on reactions occurring in the condensed phase which are not predictable from the thermal behaviour of the polymer and of additives heated separately.

Considering the specialized nature of this series the cost is not beyond the reach of individuals or groups who have particular interests in this wide field and the individual style of reporting makes the articles quite readable.

P. J. Baugh
(University of Salford)

New Elastomer Synthesis for High Performance Applications

J. E. McGrath, G. L. Wilkes, T. C. Ward, A. D. Broske, B. Lee, I. Yilgor, D. J. Bradley, J. M. Hoover and T. E. Long
Noyes Data Corporation, Park Ridge, USA, 1988, x+118 pages, $36
ISBN 0-8155-1156-6

This book emanates from work carried out by the well known polymer group at Virginia Polytechnic Institute in Blacksburg, the sponsors of the research appears to have been the US Army Tank-Automotive Command. Its format is that of a technical report in that Objectives, Conclusions and Recommendations are set out in the first seven pages. The remainder of the text is headed as Discussion, and consists of five sections dealing with: (1) a laboratory scale, low pressure reactor for living polymerization; (2) hydrogenation of model elastomers; (3) investigation of organolithium initiators; (4) ion containing copolymers; (5) morphology and properties of poly(urea-urethane) elastomers. The last of these sections is the largest being some 30 pages in length.

The material is presented with a sparse style with much emphasis on the how to approach rather than what if speculations. However, the section on organolithium initiators deals with the kinetics of formation of a difunctional initiator formed by reacting sec-butyl lithium with 1,3-bis(phenylethenyl) benzene, and is a classic example of the type of work pioneered by Szwarc. The use of the initiator to prepare polymers is also briefly discussed. The section on ionomeric copolymers reviews the problems in making such materials and concentrates on development of free radical emulsion copolymerization of sodium *p*-styrene sulphonate with butyl acrylate and anionic copolymerization of styrene with isobutyl methacrylate. In the latter case, the final ionomer was prepared by subsequent partial hydrolysis using potassium superoxide. Structure–property relationships are at the heart of the section on poly(urea-urethane) elastomers. The potential difficulties in the synthesis of these materials and the means by which these are overcome are detailed. This is then followed by the full gamut of materials testing and characterization methods on the series of elastomers produced with varying urea content. The tests involve stress–strain curves, dynamic mechanical analysis, differential scanning calorimetry whilst the characterization methods are both wide-angle and small-angle X-ray scattering. Again, the material is presented in a very direct fashion and any difficulties encountered in obtaining the data or the magnitude of errors of physical quantities is not discussed. Consequently, one has to view interfacial thickness parameters of *ca.* 1–2 Å with some caution due to the sensitivity of such values to the data treatment method used.

This book certainly exemplifies the interdisciplinary nature of polymer science and is perhaps a model for putting over scientific facts cogently, lucidly and with clarity without too much of the academic speculation which often leads to serendipitous discoveries. Consequently, it should probably be necessary reading for new entrants to the polymer industry at the research and development end of the business. It is probably also true that there is little of a revolutionary nature here and therefore will not command a wide readership. Notwithstanding these comments, it is a well written publication of its type.

R. W. Richards
(University of Strathclyde)

Photophysics of Polymers

C. E. Hoyle and J. M. Torkleson (Eds.)
Americal Chemical Society, Washington DC, USA, 1987, xi+531 pages, USA and Canada $99.95; Export $119.95
ISBN 0-8412-1439-5

This book consists of 36 chapters arising from a symposium sponsored by the Division of Polymer Chemistry of The American Chemical Society held in Anaheim, California, in September 1986. The chapters are arranged within seven headings starting with four overviews. The first is a short chapter by Hoyle on 'Polymer Photophysics' followed by more substantial overviews by Winnik on 'Study of Complex Polymer Materials: Fluorescence Quenching Techniques', by Frank, and Zin on 'Morphology in Miscible and Immiscible Polymer Blends: Interplay of Polymer Photophysics and Polymer Physics' and by Morawetz on 'Applications of Fluorescence Techniques for the Study of Polymer Solutions'.

These overviews are followed by 10 contributions under the title 'Polymer Dynamics and Complexation' which discuss many aspects of polymer dynamics in a variety of polymers using a wide range of techniques, many involving time-dependent and steady-state luminescence measurements. Thus, Monnerie *et al.* in their paper 'Spectroscopic Investigation of Local Dynamics in Polybutadienes' use the fluorescence anisotropy decay technique and ^{13}C spin-lattice magnetic relaxation to investigate local dynamics at temperatures which are 60 K above the glass–rubber transition temperature. While Winnik reports how intramolecular fluorescence quenching processes can be used to study 'Excluded Volume Effects on Polymer Cyclization'. In the chapter 'Time-Resolved Optical Spectroscopy as a Probe of Local Polymer Motions', Waldow *et al.* use a picosecond holographic grating technique to observe the local segmental dynamics of anthracene-labelled polyisoprene in dilute solutions. Horie reviews in his article various mechanisms for non-exponential decay of phosphorescence on much longer time scales, typically milliseconds, showing how this may be related to dynamics in polymer solids. Fluorescence probes and markers feature in three chapters, namely 'Fluorescence Probes for the Study of Solvation and Diffusion of Reagents in Network Polymers' by Shea *et al.*, 'Light-Induced Conformational Changes of Polymers in Solution and Gel Phase' by Irie and 'Luminescence Studies of Molecular Motion in Poly(n-butyl acrylate)' by Toynbee and Soutar. A similar approach was reported by Hayashi *et al.* who have bonded a twisted intramolecular charge-transfer compound to poly(methyl methacrylate) and shown the luminescence to be sensitive to both the polarity and the microviscosity of the surroundings. The final two chapters in this section deal with the 'Electronic Spectroscopy of bis (4-dimethyl aminophenyl), Squaraine' and 'Specific Interactions of (+)-Catechin and (−)-Epicatechin with Polymers that contain the L-Propyl Residue' by Law and Bergmann and Marrice, respectively.

The following three articles 'Excimer Photophysics of Macromolecular Scintillators' by Birch *et al.*, 'Configurational and Conformational Aspects of Intramolecular Excimer Formation' by De Schryver *et al.* and 'Photophysics of 1,5-Naphthalene Diisocyanate-Based Polyurethanes' by Hoyle and Kim, are grouped together under the title 'Excimer Photophysics'. In the first of these articles, it is demonstrated that even good fits to fluorescence decays often still provide an incomplete description. In the