Atomic Migration in Crystals. By Louis Girafalco. Blaisdell Publishing Company, New York, N. Y., (1964). 174 pages. $3.75.

This little book gives a remarkably readable account of diffusion processes in simple solids using for the most part pictorial and non-mathematical language for the description. The easy reading has been aided materially by the inclusion of some well-executed variations from the standard type drawings for the pictorial representation of crystal structures and the spatial relationships between atoms. In a couple of cases, however, the reviewer found the new figures which were used rather more obscure and more difficult to visualize than the ones usually included in solid-state textbooks. This was especially true for the diamond structure. The criticism probably represents individual reader taste or habit.

Chapter I gives an elementary discussion of the origins of different types of interatomic forces and a description of the different crystal structures which occur. The chapter opens with some fragmentary and somewhat irrelevant and partially incorrect remarks regarding the case for the existence of attractive interatomic forces at large distances. The point is very minor and had it occurred on page 10, rather than in the first paragraph of the book, no mention would be made. We trust the readers will proceed blithely and unprejudiced past these few lines to read a generally excellent account. Only two typographical errors, both of no real consequence, were apparent in the entire chapter—a mislabelled axis system in Figure 9, and a confusion regarding the writing of the symbol for the element cesium on page 25.

The real discussion of diffusion gets underway in Chapter II. Here the concept of atomic jumps and of the the various diffusion mechanisms with and without point defects is treated in sufficient detail to give the reader a sound foundation for the subsequent development in the same chapter of Fick's Laws. Also, the reader is given a neat discussion of the thermodynamic and statistical mechanical treatment of the rate processes from the activated-state point of view. The chapter is even more readable than Chapter I. There are a small number of errors, perhaps the worst of which is the bad jumbling of labels on the diagrams of Figure 24. A criticism of content might be that although the problems of correlated diffusion are among those of most current interest, they are not given any appreciable treatment.

Chapter III is a particularization of the theory and ideas developed in the previous chapter to the simple metal structures. In this chapter the author really reveals his unique skill in applying geometrical reasoning to the problems of calculation of the proper form for the pre-exponential factor in the diffusion equation. Unfortunately, an algebraic error of a factor of $\frac{1}{2}$ crept into his development for the geometrical area involved in the activated position for diffusion in the hexagonal structure, Eq. 16.5, which led the author to an erroneous conclusion regarding the relative tightness of neighboring atom configurations for diffusion along the c-axis as compared with diffusion in the basal plane. Several other errors of less importance were picked up in the review. For example, the quadrilateral of Figure 36 should actually be a parallelogram. A very general fault of the book is also illustrated in this chapter. Although the author has obviously used a figure giving experimental results lifted out of a Physical Review paper by another author, no mention is made of the source of the figure anywhere in the book—not even in the bibliography. This occurs again in the later discussion of grain-boundary diffusion.

Chapter IV covers the simpler defects which can exist in the ionic crystals and their importance in atom motion and in ionic conductivity. Impurity effects are also discussed. The chapter is exceptionally well written and can serve as excellent material for an introduction to the field. The material would also be useful to anyone just entering the field of color center research. Similarly Chapter V is a very well written descriptive account of atomic configurations relative to diffusion in the diamond and graphite structures. Here one is entering a relatively less well developed field since in many cases the mechanism for diffusion is not known at all. The author uses his ideas very effectively to produce some useful guide lines for further research and interpretation.

Diffusion along grain boundaries is discussed in Chapter VI. Here the importance of edge dislocations and pipe diffusion is stressed and the consequences developed in a simple, intuitively correct manner. In a final chapter the author discusses briefly but elegantly three subjects of great current interest: the effect of pressure on diffusion, the interactions of electron transport and atom diffusion, and the influence of temperature gradients.

All in all, the reviewer very much enjoyed reading this book and highly recommends it to all solid state physicists and chemists—except the most erudite specialists, if any—who wish to be introduced or refreshed by perusing a well-written, logically developed, non-ponderous little gem. It can easily be held over the head for long times while in a reclining position. One only regrets that the author and the publisher didn't get together more effectively during the proof period to eliminate the few remaining errors.

O. C. Simpson

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60440

About the Reviewer: O. C. Simpson was a member of the faculty of the Physics Department at Carnegie Tech from 1934 to 1947. His research interests there embraced molecular physics, neutron physics and solid state. During the war he was with the Metallurgical Laboratory of the Manhattan Engineering District carrying out research on the high-temperature properties of plutonium and plutonium compounds. He was also actively engaged in early research and development work on the Daniel's High Temperature Pile. From 1947 to 1959 he was Associate Director of Argonne's Chemistry Division and from 1959 to date the Director of the Solid State Science Division at Argonne.

Reactor Shielding. International Atomic Energy Agency, Vienna 1, Kaerntnerring, Austria. 164 pages, $3.50.

This book, designated Technical Report Series No. 34 in the International Atomic Energy Agency publication series, contains a compilation of reports on the status of shielding in thirteen different countries, as presented by a number of invited experts. The group had been convened in Vienna in March 1964 by the IAEA. The book lists a total of thirteen participants and eight observers plus several other representatives of other organizations, including IAEA, who took part in the meeting.

The major portion of the text is devoted to the status reports presented by the representatives from Belgium, Canada, Czechoslovakia, Germany, France, Italy, Japan, Norway, Sweden, Switzerland, the United Kingdom, Russia, and the United States of America. This reviewer was pleasantly surprised by the extent of what appeared to be worthwhile experimental information reported from some of these countries. Although the depth of the experimental