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Advances in Polymer Science

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New Developments in Polymer Analytics I

Volume Editor: M. Schmidt

With contributions by
M. Antonietti, H. Cölfen, H. Engelhardt,
O. Grosche, H. Pasch



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This series presents critical reviews of the present and future trends in polymer and biopolymer science including chemistry, physical chemistry, physics and materials science. It is addressed to all scientists at universities and in industry who wish to keep abreast of advances in the topics covered.

As a rule, contributions are specially commissioned. The editors and publishers will, however, always be pleased to receive suggestions and supplementary information. Papers are accepted for „Advances in Polymer Science“ in English.

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Preface

The two volumes "New Developments in Polymer Analytics" deal with recent progress in the characterization of polymers, mostly in solution but also at surfaces. Despite the fact that almost all of the described techniques are getting on in years, the contributions are expected to meet the readers interest because either the methods are newly applied to polymers or the instrumentation has achieved a major breakthrough leading to an enhanced utilization by polymer scientists.

The first volume concentrates on separation techniques. H. Pasch summarizes the recent successes of multi-dimensional chromatography in the characterization of copolymers. Both, chain length distribution and the compositional heterogeneity of copolymers are accessible. Capillary electrophoresis is widely and successfully utilized for the characterization of biopolymers, particular of DNA. It is only recently that the technique has been applied to the characterization of water soluble synthetic macromolecules. This contribution of Grosche and Engelhardt focuses on the analysis of polyelectrolytes by capillary electrophoresis. The last contribution of the first volume by Coelfen and Antonietti summarizes the achievements and pitfalls of field flow fractionation techniques. The major drawbacks in the instrumentation have been overcome in recent years and the "triple F techniques" are currently advancing to a powerful competitor to size exclusion chromatography.

The second volume starts with the introduction of a fascinating new technique developed by Köhler and Schäfer to monitor different averages of the Brownian diffusion coefficient of polymers in solution exhibiting a broad molar mass distribution. The technique is based on a scattering experiment by thermal grating, thus simultaneously monitoring Brownian and thermal diffusion of macromolecules. The last contribution by Sheiko addresses recent advances in atomic force microscopy. Besides some theoretical and experimental background the visualization of single macromolecules is discussed and complemented by the characterization and the patterning of surfaces.

Mainz, April 1999

Manfred Schmidt

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New Developments in Polymer Analytics II

Volume Editor: M. Schmidt

Polymer Analysis by Thermal-Diffusion Forced Rayleigh Scattering
W. Köhler, R. Schäfer

**Imaging of Polymers Using Scanning Force Microscopy:
From Superstructures to Individual Molecules**
S.S. Sheiko