book reviews

Polymers: The Origins and Growth of a Science

H. Morawetz

John Wiley and Sons, New York, 1985, xvi + 306 pages, US$69.30, £47.55, ISBN 0-471-89638-1

The discovery of synthetic polymers and their rapid development for use as plastics, fibres and rubbers was one of the major achievements of science in recent times. Yet, surprisingly, until now, no effort seems to have been made to write a comprehensive history of these discoveries and developments. Scientists will therefore be grateful to Herbert Morawetz for undertaking the task of writing the full story of the origins and growth of polymer science. Although the early beginnings of this subject date back to the last part of the nineteenth century, the real growth occurred in the period after World War I, and, in the author's words, 'the period 1914–1942 may be regarded as the classical period of polymer science'.

During these years, dominated by the leadership of Staudinger, Mark, Meyer, Kuhn and Carothers, and later Flory, the concept of the long-chain molecule was firmly established. Necessary techniques were developed for the determination of the structure of macromolecules and the concept of the molecular coil advanced understanding of the physical consequences of molecular structure.

During the following period (1942–1960), the fundamentals of radical, ionic and condensation processes were placed on a firm basis and simultaneously the essential tools for the elucidation of polymer properties, such as molecular weight determination, molecular weight distribution, light scattering, etc., were studied. Most of these developments have taken place in the active period of many living scientists, and it is a rare occurrence that the chronicle of these events is written by one who has witnessed their occurrence, and himself actively engaged in the work. Herbert Morawetz is well equipped for this purpose, for he has spent most of his working life at the Polytechnic Institute, Brooklyn, New York, which under the brilliant and inspiring leadership of Herman Mark was the mecca of polymer science during its formative years. In this book, the author has made a thorough, painstaking and accurate investigation of the progress and development of polymer science.

In spite of using over 1000 references, he has read and checked all the major publications cited. Also, he had access to the Herman and Staudinger archives, and visited many of the scientific and industrial laboratories in the USA and Europe that were engaged in the early discoveries, besides obtaining much information personally from a number of leading workers in the field.

The material content of the book is broadly divided into three parts:

The story up to the outbreak of World War I. The ideas and speculations regarding the nature of macromolecules and the beginnings of the polymer industry (7 chapters).

The period 1914–1942, during which the concept of the long-chain molecule and the kinetics and mechanism of polymerizations were firmly established (11 chapters).

The third period, 1942–1960, the latter date being the arbitrarily selected cut-off point in this account, in which polymer science industry reached full maturity (8 chapters).

The story of the emergence of 'molecular biology' is so clearly connected with macromolecular science that the author rightly devoted one chapter of the book to this subject.

In writing this book, Dr Morawetz has done a valuable and scholarly service to polymer science. It was a pleasure to read a work written with such great feeling for the subject. The reader will repeatedly discover new, interesting and surprising information. The book can be strongly recommended to all interested in this developing subject and, in general, in the history of science.

It is unfortunate that a volume which should have popular appeal and should be widely read is so costly. The price will inevitably restrict the book to libraries rather than to personal collectors.

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Membranes and Membrane Processes

E. Drioli and M. Nakagaki (Eds.)

Plenum Press, New York, 1986, xi + 663 pages, US$114, £71.25, ISBN 0-306-42270-0

The largest congress devoted exclusively to membrane science and technology the world has yet seen took place in Stresa, Italy, from 18 to 22 July 1984. It was organized jointly by the European Society of Membrane Science and Technology and the Membrane Society of Japan. The second such congress will be held in Tokyo in June 1987. The Presidents of the two societies, respectively Professor Enrico Drioli and Professor Masayuki Nakagaki, have edited the volume under review. The attendance list of the congress included almost 400 names drawn from 22 countries. The programme contained 105 delivered lectures, including 9 plenary lectures, 35 posters and 2 round table discussions.

This book contains 64 papers. They include 8 of the plenary lectures, 50 other lectures and 6 posters. The book has been produced from typescript, but the authors' manuscripts were all retyped by the publishers so that the product has a good and uniform appearance. There is a substantial subject index, although the reviewer's attempts at using it have not been very fruitful. A further group of 17 papers from the congress has appeared in a special issue of the *Journal of Membrane Science* (17(2)).

As would be expected from so large a gathering, the papers submitted covered almost the whole range of membrane science and technology. Although there are a few papers devoted to biological membranes, the main thrust of the book is on synthetic membranes. These are overwhelmingly organic polymers. Although inorganic membranes received a plenary lecture, there were only a couple of papers devoted to them. In the region of 12 to 15 papers contain information and discussion on the preparation and properties of membranes and materials in a form that might interest main-stream polymer scientists.

In summary it can be said that the book gives a broad and representative coverage of the science and art behind the practical application of membranes as it existed in 1984. It contains contributions from many of the world's leading researchers, not restricted to Europe and Japan.

The editors have clearly had a major problem to solve in arranging so diverse a collection of papers into coherent groups. In the first half of the book they have achieved this relatively successfully, but then the ordering system becomes a good deal looser. Thus, despite the wide and authoritative range of the contents, the book cannot be read from cover to cover as a structured review of the membrane field, and it must be regarded as a collection of distinguished original contributions.

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