Notes and News

Acta Cryst. (1984). A**40**, 168

M. J. Buerger Award

The American Crystallographic Association announces the establishment of a triennial award in honor of Martin J. Buerger, Institute Professor Emeritus of MIT and University Professor Emeritus of the University of Connecticut. The award includes the following citation: 'Martin J. Buerger is a mineralogist who has made major contributions to many areas of crystallography, including crystal growth, morphology, structure analysis, phase transformations, and instrumentation. His textbooks are classics in the field'.

The award will recognize mature scientists who have made contributions of exceptional distinction in areas of interest to the American Crystallographic Association. Because of the broad nature of Buerger's own contributions, there is no restriction as to the area or areas of crystallography in which the recipient's contributions have been made. In recognition of the role of mineralogy in Buerger's work, at least one member of the selection committee will be a mineralogist. The award is not restricted as to nationality, race, sex, religion, or membership in the ACA. The first award will be made in 1985.

Leonid V. Azaroff, of the Institute of Materials Science, University of Connecticut, directed the drive to raise the necessary endowment for the award. Contributors include students, friends, and associates of Professor Buerger, and also Amray, Inc., Blake Industries, E. I. DuPont de Nemours & Co., Philips Electronic Instruments, Inc., Charles Supper Co., Siemens AG, Siemens-Allis and JCPDS–ICDD. The ACA is extremely pleased at the creation of the Buerger Award, and expresses its appreciation of these contributions and of that made by Professor Azaroff. The endowment is still open, and any persons who wish to contribute to it are cordially invited to do so. Tax-exempt contributions may be sent to the Treasurer of the ACA (Robert J. Sparks, Nicolet XRD Corporation, 255 Fourier Avenue, Fremont, CA 94539, USA).

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (J. H. Robertson, School of Chemistry, University of Leeds, Leeds LS2 9JT, England). As far as practicable books will be reviewed in a country different from that of publication.

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Solid hydrogen: theory of the properties of solid H_2, HD and D_2. By J. VAN KRANDENDONK. Pp. xv+306. New York: Plenum Press, 1983. Price US$ 39.50.

This book is about the theory of the solid hydrogens (H_2, D_2 and HD), which, apart from the rare-gas solids, are the 'simplest' molecular solids. As such they are of very considerable interest to experimental and theoretical solid-state physicists and chemists. Professor Van Krandendonk has himself contributed to several aspects and is well placed to write this review.

The quantum nature of these light molecules means that we have to distinguish *ortho-* and *para*-H_2, with odd and even rotational states, respectively. Whereas *para*-H_2 (or equivalently *ortho*-D_2) is a spherically symmetric molecule and behaves as a pseudo-rare-gas atom, *ortho*-H_2 has angular momentum $J=1$ and an associated electric-quadrupole moment. Since both *ortho* and *para* molecules are always present, there is an additional compositional variable X (of $J=1$ molecules) and the phase diagrams, thermodynamic and spectroscopic properties can be explored as a function of P, T and X; the solid hydrogens thus also function as models of molecular alloys.

This very well organized book takes us systematically through the theory of the atomic, molecular and solid-state physics of these effects. Starting from the well documented properties of isolated molecules and their interactions, we are led through the studies of vibrational and rotational excitations in solids, and anharmonic lattice dynamics appropriate to quantum solids. Further chapters deal with the properties of single $J=1$ impurities and small clusters in $J=0$ solids. The quadrupole ordered ($Pa3$) cubic solids which are formed at high $J=1$ concentrations and their order–disorder transformations are then described. This chapter is perhaps of most interest to crystallographers interested in phase stability, with many similarities to the rare-gas solids and solid N_2, including the possibility of doing convincing calculations. Finally, the slow *ortho–para* conversion which occurs in all these solids is a reminder of the presence of non-equilibrium effects which can influence measurements. Throughout the theoretical argument is very clear, though the book is rather light on compilations of experimental data.

The author hopes that the simplicity of hydrogen will appeal to a wider group of readers as an illustration of many solid-state concepts. However, the working out of these concepts in solid hydrogen turns out to be by no means simple, and it may be that the author will have to content himself with having produced *the* text on the theory of solid H_2. It will therefore be of great interest to all those concerned with fundamental studies of molecular solids.

J. A. VENABLES
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