Book Reviews

Electrons in Metals and Alloys. By J. A. Alonso (University of Valladolid) and N. H. March (University of Oxford). Academic: San Diego and New York. 1989. xi + 603 pp. $99.50. ISBN 0-12-053620-X.

This is a timely book and should be useful to chemists, material scientists, and especially physicists involved in metals research. The chapters deal with the following topics: Electron Density Theory, Alloy Formation, Electronic Structure, Point Defects, Crystalline Alloys, Electronic States Related to Thermodynamics of Disordered Systems, Electrical Transport and Optical Properties, Magnetism, and Surfaces and Interfaces. There are numerous appendices giving more detail about a variety of theoretical approaches, such as the Hohenberg–Kohn theorem, Ginzburg–Landau theory and Josephson junctions, methods of calculations of plasmon properties, and the Friedel Sum Rule. References are collected at the end of the book totaling 1168, as well as a brief appendix.

This work is quite theoretically oriented, as might be expected since Alonso is a theoretical physicist and March is a theoretical chemist. And since the majority of work in this field has been done by physicists, the literature referenced reflects this. Nevertheless, as chemistry expands further into material science and nano-phase materials, this book should be very useful. The organization and writing are excellent. Some chapter sections are particularly well written, such as the discussion of very small metallic particles (e.g., 19 atom mixed clusters), bonding of transition metals to nontransition metals, supersaturated solid solutions by ion implantation, magnetic iron alloys, predictions vs experiment for surface segregation of alloys, and many others.

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Sterol Biosynthesis Inhibitors: Pharmaceutical and Agrochemical Aspects. Edited by D. Berg and M. Plempel (Bayer AG). Ellis Horwood: Chichester and VCH: Weinheim. 1988. 583 pp. $155.00. ISBN 0-89573-671-3.

The book deals with the chemistry, pharmacology, mode of action, and applied uses of synthetic nitrogen heterocyclic antifungal agents that inhibit sterol biosynthesis in fungi important in agriculture and medicine. Among the agents implicated are piperazine, pyridine, pyrimidine, imidazole, triazole, morpholine, piperidine, and allylamine derivatives. Their antifungal activity results from induced defective biosynthesis of ergosterol, the chief sterol of fungi.

The title tempts comparison with prior monographs [*3-Hydroxy-3-methylglutaryl Coenzyme A Reductase*, J. R. Sabine, editor (CRC Press, 1983) and *Regulation of HMG-CoA Reductase*, B. Preiss, editor (Academic Press, 1983)] that treat the biochemistry of the rate-limiting enzyme of de novo sterol biosynthesis, but the present book is an entirely different offering. The inhibition of sterol biosynthesis by these antifungal agents involves other enzymes and mechanisms.

The book is divided into three major sections, the first (seven chapters) dealing with the general matters of synthesis and chemistry, mode of action, and toxicology of the antifungal agents. The second section (six chapters) deals with the use of sterol biosynthesis inhibitors for the protection of plants of agricultural interest. The third section (nine chapters) presents applications of the antifungal agents to human and animal mycoses.

Regarding the mechanisms of action for which the monograph is named, the biosynthesis of sterols from acetate is described in Chapter 3 by H. Vanden Bossche in competent fashion, with emphasis on ergosterol biosynthesis and inhibition of the cytochrome P-450 enzymes involved in the removal of the 14α-methyl group of lanosterol by pyridine, pyrimidine, and azole antifungal agents. Trivial and IUPAC systematic nomenclature of sterols is used in mixed fashion, but the sterols implicated can be correctly identified in most cases. However, the treatment of C-24 stereochemistry of 24-alkylated sterols is incorrect and confuses the older trivial 24a- and 24b-nomenclature with the systematic 24α_F and 24β_F designations for the Fischer projections. The C-24 stereochemistry indicated in Figure 1 (page 81) for ergosterol and three other 24-alkylated sterols is drawn incorrectly. Sequence Rule designations are not provided.

Different modes of action of other antifungal agents are covered in Chapter 4 by E. I. Mercer, in Chapter 5 by N. S. Ryder, and in Chapter 6 by D. Berg et al. Morpholine antifungals inhibit the $\Delta^8 \rightarrow \Delta^7$-isomerase and Δ^{14}-reductase of fungal sterol biosynthesis and the cycloeucalenol-obtusifoliol isomerase of higher plants; allylamine inhibits squalene epoxide cyclase required of all sterol biosynthesis systems.

In the last chapter, by D. F. Covey, there is a return to steroid biochemistry: in this case in a review of aromatase inhibitors implicated in control of estrogen biosynthesis from androgen. The chapter emphasizes inhibitors of the cytochrome P-450 hydroxylases involved, giving much less attention to the nitrogen heterocyclic agents emphasized throughout the other chapters.

There are many sterol and heterocycle structures and pathways drawn in detail, with only minor lapses in exact detail. Some duplications of both kinds of structures occur in the several different chapters dealing with the same compounds. Coverage of the literature is impressive, with over 1650 items cited in the 22 chapters. Many items from 1987 are included, including items in press, recent meeting abstracts, and patents, leaving the interested reader with the satisfaction that expert treatment has been achieved.

This monograph should satisfy the curiosity of those interested in sterol biosynthesis, medicinal chemists interested in the action of antifungal agents, and nitrogen heterocycle specialists seeking to understand biological effects of such materials.

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Semiconductors and Semimetals. Volume 27. Highly Conducting Quasi-One-Dimensional Organic Crystals. Edited by Esther Conwell (Xerox Corporation). Academic: New York. 1988. vii + 500 pp. $99.00. ISBN 0-12-752127-5.

Over the past two decades, chemists have come to appreciate the large role they can play in the development and characterization of novel materials for optical and electronic applications. Perhaps no other class of materials exemplifies and illustrates the contributions of chemists as the one-dimensional organic conductors; the subject of this latest volume in the important series, *Semiconductors and Semimetals* (R. K. Willardson and A. C. Beer, Series Editors). As is standard for monographs in this series, it is composed of a series of chapters, each written by an expert in the field. The first chapter serves as an historical introduction and overview of the field. It is the one chapter in the book I would recommend for the nonspecialist. Its style and clarity coupled with a discussion of all of the important topics with illustrative examples make it an ideal choice for the general reader desiring a background knowledge of this important area of materials chemistry, or perhaps for a graduate course in materials properties and chemistry. The rest of the monograph is devoted to the specialist. An especially interesting concept, given the explosiveness of the literature, is illustrated in Chapter 2. The chapter is comprised entirely of a table listing of structural formulas, conductivities, and references for hundreds of organic conductors. It is ideally suited to the reseacher just embarking on work in the area. The remaining chapters cover the effects of structural instabilities (Chapter 3) with special care being taken to distinguish effects arising from the $2k_F$ and $4k_F$ gaps, transport theory (Chapter 4), optical properties (Chapter 5), magnetic properties (Chapter 6), and the effects of high energy radiation on various properties (Chapter 7). Each of these is well organized and well written. In summary, this is a volume which should be on the shelves of chemistry, physics, materials science, and electrical engineering libraries, and many researchers working in the area will find enough of value to include it in their personal libraries as well.

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