

## BOOK REVIEW

### *Advances in Biochemical Engineering—1*

Edited by T. K. Ghose & A. Fiechter. Springer-Verlag, Berlin, 1971.

Pp. vii+194, \$ 13.90.

Biochemical Engineering is a new branch of Engineering. This chemical engineering hybrid deals with unit operations and systems for bioprocess which have distinctive characters. Many biological processes are now well understood and can be effectively utilised for the benefit of mankind.

This book is one of the latest compilations in the series on the advanced knowledge in Biochemical Engineering. It contains 6 chapters each devoting to a different topic written by a different author.

Knowledge of fermentation fluids, their rheological properties, motion of gas bubbles in the fluid and shear problem in agitation, are essential for analysing the methods of process design and scale up. Chapter 1 has dealt exclusively in studying the above properties of fermented fluids. Separation of microbial cell from culture media lies in understanding the physico-chemical characteristics of flocculation and deflocculation. Chapter 2 deals with those phenomena. The third chapter gives interesting information on enzyme kinetics, relating to insoluble substrates, an area where little literature information is available. Production and application of enzymes has been well reviewed in Chapter 4. Enzymes offer unlimited potential for their use in wide variety of applications. Use of enzymes in detergents, immobilisation of enzymes particularly by micro-encapsulation technique have also been reviewed. The fundamental regulatory mechanisms in the microbial cell and the effect of these mechanisms on overproduction of metabolites and enzymes are described in Chapter 5. The future food supply is likely to come from single-cell organisms which could utilise hydrogen and carbon dioxide or liquid and solid hydrocarbons for their growth. Chapter 6 has reviewed these possibilities.

This book is the first series in biochemical engineering science and will be very useful for professional engineers and post graduate students who want to take up careers in this field.

*S. M.*

*Advances in Plasma Physics, Volume 4*

Edited. by A. Simon and W. B. Thompson, Interscience Publishers, 1971,  
Pp. ix+348, \$ 19.95.

The volume presenting plasma physics on a wide canvas is an important addition to the well-known series on the advances in the subject. It consists of the following chapters.

1. The Interpretation of Plasma Resonances Observed by Ionospheric Topside Sounders by J. P. Dougherty and S. R. Watson.
2. Two-stream Instabilities by Richard J. Briggs.
3. Cusp Containment by Ian Spalding.
4. Relativistic Beam Equilibria by Gregory Benford and David L. Book.
5. Plasma Collective Modes Involving Geometry and Velocity Spaces by B. Coppi.
6. Physics of Colloidal Plasma by M. S. Sodha and S. Guha.
7. The Motion of a Charged Particle in a Strong Magnetic Field by Ira B. Bernstein.

The first chapter summarizes the theoretical work on ionospheric plasma resonances detected by topside sounding satellites and related to some of the complex properties of plasma. The article by Briggs is devoted to an up-to-date analysis of one type of plasma micro-instabilities, which has attracted a considerable amount of attention since the first experimental demonstration of beam-plasma amplification 1958. The next article presents an overall view of the current state of research on a class of open-ended magnetic bottles and examines its possibilities in the field of thermonuclear fusion. The chapter by Benford and Book is a theoretical study of relativistic electron beams, which have been developed primarily for transport of high energies into a small area. The chapter by Coppi deals with collective effects in a plasma that are dependent on the particle velocity space and the macroscopic geometry of the plasma configuration. It contains an interesting section on the comparison of theoretical results with those obtained from multipole experiments with current conductors inside the plasma for producing the confining magnetic field. The longest and one most novel chapter has been provided by Sodha and Guha who have discussed the theoretical and experimental investigations on colloidal plasma formed by dust suspensions along with an appreciable number of free electrons emitted by the dust particles. The role of colloidal plasma in diverse fields, namely, electromagnetic effects of rocket exhausts, magnetohydrodynamic power generation etc., is also covered. The volume ends with an article by Bernstein, pertaining to the 'reduced description' of the motion of a charged particle in a strong magnetic field in terms of drifts and adiabatic invariants,

Several chapters of the volume are concerned with the research on controlled fusion reactors, the prospect of which has incidentally, brightened up considerably over the last few years. Nevertheless all the chapters appear to be completely independent of one another; the arrangement of the chapters also suggests that there has been no attempt for any possible co-ordination. It would have perhaps been more interesting and meaningful if a volume such as this could have thrown some light on the inter-connections between the various aspects of plasma physics. However, the volume is very helpful in keeping track of the rapid progress in some branches of plasma physics, and it can surely be recommended to all those interested in the development of the subject.

J. B.

*Physics of Electronic Ceramics : Parts A and B*

Edited by L. L. Hench and D. B. Dove; Marcel Dekker, Inc., New York, 1972.

These volumes contain proceedings of the conference on the Electronics Phenomena in Ceramics held at the University of Florida, 1969. For this conference the term electronic ceramics was meant to include topics such as semiconducting compounds, amorphous semiconductors, insulators, ferro-electrics, ferrites and materials with laser and other optical applications as also the somewhat related topics like thin films and surface defect structure. The conference was organized with the object of reviewing the present state of our knowledge regarding the basic physical theory of electronic ceramics and the application of these theories in case of commercial electronic ceramic materials. The basic theoretical background for the discussion of the various aspects presented at the conference was provided by the keynote lecture on Quantum Mechanics and Ceramics by J. C. Slater and a summary address by D. G. Thomas on Ceramics and Glasses—Some Uses in Communications Industry. Besides these there are 32 papers more dealing with different topics, like semiconducting ceramic compounds (4 papers), semiconducting glasses (3 papers), thin films (5 papers), surface defects (3 papers), dielectrics and insulators (4 papers), ferro-electrics (3 papers), magnetic ceramics (3 papers) and optical materials and phenomena (6 papers). Of these the lectures on the structural aspects of ferroelectricity by Ray Pepinsky and on the theory of antiferromagnetism and ferrimagnetism by J. B. Goodenough are highly interesting and instructive ones even for workers dealing with fundamentals of these subjects.

These volumes which as stated above provide the current developments on the different topics on electronic ceramics will therefore be useful ones for all students and researchers of material science as also for material science engineers.

A. K. D.

*Optical Microscopy for the Materials Science*

James H. Richardson, Marcel Dekkers Inc. New York, 1971.

Pp. x+692, \$ 29.50.

James Richardson's optical microscopy for the materials science is one more addition to the books that deal with the utility of optical microscopes in dealing with the various industrial problems. The book is mainly made up of 10 chapters that try to cover the vast field of optical microscopy.

First chapter deals with the fundamentals of the microscopic system and the path of light propagation, with the various types of objectives and eye pieces in relation to bright field illumination with respect to transmitted as well as incident light adjustments. The second chapter covers the various types of illumination as well as fluorescence microscopy. The third chapter is mainly concentrated on photomicrography, with various types of photographic processes, negative materials, and also the various methods of adjustments with exposures for getting good results. The fourth chapter is mainly on photomacrography with all the important instruments and accessories.

Chapter 5 gives an account of specimen preparation which includes cutting, vacuum impregnation, macroetching, thin section preparation and the procedure of good polishing. Chapter 6 is on the preparation of the samples of metals alloys binary compounds, ceramics, polymers and composites. The procedures of the etching as well as polishing reagents apart from mounting media are given in the form of tables. The seventh chapter is mainly on the safe maintenance of the laboratory wherein the above mentioned experiments are undertaken.

The qualitative and quantitative measurements in the specimens with the attachment of various accessories is dealt with the chapter 8. The chapter 9 is mainly on the various types of accessories used with the microscope. Chapter 10 gives an account of the proper design and construction of main laboratory wherein the equipments mentioned in the book can be suitably installed.

The author has made the book into a good reference book as well as laboratory guide for day to day work in an industrial laboratory. It was mainly possible because of the wide experience of the author in an university as well as an industrial concern. The transmitted polarization microscopy has been dealt in a passing manner. The optical properties of the materials under transmitted light should have been given in the form of tables just as for the materials under incident light.

Except for the above mentioned bias, on the whole, the book is highly suitable as a reference guide for laboratories dealing with industrial materials.

*A. T. B.*