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EDITORIAL

Foreword

On behalf of the Scientific Committee of the Baltic Polymer Symposium 2017 I have the pleasure of introducing this special issue of selected papers presented at the symposium.

The Baltic polymer symposia have a long tradition, initiated more than ten years ago by universities and research institutions in the Baltic States. This symposium, organized by Tallinn University of Technology, was the 17th. Since 2001 the symposia have been circulating between the three Baltic States organized by Kaunas University of Technology, Vilnius University, University of Latvia, Riga Technical University, and Tallinn University of Technology. Besides the Baltic States, we have had participants from 29 countries totalling over 150. The biggest delegations have been from Lithuania, the Russian Federation, Latvia, and Turkey. The friendly and creative atmosphere of this scientific event has encouraged young scientists to attend these meetings through all these years looking for new knowledge and establishing contacts with experts from various fields. The importance of these symposia has been growing continuously as has the number of the participants and countries. In 2017 the symposium was organized in cooperation with the COST action CA15107 – MultiComp, which is a COST action designed to bring together theorists, experimentalists, and industrialists in the field of nano-carbon materials technology.

Symptomatic to these symposia is a large number of doctoral students and young researchers among the participants. Today the scope of the symposia is broad, including theoretical as well as practical problems of polymeric materials: the synthesis, processing technology, investigation of physical and chemical properties, as well as practical applications and from natural polymers to the synthetic ones, to composite materials, nanomaterials, and hybrid structures with inorganic compounds. Special attention was paid in the framework of the COST action to the improvment of the properties of composite materials by the adequate dispersion of the nano-carbon reinforcement material and strong enough interfacial bonding between the nano-carbon reinforcement elements and the composite matrix. This action provides an ideal platform for established researchers and post-doctoral workers to enhance their research-related skills as well as their innovation and enterprise skills in this international network involving both academic and business enterprises.

From year to year the number of presentations devoted to polymer materials as functional materials has been increasing with practical applications for electronic materials and devices as well as sensor materials in environmental analytical chemistry, in medicine, etc. In 2017, an interesting presentation devoted to the fundamental problems and several prospective large-scale applications of graphene oxide were presented. Also single-walled carbon nanotubes were characterized as the most promising conductive agent for plastics due to the low percolation threshold compared to other carbon-based conductive fillers such as carbon black, carbon nanofibres, and multi-walled carbon nanotubes. The modification of epoxy and polyester resins by 0.01–0.1 wt% of SWCNTs allows obtaining electrical resistivity in the range 108–104 Ω·cm in glass fibre engineering plastics with mehcnical properties improved. The electrical conductivity and improved physico-mechanical characteristics in plastics obtained with significantly small percolation threshold of SWCNTs make this additive very promising in the polymer industry.

A number of presentations considered the use of electrospinning methods for the preparation of nano-structured polymers. The aim of these investigations was to find out the best conditions to produce electrically conductive fibres by electrospinning and to study the influence of the solution, conductive fillers, and elctro-spinning parameters on the morphology and conductivity of electrospun membranes. By analysing different recent approaches for nanofibre yarn preparation systems it was found that getting rid of mechanical contacts between fibres and the collector before the formation of the yarn leads to a significant growth in the production rate.

Molecularly imprinted polymers are still a new type of functional materials with promising applications in analytical chemistry, environmental chemistry, and medicine. At the 2017 symposium, promising steps towards improving the detection of small analytes in an aqueous solution by the quartz crystal microbalance modified with a molecularly imprinted polymer based

sensitive layer were demonstrated. The presented approach promises a positive route towards an improved specific detection of small molecules by the molecular imprinting technology.

Traditionally, a number of reports were dedicated to mechanical and structural properties as well as to the physical and chemical properties of polymers, depending on the preparation technology. A number of presentations were devoted to the electrical properties of polymeric materials as well as to the hybrid structures consisting of polymeric materials and inorganic semiconductive materials. Hybrid organic/inorganic molecular-organized materials are of great interest for developing new types of bulk-heterojunction based plastic solar cells and light emitting diodes, sensors, and catalytic and electro-catalytic systems.

The programme of the symposium included 47 oral and 73 poster presentations, covering practically all aspects of polymer engineering, science, and technology. Only a limited number of reports presented at the symposium are published in this special issue of the *Proceedings of the Estonian Academy of Sciences*. However, they give an overview of the wide range of topics in the polymer science investigated nowadays.

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Andres Öpik received his CandSc (PhD) in Chemistry from the University of Tartu in 1980. He is a professor of Physical Chemistry at Tallinn University of Technology, Member of the Estonian Academy of Sciences. At present his main research field is material science and technology: investigation of the physical and chemical properties and possibilities for practical applications of molecularly imprinted polymers. Under his supervision eight doctoral dissertations have been defended. In 1985 and 2006 A. Öpik was awarded the Estonian Science Prize. He has published five books and over 200 research papers in refereed journals.