Preface

Mechanical behaviour of polymeric materials is an area that has an interesting long history and tradition. From the very beginning this field has been a meeting place of experts from polymer synthesis, processing and application. Indeed, mechanical characteristics are decisive of reliable functions of polymers virtually in all application fields starting from materials for industrial structure parts through medical applications up to contemporary media for data storage. In all these fields, mechanical failure can cause extensive damage and heavy losses. Consequently, mechanical parameters serve for optimization of technological processes, quality control, and right design of dependable parts.

Mechanical behaviour of polymeric materials depends on their structure. The structure, in turn, must be considered at various levels: molecular, supermolecular, crystalline, phase, up to microscopic cracks. Together with the development of mechanical testing methods, a considerable body of knowledge has subsequently been accumulated on interrelations between the parameters of individual levels of hierarchical structure and macroscopic mechanical behaviour. This allowed formulation of structure models on one hand and application of mechanical methods for the characterization of structure and structural dynamics on the other. The understanding of structure-property relationship finally allowed the development of high-performance polymeric materials with dramatically enhanced strength, toughness, durability and reliability in comparison to classic polymers. Quite logically, the study of mechanical behaviour became an important and respected branch of polymer physics.

Mechanical behaviour of polymeric materials was also the title of the 18th Discussion Conference organized as the 56th meeting in the series of the Prague Meetings on Macromolecules (PMM) on July 20–23, 1998. As usual, the meeting was held under the auspices of the International Union of Pure and Applied Chemistry (IUPAC) at the Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic in Prague. The important and interesting topic (perhaps together with the beauty of the city of Prague) attracted 127 participants from 24 countries. There were 10 main lectures, 10 special lectures and 74 poster communications. Two panel discussions were devoted to *Mechanical Behaviour of High-Performance Polymers* (led by A. Hiltner, U.S.A.) and *Strength and Toughness of Oriented Polymer Systems, Composites and Blends* (led by H.H. Kausch, Switzerland). All the contributions and discussions provided a gauge of the contemporary understanding of structural micromechanisms responsible for the macroscopic mechanical behaviour. In particular, it is clear now that the assessment of the complex hierarchical structure is important for the formulation of a realistic structure model of mechanical behaviour. As expressed by Prof. Eric Baer, only very few experts in mechanical behaviour of polymers did not come to Prague in summer 1998. The participants created not only an excellent professional forum but also a very agreeable company. We wish to express our gratitude to all participants and sponsors for supporting the meeting, to the organizing committee for their very good job and to the contributors for their carefully prepared papers.

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