

## Book Reviews

MACROMOLECULAR REVIEWS, Vol. I., edited by A. Peterlin *et al.*, 302 pages, diagrams, 6×9 in., New York, John Wiley & Sons, 1967. Price, \$12.00.

*Macromolecular Reviews*, Vol. I begins a new series which aims to present review articles "useful. . . to the specialist in a certain field of polymer science and also to the general polymer researcher, or even a nonpolymer chemist or physicist who is only marginally interested in a special aspect of polymer science. . .," according to the editors' introduction.

Selected topics include: Optically Active Polymers by M. Goodman, A. Abe and Y.-L. Fan; Electrolytically Controlled Polymerizations by B. L. Funt; Poly-9-vinylanthracene by A. Renbaum and A. Eisenberg; Relationship of Catalyst Composition to Catalytic Activity for the Polymerization of  $\alpha$ -Olefins by H. W. Coover, Jr., R. L. McConnell and F. B. Joyner; Structure of Crystalline Polyethers by H. Tadokoro; Dynamic Thermogravimetric Analysis in Polymer Degradation by L. Reich and D. W. Levi.

Each article contains a substantial summary of the literature pertinent to the subject covered and provides an integration of widely scattered, not always available material. Although all the reviews are of interest to polymer chemists, the article written by Dr. Tadokoro deserves special mention not only because of its fine quality but also because he has reviewed many Japanese papers not all of which have been published in English. The subjects covered are broader and more general in scope than those usually found in the research-oriented *Advances in Polymer Science*.

It is unfortunate that this series could not have been published as a soft-cover edition so that graduate students and research workers in educational institutions could more easily afford to have all the issues.

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LASER RECEIVERS, DEVICES TECHNIQUES, SYSTEMS, by Monte Ross. 405 pages, diagrams, illustr. 6×9 in. New York, John Wiley & Sons, 1966. Price, \$14.95.

A timely and ambitious effort, this book describes the general principles and current practical aspects of coherent optical communi-

cations and reconnaissance systems. While the author has compiled a wealth of information previously not available in a single text, the book suffers from apparently hasty writing and careless editing. In particular, the organization of the material within individual sections is often sufficiently poor as to suggest the absence of an outline or adequate proof-reading. The reviewer noted a number of discrepancies, such that the reader cannot develop total confidence in the material.

An introductory discussion gives the potential advantages of optical systems followed by the highly important topics of quantum noise and detection sensitivity.

The presentation here is rambling and the definitions imprecise or badly placed. As just one example, in the discussion of thermal equivalent power, the author does not clearly distinguish between design bandwidth and reference bandwidth. Chapter 3 follows with a brief review of information theory, including the now obsolescent quantum treatments of Jones and Gordon. The information carried at low photon rates is covered in detail.

A discussion of receiving techniques is given next, including signal-to-noise-ratio (SNR) comparisons of direct-photodetection and optical-heterodyne systems. In regard to direct detection, the author implies that the background or thermal noise beating (photo-mixing) with the signal comprises the ultimate SNR limitation. This is contrary to the considerations discussed earlier in which it is shown that for  $h\nu > kT$ , quantum fluctuations (as manifested by shot noise) are predominant. The same fundamental error leads to the statement that optical heterodyne receivers "filter" the background noise, both spatially and at the intermediate frequency, when in fact the background-induced shot noise is much larger than such heterodyned noise and is in turn overridden by shot noise from the local-oscillator laser. Local oscillator noise in excess of quantum fluctuations or shot noise is stated to be a significant problem in optical heterodyning, but there is no actual discussion of multimode laser noise.

Chapter 5 covers receiving devices and is comprehensive and generally up-to-date. Various detection mechanisms and devices are discussed *vs.* system wavelength and bandwidth. One important detector, the avalanche photodiode, is covered with insufficient detail.

Modulation techniques are discussed next.