treated are those inorganic nonmetals that can deform by crystallographic slip in the vicinity of room temperature. After a general discussion of semibrittle behavior, the specific behaviors of ionic crystals and covalent crystals are treated in extensive detail. The review closes with a treatment of methods showing promise for the suppression of brittle fracture. The more than 270 references attest to the comprehensive character of this review.

In the last offering in the volume, H. J. McQueen and J. J. Jonas treat the recovery and recrystallization of metals during high-temperature deformation. This article considers the microstructural changes occurring both during and after hot working. It describes the influences of these changes on the mechanical properties of the worked material. The effects of strain hardening and its counterbalancing by the concurrent softening processes of dynamic recovery and dynamic recrystallization are examined in detail for metals deformed under both hot working and creep conditions. The treatment is expert, comprehensive, and detailed.

The book assumes that the reader has a basic understanding of dislocation theory. It will aid in focusing on the pressing current and future problems encountered in plastic deformation. It should be of great interest to metallurgists, ceramists, polymer chemists, graduate students in materials science and associated fields, and nuclear engineers concerned with plastic deformation.

Treatise on Materials Science and Technology: Microstructures of Irradiated Materials—Volume 7

Author	H. S. Rosenbaum
Publisher	Academic Press, Inc.
Date	July 1975
Pages	173
Price	$19.50
Reviewer	Louis J. Demer

Microstructural information on the effects of irradiation on solids is often vital to the solution of materials problems associated with nuclear energy technology. A basic approach is to observe and characterize microstructures, to rationalize these microstructures in terms of atomic rearrangement phenomena, and then to relate the microstructures to materials properties. This monograph aims at the development of an appreciation of the diverse and complex microstructures encountered in irradiated materials along with a practical understanding of the response of materials to irradiation environments.

A broad interpretation is given to the term irradiation effects so that it encompasses all manifestations of irradiation environments that lead to atomic rearrangements and therefore to observable microstructural changes. Numerous illustrations present various microstructures as examined using optical microscopy, field ion microscopy, and both scanning and transmission electron microscopy.

The author introduces broad concepts and terminology initially and then proceeds to consider the physical effects of irradiation, that is, those associated with the physical displacement of atoms and the subsequent atom rearrangements that can occur either by momentum transfer or diffusional phenomena. The chemical effects of irradiation are also treated, including diffusion, phase changes, precipitation of solute atoms, transmutations, and combinations of these.

The treatment proceeds from simple materials such as pure metals irradiated under isothermal conditions at low temperatures to the case of materials with complex microstructures. Where possible the complex structures are explained as a superposition of known physical and chemical effects. In some instances, however, two or more irradiation effects interact to produce a resultant microstructure different from that expected by simple superposition. These synergistic effects of irradiation on microstructures exist in many aspects of this subject, but the details are so complex that our knowledge remains sketchy.

The monograph contains some 325 references, a large portion of which are quite recent. It includes a review of the relevant literature, presented with sufficient background that readers familiar with general metallurgical phenomena can use this book directly as an introduction to the effects of irradiation without having to consult references. It should be very useful to metallurgists, ceramists, materials scientists, and engineers in nuclear science and technology. It will also be useful for those contemplating entering the nuclear field. The relatively unsophisticated treatment should make it suitable for students of materials science or engineering at an advanced undergraduate or early graduate level.

L. J. Demer, professor of metallurgical engineering at the University of Arizona, has a broad background in mechanical metallurgy, x-ray analytical methods, and imperfections in crystals. He has published in the areas of fatigue, crack growth and detection, and environmental effects on mechanical properties. He has performed research in the nondestructive evaluation of materials by novel ultrasonic techniques. Demer has also explored the use of multiple-image audiovisual techniques in the presentation of materials science and engineering course material. He is currently engaged in intensive research involving electronic materials defect characterization by x-ray and electron microscope techniques.

Nuclear Tracks in Solids (Principles and Applications)

Authors	Robert L. Fleischer, P. Buford Price, and Robert M. Walker
Publishers	University of California Press
Date	October 16, 1975
Price	$31.50
Pages	629
Reviewer	J. A. Lockwood

The technique of utilizing the radiation-damage tracks produced by the passage of charged particles through certain nonconducting solids is now sufficiently advanced, as the authors indicate, to warrant a comprehensive overview. The authors have succeeded in this book in presenting a clearly and carefully written survey of particle track etching which should be useful to both research workers in the field and to those who are attempting for the first time to use this technique. The authors present first a discussion of the general principles of track etching, including considerable practical information. The ideas about track techniques are applied to the earth and space sciences, and then to the more general fields of nuclear science and technology. Some indications are presented about how track techniques might be used to "discover" magnetic monopols (p. 312 *et seq.*): portents of things to come! In this type of book the authors always have to choose between greater details on the technique itself versus extensive discussions on the applications. In this book a reasonable compromise has been achieved, perhaps erring toward applications. But such applications do tend to make the technique clearer and its possible uses more apparent to the reader. In presenting the applications of track etching the authors did, in this reviewer's mind, discuss too much about the field of application in contrast to emphasis on the details of track formation and the methods for revealing and observing the tracks in the particular field of application.

The level of presentation is sometimes uneven. This is not, of course, unusual in reviews of an experimental technique where the types of applications are diversified, some much more complicated than others. The thorough and extensive list of references at the end of each chapter more than compensates for this deficiency. The abundance of practical information (e.g., on p. 76, the details of types of etch) is extremely important to the uninitiated in the field. The summaries at the end of some chapters are also helpful, as is the indication of needs for future work in the field. Occasionally, the text figures could be improved by schematic diagrams of the charged-particle trajectories to help understand the hole formation (as in Fig. 5-10, for example). Occasionally the authors, in an attempt to simplify and to cover a great deal of material, make unsupported statements and do not simplify details on the particular instrumentation. Some of the simplifications did not always appear necessary.

Overall, this is an excellent book on nuclear tracks in solids, containing, in addition, interesting material on subjects only peripherally related to radiation damage in solids. It is free of errors and is printed in clear, legible type with outstanding photographs. The numerous and diversified applications given of nuclear tracks clearly indicate the accomplishments in that field, and the authors are to be commended for the thoroughness of their compendium, understandable to scientists in many disciplines, as well as advanced undergraduates and graduate students.

John A. Lockwood, professor of physics and associate director of research at the University of New Hampshire, has done extensive research in the solar-controlled modulation of cosmic rays and made measurements of atmospheric neutrons and gamma rays from balloons, rockets, and satellites. His current research interests are directed toward measurements of energetic neutrons and gamma rays using directional time-of-flight detectors. Other investigations are directed toward physical models of transient decreases in the cosmic radiation near earth.

A Guide to Laboratory Design

Authors	K. Everett and D. Hughes
Publisher	The Butterworth Group, London, 1975
Pages	154
Price	\$10.00
Reviewer	J.W. McKlveen

For diligent architects, engineers, and other planners involved in designing a laboratory that is functional as well as safe, *A Guide to Laboratory Design* should prove beneficial. Drawing from almost a half-century of combined practical experience, the British authors elucidate many common problems and pitfalls which may be neglected or forgotten by the designers. Though much of the content is common sense, it behooves one to check the book's contents as a means to jog his memory and to enable him to construct a facility based on foresight—rather than hindsight. Information and suggestions are available for construction of facilities for routine work or for handling the most hazardous materials. In an easy-to-reference format, the book is divided into sections on basic laboratory design and materials, fire precautions, detection and fighting fires, ventilation, fume extraction and dispersal, and storage areas. Whereas an excess of information is provided on fume hoods, a catalog item with models and prices to satisfy most requirements, the remainder of the section on ventilation is particularly valuable. One short chapter is devoted to radioactive substances. It is superficial for those with nuclear experience, but worthwhile for others. If the chapter had been read by the architect who designed my radiation laboratories, for example, he probably would not have located the study area and low-level counting room adjacent to the radioactive materials storage.

The book contains an abundance of references, but many describe British regulations or information pertinent to those on the continent. U.S. readers, already swamped with Occupational Safety and Health Administration, Environmental Protection Agency, U.S. Nuclear Regulatory Commission, state, local, and in-house regulations, may read the book for its practical suggestions.

John W. McKlveen has a BS from the U.S. Naval Academy and an ME and PhD in nuclear engineering from the University of Virginia. He is a faculty member and radiation safety officer and, in addition, is responsible for the Radiation Research Laboratories at Arizona State University. His previous work included service in the Naval nuclear-powered submarine program and research in low-level radiation detection. His present interests include applying nuclear methods to environmental research, fast-neutron activation analysis, and low-level dosimetry techniques.

Plasmas and Laser Light

Author	T. P. Hughes
Publisher	Halsted Press