picture of both materials and the devices in which these materials are utilized, the relevant device chapters have been extended and brought up to date."

The result is a rather inhomogeneous volume containing some pa-

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The reviewer, now Chief of International Relations for the NBS, has worked in electron physics for many years. He was one of the founders of the APS Division of Electron Physics.

pers that are very good physics and some that are pure engineering. A brief summary of the index of contents gives an idea about the general constitution of the volume. Chapter 1 is on the luminescence of solids, by A. G. Fischer, R. E. Shrader, and S. Larach, followed by Richard H. Bube's paper on photoconductors. The third is, "Infrared-Sensitive Extrinsic Germanium and Germanium-Silicon Alloy Photoconductors", by M. L. Schultz and G. A. Morton. A. Sommer and W. E. Spicer have written a chapter on photoelectric emission, A. Rose on noise currents, Paul Rappaport and J. J. Wysocki on the photovoltaic effect, E. E. Loebner on solid-state optoelectronics, and F. H. Nicoll on solid-state image intensifiers. The last chapter is by James A. Amick on Electrofax behavior.

I would like to single out the paper of Sommer and Spicer, together with that of Rose, as the highlights of the volume. They are excellent summaries of the subject, and can be used advantageously, whether for teaching purposes or for research work where an up-to-date review is required. Quite good are the chapters by Bube and by Schultz and Morton.

The first chapter has in its title in parentheses, "with emphasis on electroluminescence." I believe the title is misleading. There is very little on the luminescence of solids, and the emphasis on electroluminescence is so overwhelming that it would have been wiser to entitle the whole chapter "Electroluminescence" with some comments on the luminescence of solids. The chapter is written largely from an engineering viewpoint, although it does discuss the possible models for the action of electroluminescent materials. In the introductory "general comments" part of the paper, a very regrettable slip occurs. The authors write, "The search for a theoretical understanding of incandescence led Planck in 1900, to the first significant promulgation of a quantum theory and to the concept of a 'perfect radiator' or 'black body', which has the property of emitting at least the same, but usually more, radiant flux per unit area over any given wavelength range than that obtainable from any real source operat-

ing at the same temperature." The authors convey here the idea that Planck was the first to evolve the concept of the black body, which is utterly wrong. More than 40 years before 1900, the concept of the black body was clearly evolved in Kirchhoff's classical papers, as well as in the paper of Balfour Stuart, and the measurements which were made between 1860 and 1900, as well as successive theories of Stefan, Boltzmann, Wien, and Rayleigh, are proof that the idea was alive a long time before Planck's classical investigation. Of course Planck had the great merit of evolving the concept that unified all previous investigations and theories.

The chapter on optoelectronics by E. E. Loebner is the most deplorable of all of them. It is written in a kind of gobbledegook which requires a glossary for reading. This is highly regrettable because I gained the impression that the paper may contain a series of ideas, which are very bright but hard to extract.

I was very interested in reading the last paragraph on the Electrofax process. This seems to be a very interesting new application of solid-state physics that may serve as a complement to photography or may even supplant, in some instances, conventional photographic processes.

Acoustics and living cells

ULTRASONIC ENERGY. Biological Investigations and Medical Applications. Elizabeth Kelly, ed. 387 pp. University of Illinois Press, Urbana, 1965. \$12.50.

by *Walter G. Mayer*

The use of ultrasonics in biology and medicine was the topic of a symposium held during the Summer of 1962 at the University of Illinois. The twenty-five papers presented there have now been published together with the text of the frequently very illuminating discussions following the presentations.

Ultrasonic waves can be transmitted through biological specimens, and the

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Walter G. Mayer, a member of the Physics Department at Georgetown University, has done research in ultrasonics for the past 11 years.