BOOK REVIEWS

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

Radiation Effects on Solid Surfaces
(Advances in Chemistry Series 158)

Editor	Manfred Kaminsky
Publisher	American Chemical Society (1976)
Pages	397
Price	$32.50
Reviewer	J. M. Galligan

One of today's important technological subjects, of particular interest to readers of this Journal, concerns the interaction of radiation with atoms and molecules at and near the surface of a solid. For example, the integrity of the first wall of various versions of fusion reactors is of prime importance to the commercial feasibility of controlled thermonuclear reactors; a further example might be radiation-related chemical and physical processes, which may also be of importance to silicon solar cells. It is hard, then, to cover on both a long-term and a short-term basis the state-of-the-art, since today's state-of-the-art is quite transitory. As opposed to this view, reviews may also serve the purpose of introducing a nonspecialist to a subject, such that he can acquire some pertinent background material. The present book has an interesting mixture of articles that can serve both audiences without unduly restricting the major aims of the book. For example, some local graduate students felt they could read this book and know where to look for further background material if they wanted to pursue studies in the field. Thus, many of the articles in the book are reasonably self-contained and still written at a specialist level.

Some particular topics that may be of interest to *Nuclear Technology* readers include the articles by Thomas, Bauer, Mattern, and Granoff, and two separate articles by Kaminsky and co-workers. These articles, as a group, cover some studies of radiation-related damage produced by energetic particles, at and near surfaces. Other articles are clearly related to the exposition of particular techniques that can be used to establish the local chemistry involved in various processes at or near surfaces. These techniques include positron annihilation, channeling studies, more classical x-ray studies involving x-ray emission, and electron spectroscopy for chemical analysis (ESCA) and Auger techniques. Finally, the distribution of various chemical elements, which may be introduced into the first wall by various nuclear reactions, are studied using atomic particles and nuclear reactions related to these atomic particles. All in all, the review serves the purpose of informing a wide audience of the range of problems involved in controlled thermonuclear reactors, but with very little in the direction of how to solve the problems. The book is of interest to many readers of this Journal.

J. M. Galligan is a professor of metallurgy at The University of Connecticut. His background is in physical metallurgy, and he has worked in a variety of fields, including in the areas of defects in crystals, plastic deformation, materials for nuclear reactors, and superconductivity. His experience has included work at academic and industrial facilities and at government laboratories. He has been a visiting scientist at the Max Planck Institute für Metallforschung in Stuttgart, as well as a keynote lecturer at a number of international conferences.

Introductory Physics of Nuclear Medicine

Author	Ramesh Chandra
Publisher	Lea & Febiger (1976)
Pages	185
Price	$12.00
Reviewer	Dennis D. Patton, MD

In this book, Dr. Chandra has addressed the nuclear medicine community in an attempt to make a clear presentation of basic science fundamentals of the field. His success is uneven, for he is at times lucid, at times obscure. He shows the physicist's compulsion for completeness on the one hand, and on the other hand includes treatments

so sketchy and incomplete that one wonders why they are included. The author frequently mentions concepts that are of little use to the beginner, but does not explain them or show their relevance to his discussion. These concepts include negative energy levels, the four types of forces, rest mass, spatial frequency, and semiconductor detectors. The author skims lightly over areas that should either be better explained or left out completely. In general, however, the discussion of principles of basic physics is clear and concise. The section on dosimetry is well organized.

Technically, the book suffers from an abundance of typographical errors, some of which occur in critical statements, and many of the illustrations look homemade and of poor quality.

The book is readable and concise, though incomplete and at times confusing. This book represents a limited contribution to the field of nuclear medicine.

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Modification of Radiosensitivity of Biological Systems
(Proceedings of an International Atomic Energy Agency Advisory Group Meeting, Vienna, December 8-11, 1975)

Publisher Unipub, Inc.

Pages 261

Price $14.00

Reviewer Eugene W. Gerner

An increase in the awareness that various classes of chemical and physical agents affect the radiation sensitivity of various biological systems has developed over the past decade. The ability of these agents to change radiation sensitivity is important from a radiation safety point of view, since large numbers of people receive low radiation doses in routine diagnostic radiology, in clinical investigations with radioactive isotopes, and in industrial applications of nuclear energy, as well as in clinical radiation therapy. In this latter case, it is known that failures in the clinical management of human cancers do occur as a result of the inability of the radiation therapist to control local disease. A number of clinical studies have shown that even a modest improvement in the radioresponse of several human tumors would result in a substantial improvement in the control of local disease. Thus, the possible benefits of using chemical or physical agents to improve radiation therapy of local malignancies, as well as the potential effects these agents can play in radiation safety, have provided the strong impetus for the development and study of radiosensitizers.

The papers included in this International Atomic Energy Agency proceedings provide a broad survey of current research results and directions in the field of modification of radiation responses. These modifications include radiation sensitization by a number of compounds, including hypoxic cell sensitizers, chemotherapeutic agents, and membrane specific agents, as well as radioprotection by other agents, including sulfhydryl compounds and naturally occurring substances, such as the polyamines. In general, this volume presents a solid up-to-date statement of current research results, provided by many excellent authors in the field of radiation biology. Several important points are raised by the authors of the papers in these proceedings. The first paper begins by discussing the relevance of hypoxic cells in clinical radiation therapy. This question is central to the possible use of hypoxic cell sensitizing compounds, which are discussed in an excellent paper by G. E. Adams and J. F. Fowler. Another important point brought out in several other papers is the question of fractionation schedules in radiation therapy, especially when the radiation treatments are combined with various chemical modifying agents. This discussion is important since it seems unlikely that the standard five-fraction-per-week treatment regimes, which have been used for many years in clinical radiation therapy, will remain optimal when radiation therapy is combined with radiosensitizing or radioprotective agents that affect different aspects of normal radiation repair, repopulation, and recovery mechanisms. Another very interesting point noted in this volume is the fact that poor tumor vasculization may be used to advantage by combining radiation therapy with radioprotectors. In this case, poorly vascularized tumors would not take up the radiation protecting agent, thereby affording no protection for the tumor while surrounding normal tissues, which are well vascularized, would be afforded the protection.

It is unfortunate that in the foreword to this volume, a major modality for modifying radiation responses of tissues [that of high linear energy transfer (LET) radiations] is dismissed because of financial considerations. This reason may be valid, but it discounts possible new technical developments that might minimize the cost of producing high-LET radiations. Because of the scope of the problem in clinical radiation therapy, it does not seem appropriate at this time to exclude any possible mode of eradicating local tumors. The rationale for the study of chemical or physical radiation modifiers does not require the condemnation of any other modality, especially based on financial consideration. The omission of high-LET radiation from consideration in this volume does seem reasonable, however, because of the tremendous scope of research that is currently being conducted in the area of high-LET radiation biology. Thus, the absence of material in this area does not detract from the volume. In fact, a possible weak point of these proceedings is the wide range of agents covered, some in excellent detail, with others only receiving a very cursory and incomplete treatment, even in review.

In general, these proceedings should provide interesting reading as an up-to-date review of current research in terms of modification of radiation responses. The book is not, nor was it meant to be, a complete volume including all mechanisms of modification of radiation responses. The strong point of the book is that close attention is given to the integration of results from biological research with possible application of these results toward fields of radiation safety and clinical radiation therapy. This topic area is rapidly becoming very large and complex, but the quality of the