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