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.

Thermoluminescence Dosimetry
(Medical Physics Handbook 5)

Author A. F. McKinlay

Publisher Heyden & Son Inc., Philadelphia (1981)

Pages 170

Price $28.00

Reviewer Atam P. Arya

Thermoluminescence Dosimetry is a concise, to-the-point, and very well written monograph (not a text) of about 170 pages, divided into seven chapters. The author has conveniently divided it into three parts—theoretical aspects, specific measurement applications, and the principles of designs of thermoluminescence dosimetry (TLD). The material presents detailed characteristics, in the forms of tables and plots, for most commonly used TLD substances. It also deals with the matter of practical importance, that is, the use of these detectors as applied to clinical, personal, and environmental situations using different types of radiations. The reader is further introduced to operation of TLD, practical problems, and their pitfalls. Furthermore, there are over 170 references included at the end.

There are too many topics covered in a small volume; hence, out of necessity it appears, the topics are discussed briefly. As claimed by the author, graduate students and scientists working in this field will have no trouble going through the book, while undergraduate students will need some background preparation. The material in the book and the references at the end, together, reveal the state-of-the-art. This should be very helpful to anyone who may be interested in doing any theoretical or experimental research work in the field of thermoluminescence dosimetry—in investigating the characteristics of TL materials or in designing detectors for various purposes in the fields of diagnostic and therapeutic radiation.

In addition the book contains materials on other relative topics, radiation rules, research status, and recommendations for future directions. Chapter 6 on TLD instruments is very brief and could have been expanded.

My overall reaction is that the book is one of the best, very well written, and compact books in the field. Anyone desiring to do research work in the field of thermoluminescence, or already using such detectors, will find it very useful to have this book for use and reference.

Dr. Atam P. Arya is a professor of physics at West Virginia University. Dr. Arya has worked in the field of nuclear spectroscopy and neutron physics. He has taught courses at all levels, graduate and undergraduate, including medical physics for the last three years. Dr. Arya is the author of several textbooks—modern, nuclear, atomic, and general physics.

The Physical Metallurgy of Steels

Author W. C. Leslie

Publisher Hemisphere Publishing Corporation, New York (1981)

Pages 396

Price $29.50

Reviewer J. A. Shields, Jr.

Ferrous metallurgy is a major emphasis of any metallurgical curriculum, because of the importance of steels and iron-base alloys in engineering. No other class of alloys has found as wide a range of applications or has been developed to provide as broad a spectrum of properties as has the steel family. All too frequently though, the metallurgy of ferrous alloys has been taught piecemeal—a little hardenability here, a little corrosion resistance there, some theory of phase transformations in yet another area. The net result is a student who does not have an adequate grasp of the full story of steel metallurgy. The problem is even more severe for nonmetallurgists, who may take one or two courses at most in the general area of metallurgy before graduating.

Professor Leslie's book was written as a result of teaching a course in the physical metallurgy of steels at the University of Michigan, and its primary intent is clearly that of a textbook. However, it also provides a wealth of information which will be of use to the designers who must worry about materials selection. It will also serve as a highly useful reference to the practicing engineer who must understand steels and their application.

The book is organized roughly into two broad areas. The first deals with the metallurgy of pure iron and its alloys, as it relates to body-centered cubic metals in general. It includes chapters titled "Properties of High-Purity Iron," "Interstitial Atoms in Alpha Iron," "Substitutional Solutes in Alpha Iron," and "Interactions Between Solute Atoms in Iron." The second area deals with the metallurgy of specific classes of commercial iron-base alloys. It includes chapters titled "Carbon Steels," "High Strength, Low Alloy Steels," "Heat-Treated Steels," "Thermomechanical Treatment of Steels," "Steels of Very High Strength: Fracture

Prevention," "Stainless Steels," and "Tool Steels." This subdivision by alloy class makes the book valuable as a reference for engineers and designers.

The book is well illustrated. The 271 figures contain phase diagrams, schematic drawings to clarify passages of text, and experimental data. The prose is highly readable and well referenced. References are up-to-date and provide the reader with excellent access to the literature.

I have found the book to be a valuable reference for guiding students, for use in consulting work, and as a reference when dealing with customer-related materials problems. I would recommend it highly to metallurgists, materials scientists, and those involved in design or materials specification who desire a more in-depth understanding of the properties and structure of steels.

J. A. Shields, Jr. spent five years at the Experimental Breeder Reactor-II project of Argonne National Laboratory, involved with the response of structural components to fast neutron irradiation. He subsequently spent two years at Wayne State University in Detroit, Michigan, as assistant professor of metallurgical engineering, and is currently employed as a senior research metallurgist at the Climax Molybdenum Company Research Laboratory in Ann Arbor, Michigan. His current research interests are in the metallurgy of magnetic and specialty alloys, the hot deformation of nickel, and in the metallurgy of molybdenum metal and its alloys.

Nuclear and Radiochemistry (3rd ed.)

Authors	Gerhart Friedlander, Joseph W. Kennedy, Edward S. Macias, and Julian M. Miller
Publisher	John Wiley & Sons, Inc., Somerset, New Jersey (1981).
Pages	684
Price	$42.00
Reviewer	Roy H. Filby

The third edition of *Nuclear and Radiochemistry* brings up to date a work that has become a classic since its appearance in 1949. The original text by Friedlander and Kennedy filled an important need in nuclear science education and was for many years the only textbook on nuclear and radiochemistry available to upper level students of nuclear science and chemistry. After more than 30 years, *Nuclear and Radiochemistry* still remains one of the most popular textbooks for use in nuclear chemistry courses in many countries, particularly after the second edition appeared in 1964. The third edition was written largely by G. Friedlander and E. Macias, J. W. Kennedy having died more than 20 years ago. J. M. Miller, who helped write the second edition, died unexpectedly in 1976.

The original text was written at a time when both nuclear chemistry and radiochemistry were rapidly developing disciplines with no well-defined areas of interest. During the past 30 years, nuclear chemistry and radiochemistry have pursued somewhat different paths. Although there is no agreement on definitions of the two disciplines, most nuclear scientists would concur with the statement that nuclear chemistry involves the fundamental study of the nucleus and therefore is concerned with both radioactive and nonradioactive species, whereas radiochemistry involves the study and application of radioactivity. Nuclear chemistry and nuclear physics today overlap significantly and often differ only according to the perspective of the investigator. Radiochemistry has developed into a discipline with major applications to many fields of science, e.g., chemistry, biology, geology, and nuclear medicine, to name but a few. It may be said that, at present, the most active areas of radiochemistry are in such applied fields as radioimmunoassay, radiopharmaceuticals, nuclear medicine, etc. Given the spectacular growth of nuclear chemistry research and radiochemistry, it is clear that a textbook covering both disciplines presents considerable difficulty of depth to the writers. The authors of the third edition of *Nuclear and Radiochemistry* have attempted to preserve the scope of the original text while reflecting the changes that have taken place over the past 30 years. In terms of presenting the basic concepts of nuclear and radiochemistry, the authors have succeeded well. Treatment of applications, particularly radiochemical applications, is less successful.

Most of the original structure of the first two editions has been retained in the present revision, but reorganization of some material has resulted in an improved sequence of topics. Except for the chapters on introductory radioactivity, atomic nuclei, radioactive decay, and statistical processes in radioactivity, all topics have been significantly revised. The book is characterized by an excellent treatment of the basic principles of nuclear chemistry, namely, nuclear structure and models, nuclear reactions, radioactive decay processes, and the interaction of radiation with matter. These early chapters are treated with a minimum of mathematical difficulty and thus are readily comprehensible to most chemists. Following these topics are chapters on radiation measurement, statistical aspects of radioactivity, techniques in nuclear chemistry, radiochemical applications, nuclear processes as probes, nuclear energy, sources of bombarding particles, and nuclear techniques in geology and cosmochemistry. These chapters have been extensively revised from the previous edition, with the introduction of much new material; the chapter on geology and cosmochemistry is particularly good.

In a work of this scope, it is inevitable that some topics are not treated adequately. This is particularly true of the sections dealing with radiochemistry. The section on radiochemical applications treats radioanalytical methods such as activation analysis and isotope dilution very sketchily. Other analytical techniques such as radiometric precipitations and titrations, substoichiometric isotope dilution, and isotope dilution mass spectroscopy are not discussed. Very little space is given to radiochemical separations, synthesis and properties of radiolabeled compounds, the radiochemistry of very low concentrations, separation of fission products, chemistry of nuclear fuel reprocessing and radiochemistry applied to radioactive waste disposal. In the chapter on radiation detectors and measurement, insufficient detail is given on common measurement systems. Gamma-ray spectroscopy, particularly using semiconductor detectors, which now finds extensive application to radioanalytical chemistry, is inadequately covered. Liquid scintillation counting, now the method of choice for most radiotracer work involving ^{14}C, ^{3}H, and ^{35}S, is barely mentioned. This is somewhat surprising considering the wide