Overview

The Thirteenth International Symposium on Effects of Radiation on Materials was held in Seattle, WA on 23–25 June 1986. This biennial symposium series was begun in 1960 and has served as a major international forum for the exchange and discussion of both the fundamental and technological aspects of behavior change in materials exposed to radiation environments. The thirteenth symposium reached a record level of participation, necessitating its publication in two separate Special Technical Publications (STPs).

This volume contains the majority of the papers presented in those sessions devoted to creep, creep rupture, and changes in mechanical properties of metals and alloys. Also included are papers on radiation damage in nonmetals, papers that describe irradiation facilities, and papers on the dosimetry of radiation environments. Most of the other papers presented at this symposium are published separately in ASTM STP 955, *Radiation-Induced Changes in Microstructure*, which addresses the radiation-induced production of point defects, their subsequent diffusion and their consequences on microstructural evolution, phase changes, and dimensional stability.

The first section on *Irradiation Creep and Creep Rupture* focuses on the in-reactor creep and creep rupture behavior of both simple metals and engineering alloys. It is argued in one paper that the use of unirradiated and post-irradiation data for predicting in-reactor behavior is invalid. Another paper discusses low-dose irradiation creep mechanisms in model ferritic alloys and demonstrates that intrinsic bias differences between face centered cubic (fcc) and body centered cubic (bcc) metals do not affect climb-glide creep rates. One new conclusion of another study was that irradiation creep appears to disappear at swelling levels in the range of 5 to 10%.

The second section on *Changes in Mechanical Properties of Alloys* explores changes in strength, fracture behavior, fracture toughness, fatigue crack growth, and fatigue crack initiation occurring in a wide variety of important engineering alloys caused by irradiation. Because of their unique problems, pressure vessel steels are not included in this section.

In *Pressure Vessel Steels*, both fundamental data on irradiation embrittlement and statistical studies of data bases are presented and discussed in a number of papers. Positron annihilation and small angle neutron scattering techniques are explored, which provide information on submicroscopic clustering in these alloys. Mechanical property data are also presented, which address the possibility of thermal recovery of damage.

The section on *Radiation Damage in Nonmetals* is significantly larger than that of previous symposia and contains discussions on polymeric, glass, lithium-containing ceramic, and elastomeric materials in radiation environments. Papers were presented on cable connectors, glass fibers, polyimide film, ophthalmic preservatives, reactor seals, and radioactive waste forms.

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The Irradiation Facilities section contains discussions on major irradiation facilities available to qualified users. Facilities at Idaho National Engineering Laboratory are described, as well as the Los Alamos Spallation Radiation Effects Facility, and the National Low-Temperature Neutron Irradiation Facility.

The section on *Dosimetry of Radiation Environments* explores topics in neutron dosimetry and damage analysis, radiation damage prediction, and neutronics of fusion environments.

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