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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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Кристаллография. By M. P. Ша-скольская (**Crystallography.** By *M. P. Shaskol'skaya*). Pp. 391. Vysshaya Shkola Publishing House, Moscow, 1976. Price 1 r. 52 k.

The book under review is a textbook of engineering crystallography and crystal physics appropriate, in the first place, for students of university-level technical schools; but it will be very useful too for university students specializing in crystallography. The book comprises the elements of classical crystallography and selected topics of crystal physics and technical crystallography. It also gives engineering methods of calculation of crystal properties and it points to their applications in modern technology.

As is well known, in the last thirty years great changes have occurred in crystallography. New branches of this science have come into existence and developed. We see the formation of a new line of crystallography: studies of biological subjects; and we are eye-witnesses of the development of new techniques based on the use of specific properties of crystals. Therefore the increase in demand for specialists efficient in mathematical crystallography and crystal physics is a matter of course. This is a textbook de-signed for the education of such specialists. The author mentions that the preparation of this textbook is based on her experience in lecturing at the Department of Crystallography at the Moscow Institute for Steel and Alloys, which is a Technical University for the education of specialists in the field of semiconductor and dielectric materials and the methods of their investigation.

The author pays special attention to the technical application of crystals using the experience of industrial plants and research laboratories working in this field. She presents many examples taken from industrial practice and gives engineering methods of the calculation of crystal properties with special regard to the basic needs of technical crystallography. X-ray structural analysis and some parts of crystal chemistry are not included in the book because, according to the teaching pattern assumed, these subjects would be in the course of general and physical chemistry.

The book has six chapters. The first is devoted entirely to the symmetry of the external forms of crystals. In a concise and perspicuous manner the author presents the elements of classical crystallography. The topics of this chapter are anisotropy and external symmetry of crystal forms as well as physical properties and structure. Full interpretations of the fundamental crystallographic laws, the principles of projection (spherical, stereographic and gnomonic) and the symmetry elements of crystal polyhedra are given. The crystallographic systems and classes, symbols for symmetry elements, classes, axes and planes are described in a clear way. At the end of the chapter the author shows different physical forms of crystals and gives reasons for their formation. After the presentation of a topic, exercises are given; they are solved and provided with comments.

In chapter II the symmetry of crystal structure is discussed: Bravais lattices, symmetry elements of crystal structures, space groups, symbols and the basic facts of the experimental determination of crystal structures.

In chapter III the author presents some basic problems of crystal chemistry with special emphasis on changes in crystal structures as a function of their physicochemical properties. This chapter contains extensive material concerning atomic and ionic radii, coordination numbers and schemes, methods of determination of stoichiometric formulae of substances, polarization of ions, types of bonds, stability of structures, close packing of atoms and molecules, construction of structures by means of coordination polyhedra, basic types of structures, polytypism, isomorphism and polymorphism.

In chapter IV a comprehensive description of the physical properties of crystals is given. On this basis, the author considers the symmetry principle in crystal physics and presents symmetry operation by means of matrices. She describes tensor physical properties in crystal-physical coordinate systems. Then she discusses antisymmetry and scalar and vector physical properties such as piezoelectric, dielectric and magnetic properties, thermal expansion, stresses and deformations in crystals, elasticity, birefringence, polarization of light and crystal-optical effects. A substantial part of this chapter is devoted to the optical properties of crystals and their investigation in polarized light. A lot of attention is paid to the application of optical properties. At the end of the chapter the correlation between physical properties and different phenomena occurring in crystals is discussed.

A careful description of mechanical properties and plastic deformations of crystals is given in chapter V. This chapter deals with such topics as cohesion, hardness, and changes in crystal structures. A rough classification of structural defects is presented (point defects or dislocations, supplemented by a table of Burgers vectors for dislocations in some structures). Also discussed are: energy and migration of dislocations, dislocation reactions, dislocations in some real structures, stress field of dislocations, interaction between dislocations themselves and with point defects, and methods of investigation of dislocations. This chapter is particularly well supplied with tables, figures and photographs.

In the last chapter the author presents the problem of crystal growth, which is of fundamental importance to crystallographers. She discusses conditions and possibilities for crystal growth from vapours, solutions and alloys as well as the conditions for and the possibilities of recrystallization from different crystal phases. Moreover, this chapter gives the basic facts of crystal growth, equivalent and real forms of crystal growth, macroscopic defects, normal and twin growth of crystals, epitaxy and, at the end, a summary of methods of crystal growth from vapours, solutions and alloys.

As a whole, this book is written in an intelligible, clear and logical way and is well provided with tables illustrating changes in physical properties, graphs and colour photographs. The author possesses a special gift for acquainting the reader with the world of modern crystallography

and crystal physics and shows that the essence of science is not only simple observation and recording of facts but, most important, their exploitation for the drawing of proper conclusions. The principal intention of the author is to teach the reader how to associate facts and think logically and by this means to initiate him into further studies, or research, or other professional work. The author does this by incessant emphasis on relationships between theory and practice, by giving numerous examples, and by problems and discussion of their solutions.

The book is different from the conventional type of textbook, as a result of the well-thought-out composition of its contents, from the point of view of teaching.

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