



Julius L. Jackson

In Memorium

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WITH THE SUDDEN DEATH of Professor Julius L. Jackson on July 5, 1974 the scientific community lost a productive, stimulating and wonderful colleague. Dr. Jackson was buried in the special memorial plot at the Weitzmann Institute of Sciences, Rehovot, Israel, where he was a visiting scientist for the summer. Dr. Jackson served from 1969 to 1974 as the Chairman of the Department of Chemical Engineering and Material Sciences, Wayne State University, a post he resigned this June in order to devote more time to teaching and research. He recently served as a member of the Publications Board of CEE. He is survived by his wife, three sons and a daughter.

Professor Jackson was born on 9 November, 1924, in New York City and received degrees in Physics at Brooklyn College, Princeton, and New York University, where he earned his Ph.D. in 1950. He served as a visiting professor at the State University of Iowa prior to joining the Applied Physics Laboratory of the John Hopkins University as a research physicist in 1951. He also served at the Office of Naval Research and in 1956 he became a research physicist at the National Bureau of Standards where he worked in the Free Radicals Program and in the Statistical Physics Section. In 1961 he joined Howard University as Professor of Physics.

A memorial Festschrift is being prepared, a memorial lecture series will be held at Wayne State University, and a fund for the education of his children has been established. Contributions to any of these should be sent to Julius Jackson Memorial Fund, Wayne Fund, Detroit, Michigan 48202. Jacob Jorne, Wayne State University, Detroit, Mich.

ChE book reviews

Polymer Materials Science, by Jerold M. Schultz, Prentice-Hall, Inc., Englewood Cliffs, N. J. 1974. Reviewed by A. T. DiBenedetto, U. of Connecticut; Storrs, Conn.

POLYMER MATERIALS SCIENCE is a textbook for senior level or first year graduate students majoring in chemical engineering, physics or materials science. It presupposes a good background in physical chemistry, crystallography, solid mechanics and mathematics. The text is divided into three sections. The first four chapters cover the science of polymer crystals in a rather unique way, emphasizing the experimental techniques of characterizing polymer crystals and the interpretation of such measurements. The second section is a very brief two chapters on polymerization and molecular weight distribution, included to describe the character of polymeric chains. The third section is a loosely connected set of five chapters on the properties of polymeric materials. Some of the material in these latter chapters are analytic descriptions of the relationships between structure and properties (e. g. rubber elasticity) while the rest is by necessity more qualitative (e. g. the mechanics of semi-crystalline polymers).

Like most polymer texts that have been written in recent years, it reflects a point of view by the author of what should be in an introductory course in polymeric materials. Those who feel that students should be exposed first to the technology of polymers will not want to use this book as a text. There is no information here on plastics fabrication and end use. Those who feel that polymer synthesis and the control of properties through chemical reaction kinetics deserves at least equal time with structure-property relations, also will not want to use this book as a text.

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BOOK REVIEW: Schultz

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There is one chapter devoted to polymerization, but it would not satisfy most people who include such material in an introductory course.

There is a uniqueness in the first four chapters, however, that will appeal to materials science specialists, especially those who are interested in interdisciplinary approaches to materials science. After an introductory description of the shape, configurations and conformations of polymer molecules, Professor Schultz embarks on a clear and carefully written exposition on polymer crystal structure. He introduces the reader to the morphology of single crystals through the techniques of microscopy. He discusses the principles of electron microscopy and electron diffraction and then interprets pictures of polymer crystals in a very readable manner. He repeats the process using data from optical microscopes, dark field methods and polarized light techniques. This seems to be a particularly appealing way to introduce the subject matter. The physical structure of polymer crystals is complex indeed, and the interpretation of microscope pictures is usually a very frustrating experience for those who are inexperienced in the subtleties of microscopy. Professor Schultz tries to interpret through words and supplementary sketches what is not evident to the untrained eye. The study of polymeric crystals through small angle X-ray scattering and study of the details of molecular arrangement through NMR and infra-red techniques are also covered in the second chapter. He includes a few exercises for the students and presents an extensive bibliography that will be very useful to a researcher in the field. The third chapter starts with a qualitative description of crystals formed from the melt, with a clear explanation of why they are different from those formed from a dilute solution. This is followed by a description of spherulite morphology on morphology. An up-to-date bibliography is again included. The fourth chapter is devoted to a definition of degree of crystallinity in terms of the variety of experimental techniques used for its measurement.

It is not until Chapter 9 that Professor Schultz completes his exposition on crystallinity by including a very good chapter on crystallization kinetics and mechanisms.

Chapters 1 to 4 and 9 constitute one of the

better introductory discussions of polymer crystal structure. I wish these 265 or so pages had constituted a smaller, less expensive book that could have been purchased as a supplement to a more general text in polymer engineering. The material in the remaining six chapters is presented clearly and the quality is commensurate with the other introductory textbooks in the field, but the subjects are only loosely connected, show less depth and are considerably less original in the mode of presentation. The trouble is that everyone has his own ideas about how to present the remaining material in a classroom situation and there is not enough material in these chapters to supplement in-depth lectures. Whereas the material on crystallization is so well done that most instructors will defer to Professor Schultz's approach, the remaining material is too sketchy for self study and too weak to compete with each person's own ideas. In Chapter 7, for example, the average student will become lost in a maze of equations describing rubber elasticity, without developing much appreciation of the properties of rubber. He would be better advised to read a standard treatise on rubber elasticity for the kind of information that is presented here in abstracted form. After the section on rubber elasticity, continuum mechanics is introduced in order to explain the effects of fillers. This is just too much material for the average student to handle alone. The average instructor with a serious interest in this material will not introduce it in such a superficial manner, while the instructor with a more qualitative interest will not wish to introduce so many abstract quantities. The degree of superficiality leads to misinterpretation in several places. For example, the presentation of data on the effect of fillers on glassy polymers (Figure 7.16) and the development of the Kerner equation are interlaced with discussions of the effects of fillers on elastomers without clarifying the important differences between rubbery and glassy matrices. Similar comments can be made about the short sections on viscosity and fracture, the brief chapter on time-dependent properties and the surveys of Chapters 10 and 11.

All things considered, I found this to be a very good text for an introductory course that emphasizes correlations between structure and properties. Also, if one is planning to do research in the area of polymer crystal structure, this book gives an excellent introduction to the field. I certainly would buy a copy for my own bookshelf and I have no hesitation in recommending it to my students and colleagues. □