



Preface

The Baltic Polymer Symposia were initiated more than ten years ago by universities and research institutions of the Baltic States and thus have a long tradition. The importance of these symposia is growing continuously, as is the number of participants and countries. In 2008 we had participants from Netherlands, Belgium, Belarus, Russia, Ukraine, Finland, Hungary, and Austria and of course many participants from the Baltic States. Characteristically, the number of doctoral students and young researchers has been large among the participants in the last symposia. The scope of the symposium is broad today, including the synthesis, processing technology, and practical applications of different polymer materials – from natural polymers to synthetic ones, to composite materials and hybrid structures with inorganic compounds. In the 2008 symposium the synthesis of polymers, as well as classical organic synthesis, was under special discussion.

Traditionally, a number of reports were dedicated to the mechanical, structural, physical, and chemical properties of polymers, depending on the preparation technology. An interesting question from the ecological point of view is the utilization of the polycarbonate-based DVD and computer discs. This problem can be solved by increasing the content of the high-modulus component in the form of different resins.

The development and design of biobased biodegradable polymers and composite materials has been stimulated by the continuously growing public concern about the pollution of our environment. Characteristics of various kinds of paper as matrix for reinforced biodegradable polymer composites were studied with the aim of developing paper-based polymer composite materials, in which the paper functions as the reinforcing component and polymer is the matrix. Also, the properties of degradable plastics have been largely investigated during the recent years. The well-known disadvantage of bioplastics is their incompatibility with polyethylene. One possibility of avoiding this problem can be the preparation of degradable plastic composite films consisting of polyethylene and flax dust. The number of presentations devoted to the polymer materials as functional materials is increasing from year to year.

It is remarkable that a new class of functional materials, electrically conductive polymers, and organic charge-transporting materials, hydrazones, has obtained a strong position among traditional polymer materials. Many papers presented at the symposium dealt with this subject.

Hybrid organic-inorganic molecular-organized materials, based on conjugated polymers and inorganic nanoparticles, are of great interest for developing new types of bulk-heterojunction-based plastic solar cells and light-emitting diodes, sensors, catalytic, and electrocatalytic systems. Physical properties of hybrid structures for solar cells, consisting of conjugated polymers and fullerenes C_{60} , were reported. The influence of technological parameters, such as temperature or chemical composition, on the photovoltaic properties of hybrid inorganic-polymer heterostructures was investigated by many authors from different countries and interesting results were presented in the symposium. Several reports were devoted to the molecular imprinting as a promising technology for preparing artificial receptors based on molecularly imprinted polymers containing tailor-made recognition sites.

A number of papers dealt with organic charge-transporting materials, such as thiophene-based polymers used for fabrication of various optoelectronic devices: light-emitting diodes, photovoltaic cells, organic transistors, and electrographic photoreceptors. Many researchers spoke about the physical and chemical properties of the organic charge-transporting materials, hydrazones, used in optoelectronic and electronic devices, like electrophotographic photoreceptors, organic light-emitting diodes, and photovoltaic cells.

The developing biotechnological industry requires more and more stable biocatalysts. Immobilization is one of the most effective ways to improve the stability of enzymes. Immobilized enzymes are enzymes that are synthetically associated with an insoluble material to prevent enzyme loss and to enable the enzyme to be anchored for a fixed duration during experimentation. The synthesis of polymeric carriers for lipase immobilization was discussed in the 2008 symposium.

Chemical modification of chitosan is an important topic for the production of biofunctional materials, with

wide practical applications in many areas such as pharmacy, medicine, and cosmetics. Chitosan can be used for the preparation of various polyelectrolyte complexes with natural polyanions for controlled release of encapsulated drugs and biomolecules. Synthesis, characterization, and application of magnetic microcapsules from graft chitosan for immobilization of enzyme maltogenase were considered in many presentations of the symposium.

Altogether the programme of the symposium included 22 oral and 43 poster presentations, covering

practically all aspects of polymer engineering, science, and technology. In this special issue of the *Proceedings of the Estonian Academy of Sciences* only a limited number of papers are published. However, they give an overview of the wide range of topics in polymer science investigated nowadays.

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Baltic Polymer Symposium 2008