Compounding Materials for the Polymer Industries: A Concise Guide to Polymers, Rubbers, Adhesives, and Coatings

John S. Dick

(Noyes Publications, 1987)

In 279 pages John S. Dick has succeeded in presenting a balanced introduction to the plastics, rubber, adhesives, and coatings industries, including most of the major families of polymers and additives used in each of them. The book is designed for the scientist or engineer who is beginning to work with additives in these industries, or who is beginning to work with a new unfamiliar family of additives, and who needs a quick introduction and survey of the field. Since most of these materials are organic chemicals, a knowledge of organic chemistry is very helpful if not necessary.

For plastics, he begins with capsule 1-5 page descriptions of 17 leading families of polymers used in the industry. He then offers 1-9 page chapters on 11 of the 13 major families of additives used in these polymers. For each he describes briefly their composition, structure, function, and mechanism, and the polymers in which they are most commonly used.

Similarly for the rubber industry, he describes 14 leading polymers, and follows this with eight chapters on the major families of additives used in compounding rubber. For adhesives, he describes seven reactive polymer systems, eight thermoplastics, seven elastomers, and eight natural polymers used as adhesive binders, then adds chapters on tackifiers and six other families of additives commonly used to produce complete adhesive formulations. For coatings, he begins with chapters on the manufacture, testing, application, and formulation of coating systems, then follows with chapters on 10 major polymeric binder systems, and on solvents, pigments, and 13 common classes of additives.

To combine an introductory coverage of such broad and detailed scope, the style is necessarily packed, but still perfectly accessible to the careful reader. Occasional errors could be temporarily misleading; hopefully anyone working seriously in the field could correct these as he progresses more deeply into any of these specialties. At the end of each of the four sections, he gives a list of 11-30 leading books suggested for more detailed reading in the field; these lists include many of the major texts, with a few omissions.

Overall the combination of breadth, depth, and balance in an introductory text is probably the best available in the field of additives for polymers.

Reviewer: Rudolph D. Deanin, Professor of Plastics Engineering and Coordinator of Graduate Programs at the University of Lowell, is the author of eight books and 250 papers and patents, more than half of them on additives for polymers.

Modern Crystallography IV—Physical Properties of Crystals

Edited by L.A. Shuvalov

(Springer-Verlag, 1988)

Many modern industries have their bases on crystals, especially, for example, the semiconductor industry. Most integrated circuits, semiconductor laser diodes, light emitting diodes, and various types of transistors are all made from semiconductor single crystals. Furthermore, quartz oscillator, various solid state lasers, electroacoustic devices, and so on are fabricated from oxide single crystals.

Crystallography encompasses a variety of areas—growth of crystals, structure analysis, and the characterization of their physical properties; and there are tremendous numbers of natural or artificial organic and inorganic crystals. Because crystallography covers such a wide area and such a large number of methods in growth and characterization, it is not easy to summarize this field in a single book. This difficult task was done by the members of the Institute of Crystallography, Academy of Sciences of the USSR, Moscow. The institute has a scientific staff of more than 500 working in the various aspects of crystallography. Leading scientists from the institute and in the USSR contributed to the volume under review.

Modern Crystallography IV is the last volume in a series of four books edited by B.K. Vainshtein (editor-in-chief), A.A. Chernov, and L.A. Shuvalov. The first and the second books of the series are devoted to fundamentals of crystallography, crystal structure, and methods of structural analysis. The third book describes fundamental aspects of crystal growth and also deals with the methods of actual crystal growth from vapor, solution, and melt.

This last book describes physical properties such as the mechanical, electrical, magnetic and optical properties of the crystals. For readers not familiar with the expression of anisotropy in the physical properties, Chapter 1 gives a tutorial introduction to tensor analysis and the methods for expressing crystal symmetry.

For the materials currently used in industries, the authors prepared separate chapters, writing intensively on semiconductors and liquid crystals. The authors, all members of the institute, include: L.A. Shuvalov, A.A. Urusovskaya, I.S. Zheludev, A.V. Zalessky, S.A. Semiletov, B.N. Grechushnikov, I.G. Chistyakov, and S.A. Pikin.

Although the authors have tried to include the published results from the Western scientific community, some important articles published outside the Soviet Union are not included. This is an unavoidable result of the information path between the Soviet Union and Western countries. What has been accomplished instead is a complete collection of work in the socialist countries. This book is especially helpful in its documentation of the accumulated knowledge and recent accomplishments in the field of crystallography in Socialist countries.

The level and the contents differ from chapter to chapter. The present reviewer had an impression that some of the chapters were written on the tutorial level for undergraduate or graduate students. Some experts in this field might not be satisfied with the contents; but, as a whole, this book is written on a high enough level to be useful even for experts in crystallography.

Reviewer: Tatau Nishinaga is a professor in the Department of Electronic Engineering, Faculty of Engineering, University of Tokyo. □

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