Foreword

On behalf of the Scientific Committee of the Baltic Polymer Symposium 2005 I have the pleasure of introducing this special issue of selected papers presented at the Symposium. Actually, the selected papers of the Symposium are published in two special issues of the *Proceedings of the Estonian Academy of Sciences*, one in the series *Chemistry* and the other in the series *Engineering*.

The Baltic Polymer Symposium 2005 elucidated the scientific potential existing in the Baltic States in the field of the science about polymers, led to contacts of research groups from different universities and research institutions, and also enhanced personal contacts between scientists, preparing grounds for future joint projects.

The Baltic Polymer Symposia have a long tradition, initiated by universities and research institutions in the Baltic States. Today the importance of these symposia is growing continuously. During this Symposium, organized by Tallinn University of Technology, we had presentations also form the Czech Republic, Finland, France, Germany, Poland, Russia, Spain, and Ukraine. Symptomatic to this Symposium was a large number of doctoral students and young researchers among the participants. Keynote lectures and poster presentations covered a wide range of fundamental and practical aspects of polymer materials. The scope of the symposium is today broad including the synthesis, processing technology as well as practical applications of different polymer materials – from natural polymers to the synthetic ones. A traditional topic of materials science in general as well as of polymer synthesis is the creation of polymers for special applications. Metallopolymers, new intelligent materials used for microelectronics and magnetooptics, membrane technology, and medicine were discussed during the 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.

Growing public concern about the pollution of the environment with solid waste accumulation has stimulated the development and design of biobased biodegradable polymers and composite materials. Technologies of the preparation of biocomposite materials offer a possible alternative to traditional plastic materials and are original solutions both from the technical and environmental point of view.

It is remarkable that a new class of functional materials – electrically conductive polymers – has obtained a strong position among traditional polymer materials. Photovoltaic solar energy production is one of the most promising renewable energy technologies. The characteristics of solar cells, based on molecular glasses and $CuInS_2$ electrically conductive polymers, were considered.

Mechanical and structural properties of polymers, depending on the preparation technology, have also been widely investigated. As the technological parameters of the adhesive layer formation significantly depend on the rheology, wettability, and structure of the adhesive, the results of the investigations of the possibilities of modifying these parameters, using disperse filling with mineral highly dispersed materials such as TiO_2 and Al_2O_3 powders, were presented.

Porous polymer materials are widely used instead of solid ones, because they are cheaper, lighter, and exhibit good strength properties and deformability. Porosity and its influence on the mechanical properties of polymer materials was considered in several papers.

Textile polymers and leather technology were also treated in numerous presentations. Microporous polymer films, laminated with leather, are widely used in garments. Real leather with unique microporous finish, allowing natural aeration and providing a layer of protection that guards against scuff, stains, and water, has been developed.

The efficiency of the technology of processing animal skin into leather mainly depends on the quality of soaking, liming, and tanning processes. During these processes, different bonds between fibrous elements of the high-molecular protein are broken and new bonds with applied chemicals are established. The production of white leather is a very specific process. Selection of chemicals for the treatment of the semi-finished material is very important. Investigations have shown that wet-blue bleaching with modified compounds of titan improves physico-mechanical, elasto-plastic, and hygienic properties of the finished leather.

In all technological processes in which liquid materials are used, an important characteristic of the material is viscosity. In several papers viscous properties of resins were investigated.

Problems of wood chemistry and physics were also discussed during the Symposium. For example, changes in the H-bonding system, caused by the uptake of the liquid by the cell wall and its influence on the mechanical properties of wood, were investigated.

Altogether the program of the Symposium included 13 oral and over 50 poster presentations, covering practically all aspects of polymer engineering, science, and technology. In these special issues only a limited number of papers presented at the Symposium 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 2005