Workshop “Polymer Materials Research & Innovations”

Workshop “Polymer Materials Research & Innovations” was opened at 13:25 on 30 October 2013. The participants were 52 - 9 invited lecturers, 37 from the staff of the Institute of Polymers and 6 PhD students (their participation was supported by other sources). The invited speakers were Prof. Andrzej Dworak (Centre of Polymer and Carbon Materials, Polish Academy of Sciences), Prof. Brigitte Voit (Leibniz Institute of Polymer Research, Dresden, Germany), Corr. Member Prof. Christo Tsvetanov (Institute of Polymers, BAS, Bulgaria), Prof. Filip Du Prez (Polymer Chemistry Research Group, University of Gent, Belgium), Prof. José Kenny (University of Perugia, Italy), Prof. Juan Francisco Rodriguez Romero (Department of Chemical Engineering, Castilla-La Mancha University, Spain), Prof. Stergios Pispas (Theoretical and Physical Chemistry Institute, NHRF, Greece), Prof. Steve Brocchini (UCL School of Pharmacy, Great Britain) and Assoc. researcher Rosica Mincheva (University of Mons, Belgium).

The first session was chaired by Prof. Voit. The lectures addressed recent developments of current and prospective interest in polymer synthesis and polymer materials fabrication for achieving enhanced materials functionality. The ability to manipulate or control processes affords new materials, leads to changes in materials properties and application, life-cycle of end-products. The session included 4 invited lectures.

Prof. Filip Du Prez presented results on efficient reactions leading to precise synthesis of copolymers. The title of his lecture was: “Striving for the ideal click chemistry platform: Highly modular reversible and irreversible linking”. Prof. Du Prez also shared the Belgian experience in patenting the research results.

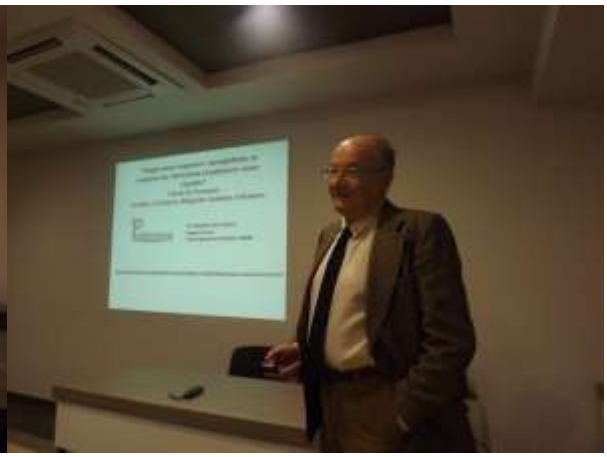

The formation of temperature-sensitive nano-assemblies composed of block copolymers and enzymes targeting biomedical applications were in the focus of the lecture delivered by prof. Stergios Pispas: “Thermoresponsive chimeric nanostructures from block copolymers and lysozyme”. Dr. Rosica Mincheva presented the modern trend in the polycondensation processes and the routes to obtaining new plastics based on biopolymers: “(Combined/co)polycondensation for bio-based (nano)plastics”. Prof. Jose Kenny focused on the synthesis of new synthetic biodegradable copolymers: “Synthesis and characterization of PLA-PCL block copolymers and their poly(ester-urethanes) with shape memory behavior”.

Scientists from IP-BAS presented results concerning the synthesis of functional biocompatible polymers. Assoc. Prof. Darinka Christova shared the results on preparation of fluorophore functionalized polymers derived from 2-substituted-2-oxazolines. Assoc. Prof. Neli Koseva reported the application of highly efficient reactions for synthesis of phosphorus containing biodegradable copolymers. The obtained polymer products are applicable in medical diagnosis or/and treatment.

The lectures and discussion in the first session served also as a basis for the following discussions during the next two sessions of the workshop.

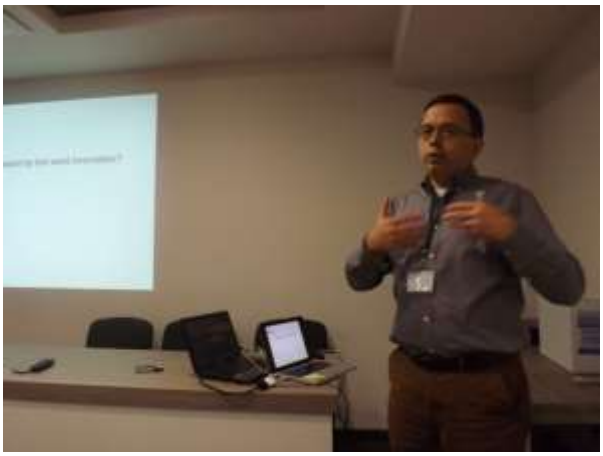
Healthcare is an important sector that utilizes high added value products. The application of polymers and polymer materials in biomedicine and pharmacy is providing important benefits both for patients and society - more precise diagnosis of diseases, improving the efficacy of medical therapies, increasing the potential of the regenerative medicine. The challenges of developing of an effective medicine and its transformation into a product compatible with industrial processes and strategies were addressed in the lectures included in the second session.

Prof. Andrzej Dworak presented a lecture on so called intelligent polymers and the construction of drug delivery systems based on such polymers affording “smart” response to certain changes in the environment: "Stimuli sensitive polymers and polymer materials”.



The next lecture, presented by Corr. Member Prof. Christo Tsvetanov was focused on the approaches for formation of polymer nanocontainers. He presented an original method for obtaining hollow nanoparticles applicable as DNA delivery vesicles. The title of his lecture was: “Temperature-responsive mesoglobules as templates for fabrication of polymeric nano-capsules”.

Then Prof. Steve Brocchini shared his knowledge and experience in development of pharmaceutical polymer-based products, including all stages from the laboratory research to the commercialization of the final product: “Innovation case study to exploit polymers for biomedical applications”.



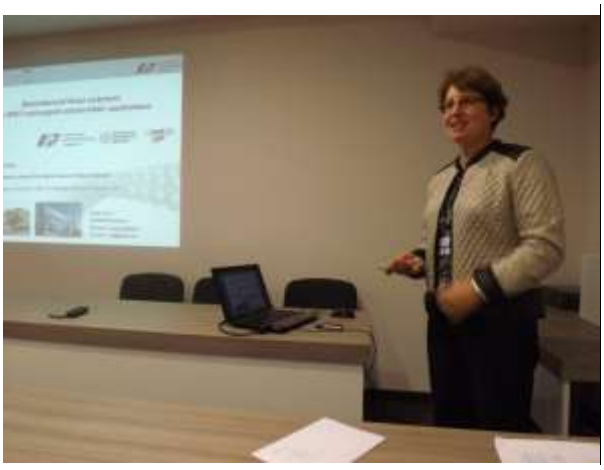
Two lectures presented by scientists of IP-BAS revealed research results within the topic of session 2. Assoc. Prof. Petar Petrov described different

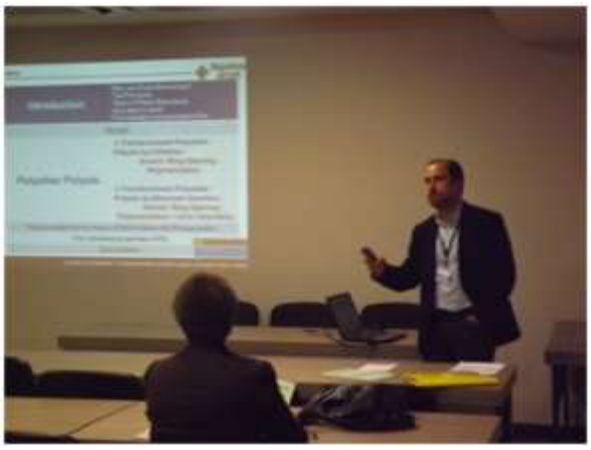
approaches in obtaining nanosized polymer carriers for prolonged release anticancer drugs, while the other lecture was dedicated to the fabrication of bioactive nanofibrous materials based on polyesters.

The discussions in this session were mainly on the application of nanotechnologies and polymer materials for the development of new nanomedicines and the next generation of bioactive materials with dual function, i.e. acting as therapeutic and diagnostic preparations for application in the emerging field of theranostics.

Stable, efficient and reliable industrial sectors (energy, transport, high-tech, building sector, etc.) are necessary for the competitiveness and sustainable growth of Europe. Advanced polymer materials in combination with new technologies can provide solutions for major social, industrial and environmental challenges concerning utilization of natural resources, energy production and energy saving, re-use technologies, etc.

The third session was dedicated to development of special polymers and materials for green energy or ecologically oriented purposes. The firs lecture was presented by Prof. Brigitte Voit, who shared the results of precise synthesis of linear and branched conjugated polymers used in the construction of devices for conversion or storage of energy: "Linear and branched polymers for OFET and organic photovoltaic applications". A parallel was made between the laboratory researches and the possibilities for commercialization of similar results.





Prof. Juan Rodriguez Romero shared his experience in the field of innovations and patenting of research results on the development of new materials with improved

flame retardant properties. The title of his lecture was "Polyurethanes with Improved Flame Retardant Properties based on Phosphate and Phosphonate based polyols".

Assoc. prof. Veselin Sinigersky delivered a speech on the preparation of polymer membranes for fuel cells. He described the applied research carried out in the institute concerning the preparation of polybenzimidazole based membranes and different approaches applied for enhancing the membrane characteristics.

Dr. Irena Kamenova from Bulgarian Polymer Association presented the main activities of the Association and their experience in applying European standards and legislation by companies in polymer industry. The possibilities for more intensive interaction between the Institute and the members of the Association were also outlined.

The scientific sessions were followed by concluding remarks and discussion on the perspectives in polymer materials research and innovations, on the challenges that the Institute of Polymers is facing on the way to development of its research and innovation potential.

The workshop closing session included lecture on the Intellectual Property Management presented by Radostina Halacheva. She also made an introduction to the draft version of the Internal Rules for Intellectual Property Management of IP-BAS. During the followed discussion the first feedbacks were collected and further used in the elaboration of the final version of the Internal Rules for Intellectual Property Management.

All participants shared a common opinion that the scientific program of the workshop was at a very high level, and it contributed greatly to the exchange of ideas and experience. The sightseeing excursion to the Tzari Mali Grad Ancient fortress reinforced the teambuilding effect of the workshop.