

This Week's Citation Classic

Damask A C & Dienes G J. *Point defects in metals.* New York: Gordon and Breach, 1963. 314 p. [Brookhaven Natl. Lab., Upton, NY and Pitman-Dunn Res. Inst., Frankford Arsenal, Philadelphia, PA]

Point defects are crystalline irregularities of atomic dimensions which play a central role in the atomic interpretation of many physical properties and processes in solids. This book contains a summary of the fundamental knowledge of point defects in metals and alloys up to 1963. The contents are: general theory, annealing theory, methods of analysis of annealing curves, physical properties of point defects, and some basic experiments. [The **SCI**[®] indicates that this book has been cited over 630 times since 1963.]

A.C. Damask
 Department of Physics
 Queens College
 City University of New York
 Flushing, NY 11367

June 9, 1981

"In 1953, I worked in a Department of the Army laboratory at the Frankford Arsenal on anelastic behavior of alloys and the effect of quenched-in vacancies. This research was in collaboration with Arthur Nowick, then a consultant from Yale. He had been inspired to enter this field of research by Clarence Zener. In 1954, I was sent to Brookhaven National Laboratory as a liaison scientist to work with C.J. Dienes, who was building a group to study radiation damage in solids. Shortly after my arrival at Brookhaven, high speed computers became available. Dienes and I did a series of simulated defect annealing calculations with the computer, and this ability to rapidly solve coupled differential equations revealed a number of important concerns in the analysis of experimental data. In addition, by carefully selecting alloys and temperature ranges in which a single one of the several possible radiation effects in alloys predominated, we were able to separate effects so that they could be added to predict behavior in other alloys.

"During the peak eight-year period (1954-1962), the group expanded in size as well as interest. Some key members were George Vineyard, Paul Levy, Robert

Johnson, Allen Goland, and the late John Gibson and Cavid Erginsoy. Brookhaven's policy of term appointments for visiting scientists permitted a number of both US and foreign scientists to participate.

"The Brookhaven National Laboratory became one of the world's most active centers for fundamental radiation defect studies. Being about two hours away from Kennedy Airport, visitors from all over the world stopped in while passing through New York. Dienes's office, and mine next to his, became centers for information exchange. Worldwide experiments, theories, and results were discussed long before publication.

"It was logical and inevitable that a book be written which would be a definitive summary of the state of the art that could serve both as a guide to future research and as an introductory book for researchers and students entering the field. Dienes and I had the advantage that we were aware of all of the significant work that had been done. However, we reread about 750 papers and referred to over 400. We worked one winter at Dienes's house in late afternoons. He had a theory that the mind worked best when the body was coldest, so he kept the temperature in the low fifties. It is therefore not surprising that the book was written in one and a half months.

"The book became a frequently used secondary reference for the classic papers as well as a source of experimental and analytical techniques. After 18 years it is still in print. In 1966, a Russian translation was produced by MIR Publishers, Moscow, and I was told by them that the 3,000 copies printed sold out in a few weeks.¹ On a visit to the USSR the publisher gave me my share of the royalties, amounting to 162 rubles, 35 kopecks, which I spent on a dinner for my wife and two Russian friends.

"I received the Department of the Army Research Award for this work. More recent books that update part of this material are *Anelastic Relaxation in Crystalline Solids* and *Point Defects and Diffusion*^{2,3}

1. Damask A C & Dienes G J. *Point defects in metals.* Moscow: MIR, 1966.

2. Nowick A S & Berry B S. *Anelastic relaxation in crystalline solids.* New York: Academic Press, 1972. 677 p.

3. Flynn C P. *Point defects and diffusion.* Oxford: Clarendon Press, 1972. 815 p.