

Contemporary Topics in Polymer Science—5

E. J. Vanderberg (Ed.)

Plenum Press (New York and London), US \$75 ISBN 0-306-41665-4

The fifth volume of the above series consists of fourteen invited lectures on the theme 'High Performance Polymers' presented at a symposium of the Division of Polymer Chemistry of the American Chemical Society held on 20–24 November 1982. On this occasion Prof Herman Mark was presented with the division's Polymer Chemistry Award, for his outstanding achievements and his unique missionary role in the development of polymer chemistry. It is very appropriate that Prof Mark in his opening address should review the early days of polymer chemistry, and the events which occurred during 1926 and 1947 which laid the foundations of polymer science.

The invited papers describe a wide vista of current research in 'High Performance Polymers' and particularly biochemical and high temperature–high strength polymers. The opening paper (R. H. Marchessault) discusses the fundamental role of carbohydrate polymers in nature and the authors use this term to include polynucleotides and natural polyalkanoates. The next paper (M. H. Caruthers) titled 'Gene Synthesis—Toward a Future World' reviews some recent advances in molecular biology which has led to dramatic progress in genetic engineering such as useful plastic vectors, use of restriction endonucleases, and the synthesis of D.N.A. An interesting paper by K. Dorn and H. Ringsdorf discusses polymeric monolayers and liposomes as models for membranes and cells.

The next paper (E. Fitzer) describes the structure of polymeric carbon, and the use of carbon fibres as reinforcement of organic polymers. The author points out that the wider application of such composites as replacement for metals still needs improved polymeric matrices, the development of more economical fabrication methods and cost reduction of carbon fibres before we attain the vision of a future 'carbon age'.

The next two papers highlight the recent achievement of ultra-high strength and high temperature stable polymers. I. M. Ward gives a comprehensive survey of

the processes for the manufacture of ultra high modulus polyolefines together with their possible applications, whereas J. K. Stille describes the relationship between structure and properties of the polyquinolines. A somewhat similar objective is attempted in the following paper (W. R. Jackson) which shows the effect of composition on the melting points and properties of thermotropic liquid crystalline polyesters prepared from substituted hydroquinones.

Inorganic fibre based materials offer potential for the next generation of advanced materials, and A. K. Dhingra, gives an overview of inorganic fibre technology and the key structural features of alumina and alumina–silica fibres and the new products based on these fibres.

The following paper by H. M. Relles surveys a new class of high performance polymers—the polyetherimides—that have outstanding thermo-oxidative stability, flame and solvent resistance, and unlike the polyamides can be processed by conventional methods.

The last five papers of the symposium present important developments relating to polymer applications. Two papers deal with metal like conductivity (R. H. Baughan), one on electronic applications, of high temperature polymers (J. Economy) one on a novel approach to high temperature ionic membranes (A. Eisenberg *et al.*) and finally an account by E. M. Pearce of some recent aspects of polymer flammability. A significant feature of the last group of papers is the emphasis given to the shortcoming of existing systems, the methods of overcoming present difficulties and an examination and speculation about materials needed for future technological progress. As a whole the volume provides an important review of progress, development and application of a range of speciality polymers and a feature of many of the articles in the predictions and designs of the next generation of materials.

C. S. H. Bawn
(Tiverton, UK)

Photochemical Conversion and Stabilisation of Polymers

V. Ya. Shlyapintokh

Hanser Publishers, 1985

(English Language Edition),

470 pp. Approx. DM148

ISBN 3-446-13670-3

With an ever increasing use of polymers in applications where light exposure is important their photochemical stability is an area of major concern. Research into the photophysics and photochemistry of polymers has and continues to be prolific totalling an annual average of some 500 research papers (excluding patents).

While it may be argued that this field is saturated with books this one is different in two main respects. First, it's an English translation of a Russian book and gives an insight into much of the literature in the Soviet Union which has not previously been available. Second, its approach is somewhat different in providing

the reader with a clear, in depth picture of the theoretical, scientific and practical problems in the field.

Subject areas covered are photo-conversion processes in polymers including photophysical processes in aromatic-based systems, dark reactions, photo-oxidation of polypropylene and aliphatic polyamides and single oxygen reactions. The other area covered is light stabilization and encompasses sections on modelling stabilization, photo-transformation processes and physical methods of stabilization, photochemistry/physics of u.v. absorbing molecules including dyes and the photo-protective action of modern day stabilizers.

In general the book is nicely presented, well-written and a pleasure to read providing the reader with an in-depth view of the literature rather than just a simple compilation of articles to be referred to later. I am sure the book will be of immense value to research scientists and technologists working in the field.

Norman S. Allen
Manchester Polytechnic