Physics of Radiation Effects in Crystals

Edited by R.A. Johnson and A.N. Orlov (Vol. 13 of Modern Problems of Condensed Matter Sciences, edited by V. M. Agranovich and A.A. Maradudin, Elsevier Science Publishers, 1986)

This is the first general review of radiation effects in solids since those by C. Lechmann (*Interaction of Radiation with Solids and Elementary Defect Production*, Elsevier, 1977) and M. Thomp (Defects and Radiation Damage in Metals, Cambridge University Press, 1969). Eleven chapters, reflecting the views of 21 authors active in the field, cover the general background and theory of radiation effects, topics associated with specific materials, and problems of technological interest.

The first four chapters, "Basic Defects in Metals" by Erhart, Robrock and Schrober, "Production of Radiation Defects by Collision Cascades" by Agranovich and Kirsanov, "Theory of Microstructural Evolution" by Bullough and Wood, and "Phase Stability and Solute Segregation During Irradiation" by Weidersich provide an up-to-date experimental and theoretical view of the physical properties of point defects and complexes, their production during irradiation, subsequent migration and agglomeration, and the changes in microstructure and phases resulting from this mass transport.

The next four chapters treat topics specific to semiconductors, high-field superconductors, insulating materials and alkali halides. Vinetskii and Kholodar concentrate on control of radiation-induced modifications in "Quasichemical Reactions Involving Point Defects in Irradiated Semiconductors," while Snead and Luhman explore damage mechanisms and material limits in "Radiation Damage and Stress Effects in Superconductors: Materials for High-Field Applications." Clinard and Hobbs discuss the response of complex polyatomic solids, in particular ceramics, to radiation in "Radiation Effects in Non-Metals"; and Lushchik details the production of defects by ionizing radiation in "Creation of Frenkel Defect Pairs by Excitons in Alkali Halides."

The final chapters review three aspects of the response of structural materials to irradiation in nuclear reactor environments. Zelensky and Reznichenko discuss dimensional changes in "Irradiation Growth of Metals and Alloys," Slyozov and Bereznyak contrast creep mechanisms in "Irradiation Creep of Metals," and Guseva and Martynenko review experimental observations and theory for macroscopic surface erosion in "Blistering."

The volume should be of great specific interest to those actively engaged in radiation effects research, particularly because it includes over 1,500 literature citations. It should also prove to be a convenient reference or, taken in parts, a text for graduate courses in various aspects of radiation effects.

Reviewer: Michael W. Guinan is a senior staff physicist, Chemistry and Materials Science Department, Lawrence Livermore National Laboratory. His recent interests involve experimental and theoretical studies of 14 MeV neutron damage in materials for fusion applications.

Materials and Processing Report

(Massachusetts Institute of Technology Press)

Materials and Processing Report is a newsletter which, according to its own subtitle, covers "the leading edge of technology worldwide." *MPR* first appeared in April 1986, having enlisted Renee G. Ford as editor. Ford moved from *High Tech Materials Alert*, another materials newsletter. *MPR* boasts a prestigious advisory board representative of government, industry, and university and is published in association with the Materials Processing Center at MIT.

MPR appears monthly and usually runs 10 pages, treating on average eight separate materials topics, usually as conference highlights or technical notes. Sources are clearly appended, allowing interested readers to pursue further detail. In the space available in *MPR*, only summaries and highlights can be related for any given subject, but they are done with a high degree of technical faithfulness to the essential aspects of the topic. *MPR* surpasses many newsletters in that it does not water down or distort the technical essence for a nontechnical readership. This is very likely a result of Ford's thorough coverage and consulting with the technical experts.

In addition to the current topical coverage, four standard items are provided—a policy report, a patent report and a meetings calendar which are informative albeit not intended to be exhaustive, and a catch-all category labeled "noteworthy" for one-paragraph notices.

As an accurate anecdotal source for those interested in R&D advances in materials, *MPR* fills the bill. While its limited space prevents coverage in great depth (not expected of a newsletter), it does force choices on what to cover and what to omit. In this sense *MPR* technically favors, for example, ceramics and composites at the expense of metals and alloys, and electronic materials by a ratio of about two to one. Its utility, however, as one of several sources of technical news for the nonspecialist is not seriously compromised by its leanings. At $337 for 12 issues, it may not be for everyone, but would be a useful addition to department and group libraries.

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