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Foreword

Mass spectrometry has always been an important technique for the indirect study of synthetic polymers. Limitations on the molecular weight range that could be studied directly and difficulties in ionising low polarity molecules led to the need to break down the polymer, by thermal or chemical means. Indeed, for many years the most relevant application of mass spectrometry was in the characterisation of the various additives that are used to improve the performance of commercial formulations. The advent of electrospray ionisation (ESI) and matrix-assisted laser desorption/ionisation (MALDI) mass spectrometry has greatly extended the range of synthetic polymeric materials that can be studied. The use of mass spectrometry approaches differs from more commonly used methods such as nuclear magnetic resonance (NMR) spectroscopy and infra-red (IR) spectroscopy in that individual molecules are studied instead of ensemble averages. The papers presented in this volume represent the current level of scientific understanding that can be obtained with this approach.

The fundamental parameters that can be studied include:

- Molecular weight distribution
- Initiating/terminating end group characterisation
- Sequence data
- Copolymer composition
- Polymer conformation

Quantitative studies are currently focussed on low polydispersity material; this limitation is discussed and explained. Polymer synthetic mechanisms are explored and novel experimental approaches are discussed.

It is clear that the use of mass spectrometry as a primary technique in the study of complex synthetic polymer formulations is in its infancy. The information content of the experiment is significant, however, and further advances may be expected in the near future. Structural/property relationships, which are of major importance in the design of new polymeric systems, will be amongst the first areas to be studied and it is likely that mass spectrometry will form a major component in the development of specialised polymeric materials.

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